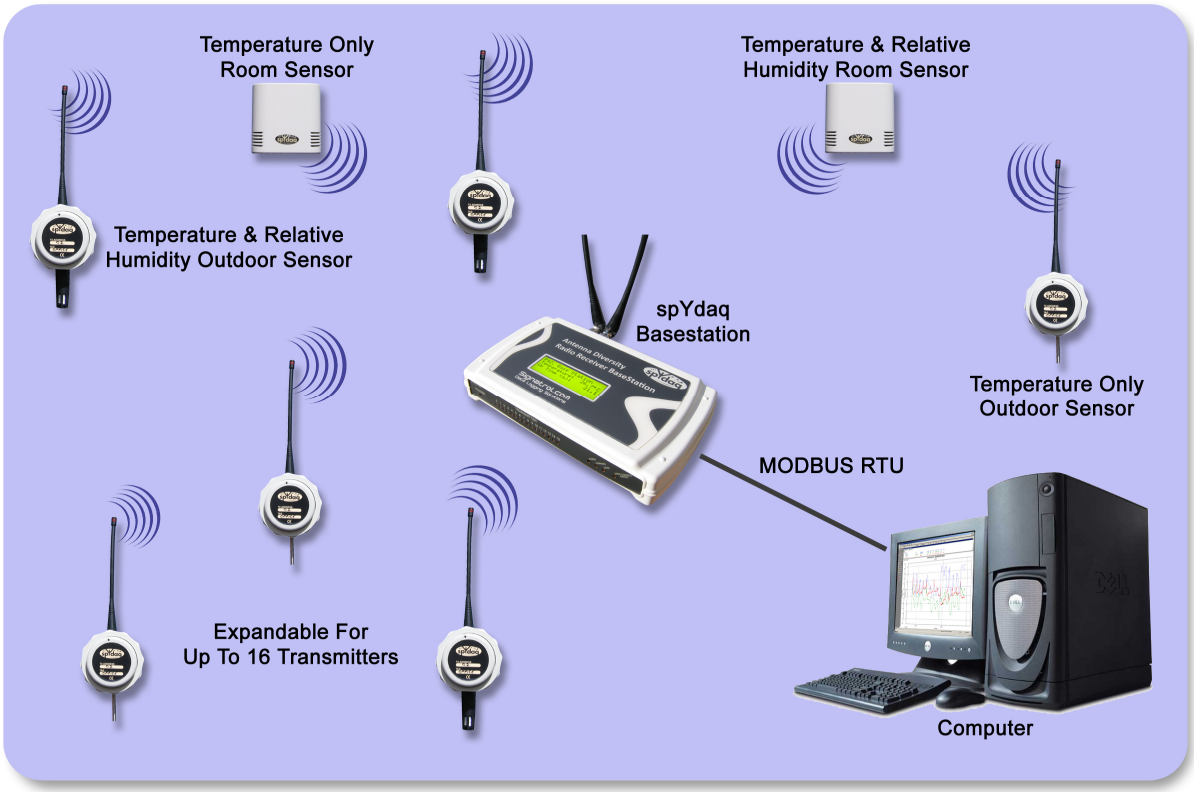
Signatrol.com
Data Logging Solutions

spYdaq Hardware Manual.



Contents

1 Document History.

Version	Comments
SIG-1227-01-02	Initial Release.
SIG-1227-01-03	Released 27 September 2011 Reading and Alarm block information added.
SIG-1227-01-04	Released 30 November 2011 - Added information on Signal Strength - Corrected Signal strength table in section 9, Basic Diagnostics.
SIG-1227-01-05	Released 08 August 2013 • Add 4 channel information • Swap switch tables around to LSB first.
SIG-1227-01-06	Added section 11 (Signal Strength)
SIG-1227-01-07	Release 07/06/2017 Changed made for Mk2 Transmitter

2 Introduction

Congratulations, you have just purchased an advanced radio data logging system. The following guide takes you through the setting up procedure to enable you to get your system up and running.
The system comprises of a number of radio transmitters, each with their own address, which measure various parameters and transmit them to a base station where they are received, checked for validity and alarms. The parameters are displayed on the local LCD display and passed either via a serial MODBUS connection to a PC running appropriate software, or via the mobile phone network (GPRS) to a host website.
There are two frequency channels so that up to two systems can operate side by side.
This manual is only concerned with the MODBUS version.

3 Receiving

Check the box for obvious signs of damage. Is the outer box appears damaged please do not accept delivery.
Assuming that the system has arrived in good condition then carefully unpack the various items and check that they are what were ordered.

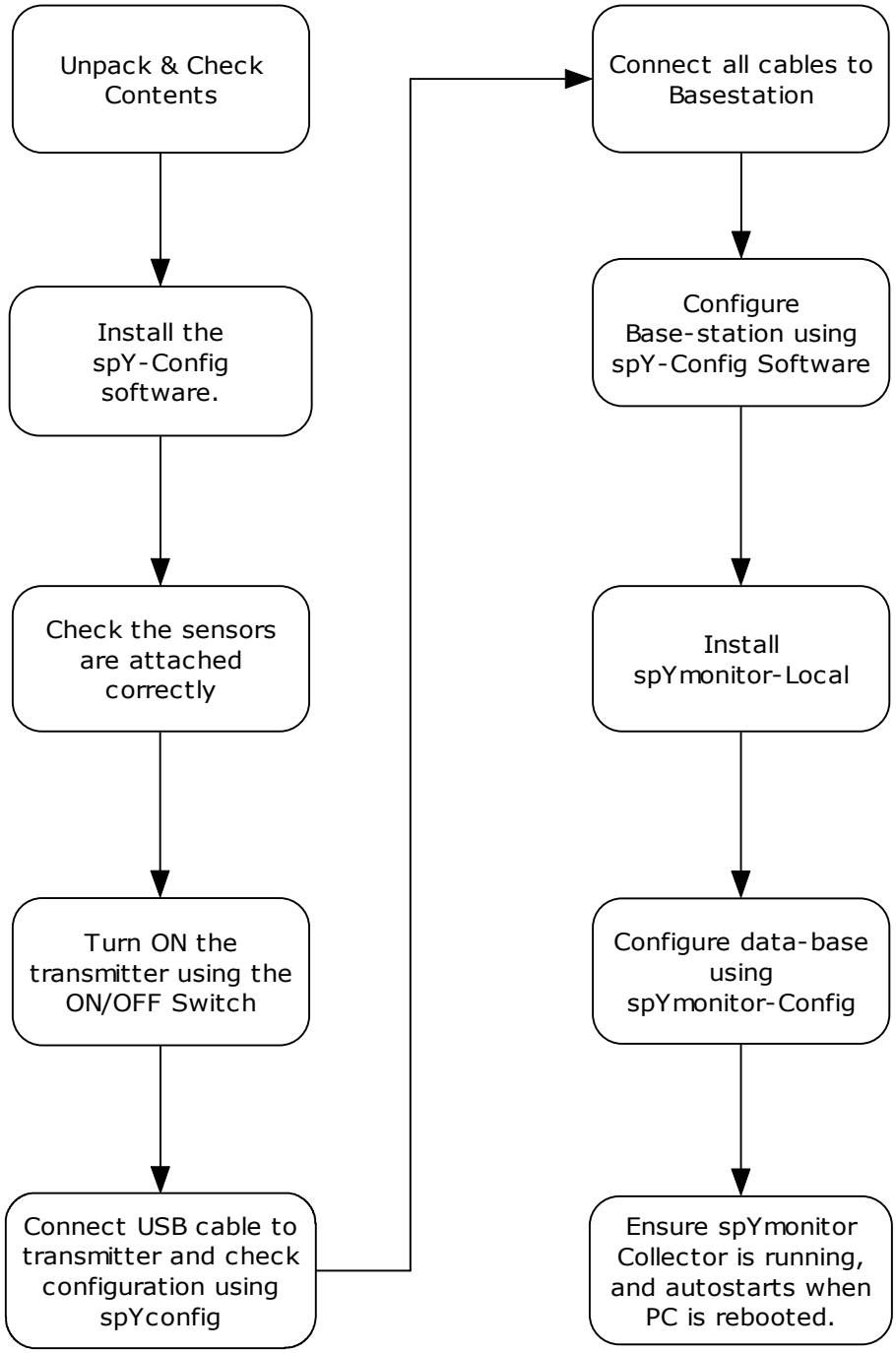
3.1 Transmitters

If they have been ordered complete with sensors then the sensors should already be connected and so all that is necessary is to set the address, select the frequency channel and connect the batteries.

3.2 Base-station

The base-station comes with two standard aerials, a serial interface cable, a USB interface cable and a power supply with interchangeable plugs. It is necessary to connect the cables and pre-configure the base-station to enable it to work with the transmitters

3.3 Flow Chart



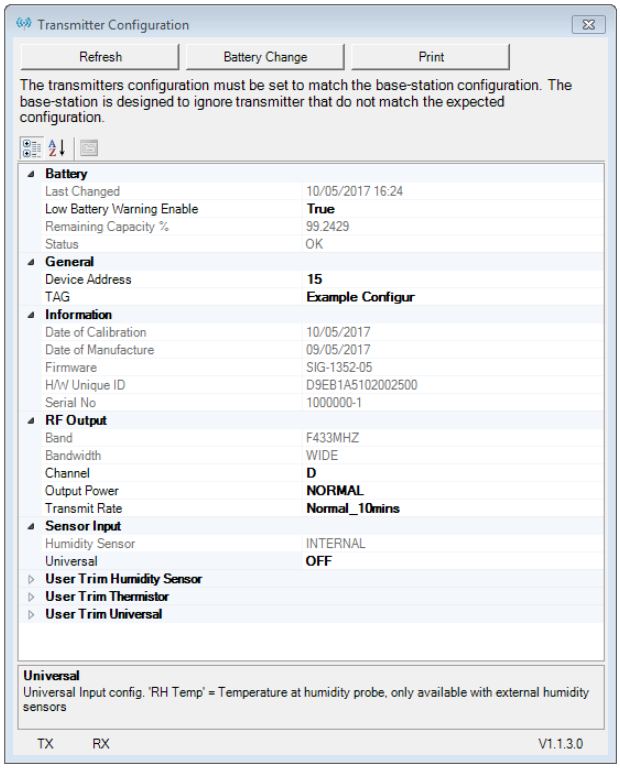
4 Transmitter Set-up

4.1 Setting the device address

Each Base-station can accommodate up to 16 transmitters and each transmitter can have up to three channels. Temperature, Humidity and Universal, providing a theoretical maximum of 48 measured points per system. All transmitters use the same PCB but not all of the transmitters allow access to all three channels. Consult the individual transmitter specifications for details.

Before setting the device addresses it is advisable to complete the Channel Map. Each transmitter is then assigned to a particular area and function. Store the Channel Map is a safe place for future reference.

Below is a screen shot of the transmitter configuration screen in the spY-Config application (V1.0.22 or higher required).



Note: Each transmitter must have its own unique address or conflicts will arise giving false readings. Transmitters must be enabled in the Basestation using the spYconfig software. Signals arriving at the Basestation which have not been enabled within the Base-station configuration will be ignored.

4.2 Setting the Channel Frequency

Each transmitter can operate on one of four different licence free frequencies. The channel is selected using the transmitter USB connection and changing the setting under RF Output>Channel.

Standard Transmitter.

Transmitters with a SPYDAQ-100x prefix.

Channel	433 Band
A	433.55 MHz
B	434.29 MHz
C	433.25 MHz
D	433.92 MHz

Special Order Transmitters.

Transmitters with a SPYDAQ-110x prefix.

Channel	868 Band
A	866.00 MHz
B	867.00 MHz
C	866.33 MHz
D	866.67 MHz

Transmitters with a SPYDAQ-120x prefix.

Channel	915 Band
A	914.50 MHz
B	915.50 MHz
C	922.00 MHz
D	923.00 MHz

Note: whatever frequency is selected for transmission, ALL TRANSMITTERS MUST BE SET TO THE SAME FREQUENCY and THIS MUST MATCH THE FREQUENCY SELECTED IN THE BASE-STATION. If the user is using a SPYDAQ HPR (High Power Repeater) the transmitter frequency channel may differ to the Base-Station channel due to the repeaters operation.

4.3 Setting the Transmission Rate

The transmission rate determines how often the transmitter takes a measurement reading and transmits it to the base-station. Most application run on a 10minute transmit rate which give a battery life in excess of 7 years. Shorter transmit rates significantly reduce battery life.

Transmit Rates	20 Second*	60 Minute	10 Minutes (default)	30 Minutes

*This mode to be used for setup and commissioning only.

The transmit rate must be the same as the rate set up in the Basestation. Setting different transmit rates on the transmitter compared to the Base-station will result in a mis-match error and late alarms/warning.

4.4 Selecting an Appropriate Sensor

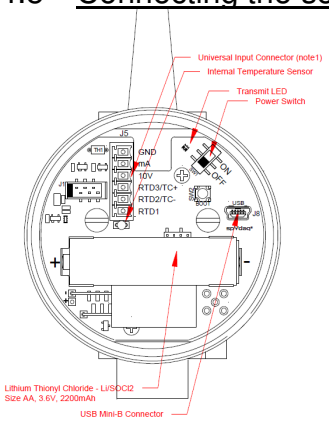
Where the transmitter is designed to accept a 'Universal' input, it can be one of a number of different types which are selected as follows:

Available Settings
OFF (Channel Disabled)
RTD/Switch
Thermocouple
0-10 V
0-20 mA
RH Temp *

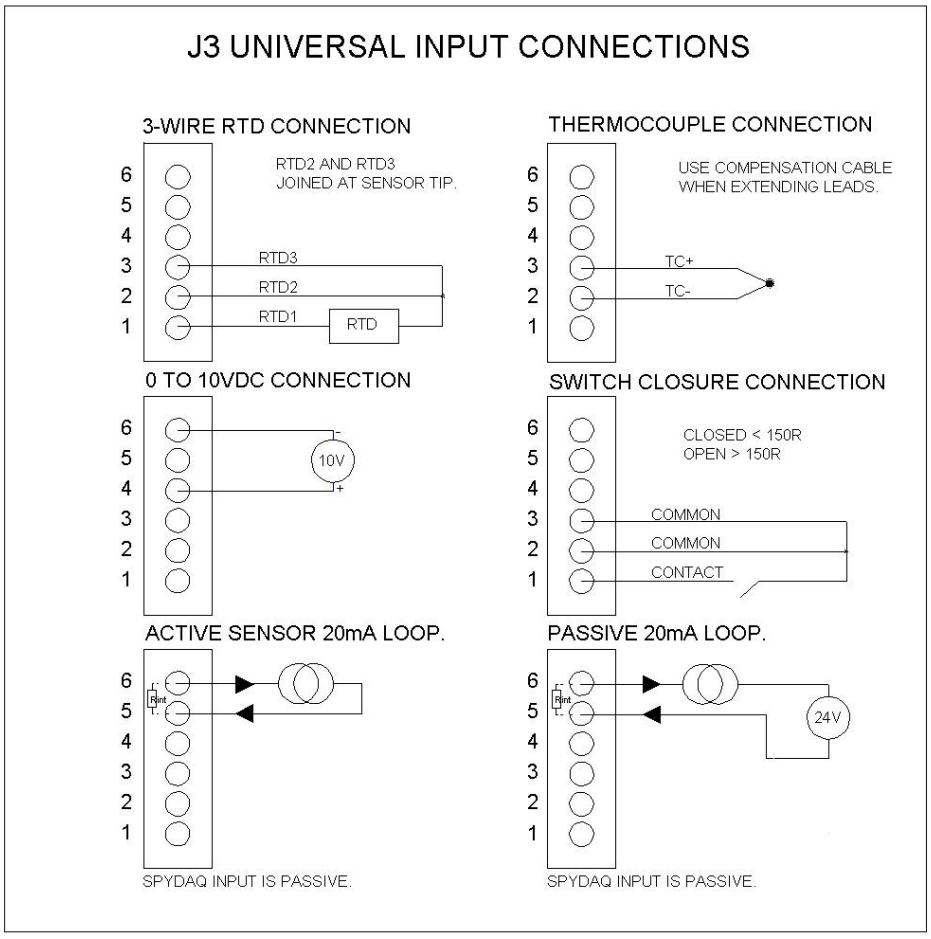
*RH Temp only available with transmitters fitted with Remote RH

Note: It is important that whatever sensor is selected here is matched by the configuration of the Base-station. Transmitter signals arriving at the Basestation with an incorrect configuration will be rejected (See Mismatch error). Please note that many of the sensors supplied have been pre-configured and need no further attention.

4.5 Connecting the sensor



Having selected an appropriate sensor it then needs to be wired into the PCB as follows:



Note 1.
4 to 20mA input has an internal impedance of approx 120ohms. The impedance stated includes the resistance of a series current limiting PTC.
The maximum voltage drop across the spYdaq input is 3V @ 25mA.

4.6 Positioning the Transmitters

The performance of radio signals are notoriously difficult to predict due to obstacles, reflections, interference etc. If there are known issues such as for instance a steel bulkhead care should be taken in positioning the transmitters and the base-station to ensure satisfactory transmission signal strength. Positioning of the Base-station aerials can also have a marked effect on performance see Antenna Diversity.

In general transmitter should be mounted so that the antenna is vertically orientated and at least 1 metre above ground level. If a particular transmitter is not producing sufficient field strength then it may benefit from an alternative directional aerial or re-positioning. It is for these reasons that, in all but the most simple and straightforward installations, we would recommend a site survey prior to determining the final positioning of all the transmitters. Contact the sales office for details.

5 PC Software

5.1 General

For Hardware configuration:
spY-config must be installed on a PC used to setup the spYdaq base-station via USB. The configuration internal to the base-station must match the transmitter switch configuration. The user can also setup alarm for each transmitter which will activate the internal relay and beeper. Customer using spYmonitor has the option to set soft alarms. Soft alarms can also be set to send emails and/or sms on alarm.

5.2 Installing the spY-config software

Insert the USB drive into your computer and locate the installation exe file.

6 Modbus Masters

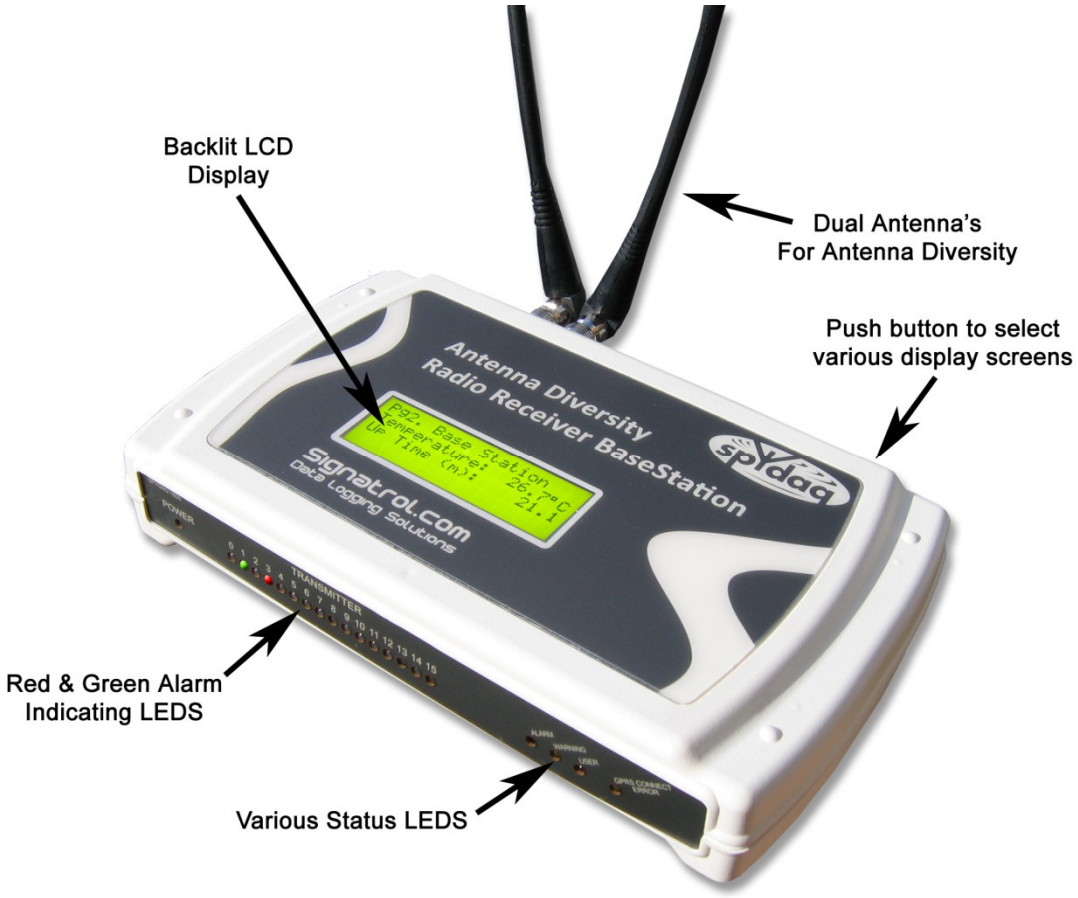
The spYdaq base-station has a MODBUS RTU output which is compatible with a wide range of software platforms, PLCs etc.

We have worked with a number of SCADA systems, including Integraxor, Specview and Prodigy, but many other systems are available. For more information contact the sales office.

Modbus is not available on all Base-stations. If you require Modbus make sure that it was specified on the order. If in doubt, contact our support team.

7 The Base-station

The base-station receives the signals from the transmitters, checks them for Alarms and Warnings. Annunciates any Alarms present and presents the data via MODBUS registers and USB port. Whenever a signal is received, the appropriate LED flashes on the front panel. If that channel is in alarm it will flash red else it will flash green.



7.1 Connecting the Base-station

Connect the Base-station to the USB port of a PC. Connect both antennas. Select the appropriate plug type for the intended country and securely fix it to the power supply module. Connect the power supply cable and plug the power supply into a suitable mains outlet.

7.2 Optional Auxiliary Power Supply

The Base-station can be powered by an optional auxiliary power supply (APS), Part Number: SPYPOWER-APS. The auxiliary power is powered by the standard basestation power pack, but in the event of mains power loss, a fully charged unit will keep the base-station alive until mains power is restored, up to a maximum of 4 days (for a fully populated system). For more details contact the sales office.

Image of SPYPOWER-APS

Image showing SPYPOWER-APS installed below base-station.

Image showing SPYPOWER-APS Installed below base-station with power connection linked.

7.3 Wiring the Alarm Connector

A Changeover relay is provided in the Basestation to connect to external devices, that is energised when the power is on and the system has no alarms,.. The relay is energised when the system is powered and has no alarm and de-energised when an alarm is present of if the power fails.

WARNING: No not connect voltages in excess of 24V to the relay contacts.

The relay is available via a two part rear panel connector and there are three connections labelled:

NC: Normally Closed (Power off)
C: Common
NO: Normally Open (Power off)

The Common or Wiper changes the connection according to the following table.

	NC	C	NO
Power On No Alarm		———	
Power On Alarm Present	———		
Power Off	———		

As can be seen from the table, the effect of a power failure is the same as when the system encounters an alarm condition.

7.4 Configuration the Base-station

The Base-station must be set up to the parameters you require for your system. You must tell the base-station how many transmitters are on the system and which addresses they can be found at. You must also define the transmitter types so that if the base-station sees any change to the transmitters, it will immediately recognise it and show a 'Mismatch' error.
All these parameters are configured via the USB port by using a special programme called spY-Config.
It is recommended that the transmitters are set up for a 20 second transmit rate so that the configurations, and hence the correct system operation, can be verified relatively quickly. After verifying that the system works as required, the transmitters, and the Base-station configuration, should be changed to their operating mode of 10 Min transmission rate.
Configuration of the Base-station is only normally required at the commissioning stage of when there are hardware changes to the system.
Make sure that the Base-station is powered and the USB port connected, via the cable provided to the PC where spY-Config is installed. **Run spY-Config**.

The following screen will appear:

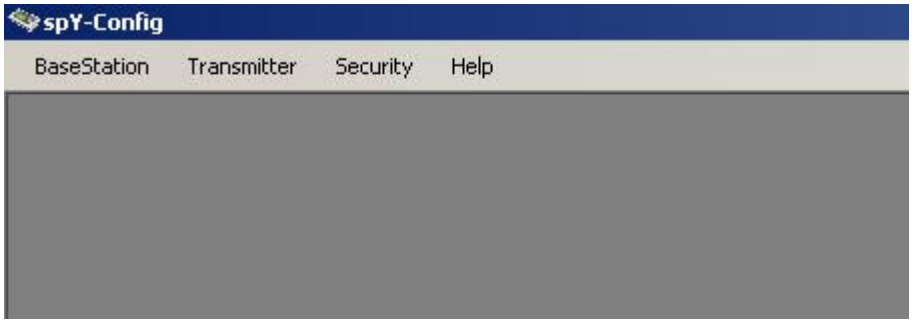
First Use

The first time the system is used it will ask for a password.

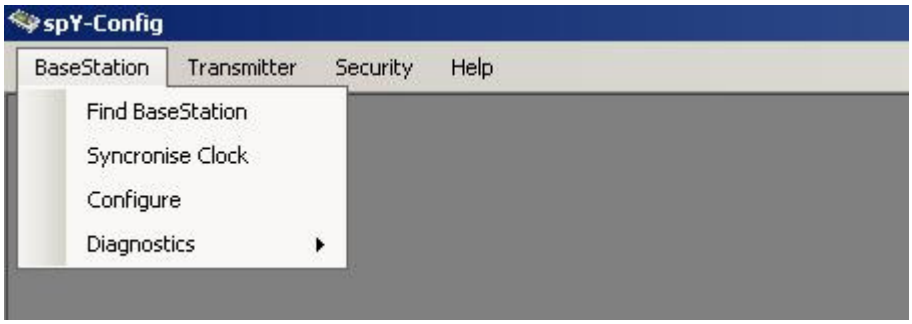
This PASSWORD is between 6 and 12 characters and you should make a note of what you have chosen and keep it in a safe place.

The PASSWORD will be required if you want to enable the security features later.

After successful entering of the password, the following screen will be presented:



Then click on Base-station

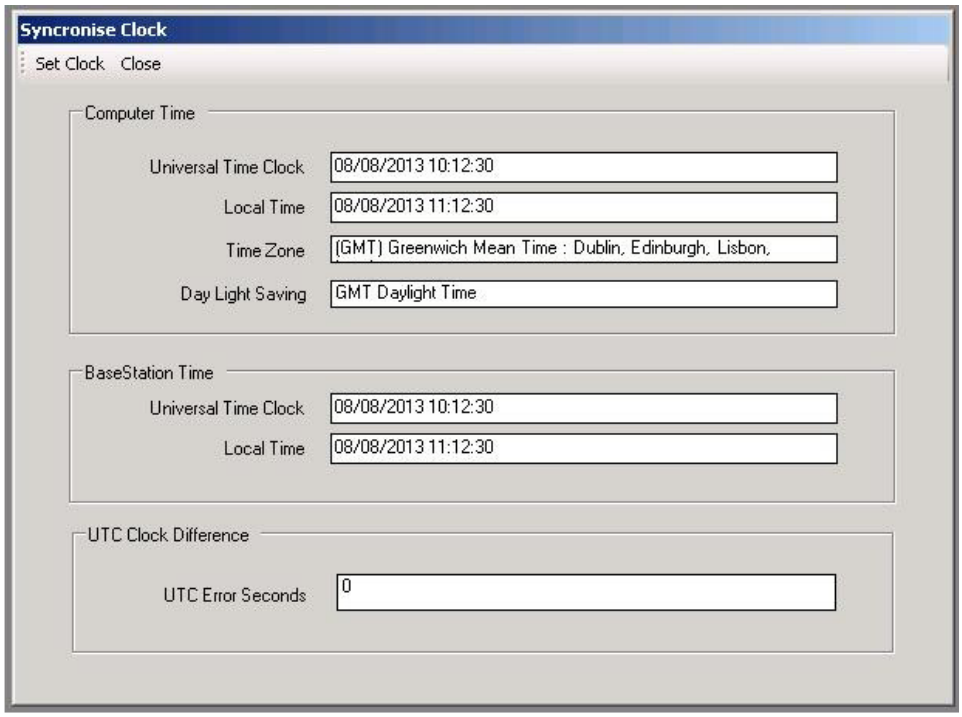


Find Base-station

If only one base-station is connected they system will automatically detect it and no further action is required. If more than one are being used then click on Find Base-station and a list of available base-stations is presented. Click on the one that you wish to configure

Synchronise Clock

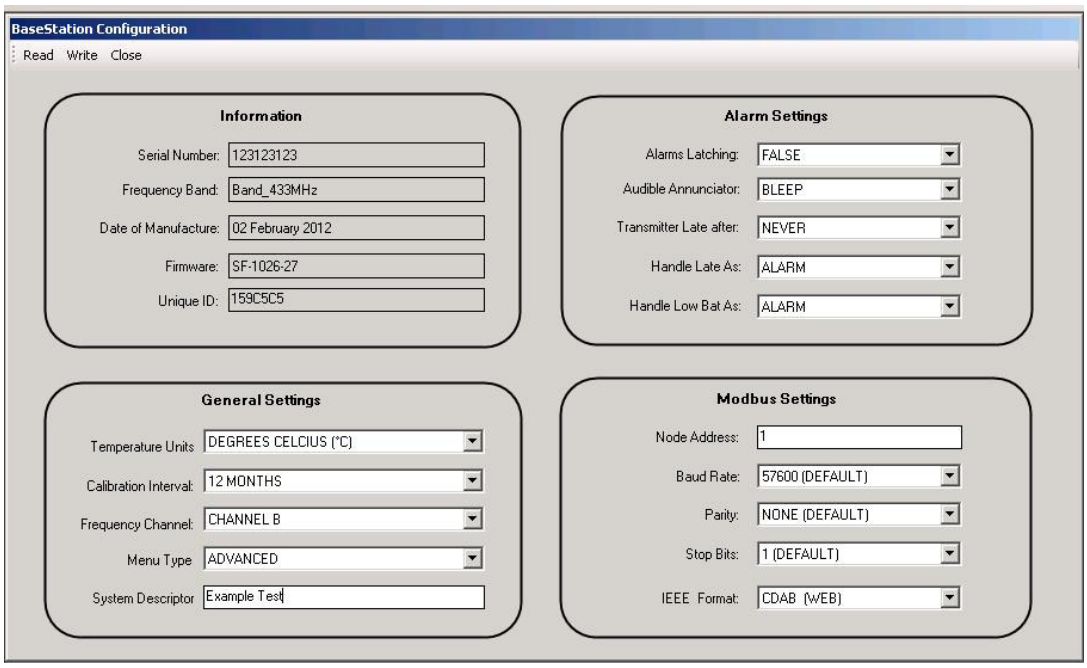
Selecting this tab takes you to a 'Synchronise Clock' window where the time, date and time zone etc held within the Base-station can be synchronised to the Time and Date etc used on the PC.



Now close this screen.

Configure

This is where the basic system parameters of the Base-station are configured.



spY-Config will automatically read the previous configuration and present the above screen.

The screen is divided into four panels as follows:

Top Left-System Information

This is a read only screen with information entered at time of manufacture. There are no user configurable fields here.

Bottom Left-General Settings

Temperature Units

Here you can select Degrees Celsius, Fahrenheit or Kelvin

Calibration Interval

Here you set the calibration interval to 6, 12, 24 or 36 Months or Disabled. This is the interval that triggers a calibration reminder on the Health Parameters. It is strongly recommended that this interval remains at its default of 12 months to ensure accurate readings.

Frequency Channel
Here you set the frequency channel to A,B,C and D.

Menu Type
This selects the number of different screens on the LCD display on the base-station. Long includes many more screens that can be useful during commissioning. After commissioning it is recommended that this is set to BASIC.

Top Right-Alarm Parameters
Here you set up the parameters associated with Alarms and Warnings.

System Descriptor
This is a customer editable 32 character string to identify the base-station.

Top Right – Alarm Settings

Alarm Latching
This selects whether or not an alarm latches or not when it occurs. This can be useful to identify alarms that have occurred when no-one was around, say over a weekend. If the alarm is latched it remains in alarm, even if the alarm has subsequently gone away, until the alarm is reset either from the rear push-button or via the USB port by sending a configuration or by writing to an appropriate MODBUS register. (Latched alarms can be reset by writing to the alarm again or by pressing and holding the pushbutton on the rear panel of the Base-station for 10 seconds.)

Audible Annunciation
This selects whether or not the inbuilt audible alarm sounds in the event of an alarm. There are three modes, Off , continuous or Bleep.

Transmitter late after
This parameter defines when the system determines that a reading is late. It can be after 1, 2, 3, 4 or 5 consecutive missed readings. Alternatively, if Never is selected then the system will never flag missed readings. It is recommended that the Late After is set to 3 then it will raise a warning after three consecutive readings have been missed.

Note for Modbus users:
When a late alarm occurs the Modbus parameter data for that transmitter will be set to NaN (Not a Number). If you wish the Modbus register to remain at the last received value, set Late to NEVER.

Handle late as
When there is a late reading as defined above the system can interpret this as either a Warning or Alarm. The recommended mode is Alarm.

Handle Low Bat as

When a transmitter detects that its battery voltage is low and will need replacing soon the system can interpret this as either a Warning or Alarm. The recommended mode is Alarm.

Bottom Right-Communications Parameters.

Here you set the communication protocol parameters in order to effectively communicate with your MODBUS master. The settings will be defined by the MODBUS master.

IEEE Format

Process variable data such a temperature, humidity, pressure, etc is stored within the base-station as an IEEE 754 number. When transferring the data to different systems the word and byte position is very important, and this format is not set down by any standard. Having in incorrect format may result in unrealistic values being recorded.

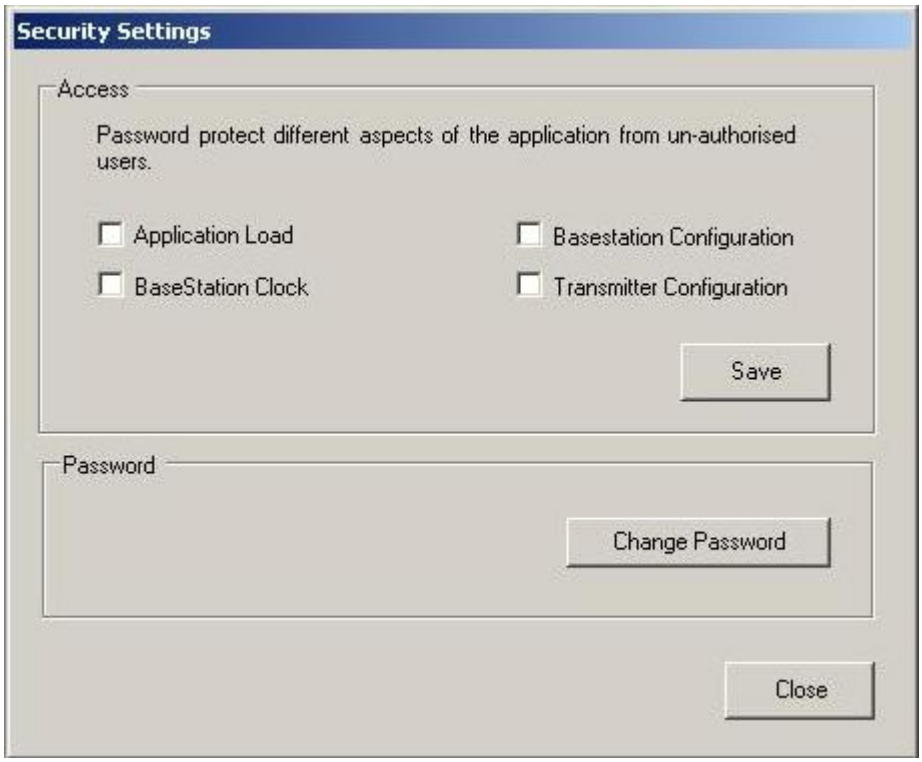
When using spYmonitor-Local via USB the format must be set to = “CDAB (WEB)”, customer using the GPRS version of the base-station must set the format to = “ABCD (MODEM)”.

After selecting the various parameters CLICK WRITE and close the screen.

Security

This enables control access to various parts of the configuration to authorised people, i.e only those in possession of the PASSWORD as define previously'. It also allows password holders to change the password.

Tick the menus where you want to restrict access and click Save.



The password will now be required to access the selected screens as shown below.

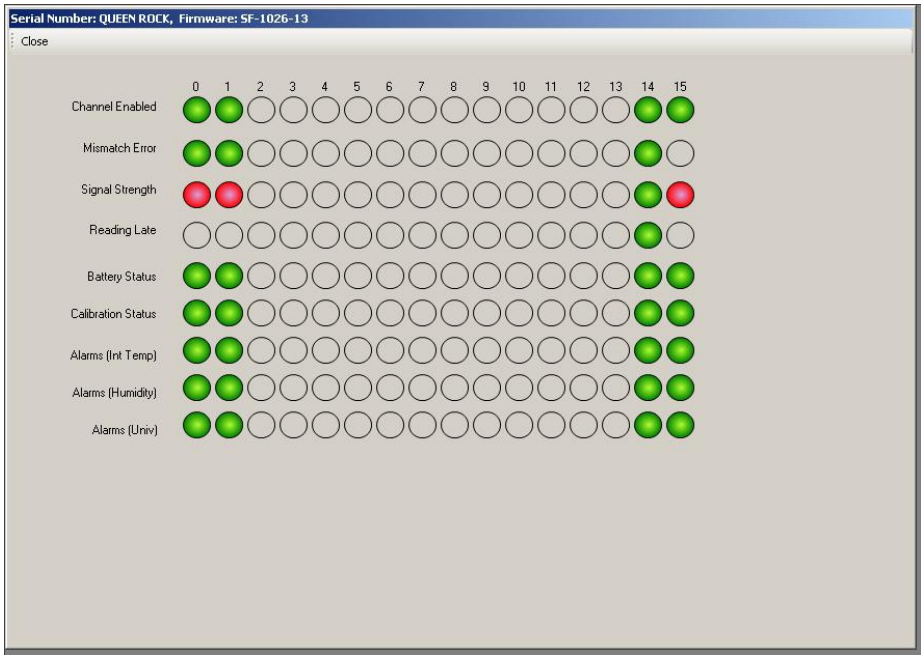
Diagnostics

This enables the commissioner to view various parts of the system in order to ensure correct operation.

Basic

Internal status of the Basestation is displayed in the form of coloured lights.
Using the following key, problems can be easily identified. Generally Green is good and Red is bad, apart from signal strength. Then the following table is applied.

Color	Signal dBm	Signal Status
Green	Signal> -70dBm	Good
Amber	-70dBm > Signal > -80dBm	Fair
Amber Flashing	-80dBm > Signal > -100dBm	Warning
Red	Signal < -100dBm	Bad

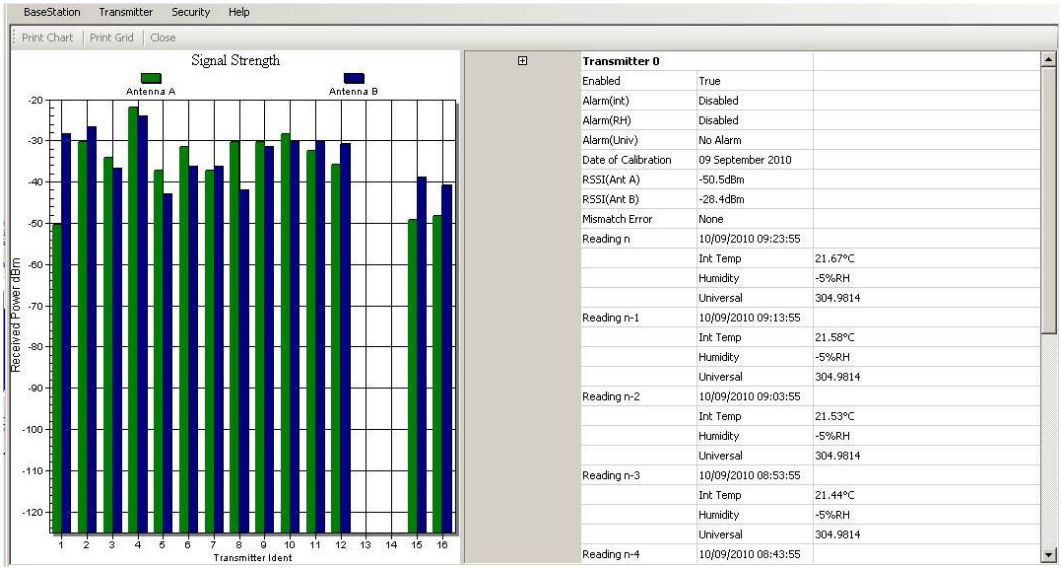


Advanced

It shows a chart of field strength for each transmitter on the system. For reliable operation signals should be in excess of -80 dBm.

Clicking on the + against a transmitter opens up a window that shoes various transmitter performance characteristics.

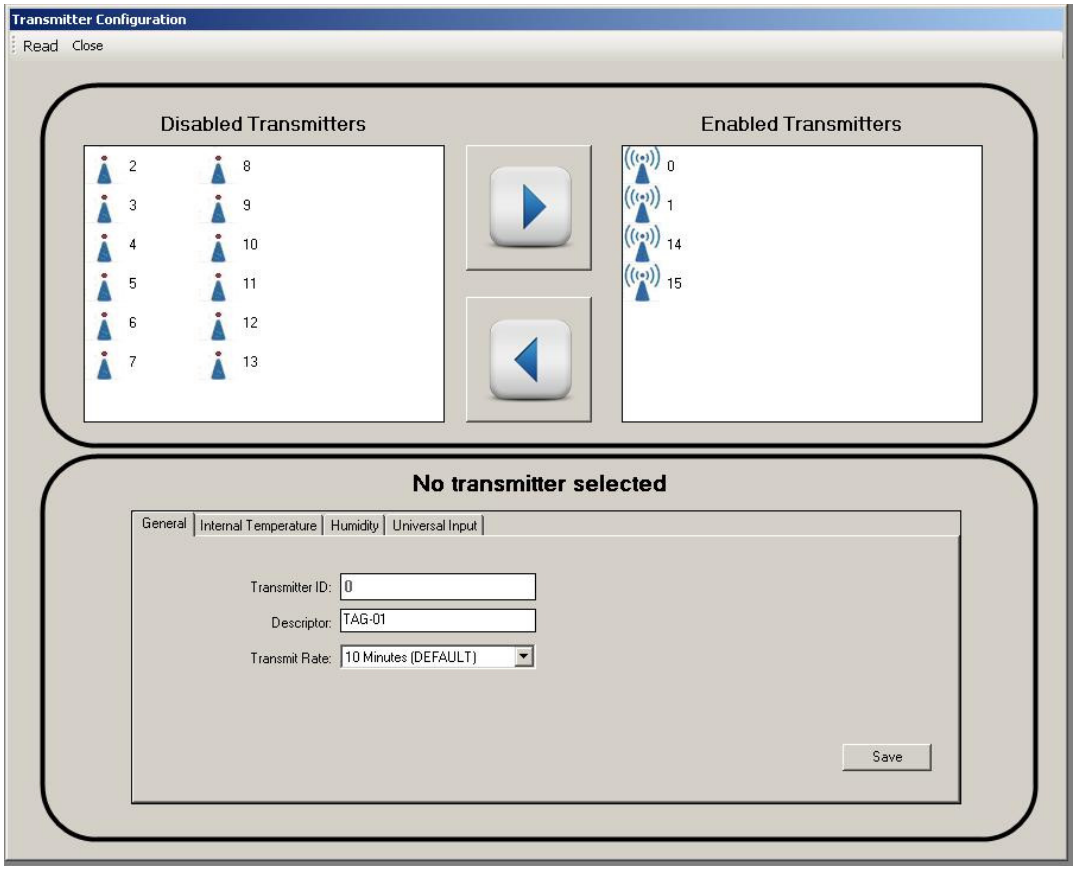
For more information on signal strength see section 11.



Transmitter 0		
Enabled	True	
Alarm(int)	Disabled	
Alarm(RH)	Disabled	
Alarm(Univ)	No Alarm	
Date of Calibration	09 September 2010	
RSSI(Ant A)	-50.5dBm	
RSSI(Ant B)	-28.4dBm	
Mismatch Error	None	
Reading n	10/09/2010 09:23:55	
	Int Temp	21.67°C
	Humidity	-5%RH
	Universal	304.9814
Reading n-1	10/09/2010 09:13:55	
	Int Temp	21.58°C
	Humidity	-5%RH
	Universal	304.9814
Reading n-2	10/09/2010 09:03:55	
	Int Temp	21.53°C
	Humidity	-5%RH
	Universal	304.9814
Reading n-3	10/09/2010 08:53:55	
	Int Temp	21.44°C
	Humidity	-5%RH
	Universal	304.9814
Reading n-4	10/09/2010 08:43:55	

Transmitter Configuration

The Base-Station must be configured to expect the right number of the right type of transmitters as follows :



This tab is where you tell the Base-station what transmitters to expect. The configuration entered here must match that set up in the transmitter or the Base-station will not recognise it. Initially all 16 transmitters will appear in the left hand (Disabled) panel. The transmitters that are to be active on the system are selected by clicking the mouse on the appropriate number. Clicking on the large blue arrow> will move the transmitter into the Enabled panel and the Base-station now expects that device to be transmitting.
In this way select all the transmitters you wish to work with until the map in the Enabled Transmitter panel accurately reflects the system.
It is now necessary to enter the characteristics of each active transmitter into the Base-station. Select an active transmitter by clicking on the number.
The lower pane now shows the configuration data for that transmitter.

General

The first tab displays the Transmitter ID, a 12 character Descriptor which is used to more easily identify the measurement area and the transmit rate which must be set to the same rate as the transmitter (Normally 10 Minutes). Move to next tab or save.

Internal Temperature

Each transmitter has an on-board temperature sensor that can have a low and a high alarm set.

To enter an alarm, click the Alarm Enable box and simply enter the high and lo alarm levels. There is also an Alarm Delay field which can help remove spurious alarms. When an number is entered in here that is the number of consecutive readings in alarm that the Base-station needs in order to annunciate the alarm; This feature reduces the chances of spurious alarms being detected but please bear in mind that on a 10 minute transmit rate, in order to receive two consecutive alarms it can take up to 20 minutes before the alarm is recognised.

Humidity

This is where the humidity channel is enabled. Please ensure that you only enable the humidity for transmitters that are equipped with the humidity sensor.
As for the Internal Temperature, you can enable Hi and Lo alarms and enter a delay time.

Universal Input

This is where the Universal channel is enabled in much the same way as the Humidity channel but here the type of sensor used must be selected. As for the Internal Temperature, you can enable Hi and Lo alarms and enter a delay time.

******NOW SAVE THE CONFIGURATION******

REMEMBER:-only when the Base-station transmitter configuration and the actual transmitter configuration match EXACTLY will the transmitter readings be received.

Antenna Diversity

Antenna Diversity s a simple means of improving the quality of the radio signals.
In essence two antennas are connected to the receiver and during the pre-amble part of the incoming message, the field strength from each antenna is monitored and the one providing the strongest signal selected. In this way the two antennas can be placed at different points to optimise reception.
The Base-Station is supplied with two small standard aerials and for the majority of installations this is entirely adequate. Antennas with gain, antennas with long cables and directional antennas are available from Signatrol which may be able to provide enhanced performance in difficult areas. Please contact the Sales Office for further information

7.5 Base-Station Controls

The only control available on the Base-Station is a rear mounted push button.
Repeated pushing of the button cycled the display through its various screens as defined by the menu type.
The first time the push button is pressed it activates the rear back-light of the display for a period of 60 seconds, after which time the back-light switches off to conserve power.
Pressing and holding the button enables Latched Alarms to be reset.

7.6 Base-Station Runtime Screens

Basic Menu

A number of diagnostic screens are available on the Base-Station which are cycled through by pressing the rear mounted push button. These screens are as follows:

Screen Name	Displays the following information	Advanced	Normal	Basic
Real Time Clock	• Local Date/Time store within the Base-Station	✓	✓	✓
Base Station	• Base-Station internal temperature. • Seconds since last Base-Station reset • Local time offset compared to UTC time.	✓	×	×
RF Settings	• Receiver operating frequency. • Receiver firmware version.	✓	×	×
Modbus Settings	• Modbus Slave node address. • Serial Interface settings	✓	×	×
Last Received Transmitter	• Transmitters ID • Date/Time when received • Transmitter Status	✓	✓	✓
Transmitter Readings	One screen for each transmitter enabled • Internal temperature (A) • Humidity (B) (if present and enabled) • Universal (C) (if present and enabled) • Date/Time when received.	✓	✓	×
Transmitter in Alarm	• Displays the transmitter id's of all channels in alarm.	✓	✓	✓
Transmitter Alarms	One screen for each transmitter enabled • Late Alarms (only when Late configured as alarm) • Low Battery (only when Low Bat configured as alarm) • Bad Calibration. • Any input alarms	✓	✓	✓
Transmitter Health	One screen for each transmitter enabled • Mismatch Errors • Low Bat status • Calibration status • Humidity enabled • Universal channel input type. • Calibration due date.	✓	✓	✓
RF Message Statistics	• Received Messages • Handled Messages • Correction information	✓	×	×
Signal Strength	• Displayed signal strength (RSSI) for all 16 transmitters, on both antennas. The value show is in hexadecimal, 0 to F.	✓	×	×
Eeprom Information	• Installed memory circuits • Total Log Memory size • Remaining free Log Memory	✓	×	×
Factory Page	• Base-station serial number • Firmware version.	✓	✓	✓

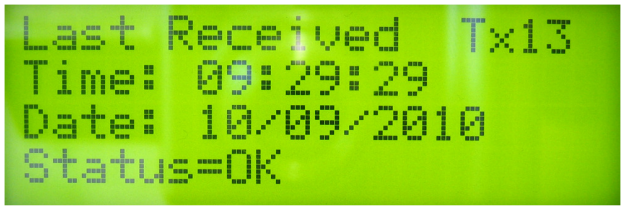
Other Screens				
Critical Errors	This screen displays internal errors within the Basestation which will cause incorrect operation. • Bad Power Supply • Real Time Clock failure • Radio Receiver failure • Eeprom failure • Real Time clock not running Most of these errors will require the unit being returned to the supplier for repair. The user can attempt to recover the real time clock error by setting the real time clock in spY-Config.	n/a	n/a	n/a
Clock not set	Real Time clock has not been set, and requires settings in spY-Config. The radio receiver will not function until the clock is correctly set.	n/a	n/a	n/a

Below are a few example screens.

Factory:

Real Time Clock

Last Received Transmitter



8 MODBUS RTU Registers

The spYdaq Base-station can have a MODBUS output which is compatible with many industrial standard MODBUS packages.
MODBUS works by using a series or registers that you can either write to or read from. Specification SIG1223-01-XX defines all the registers and their functions a copy of which can be found on this CD.

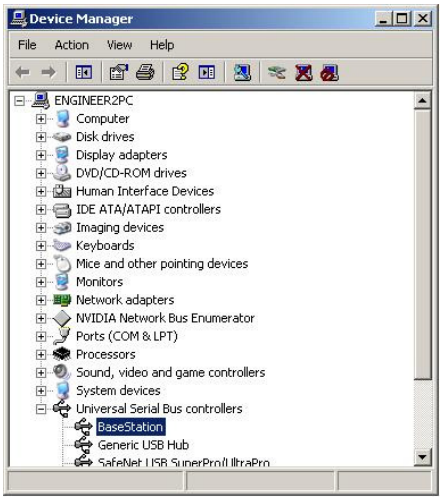
The external Modbus connection is made via RS232 using the 9pin D-Type connector. No handle shacking lines are implemented. All three connections below are required.

Name	Pin	Description
Transmit Data	2	MISO (Master in Slave out)
Receive Data	3	MOSI (Master out Slave in)
Ground	5	Ground Connection.

Customer who require RS485 connection to the base-station should use an Amplicon MA485F9 converter, for more information contact the sales office for application note AP00002. Other convertors are available but unfortunately only the Amplicon one is supported by Signatrol.

9 Trouble Shooting

Problem	Possible Cause	Possible Solution
I cannot communicate with one transmitter but others work OK	1. Base-station Transmitter configuration does not match actual transmitter configuration 2. Transmitter battery link not fitted or replacement battery required 3. Distance too far from Base-station or badly sited antennas 4. Transmitter set to wrong frequency channel 5. Transmitter to close to Base-station	1. Check configurations and correct accordingly 2. Fit link/ replace battery 3. Check signal strength and either re-site transmitter of one of the base-station antennas. Replace Base-station antenna with directional type. 4. Check and correct if necessary. 5. Least at least 2 metres between Base-station and Transmitter.
I cannot communicate with any transmitters	1. Base-station not powered 2. Base-station and Transmitters set to different channels Distance too far from Base-station or badly sited antennas	1. Check power connections. 2. Check Channel selection and change if necessary. 3. Check signal strength using diagnostics and re-site.
Base-Station does not reply to Modbus Master via RS232 Connection.	1. RS232 Cable not connected. 2. Base-Station Node address is incorrect. 3. Modbus baud rate incorrect. 4. Modbus stop bits incorrect. 5. Modbus parity is incorrect. 6.	1. Connect RS232 cable from Modbus Master to Base-station using the 9 Pin D-Type connector at the rear of the unit. 2. Check Base-station node address is correctly set in spY-Config. This number must be unique. 3. Modbus master and Base-station must be set to the same baud rate. Check using spY-Config. 4. Modbus master and Base-station must be set to the same stop bit setting. Check using spY-Config. 5. Modbus master and Base-station must be set to the same parity setting. Check using spY-Config.

I cannot communicate with my Base-station using spY-Config.	1. Check USB Driver is installed.	1. From windows control panel open system>hardware>Device Manager. If the Base-station is correctly installed, it will be displayed under Universal Serial Bus controllers. See image below. If the Base-station is not present. Check for a device listed as unknown or with a question mark. Double click the device and install the driver provided on the spY-Config CD. The filename is Basestation.inf. 

10 Specifications

10.1 spYdaq Radio Transmitters

General

Function	Specification
Power Supply	1 AA Size Lithium Thionyl Chloride 2.2 Ah, 3.6VDC Signatrol Part: SPYDAQ-ACC-01
Typical Battery Life (Using Signatrol supplied batteries).	Sample Rate (Seconds) — Years 60 — 1.3 600 — 7 1800 — >8 Ambient @ 25°C
Centre Frequency	434MHz Version A) 433.55 MHz B) 434.29 MHz C) 433.25 MHz D) 433.92 MHz Conforms to ETSI EN300-220-1 868MHz Version A) 866.00 MHz B) 867.00 MHz C) 866.33 MHz D) 866.67 MHz Conforms to ETSI EN300-220-1 916MHz Version A) 914.50 MHz B) 915.50 MHz C) 922.00 MHz D) 923.00 MHz Confirms to FCC Part 15
Transmission Rate	USB selectable – • 20 Seconds (Commissioning) • 1 Minute • 10 Minutes (Recommended) • 30 Minutes
Encoding	Multiple reading, Manchester encoding with error correction and CRC16 checksum.
Range	Typically 400m* line of sight with standard antennas 800m* line of sight with Yagi 6dB direction antenna on base-station. (Range reduces within buildings etc.) *434MHz Version. Repeater available to significantly increase range.
Output Power	Conforms to current legislation (<10mW)

10.2 Basestation

spYdaq Base-station, accepts up to 16 transmitters with LED and LCD indication, audio annunciation, alarm relay, USB configuration port, RS232 Modbus (on some models), RTU serial port, 2 antennas, serial lead and mains power supply.

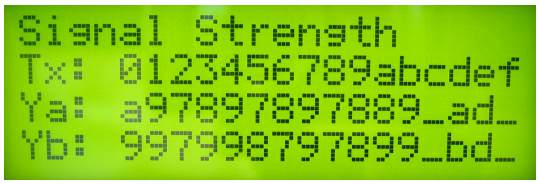
General

Function	Specification
Power Supply	10 to 28 VDC (12VDC Mains adaptor supplied)
Reading Storage	Stores up to 15,488 reading blocks This will give up to 6.7 day of storage. Reading store requires spY-monitor software (local or online).Data stored in non-volatile memory.
Alarm Storage	Stores up to 255 alarm blocks. Data stored in non-volatile memory.
Alarms	Audible, Red LED & Relay (1A @ 24VDC. 100,000 operations)
Warnings	Orange LED
Channel LED's	Bi-Colour. (Green/Red) Showing data received and alarm condition
LCD Display	4 line x 20 character Displaying system, alarm and real-time information. Back-light has 60 second time-out.
Antenna Diversity	Selects the strongest signals from two antennas
Dimensions	Enclosure: 240mm x 135mm x 45mm High. Antenna: 80mm

11 Signal Strength

For reliable reception, the signal strength should be checked during installation. The screen below is available on the Base-Station when the menu setting is set to advanced, and then the screen toggled using the button at the rear of the Base-Station.

Each transmitter is listed on the screen in hexadecimal format. In hexadecimal number 0 to 9 are the same as 0 to 9 in decimal. But numbers 10 to 15 are represent by the digits A through to F, (e.g. D = 13). The Base-Station has two receiver inputs, Antenna A and B. Both antenna has its own signal strength.



Depending on the firmware version loaded into the base-station. The following target values should be achieved for best performance.

Firmware Version	Value Range	-80dB Value (Minimum Ideal)	-50dB Value	Resolution
SF-1026-01 to SF-1026-27	0 to F Hex (0 to 15dec) 16 steps	6	10	7.4dBm
SF-1026-28	A to Z 26 steps	J	W	1.6dBm
SF-1026-29 and higher	1 to 9 then A to Z. (# indicates not signal received) 35 steps	C	V	1.0dBm

The installer should aim to a reading of > -80dBm or above for reliable communications. It may be that only one antenna can achieve this. If the reading is < -80dBm, the installer should consider the following:

- Replace the standard Base-Station antenna with higher gain types.
- Position on the Base-Station A and B in different locations.
- Raise the Transmitter antenna if close to the ground.
- Move the transmitter antenna away from solid walls.
- Use an optional spYdaq signal repeater (SPYDAQ-1000-HPR).

The Base-Station will receive signals down to -100dBm, but signals below -80dBm are more prone to errors.

12 Glossary of Terms

Alarm	A measured parameter going outside its pre-set limits for a pre-set period.
Antenna Diversity	A means of enhancing radio signals be providing a choice of antennas and selecting the strongest signal
Delay	The number of readings required for the Base-Station to recognise an event
GPRS	General Packet Radio Service: offered by most mobile phone service providers
Latching Alarms	When this is selected, an alarm condition remains annunciated until manually reset by an operator.
Late Readings	The number of missed readings that the system can accommodate before raising a warning or alarm
LCD	Liquid Crystal Display
LED	Light emitting Diode
MODBUS®	Proprietary industrial serial communications protocol.
Pt100	Platinum Resistance Temperature sensor with R= 100 ohms @ 0°C
RTD	Resistive Temperature detector, typically a Pt100.
SCADA	PC Software which stands for Supervisory Control And Data Acquisition.
Specview®	A proprietary MODBUS based SCADA system for Windows from Specview Ltd.
Prodigy®	A proprietary MODBUS based SCADA system for Windows from Tascomp Ltd.
spYconfig®	PC software to configure the basestation
Type Mismatch	Error caused when transmitter and Basestation configurations do not match.
Warning	A problem or potential problem with the system requiring operator intervention

13 System Notes.

Project :…….. Date:……

14 Channel Mapping Template.

Project :…….. Date:…… Frequency A/B/C/D*

ID	Location	Temperature (a)	RH (b)	Universal(c)	
		Description	Description	Type	Description
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					