Wi5 Data Concentrator
User Manual

Warning: This manual contains important safety and operating information. Please read, understand and follow the instructions in the manual.

MAN-567-0002-J

TABLE OF CONTENTS

1 Description

1.1 Technical Specifications

Power supply

- 12V – 2A DC input provided by external PSU (supplied)
  PSU compatible with AC Input: 90-264 VAC 50-60 Hz

- Battery Backup – supply power to the unit for 24 hours in the event of mains power loss (***GPRS version only***)

- DC input requirements: 0.5 A average current with short spikes of 2A ; unit sill stop operating below 9VDC

Radio Compatibility

- Compatible with RTCOM transmitters
- Mono-frequency (version dependent) :
  - UHF (433.92 MHz or 868.950 MHz) – short antennas supplied
  - VHF (169.40625 MHz or 153.100 MHz) – antennas optional

Real Time Clock

- On board real time clock synchronized every 24 hours via time server (for SNTP mode on the Ethernet model the time is updated once per week)

Data Recording

- Records up to 3 months worth of data on 1GB/2GB MicroSD card (supplied)

GPRS/SMS

- Uses Quadband GSM engine
- Configurable filters used to reduce amount of GPRS traffic
- GPRS connections established only at transfer time
- FTP Protocol to transfer data to server

Ethernet

- Uses Email to transfer data via SMTP server (Port 25 used by default but is configurable)
- DHCP Enabled to get dynamic IP from LAN – Static IP configurable
- Internet access required to synchronize unit on public time server

Configuration

- Via Local USB Connection
- Via SMS (GPRS version only).

Installation

- Wall mounting
- Front panel LEDs to assist in operation diagnostic
- SMS used for remote access during installation (GPRS version only)

Housing

- Dimensions – 220 mm X 200 X 45 mm
- Weight : 500 grams without antennas and VHF receiver
- IP rating : IP66 with optional enclosure

1.2 Radio Receiver

The Wi5 concentrator can work on only one receiving frequency as the radio receiver fitted on the PCB is different for each frequency. The part number of the product identifies which frequency is to be used.

The product is compatible with majority of RTCOM transmitters.

As radio packets are coming in, these are time-stamped using the on-board real time clock. The clock is synchronized periodically using a UTC Time Server to guarantee accuracy. All time stamps will be UTC/GMT.

1.3 Data Recording

The Wi5 concentrator uses an on board microSD card to record the data before transmission. It will keep up to 3 months worth of historical data which can be retrieved at any time using SD card reader and standard text editor by pressing the pushbutton on the concentrator PCB for 2 seconds. The microSD card can then be removed from the connector.

 **The microSD card is required for product operation ensure you insert it and lock it back in the connector after data upload**

1.4 Data Transfer

Data is transferred at a periodical interval via GPRS UDP or HTTP for Ethernet versions. If the data transfer is not successful (intermittent GPRS connection, LAN disconnection); the data will be stored and transferred on the next occasion. In the event that the Wi5 concentrator is offline for an extended period it will send stored data starting from the oldest record.

Filters can be used to reduce the amount of data sent to the server (ftp or email):

- Only allow particular transmitter IDs' or packet types
- Reject particular transmitter IDs' or packet types

- Reject a packet from a transmitter if it has already transmitted within the last x seconds
- Only allow one packet per transmitter per transfer

Please Refer to Product configuration paragraph for the procedure to change the concentrator‘s configuration.

1.5 Monitoring Unit Status

The concentrator will send at a specified rate a summary report to the server. This report contains information on the unit status such as:

- Mains Power status (GPRS Only)
- GSM signal strength (GPRS Only)
- Filter Settings
- Concentrator ID
- Firmware Revision
- Statistics on data transfer

This report can also be sent via email.

GPRS versions only:

In the event of a mains power failure, a summary report will be sent immediately, the report will indicate that the unit is working on battery.

Alternatively an alert SMS can be sent to a specific phone when this event occurs.

Please note that in this mode the unit will not record transmitted data packets, this is done to minimize power consumption and ensure the unit will function on battery for 24 hours.

Please Refer to Product configuration paragraph for the procedure to change the concentrator‘s configuration.

1.6 Unit Configuration

The unit operation can be configured via local USB connection, or for GPRS versions via SMS.

Please Refer to Product configuration paragraph for the procedure to change the concentrator‘s configuration.

1.7 Use of Cellular networks / SMS – Important Notes

Availability of SMS

Models which include the GPRS cellular network modem have the ability to communicate to a server via use of the cellular data network. They also offer SMS (Short Message Service) messaging for some services. For SMS use, the logger uses the available **2G network**.

Important: 2G (GPRS) services, which carry the SMS messaging system, are slowly being turned off around the globe. Once 2G is switched off the SMS services available within the Wi5 will no longer be able to function. Therefore, check with your cellular network operator for their switch off date before setting the Wi5 to use any feature requiring SMS use.

2 Commissioning

This paragraph describes the required steps to ensure the product is fully functional following reception. Ensure one step is covered before going to the next.

2.1 Step 1: Inspecting Package Content

RT-Wi5 Data Concentrator

Mains Power Supply Unit – 12V DC output

Configuration Cable (USB A/B) – optional

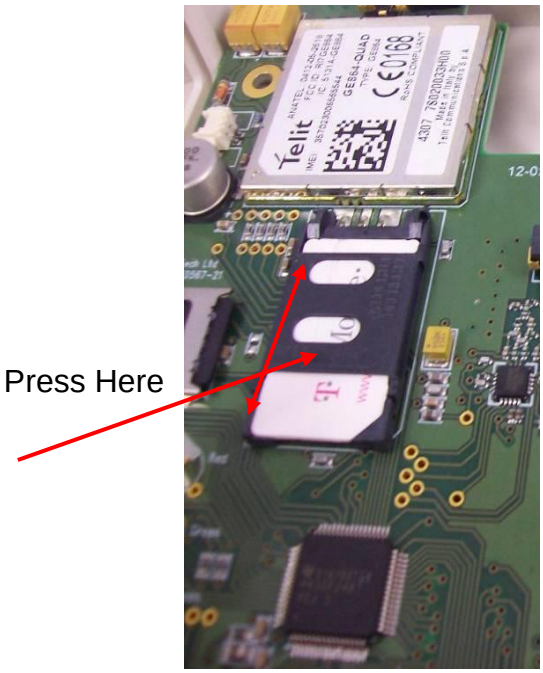
Antennas (GSM SMA / UHF BNC – VHF is

2.2 Step 2: SIM Card installation (GPRS Version)

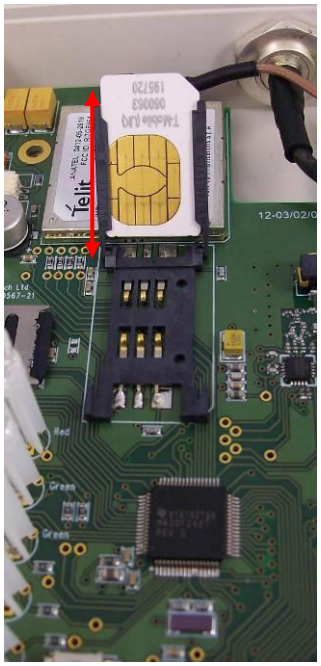
If not already equipped by HWM the SIM card can be installed using the following procedure:

- Remove the front cover
- Install the SIM card into the SIM card connector as shown below:

Locking/Unlocking the connector



Remove/insert the SIM Card



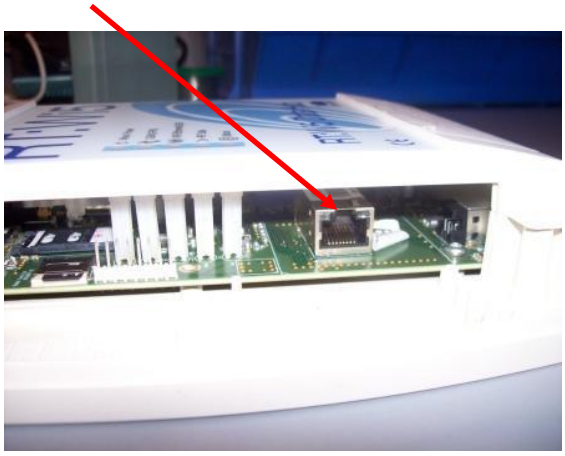
Please Refer to Product configuration paragraph for the procedure to change the concentrator's configuration.

2.3 Step 3: Connecting the product

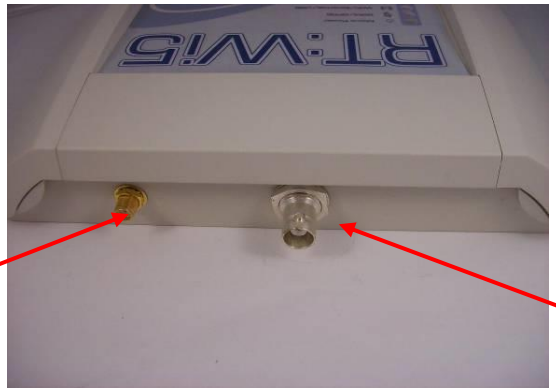
- In order to avoid GPRS transmission during shipping the backup battery is disconnected. Connect the battery connector as shown below (**not required for Ethernet versions):**

Only use the battery supplied with the unit. Failure to do so could result in product damage.

- Connect the Ethernet cable (if applicable)



- Reinstall the top cover
- Connect the external GSM and Radio antennas to the connectors as shown below:



If using a heavy RF cable for GSM or Radio connection use a strain relied on the cable to avoid stressing the connector, with excessive stress there is risk of cracking the case

- Connect the external Power Supply Unit DC connector into the location shown below:

- Connect the external Power Supply Unit to the wall mains socket

Only use the Power Supply Unit supplied with the unit. Failure to do so could result in injury and product damage.

There is no power switch on the unit, to power off the unit it is required to disconnect both the Power Supply Unit and the battery. So ensure the Power Supply Unit is accessible on site.

2.4 Step 4: Interpreting Front Panel LEDs

Your Wi5 unit has five LEDs on the front. Two versions of LED symbols exist, as shown in the diagram below. The LEDs are used to indicate the current status of the unit and indicate potential faults:

- **Mains Power (RED Color)**
  - Present : double flash every 2 seconds
  - No Mains power : one flash every 5 seconds
  - Battery Fault : LED alternates between on and off for equal times whilst the problem persists.

- **GSM/GPRS (GREEN Color)**
  - GSM ON : double flash every 2 seconds
  - GPRS transfer in progress : ON Steady

- **Ethernet/USB (GREEN Color) :**
  - Data Transfer (In/Out) : LED Flashes

- **RF Data– VHF or UHF version dependent (ORANGE LED):**
  - Data Coming In : LED flashes

- **Status (RED LED):**
  - No Fault: OFF
  - SIM card not recognized / no registration on the GSM network / poor GSM signal (less than 2 bars): single flash every 2 seconds
  - SD Card not recognized: double flash every 2 seconds
  - Time Synchronization failed : three flash every 2 seconds

    Note:
    - *For the first 2 minutes following power-up the status LED will flash while the unit is initializing, wait for at least 2 minutes before interpreting the status LED.*
    - *If a combination of faults exists the status LED flashing will alternate between error codes, for example:*
      - *Single Flash indicates GSM issue*
      - *2 seconds wait*
      - *Triplet Flash indicates the time synchronization did not take place*
      - *2 seconds wait*
      - *Single Flash…*

In order to confirm that the unit is fully operational ensure that the status of the LEDs is as follow:

- Mains Power (RED Colour) is **double flashing every 2 seconds**

- GSM/GPRS (GREEN Colour) is **either double flashing or constant ON**

- Ethernet/USB Status (GREEN Colour) is **OFF**

- RF Data – VHF or UHF version dependent (ORANGE LED) **is flashing when a test transmitter is activated**

- Status (RED LED) is OFF **; this should turn itself off ~2 minutes after powering on the unit**

If the status of the LEDs do not match with the above, please refer to the Troubleshooting section

2.5 Step 5: Confirming Data Transfer

Once the unit has been configured the system time should be checked. This can be done by typing “status” (without the quotes), the time and date will be displayed in the status response. To test the connection to the server:

- enter “dump reports” (without the quotes). If there are any active transmitters within range the Wi5 should display the packets ready to be sent.
- enter “upload reports” (without the quotes). The Wi5 should contact the specified server, send the data then confirm if the data transfer was successful.

If the status of the LEDs do not match with the above, please refer to the Troubleshooting section

3 Configuring

3.1 Configuration using USB port

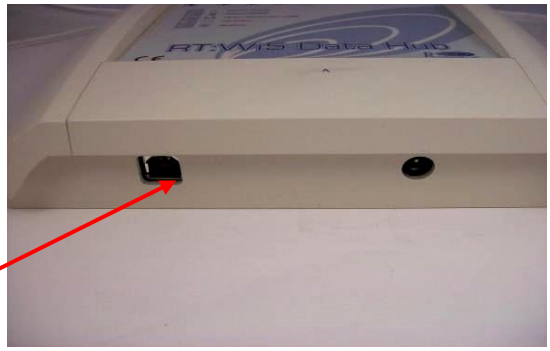
3.1.1 USB Driver

It is recommended to download and install the latest Windows Driver D2XX from FTDI website: http://www.ftdichip.com/Drivers/D2XX.htm before proceeding.

3.1.2 Connecting the USB cable

- A standard USB A/B connector is required. Ensure the unit has the Power Supply Unit connected and connect the USB cable as shown below:

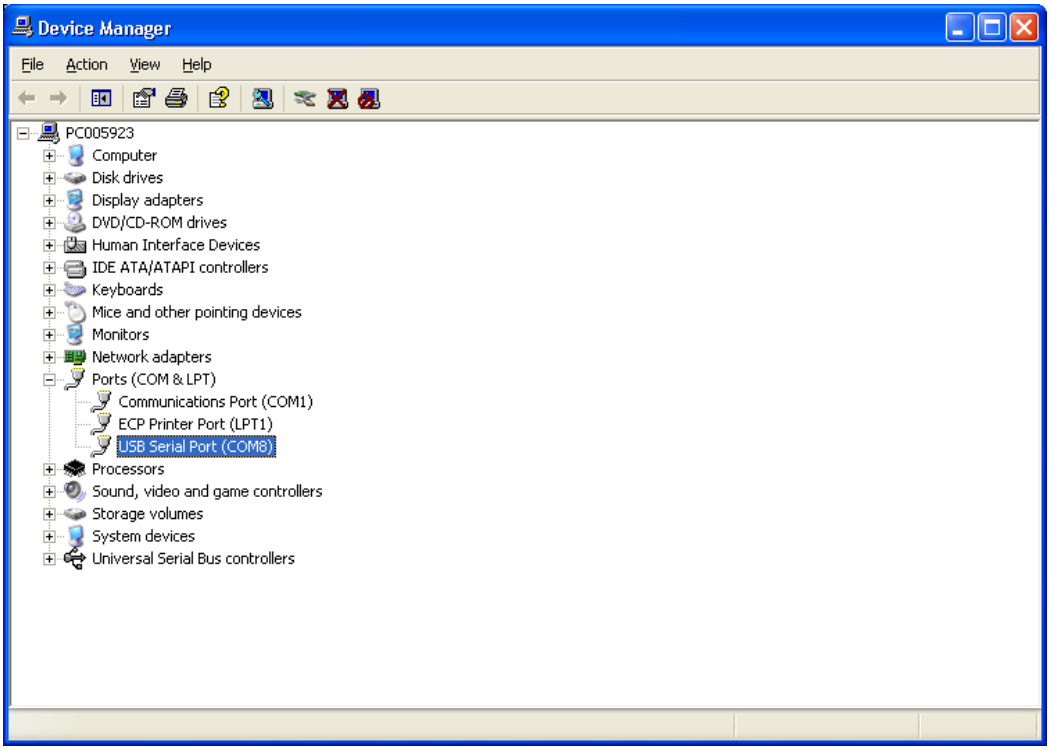
Connect here



If using your own USB cable ensure the total length is less than 3 meters

3.1.3 Finding the COM Port in Windows

- Click on Start Windows Menu
- Click on Settings
- Click on Control Panel
- Double Click on System
- Click on Hardware Tab
- Click on Device Manager
- Find the COM port number (in the following example COM8)



3.1.4 RS232 Communication Terminal Settings

Any standard RS232 Terminal program can be used with the concentrator (HyperTerminal, Putty,…), ensure the following settings are used :

- 8 bits, No Parity, 4800 bauds, 1 stop bit
- Com Port (see previous paragraph)
- No Flow Control
- End of line character Send and Receive is Carriage Return

Once connection is established, enter the STATUS command, unit should respond with configuration summary.

Example for GPRS version:

STATUS

11/07/12 15:04:41
Version 7.3
GSM Version 07.03.000
GSM Signal 28
Comms mode GSM
Logger ID ZZ99
Configuration disabled
Power status: Mains
SIM IP: 10.79.123.456
NTP server pool.ntp.org
NTP protcol SNTP
GPRS settings: radio:12345!@o2.wyless.net
Primary FTP settings: (undef):(undef)@gnetdata1.global-net.eu
Num retries 2
Secondary FTP settings: disabled
FTP period 60 minutes
FTP Mode Active
Whitelist unused
Blacklist unused
Reject time disabled
One per session disabled
Summary reports by FTP after 1440 minutes
Files sent 0
Bytes sent 0
CRC errors 0
GSM reboots 0
SD card: Used 262144, Free 2012061696

Refer to configuration commands paragraph for full list of available commands

3.2 Configuration using SMS (GPRS version only)

This functionality is only available on GPRS concentrators from firmware revision 6.2 onwards. If you have an older firmware revision, please consult Radio-tech for advice on firmware upgrade.

Note: Refer to section 1.7 regarding SMS availability before commencing.

3.2.1 Protocol

This mode is used to remotely configure the GPRS concentrator via SMS. The protocol works as follows:

STEP 1: User sends a SMS containing configuration commands

STEP 2: The concentrator gives an acknowledgment SMS to the user or to a different phone number (optional)

STEP 3: The concentrator processes the configuration request

STEP 4: The concentrator sends a summary report to the FTP server with updated configuration

3.2.2 Configuration SMS format

The configuration SMS should follow the following format:

COMMAND1
COMMAND2
…
Phone Number

where:

- **COMMAND1** ; **COMMAND2**; … are valid commands.


Refer to configuration commands paragraph for exact command syntax

Phone Number is an option. If present, the acknowledgment will be sent to this number instead. Phone number has to be expressed in an international format starting with + country code prefix.


The size of the SMS should not exceed 160 characters. If this is the case, extra characters will not be processed


There can be latency between the time the SMS is sent and the time the SMS is actually received by the concentrator. This latency is generated by the GSM network and is independent from the concentrator.

3.2.3 Acknowledgment SMS

The acknowledgment SMS is structured in the same order as the configuration SMS. Each command received with a correct syntax will be repeated. Each command received with an incorrect syntax will not be repeated but replaced by the word “USER FAIL”.

Example:

In the following example the SET FTP command has the wrong syntax

Configuration SMS

SET GPRS APN wyless.uk
SET FTP ADDRESS 123122

Acknowledgment SMS

SET GPRS APN wyless.uk
USER FAIL

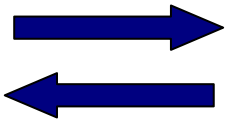
 **If an unknown command is contained in the configuration SMS it will not be acknowledged at all. This is to avoid sending unnecessary SMS when receiving SPAM**

3.3 Configure the unit to assist during radio transmitters installation via SMS (GPRS version only)

Note: Refer to section 1.7 regarding SMS availability before commencing.

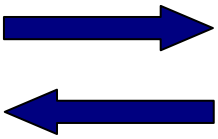
This mode can be used when installing transmitters on site to verify that radio packets are received successfully.

STEP 1 : Send install SMS to the concentrator phone number



STEP 2 : concentrator sends acknowledgement SMS back “OK” to the mobile phone

STEP 3 : Send normal SMS “NORMAL” to the concentrator phone number to reset the unit to initial configuration



STEP 4 : concentrator sends acknowledgement SMS back “OK” to the mobile phone

Mode of operation between steps 2 and 3 depends on the install SMS sent:

- "**INSTALL ALL A**" : concentrator sends SMS containing radio packet in ASCII when received
- "**INSTALL ALL B**" : concentrator sends SMS containing arrival time of radio packet when received
- "**INSTALL <ID> A**" : concentrator sends SMS containing radio packet in ASCII coming from transmitter <ID> , ID has to be the 6 digits Hex address of the transmitter, leading zeros are required
- "**INSTALL <ID> B**" : concentrator sends SMS containing arrival time of radio packet coming from transmitter <ID> , ID has to be the 6 digits Hex address of the transmitter, leading zeros are required
- "**INSTALL FTP**" : changes the FTP transmission period to 5 minutes, will resume to initial setting after 8 hours or if NORMAL SMS is sent.

3.4 Configuring Ethernet Model

The Wi5's IP address is set by default to obtain its IP address via DHCP server as configured by the factory.

To enter details for a fixed IP address refer to section 6.3.24 on page 44 for the appropriate commands.

From firmware V7.11 onwards the Wi5 has the ability to perform domain name lookup, so the NTP and email server addresses may be entered as domain names as well as IP addresses.

An example of Ethernet Status:

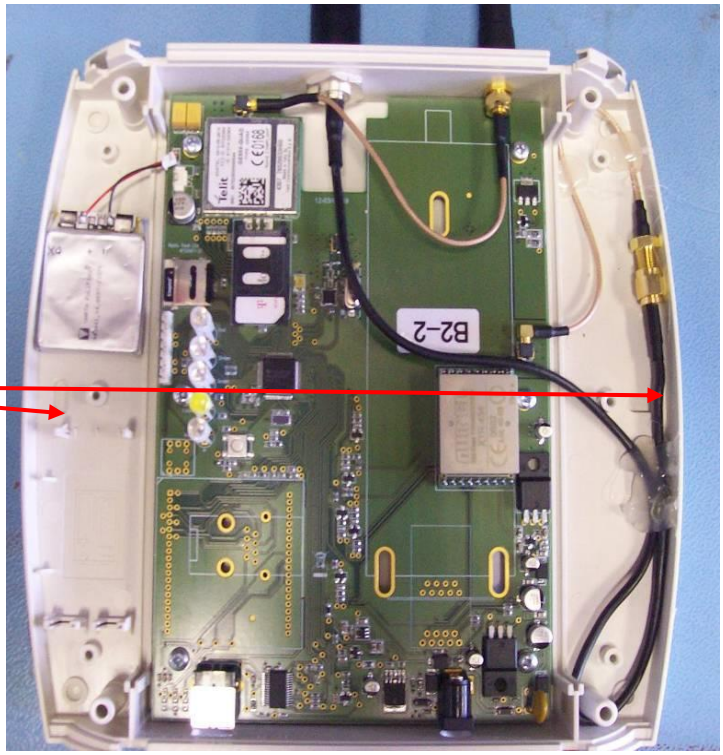
STATUS
02/12/13 10:10:17
Version 7.6
Comms mode ETHERNET
Static IP 10.19.0.254
Subnet mask 255.255.255.128
Default gateway 10.19.0.1
Logger ID CN99
Configuration VHF
Power status: Mains
NTP server 212.64.152.252
NTP server2 38.106.177.10
NTP server3 64.250.177.145
NTP protcol DAYTIME
Email settings: transmitter@gnet24.com:!nd3rTX@78.109.169.84 (port 25)
From: (undef)
To: inbound@gnet24.com
FTP period 120 minutes
Whitelist
0194B4
01940E
01D97C
01D97D
Blacklist unused
Reject time disabled
One per session FIRST
Summary reports by FTP after 1440 minutes
Files sent 20
Bytes sent 1428
CRC errors 0
SD card: Used 626688, Free 1998151680

4 Installation

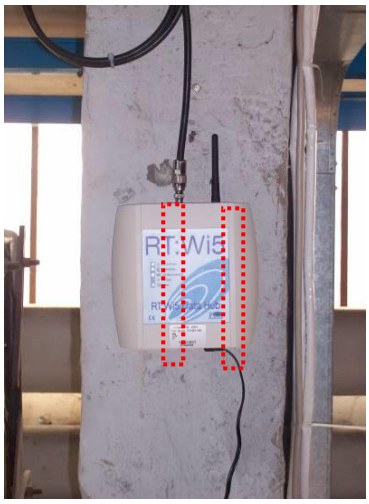
The concentrator is not waterproof and as a result suitable for indoor use only. If outdoor installation is required, optional IP66 enclosure must be used.

- Once the two side lids are removed, simply take off the front cover. The disassemble unit and wall mounting punch through holes are shown below:

Punch through holes locations



- Alternatively industrial Velcro can be used at the back (red boxes on the picture).



- Also ensure that Mains Power is securely mounted to avoid falling out.

For connections and tests, please refer to commissioning paragraph Steps 3 to 5

5 Troubleshooting Guide

Mains Power LED is single flashing

- Ensure that the PSU is plugged in the mains socket and the DC connector fully inserted in the GPRS concentrator
- Ensure that the PSU supplies 12VDC

No USB Connection

- Ensure the computer has the latest FTDI driver installed (see driver section in this manual)
- If GPRS LED is ON constantly, a FTP transfer is taking place, during this period of time incoming commands are not processed, wait until the GPRS LED double flashes
- Ensure the terminal software has the correct settings 8 bits, no parity, 1 bit de stop, 4800 bauds and the COM port selected is the one detected by Windows (see configuration paragraph)

Radio LED does not flash when test transmitter is activated

- Ensure the BNC antenna cable is connected properly
- Ensure the correct Radio freq. has been selected (see configuration)

SIM Card not recognized / no registration on the network / poor GSM signal (it may take up to one minute for LED to come off after adjustments below have been made)

- Ensure the SIM card is inserted properly
- Ensure GSM Antenna is connected properly
- Check that the area has sufficient coverage with the SIM card provider

SD Card not recognized

- Open the sides lids and remote front cover, ensure that the microSD card is there and connector is locked in place

No FTP files are received on the server

- Double check FTP settings : user name / password / server address
- Ensure SIM card has calling credit

6 Configuration Commands Description

6.1 Syntax

- <CR> stands for Carriage Return
- In the examples, the characters in bold are the characters entered by the user
- Commands are not case sensitive

6.2 Response Codes

- A “000” reply means the command was recognised
- A “001” reply means the command has an incorrect parameter
- A “Unrecognised command” reply means the command does not exist

6.3 Table of commands

Command	Function	GPRS	ETH	Page
HELP	List commands available	●	●	**29**
STATUS	Outputs concentrator configuration	●	●	**29**
SET DATETIME	Sets the date and Time Manually		●	**30**
SET TZONE	Sets the Time Zone	●	●	**30**
SET FTP ADDRESS	Sets FTP Server Address	●		**31**
SET FTP USER	Sets Username for FTP Server access	●		**31**
SET FTP PASS	Sets Password for FTP Server access	●		**31**
SET FTP PATH	Sets Destination Path within the FTP Server	●		**31**
SET FTP ADDRESS2	Sets Secondary FTP Server Address	●		**31**
SET FTP USER2	Sets Username for Secondary FTP Server access	●		**31**

Command	Function	GPRS	ETH	Page
SET FTP PASS2	Sets Password for Secondary FTP Server access	●		**31**
SET FTP PATH2	Sets Destination Path within the secondary FTP Server	●		**31**
SET FTP CONFIG	Performs a configuration script upload from a specific FTP server	●		**31**
SET FTP MODE	Set FTP Mode Passive or Active	●		**31**
SET GPRS APN	Sets Access Point Name for GPRS Connection	●		**33**
SET GPRS USER	Sets Username for GPRS Connection	●		**33**
SET GPRS PASS	Sets Password for GPRS Connection	●		**33**
SET GPRS CONFIG	Sets APN, username, password in one command	●		**33**
SET NTP ON	Enable Date/Time Synchronization	●	●	**34**
SET NTP OFF	Disable Time Synchronization	●	●	**34**
SET NTP PROTO	Set the time server protocol	●	●	**34**
SET NTP ADDRESS	Sets the server address for Date/Time Synchronization	●	●	**34**
SET NTP ADDRESS2	Sets the server secondary address for Date/Time synchronization	●	●	**34**
SET NTP ADDRESS3	Sets the server third address for Date/Time synchronization	●	●	**34**
FORCE SYNC	Used with Ethernet & GPRS. “Forces a time synchronisation operation using the NTP servers previously set”	●	●	**34**
SET CONFIG	Sets the radio receiver	●	●	**35**
GET CONFIG	Get the radio receiver configuration	●	●	**35**
SET NEXT FTP TIME	Sets the FTP or email transmission interval	●	●	**35**
SET SUMMARY TIME	Sets the Summary Report transmission interval	●	●	**36**
SET FTP RETRIES	Sets the number of retries before aborting FTP	●	●	**36**
DUMP REPORTS	Displays radio packets currently in memory	●	●	**36**

Command	Function	GPRS	ETH	Page
UPLOAD REPORTS	Uploads data held in memory (and not previously uploaded) to the programmes FTP/SMTP server.	●	●	**36**
GET VERSION	Displays Concentrator Firmware Revision	●	●	**38**
SET AC FAIL NUMBER	Sets the phone number to contact if mains failure	●		**38**
SET REJECT TIME	Sets the Reject Time Filter	●	●	**39**
GET REJECT TIME	Displays the Reject Time used for Filter	●	●	**39**
SET ONE PER SESSION	Sets the One Per Session Filter	●	●	**40**
GET ONE PER SESSION	Displays the One Per Session Filter Settings	●	●	**40**
ADD WHITELIST ITEM	Sets the White List Filter	●	●	**41**
GET WHITELIST	Displays the White List Filter Settings	●	●	**41**
CLEAR WHITELIST	Clears the White List	●	●	**41**
ADD BLACKLIST ITEM	Sets the Black List Filter	●	●	**42**
GET BLACKLIST	Displays the Black List Filter Settings	●	●	**42**
CLEAR BLACKLIST	Clears the Black List	●	●	**42**
SET EMAIL TO	Sets the destination email address for data		●	**43**
SET EMAIL FROM	Sets the origin email address		●	**43**
SET EMAIL SMTP	Sets the SMTP server address for emails		●	**43**
SET EMAIL USER	Sets the SMTP server username if required		●	**43**
SET EMAIL PASS	Sets the SMTP server password if required		●	**43**
SET EMAIL PORT	Sets the IP port of the email server (default 25)		●	**43**
RESET ETHERNET	Resets the Ethernet module to factory settings		●	**44**
UPGRADE	Upgrade Concentrator Firmware through GPRS	●		**44**
SDUPGRADE	Upgrade Concentrator Firmware from MicroSD card	●	●	**44**
SET STATIC IP	Sets the static IP address		●	**44**
SET GATEWAY IP	Sets the default gateway IP address		●	**44**

Command	Function	GPRS	ETH	Page
SET SUBNET MASK	Sets subnet mask		●	**44**
SET DNS ADDRESS	Sets DNS address		●	**44**

6.3.1 HELP

HELP <CR>	List all the commands available through the command line

Example

```
HELP
SET FTP ADDRESS x – set the primary FTP address
SET FTP USER x – set the primary FTP user name
SET FTP PASS x – set the primary FTP password
```

6.3.2 STATUS

STATUS <CR>	List the current configuration of the concentrator:

Example

```
STATUS

11/07/12  15:04:41
Version 7.3
GSM Version 07.03.000
GSM Signal 28
Comms mode GSM
Logger ID (undef)
Configuration disabled
Power status: Mains
SIM IP: 10.79.227.24
NTP server  pool.ntp.org
NTP _rotocol SNTP
GPRS settings: radio:tech3a6@o2.wyless.net
Primary FTP settings: (undef):undef)@gnetdata1.global-net.eu
Num retries 2
Secondary FTP settings: disabled
FTP period 60 minutes
FTP Mode  Active
Whitelist unused
Blacklist unused
Reject time disabled
One per session disabled
Summary reports by FTP after 1440 minutes
Files sent 0
Bytes sent 0
CRC errors 0
GSM reboots 0
SD card: Used 262144, Free 2012061696
```

6.3.3 SET DATETIME

SET DATETIME YYYYMMDDHHMMSS<CR>	***Available only from firmware revision 7.3*** Manually set the date and Time

Note! This feature is only to be used when the time server is not available. When running from its internal clock the time on the Wi5 will drift so it is not recommended that the Wi5 is run in this mode for extended periods.

Example

SET DATETIME 20120716120000 000

6.3.4 SET TZONE

SET TZONE x<CR>	***Available only from firmware revision 7.18*** Set the Time zone offset in ½ hour intervals. E.g. x=2 gives +1 hour offset or x=-5 gives -2.5 hours offset (Default is 0)

Example

SET TZONE 0 000

6.3.5 SET FTP

SET FTP ADDRESS x <CR>	Sets the primary FTP server address, the address x can be set as an IP or URL. **The address x cannot be longer than 31 characters**
SET FTP USER x <CR>	Sets the username for primary FTP connection **The username x cannot be longer than 15 characters**
SET FTP PASS x <CR>	Sets the password for primary FTP connection **The password x cannot be longer than 15 characters**
SET FTP PATH x <CR>	Sets the path from the root (/folder/) of the primary FTP server where the files will be transferred. By default the files will go in the root. If x is omitted, path will be set back to root.
SET FTP ADDRESS2 x <CR>	Sets the secondary FTP server address, the address x can be set as an IP or URL. The data will then be set to both primary and secondary server. **The address x cannot be longer than 31 characters** By default the secondary server is not used. If x is omitted, secondary server will not be used.
SET FTP USER2 x <CR>	Sets the username for secondary FTP connection **The username x cannot be longer than 15 characters**
SET FTP PASS2 x <CR>	Sets the password for secondary FTP connection **The password x cannot be longer than 15 characters**

SET FTP PATH2 x <CR>	Sets the path from the root (/folder/) of the secondary FTP server where the files will be transferred. By default the files will go in the root. If x is omitted, path will be set back to root.
SET FTP CONFIG user:pass@address/path <CR>	Performs a configuration script upload from a specific FTP server user is the username for FTP connection pass is the password for FTP connection address is the address of the FTP server path is the path within the FTP root of the text file used for configuration
SET FTP MODE x	***Available only from firmware revision 7.0*** Sets FTP Mode to active (default) or Passive X = 0 = ACTIVE X = 1 = PASSIVE (Default, from V7.6)

Note on secondary server usage:

- When using the secondary server, if a file transfer failure happens, the file will be retransmitted on both servers.
- If an authentication on the secondary FTP server fails, the file will not be retransmitted. This prevents from overflowing the primary server if the FTP settings for the secondary server are wrong.

Example

SET FTP ADDRESS global-net.eu
000

SET FTP USER user1
000

SET FTP PASS pass1
000

SET FTP CONFIG user:password@xxx.xxx.xxx.xxx/script.txt

SET FTP MODE 1
000

6.3.6 SET GPRS

SET GPRS APN x <CR>	Sets the Access Point Name for GPRS connection. **For firmware versions up to V7.9 the APN is limited to a maximum of 31 characters. From V7.10 onwards it can be up to 63 characters.**
SET GPRS USER x <CR>	Sets the username for GPRS connection **For firmware versions up to V7.9 the username is limited to a maximum of 15 characters. From V7.10 onwards it can be up to 31 characters.**
SET GPRS PASS x <CR>	Sets the password for GPRS connection **For firmware versions up to V7.9 the password is limited to a maximum of 15 characters. From V7.10 onwards it can be up to 31 characters.**
SET GPRS CONFIG apn,user,pass	Sets the complete GPRS configuration where apn is the GPRS Access Point Name user is the GPRS user name pass is the GPRS password **The maximum command length is 99 characters. If the GPRS parameters exceed this then use the individual commands above.**

Example

SET GPRS APN wyless.uk
000

SET GPRS USER user1
000

SET GPRS PASS pass1
000

SET GPRS CONFIG wyless.uk,user1,pass1

6.3.7 SET NTP

SET NTP ON <CR>	Enables Date/Time Synchronization every 24 hours (Default value)
SET NTP OFF <CR>	Disables Date/Time Synchronization
SET NTP PROTO <CR>	0 – DAYTIME Protocol (port 13) ***Note 1*** 1 – TIME Protocol (port 37) ***Note 2*** 2 – SNTP (port 123) ***Note 3***
SET NTP ADDRESS <CR>	Sets the server address for Date/Time Synchronization
SET NTP ADDRESS2 <CR>	Sets the secondary server address for Date/Time Synchronization ***Note 1***
SET NTP ADDRESS3 <CR>	Sets the third server address for Date/Time Synchronization ***Note1***

Note 1: ***The DAYTIME protocol is available from firmware V6.8 onwards. The time is updated once per day. For Ethernet variants using the HWM "Cliff" email server, the time will also be updated whenever a connection to the server is made.***

Note 2: ***The TIME protocol was added in firmware V6.8, but later removed in V7.11. Where available the time is updated once per day.***

Note 3: ***GPRS variant:*** ***The SNTP protocol is available from firmware V6.8 onwards. The time is updated once per day.***

Ethernet variant: ***The SNTP protocol was added in firmware V7.3, but later removed in V7.11. Where available, the time is updated once per week.***

Example

SET NTP ADDRESS 192.43.244.18 000

6.3.8 FORCE SYNC

FORCE SYNC	Forces a time synchronisation process with the NTP server

6.3.9 CONFIG

 **This is normally set during manufacture and should no be changed. Advise HWM before changing this parameter**

SET CONFIG x<CR>	Sets the Radio Receiver to be used, x can be: 0 – none 1 – UHF Module 2 – UHF Internal 3 – VHF Module
GET CONFIG <CR>	Gets the current Radio Receiver configuration

6.3.10 SET NEXT FTP TIME

SET NEXT FTP TIME x<CR>	Sets the interval in seconds between each transfer of data from the Wi5 to the ftp or email server x is expressed in seconds – default 3600 sec

Example

SET NEXT FTP TIME 3600 000

6.3.11 SET SUMMARY TIME

SET SUMMARY TIME x<CR>	Sets the interval in seconds between each summary report transfer – the summary report will contain unit configuration x is expressed in seconds – default is once a day

Example

SET SUMMARY TIME 600 000

6.3.12 SET FTP RETRIES

Advise HWM before changing this parameter

SET FTP RETRIES x<CR>	Sets the number of time will attempt to connect to the FTP server before aborting the current transmission

6.3.13 DUMP REPORTS

DUMP REPORTS<CR>	Displays the radio packets in memory which will be transferred on the next FTP session

Example

DUMP REPORTS
20090508100548810 0E2AC480003C060DA4F
20090508100548820 11BE209002B8000F08D
20090508100549A016F1E46815D00002D5E
20090508100549820 16FAE03002C0197C2B8
20090508100549820 16FAE03002C0197C2B8
20090508100550 8A016E960600CD010E8A9C
20090508100550820 0C67A43002801982860
20090508100550820 0442407002B8FFFA353
20090508100550 8A016F1446815D00002DF4
20090508100550820 1250C09002B80003800
20090508100551820 151E20900298000BA89
20090508100551820 16FAA03002C019C82FB
…

6.3.14 UPLOAD REPORTS

UPLOAD REPORTS<CR>	Uploads data held in memory (and not previously uploaded) to the programmed FTP/SMTP server,

6.3.15 GET VERSION

GET VERSION<CR>	Displays the current Concentrator Firmware Revision

Example

GET VERSION Version 4.4 000

6.3.16 SET AC FAIL NUMBER

Note: Refer to section 1.7 regarding SMS availability before commencing.

SET AC FAIL NUMBER x <CR>	Sets the phone number to contact in case of Mains Power failure. A SMS will be sent to this phone number 2 minutes after mains power failure. X is the phone number in international format if x is omitted function is deactivated (Default)

Example

SET AC FAIL NUMBER +44xxxxxxxxx 000

6.3.17 REJECT TIME FILTER

SET REJECT TIME x<CR>	Sets the reject time filter in seconds. If this filter is set, if a particular transmitter transmits several times within a period of x seconds, only the first packet will be kept. If x is omitted, function is disabled (Default)
GET REJECT TIME <CR>	Displays the current reject time in seconds

Example

SET REJECT TIME 10 000

6.3.18 ONE PER SESSION FILTER

SET ONE PER SESSION x<CR>	Sets the one per session filter. This filter is used to force only one radio packet per transmitter to be sent for each FTP session. X can be set to: FIRST – only first packet of each transmitter will be sent FIRST xx – only first packet of each transmitter type xx will be sent (xx is the type, for example 81 if pulse transmitter) – filter does not apply to other transmitter types FIRST NOT xx – same but filter applies to all transmitter types except transmitters type xx LAST – only last packet of each transmitter will be sent LAST xx – only last packet of each transmitter type xx will be sent LAST NOT xx – same but filter applies to all transmitter types except transmitters type xx If x is omitted filter is deactivated (Default)
GET ONE PER SESSION<CR>	Displays the current configuration of one per session filter

Example

The command below will set the unit to only send the first message received from type 81 transmitters (pulse). All subsequent messages from the same type and ID will be rejected. The filter will not apply to all the other transmitters.

SET ONE PER SESSION FIRST 81 000

6.3.19 WHITE LIST FILTER

ADD WHITELIST ITEM x<CR>	Sets the white list filter. This filter is used to accept packets from particular transmitters x can be set to: XX – Accept only transmitters from a particular type XXXXXX – Accept only transmitters with a particular address (Address is Hex coded and has to be 6 digits long with leading zeros) The list can contain up to 50 items. The list is empty by default.
GET WHITELIST<CR>	Displays the current configuration of white list filter
CLEAR WHITELIST<CR>	Clears the white list content

Example

The command below will set the unit to send messages received from transmitter ID 1A1A1A. All other messages will be rejected.

ADD WHITELIST ITEM 1A1A1A 000

6.3.20 BLACK LIST FILTER

ADD BLACKLIST ITEM x<CR>	Sets the black list filter. This filter is used to reject packets from particular transmitters x can be set to: XX – Reject only transmitters from a particular type XXXXXX – Reject only transmitters with a particular address (Address is Hex coded and has to be 6 digits long with leading zeros) The list can contain up to 50 items. The list is empty by default.
GET BLACKLIST<CR>	Displays the current configuration of white list filter
CLEAR BLACKLIST<CR>	Clears the black list content

Example

The command below will set the unit to reject messages received from transmitter ID 1A1A1A. All other messages will be sent.

ADD BLACKLIST ITEM 1A1A1A 000

6.3.21 SET EMAIL

SET EMAIL TO x <CR>	Sets the email destination address for data, the address x is an email address. **Max. address length is 31 characters.**
SET EMAIL FROM x <CR>	Sets the origin email address for data, the address x is an email address. **Max. address length is 31 characters.**
SET EMAIL SMTP x <CR>	Sets the smtp server address to use for emails. Address is to be entered in IP address form. **Max. address length is 31 characters.**
SET EMAIL USER x <CR>	Sets the smtp server username for secure access (if required) **Max. username length is 31 characters.**
SET EMAIL PASS x <CR>	Sets the smtp server password for secure access (if required) **Max. password length is 31 characters.**
SET EMAIL PORT xxx <CR>	***Available only from firmware revision 7.3*** Sets the port of the email server, default port 25 range 0 to 999

Example

SET EMAIL TO test@gnetdata.global-net.eu
000

SET EMAIL FROM ID@gnet24.com
000

SET EMAIL SMTP xxx.xxx.xxx.xxx
000

SET EMAIL USER username
000

SET EMAIL PASS password
000

SET EMAIL PORT 587
000

6.3.22 RESET ETHERNET (Ethernet only)

RESET ETHERNET<CR>	Resets the internal Ethernet module to its initial factory settings.

6.3.23 UPGRADE

 **These commands should not be required and HWM must be consulted before using these.**

UPGRADE x<CR>	Performs a remote firmware upgrade using GPRS
SDUPGRADE x<CR>	Performs a firmware upgrade using microSD card

6.3.24 FIXED IP ADDRESS (Ethernet only)

SET STATIC IP x.x.x.x	Sets the static IP address. Eg 192.168.0.123 The unit is set for DHCP as default. If you are required to return to using DHCP after using a static IP address then enter 0.0.0.0 with this command. ***Note 1***
SET SUBNET MASK x.x.x.x	Sets the subnet mask. Eg 255.255.255.0 ***Note 1***
SET GATEWAY IP x.x.x.x	Sets the default gateway IP address. Eg 192.168.0.1 ***Note 1***
SET DNS ADDRESS x.x.x.x	Sets the domain name server address if using domain name addressing. ***Note 2***
NB: Please ensure that when configuring the above settings that the broadcast address is not implemented as this could cause problems with your LAN (there is no check for this with data entry).	

Note 1: ***The STATIC, SUBNET MASK and GATEWAY addresses are available from firmware V7.6 onwards.***

Note 2: ***The DNS address is available from firmware V7.11 onwards.***

7 FTP File or Email Content

The filename or email subject is unique and comprises of the logger ID and the data and time stamp.

For example:

0003_20061215111527.txt

0003 is the logger ID
2006 – Year
12 – Month
15 – Date
11 – Hour
15 – Minute
27 - Seconds

Starting with applications such as AMR, Vehicle ID and attendance monitoring, etc, incoming data is appended with a time and date stamp before forwarding on a (n)-minute interval. In applications such as bulk meter reading down to the second reading is not required as a total for the day is required, hence a single time and date stamp can be applied to a whole packet of data which is delivered once per day.

Time and Date	Data
Time and Date	Data
Time and Date	Data
Time and Date	Data
Time and Date	Data
Time and Date	Data
Time and Date	Data
Time and Date	Data

Time and date stamped file

The above is an example of a time and date stamped file format on an individual basis.

An typical example of the contents of a file are shown below:

```
20061215110603810OC10C0100001D60A4B3
20061215110758810OC10601000013AFE02D
20061215110807810OADB2110000AD0BE647
20061215111104810OC10A0100001DA22544
20061215111247810OC11001000012AD628A
20061215111419810OC10E0100001CAFE495
20061215111458810OC10801000027A8B601
```

This document assumes that the user has the ability to manipulate files using standard software packages or custom written applications. Hence, is able to extract the data into tabular form and separate the data into the fields required.

Hereafter in this document we assume that the file has been successfully delivered and opened in a standard editing or similar package.

Ultimately we anticipate that uses will go on to write their own applications and hence will decode the CRC check sum and use this as a method of data validation.

Time and Date Stamp Format

The time and date stamp follows the following format

-------Year -------		Month	Day	Hour	Min	Sec
20	06	12	15	11	14	30

The data can be either treated as decimal or hex values as there is no difference in the output data file.

Data Packets

The packets vary depending on the type of data being received at the hub. The ID message is important as it lest you identify the type of data before decoding begins.

7.1 Pulse Transmitter VHF (VHF – type 81)

Typ	-------Unit/ID---------			Status	------Pulse Count-----		Lvl/Ctr	----CRC--	
$81	$00	$12	$23	$00	$01	$12	$AA	$A4	$??	$??
$81	$01	$22	$00	$00	$00	$00	$01	$A8	$??	$??

Where taking line 1 as way of example

Type 81 = Pulse transmitter

Address = 001223(Hex)

Status = Low Battery and Firmware Revision Number
Bit 7 set for low battery
Bits 0-3 indicate the firmware revision number

Pulse count = 0112AA(Hex) ⇔ 70314 (decimal)

SLvl/Ctr – Signal Level = A =10 decimal (Varies from 0-10)
Ctr = 4 (Counts from 0 -15)

The SLvl is only available on VHF systems

CRC - ???? (dependant upon code content, does not include ID byte)

The VHF transmitter provides a signal Level value between 0-10 indicating the level of the RF signal received. This can be used to determine the quality of the signal being received.

7.2 Temperature measurement (UHF – type 82)

Type	----Transmitter ID---		Status	----Temp1----		----Temp2-----		----CRC----	
$92	$00	$12	$23	$00	$0F	$C3	$00	$34	$??	$??
$82	$01	$22	$00	$00	$00	$20	$00	$38	$??	$??

Where taking line 1 as way of example

Type 82 = Temperature transmitter

Address = 001223(Hex)

Status = Low Battery and Firmware Revision Number
Bit 7 set for low battery
Bits 0-3 indicate the firmware revision number

Temp1 = 0FC3 where
0F indicates negative temperature
C3 (=195 decimal) translates as (256–195))/2 = -30.5C (decimal)
Temp2 = 0034 where
00 = +ve temperature 34 = 34(hex)/2 = 26C (decimal)

CRC - ???? (dependant upon code content, does not include ID byte)

7.3 Humidity & Temperature Measurement: (UHF - type 83)

Type	----Transmitter ID---		Status	---Humidity---		Temperature		----CRC-----	
$83	$00	$11	$66	$01	$05	$44	$17	$A9	$FB	$5A
$93	$00	$11	$64	$01	$04	$AC	$18	$C5	$7E	$AD

Where taking line 1 as way of example:

Type 83(Hex) = Humidity & Temperature transmitter

Address = 001166(Hex)

Status = Low Battery and Firmware Revision Number
Bit 7 set for low battery
Bits 0-3 indicate the firmware revision number.

Note: There are two versions of message content that can originate from a type 83 transmitter. To correctly interpret the data values, inspect bits 0-3 of the Status field, and then determine which methods of data conversion apply.

- When bits 0-3 have a value of '3', or less, then use "Method 1".
- When bits 0-3 have a value of '4', or more, then use "Method 2".

(In this example, Status bits 0-3 have a decimal value of 1. Therefore, data conversion Method 1 applies).

CRC - ???? (dependent upon code content, does not include ID byte).

Method 1:

Temperature Conversion (approximate):
Temperature (deg C) =
(RawTemp x 0.01) – 40.

Temperature Conversion (precision):
Temperature (deg C) =
$(RawTemp \times 0.01) - 39.7 - ((RawTemp - 7000)^2 \times 0.00000002)$.

Humidity conversion (at approx. 25 deg C):
Humidity (%) =
$(RawHum \times 0.0405) - 4 - (RawHum^2 \times 0.0000028)$; termed rh_linear.

Humidity conversion (temperature compensated):
HumidityTrue (%) =
rh_linear + ((Temperature (in deg C) – 25) x (0.01 + (RawHum x 0.00008))).

Method 2:

Temperature Conversion (precision):
Temperature (deg C) = (175 x RawTemp / 65535) – 45.

Humidity conversion (temperature compensated):
HumidityTrue (%) = 100 * RawHum / 65535.

7.4 Alarm Monitoring (UHF – type 88)

Type	----ADDRESS-----			Status	-----Pulse Count----			Ctr	-----CRC-----	
$88	$00	$12	$23	$00	$01	$12	$AA	$34	$??	$??
$98	$01	$22	$00	$00	$00	$00	$01	$38	$??	$??

Where taking line 1 as way of example

Type 88 = alarm transmitter

Address = 001223(Hex)

Status = Low Battery and Firmware Revision Number
Bit 7 set for low battery
Bit 4 set for alarm active, clear for ok
Bits 0-3 indicate the firmware revision number

Pulse count = 0112AA(Hex)

Ctr - Incremental Counter (00 – FF)

CRC - ???? (dependant upon code content, does not include ID byte)

7.5 Contact Monitoring (UHF – type 87)

Type	---- ADDRESS	----	Status	------Pulse Count-----			Ctr	----CRC-----	
$87	$00	$12	$23	$00	$01	$12	$AA	$34	$??	$??
$97	$01	$22	$00	$00	$00	$00	$01	$38	$??	$??

Where taking line 1 as way of example

Type 87 = Contact transmitter

Address = 001223(Hex)

Status = Low Battery and Firmware Revision Number
Bit 7 set for low battery
Bit 4 set for contact closed, clear for contact open
Bits 0-3 indicate the firmware revision number

Pulse count = 0112AA(Hex)

Ctr - incremental Counter (00 – FF)

CRC - ???? (dependant upon code content, does not include ID byte)

7.6 Legionella Flushing Unit (UHF – type 7A)

Type	---- ADDRESS	----	Status	---- Temp----	-----	ADC------	----	CRC-----	-----
$7A	$00	$12	$23	$23	$00	$ED	$01	$2C	$??	$??

Where taking line 1 as way of example

Type 7A = Legionella Flushing unit

Address = 001223(Hex)

Status = 23 (Hex) (Cold Water Valve Open / Software version 3)

Bit number	Function
0	0 – 2 software version
1	
2	
3	**Flow Fault** A) When the hot or cold water valve is open and if this bit is set, this indicates no water is detected. B) When the hot or cold water valve is closed and if this bit is set, this indicates water is detected.
4	**Hot Water Valve Open** set when hot water valve is open
5	**Cold Water Valve Open** set when cold water valve is open
6	**Temperature Probe Fault** set when probe is open or short circuit
7	**Low Battery Warning** set when battery is low

Temp MSB and Temp LSB = ED (Hex)
Bit 7 of MSB if set indicate a negative temperature.
Temperature = (Temp) / 10
(0x00ED) / 10 = 23.7°C

ADC MSB and ADC LSB = Raw ADC values (for factory use only)

CRC = ???? see CRC paragraph for algorithm

7.7 Current/Voltage/CO_2 Transmitter (UHF - type 85)

Type	--- ADDRESS	-----	Status	----	-ADC----		--NOT USED-		----CRC-----	
$85	$00	$12	$23	$03	$00	$00	$00	$00	$??	$??

Where taking line 1 as way of example

Type 85 = Current/Voltage/CO_2 Transmitter

Address = 001223(Hex)

Status = Low Battery and Firmware Revision Number
Bit 7 set for low battery
Bits 0-3 indicate the firmware revision number

ADC MSB and ADC LSB = Raw ADC values

ADC = Raw ADC value (10-bit MSB first)

Voltage:	0 – 10 V	=>	ADC 0 – 1000	(nominal)
Current:	0 – 20 mA	=>	ADC 0 – 800	(nominal)

For best accuracy use the calibration chart provided with each transmitter.

CO_2: 0 – 2000 ppm 0 -10 V sensor => ADC 0 – 1000

For other sensors scale appropriately.

CRC = ???? see CRC paragraph for algorithm

7.8 Checksum Calculation

A CRC-16 checksum is implemented on every message to detect any bit errors in the message. The checksum calculation is only used to detect errors but cannot correct them.

The crc generating polynomial used is: $x^{16} + x^{15} + x^2 + 1$

CRC Algorithm :

1. Load a 16 bit register with all 1s'
2. Exclusive OR the first 8 bit byte with the high order byte of the 16 bit register, putting the result in the 16 bit register
3. Shift the 16 bit register one bit to the right
4. If the bit shifted to the right is a 0
   return to step 3
   Else
   Exclusive OR the generating polynomial 1010 0000 0000 0001 with the 16 bit register
5. Repeat steps 3 & 4 until 8 shift have been performed
6. Exclusive OR the next 8 bit byte with the 16 bit register
7. Repeat step 3 through 6 until all bytes of the message have been exclusive OR'd with the 16 bit register and shifted 8 times
8. The contents of the 16 bit register are the 2 byte CRC error check and is added to the message msb first.

Code Example

The following example shows how the CRC can be verified in ‘C’

```
#include <stdio.h>

/************************************************************
 Sample code to check CRC data from a Wi5

 The sample data starts from the transmitter type, it does not
 include the Date Time Stamp.  The transmitter type is
 included in the data packet sent to the crc_check routine
 even though the type byte is not included in the CRC check.
 This is to maintain compatibility with the User guide.

************************************************************/

typedef enum{
  CRC_OK,
  CRC_NG
}ENUM_CRC_CHECK;

ENUM_CRC_CHECK crc_check(unsigned char *d)
  {
    unsigned short CRC;
    int count, count2;

    CRC = 0xffff;
    d++;

    for(count2 = 0; count2 < 8 ; count2++)
      {
       CRC ^= *d++;
       for(count = 0; count < 8; count++)
         {
           if(CRC & 1)
             CRC = (CRC >> 1) ^ 0xa001;
           else
             CRC = (CRC >> 1);
         }
      }

    if((((CRC>>8) & 0xff)==d[1]) && ((CRC & 0xff)==d[0]))
      return CRC_OK;


   return CRC_NG;

  }


int main(void)
{
  /*Test example which passes CRC check*/
  unsigned char data[]={0x81,0x02,0xB4,0x69,0x02,0x00,0x00,0x15,0x94,0x4A,0x1F};

  if(crc_check(data)==CRC_OK)
     printf("CRC OK\n");
  else
     printf("CRC NG\n");
}
```

7.9 Examples of messages

VHF Pulse Transmitters:

200502201312018100 1CB816016EDF5A775B

Date & Time	*20050220131201*
ID Type	*81=Pulse Counter*
Address	*001CB8 (HEX) = 00007353 (dec)*
Status	*16 (battery + Version)*
Pulse Count	*016EDF (HEX) = 00093919 (dec)*
Signal Strength	*5 = RF Signal Level 5*
Frame Counter	*A (packet counter from 0 to F)*
CRC	*775B (Hex 16-bit)*

UHF Pulse Transmitters:

200502201312018100 1CB816016EDF5A7767

Date & Time	*20050220131201*
ID Type	*81=Pulse Counter*
Address	*001CB8 (HEX) = 00007353 (dec)*
Status	*16 (battery + Version)*
Pulse Count	*016EDF (HEX) = 00093919 (dec)*
Frame Counter	*5A (packet counter from 00 to FF)*
CRC	*7767 (Hex 16-bit)*

UHF Temperature Transmitters

20050220131203 82 003170 07 0006 8FFF1A49

Year	*2005*
Month	*02*
Day	*20*
Time	*13:20:13*
Message Type	*82 = Temperature*
Address	*003170 (H)*
Status	*07*
Temperature 1	*0006 = 3 deg C*
Temperature 2	*8FFF (H) = Invalid Temperature*
CRC	*1A49(Hex 16-bit)*

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