



GSM 2

4 – 20mA Mirror Operation & Wiring Manual

Revision 1.4 Jan 2017

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Description

The Multi-Port Controller is a device for measuring analogue and digital inputs and providing analogue and digital outputs.

Measurement information may be relayed by GPRS and (optionally) satellite to a server. When connected to the server information may be downloaded and used for the control of the outgoing analogue and digital connections.

The unit is highly configurable. There is one fixed analogue input and one fixed output. The remaining six ports may be any mixture of inputs or outputs, as well as being available for future development of other sensors and controllers.

These ports are accompanied by 4 fixed digital inputs and 5 fixed digital outputs. One digital output is reserved for status indication to the host system.

In a mirror configuration GSM 2 Unit A and GSM 2 Unit B are used in the place of a hard wired connection.

4 to 20mA inputs on Unit A are mirrored on Unit B's 4 to 20mA outputs (and visa versa) and the same of true of the digital inputs / outputs.

The delay in mirroring changes is dependant on sample rate, which is configurable from 1 minute upwards.

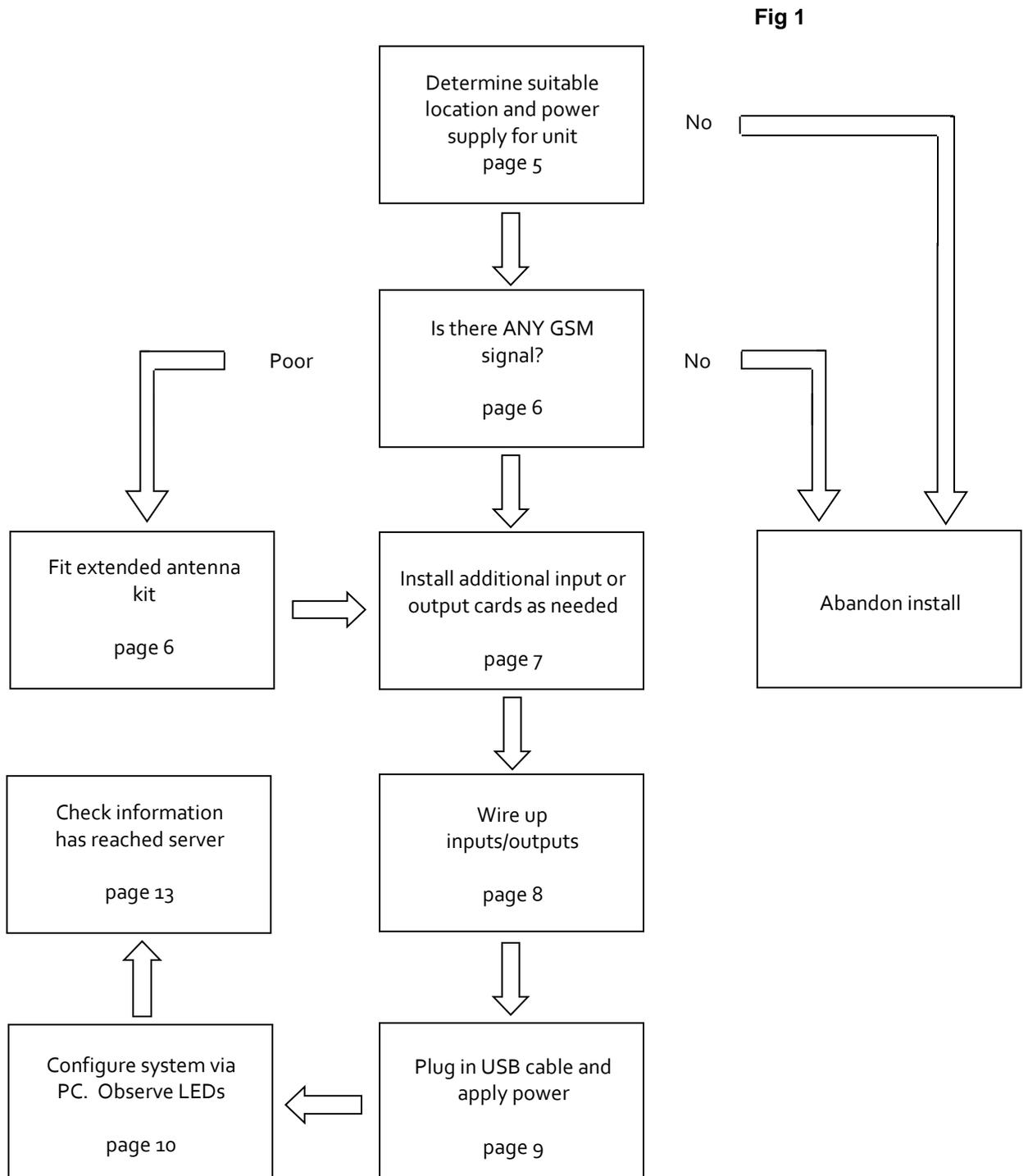
The unit may be fitted with a "roaming" SIM card. When it has a roaming SIM it is capable of connecting to any operator* and in the event of connection problems will swap operators without interrupting the mirroring operation (Bump less transfer) .

Should the loss of connection continue (no usable mobile operator signal available) , after a settable default time ,the unit will indicate failure to the host and operate in a configurable "fail mode" , also configurable until connection can be automatically re-established. The system will then return to normal working automatically. All monitored by a 'system fail' monitor relay available for telemetry and indication purposes.

* Which operators are available is dependant on the provider; the unit will only try those available.

Installation and Commissioning

The installation is carried out following the flowchart shown in fig 1. Each step is clarified in the text below.



Location and Power Supply

Locating the enclosure

Dimensions:

- Length: 213mm 8.4inches
- Width: 185mm 7.3 inches
- Height: 102mm 4.0 inches

The unit is housed in an enclosure which has limited protection from water ingress. The unit should not be placed in areas of high humidity or where water may be present for long periods.

Sufficient space should be left around the enclosure for the antenna, cable entry and cooling.

Cable entry is from the bottom. IP65+ rated glands should be used to retain existing IP rating and give strain relief.

Power Supply

- 10-30 volts DC
- 120 mA minimum (25ma per extra analogue input /output card and 50ma extra per driven relay) .

GSM Signal Availability

Using a mobile phone (or preferably a Simranger 2G / 3G scanner) check to see if a mobile phone signal is present. If the signal is present but very low, consider the use of an extended antenna kit outlined below as signals can drift vastly in different weather and atmospheric conditions.

As this equipment is capable of steering to connect to multiple operators (roaming) it is important to have as many operators/network providers within range as possible. The scanner (and even the unit itself ^{see Fig 2}) will report which are in range and available. eg :

Fig 2

STATUS	
Current Operator	vodafone UK
Signal	- 96dB
Connection Status	Connected 3G
Operators in area	vodafone UK 3G vodafone UK 2G EE 2G O2 - UK 3G O2 - UK 2G EE 3G
Current Server	ww1.myserver.com/relay

Extended Antenna Kit

Should the unit be fitted into a metal cabinet or the signal is low then the antenna will need to be located for maximum signal.

The extended antenna kits comprise a cable and antenna. The antenna style is selected either for gain or vandal resistance.

The cable length should be selected as short as possible to prevent losses.

Should the cable requirement exceed 10 meters low loss cables and connectors will need to be specified, and the antenna have a gain of more than 3dB

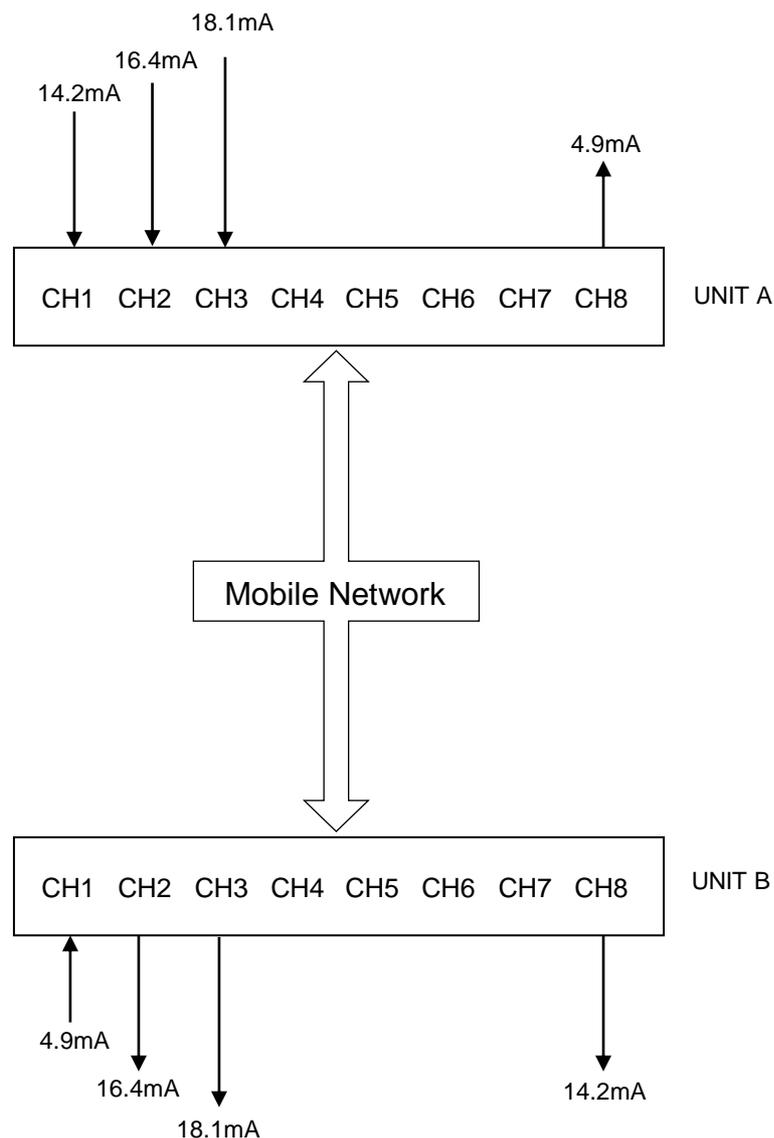
Antennas should be fitted away from trees etc and as high as practical.

Installation of Additional Analogue Cards

- **Channels 2 through 7 are entirely optional.** Input or output cards may be fitted, or left out as required.
- **Note - Channel 1 is a fixed input and channel 8 is a fixed output.** In operation, any input on channel 1 is always mirrored as output on channel 8 of the remote end.
- **Channels 2 to 7 – these can be either analogue input cards or output cards fitted to suit the application.** (This gives you up to 7 analogue inputs or analogue outputs or a combination of either!)
- **Note-** the screen printing on the GSM 2 PCB for correct fitting of the additional analogue input or output cards required in the appropriate slots.

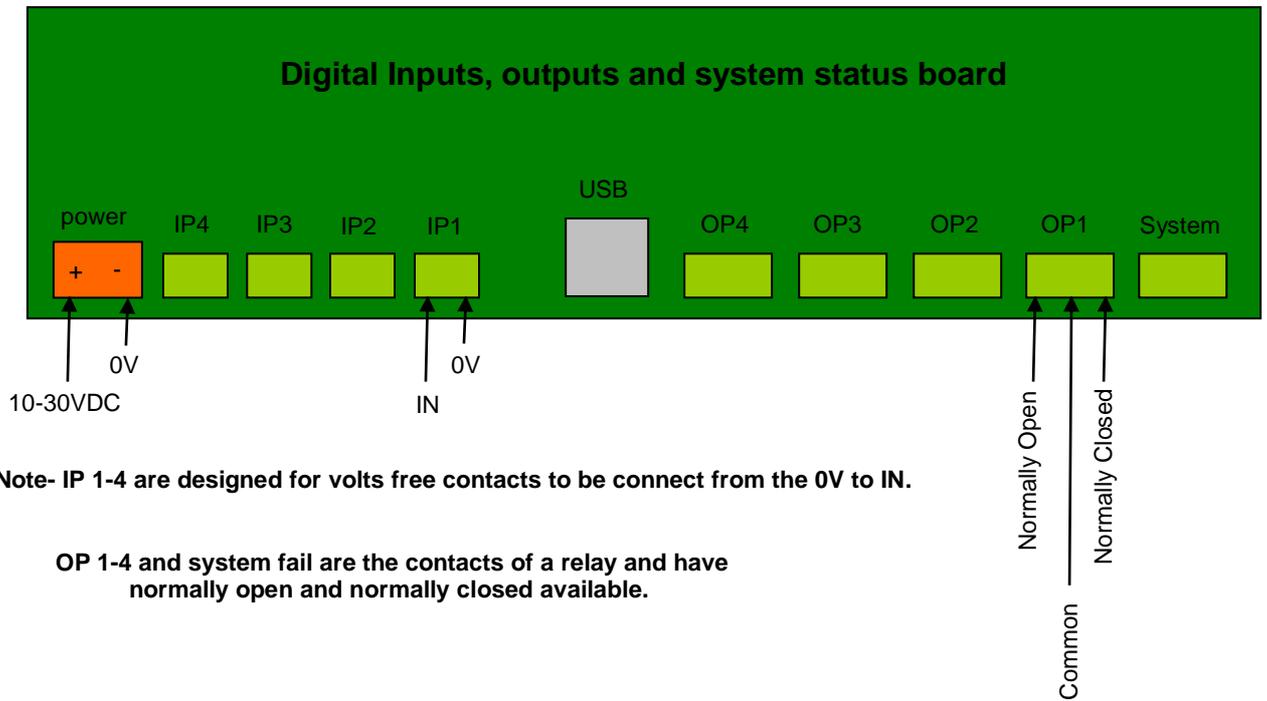
ALWAYS POWER UNITS OFF PRIOR TO FITTING ADDITIONAL CARDS.

On one unit, an output must be used on the corresponding channel of the remote unit. ie – if you have an analogue input connection card fitted on say channel 3 this will be 'mirrored' and outputted using channel 3 (analogue o/p card) fitted on the paired remote unit etc. See diagram below:

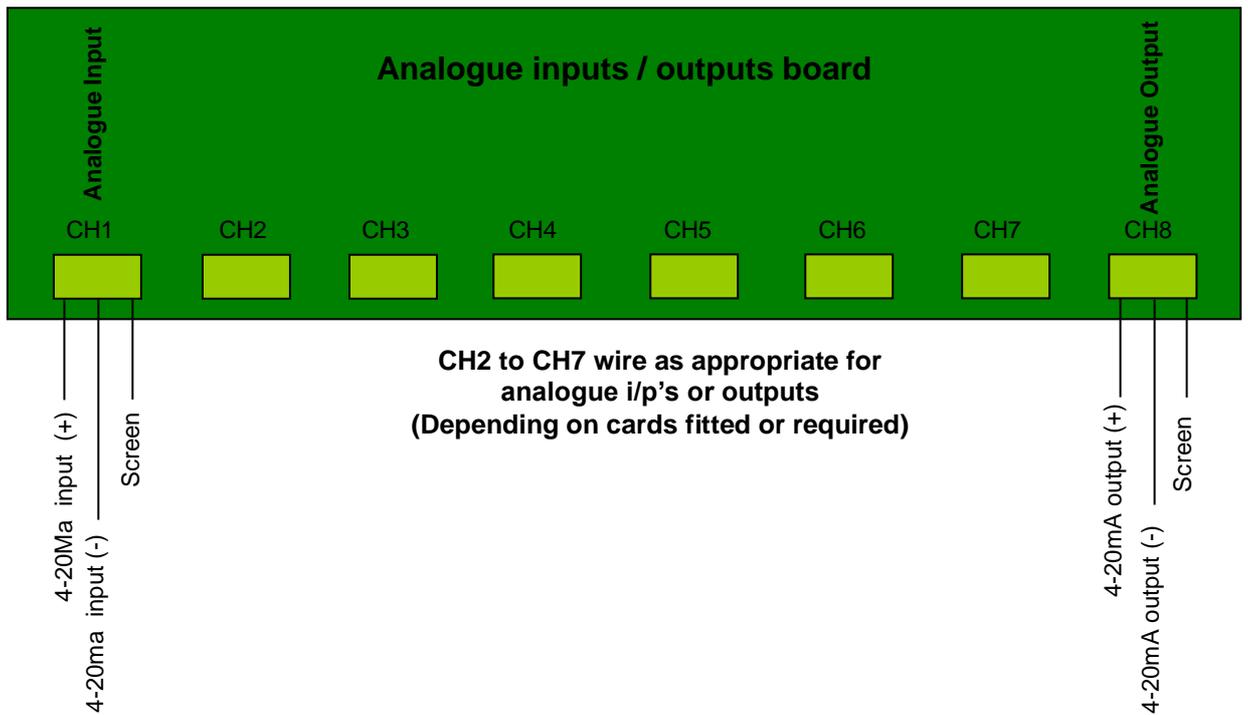


Wiring of Inputs/ Outputs

Base PCB – power, digital I/O and system status



Top PCB – analogue inputs and outputs



USB Comms Cable between Simranger GSM 2 and PC / Laptop

- **Required cable** - USB A to B connection (**Printer to PC type cable**).

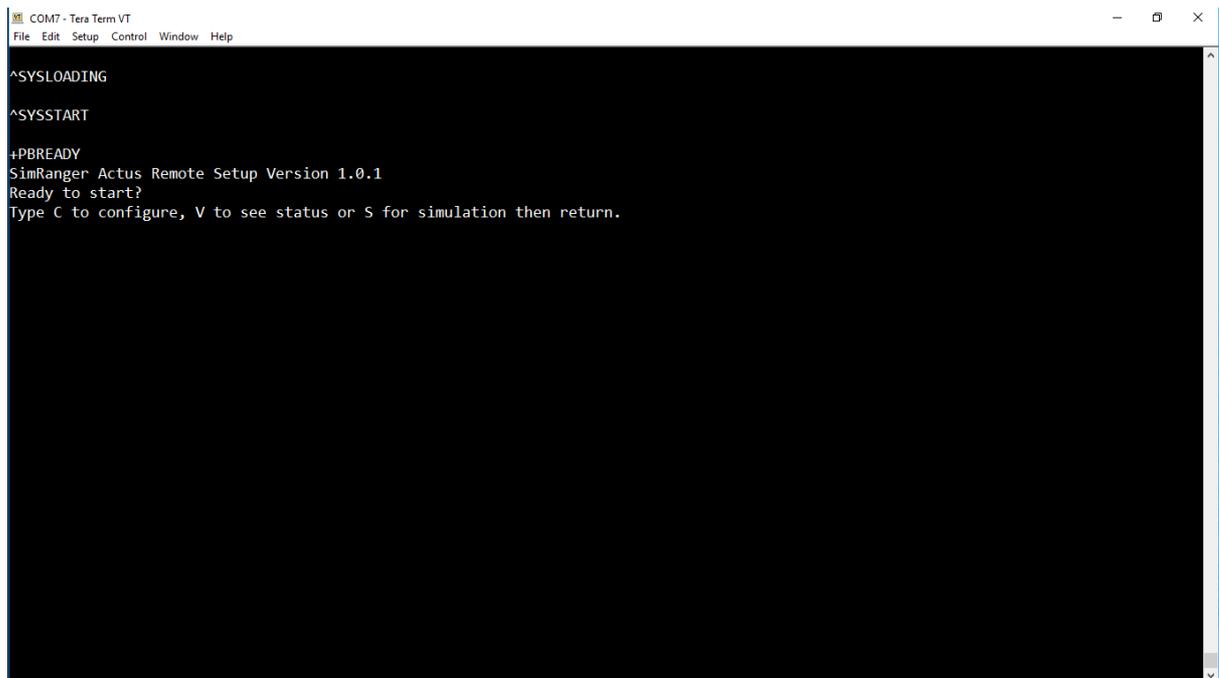
*** NOTE - Prior to plugging in the USB cable between PC and GSM 2**

- **Ensure** that you have loaded the USB Driver available to download on the www.simranger.com website (under the programme and driver download area) and if /when asked by the PC /Laptop to search for a driver direct the search to the USB file in the folder you have downloaded it to.
- **Also** - Ensure you have downloaded 'Teraterm' download, again available on www.simranger.com , and set up this software prior to trying to communicate with the GSM 2.
- This is because a USB connection only exists if there are two devices capable of communicating. Should you power up without the cable connected as described the device will assume no connection and will not allocate the resources for USB.

See Appendix 1 for full info.

Configuration of GSM 2 Using 'Teraterm'

- Start 'Teraterm' on your PC / Laptop
- Press reset or recycle power on the GSM 2 Unit connected



```
COM7 - Tera Term VT
File Edit Setup Control Window Help
^SYSLOADING
^SYSSTART
+PBREADY
SimRanger Actus Remote Setup Version 1.0.1
Ready to start?
Type C to configure, V to see status or S for simulation then return.
```

When the unit and terminal software are running you will be prompted to press a valid key

- Type **C** to configure, **V** to see status or **S** for simulation* - all uppercase and then 'Enter'.
- **V** will allow you to see GSM available and in use etc and current I/O status.
- **C** to view/configure all parameters.
This is password protected – password is "letmein" (all lower case).
- **S** to set simulated outputs on the analogue output channels.
Note - simulation only works correctly when the unit is not connected to the internet, should it connect it will overwrite the simulation settings.

Configure GSM 2 System

At the start you will be prompted for input “Type **C** to configure, **V** to see status or **S** for simulation then return.”

Let’s start with –

- **Press an uppercase C to configure.**
- You will be prompted to “*Enter password to change configuration*”
- Enter the password – **letmein** then press ‘Enter’
- The first thing you see will be the current configuration, keep pressing ‘Enter’ to step through the settings ie as per below.
- **If you wish to change one of the settings then simply type in the required information/setting and press ‘Enter’. If no change required just press ‘Enter’ to move on to the next setting.**

Current Setup	
Serial No	SR00008
Paired With	SR00007
APN	ie - mobiledata
Username	N
Password	N
Primary Server	ie - www1.myserver.co.uk/relay
Secondary Server	ie - www2.myserver.co.uk/relay
Tertiary Server	ie - www3.myserver.co.uk/relay
GSM retries	ie - 1000
GSM retry wait	5
Data interval	1
Failsafe Mode	3
Failsafe timeout	5
SMS fallback	no
Fallback number	ie +447905213124
Channel 1	4 to 20mA input
Channel 2	4 to 20mA input
Channel 3	4 to 20mA input
Channel 4	4 to 20 mA output
Channel 5	4 to 20 mA output
Channel 6	not fitted
Channel 7	not fitted
Channel 8	4 to 20 mA output
Averaging	No

- **Note- All timeouts, waits, delays and intervals are in minutes.**

Expanded explanations for each variable listed above:

- **Serial Number** = *this is the serial of the unit that you are currently connected to for programming.*
- **Paired With** = SR00007. Enter a new serial number or just return to keep original *this is the serial of the remote unit that this one is paired with for mirroring.*
- **Access Point Name (APN)** = *mobiledata*. Enter a new APN, **N** for none or just return to keep original *the Access Point Name associated with the SIM card*
- **GPRS username** = *web*. Enter a new username, **N** for none or just return to keep original *the username associated with the SIM card*
- **GPRS password** = *web*. Enter a new password, **N** for none or just return to keep original *the password associated with the SIM card*
- **Primary data exchange server** = *www1.myserver.co.uk/relay*. Enter a new server, **N** for none or just return to keep original *the URL of the first relay server to be tried. IP address results in a much lower data rate than domain name as it avoids DNS lookup.*
- **Secondary exchange server** = *www2.myserver.co.uk/relay*. Enter a new server, **N** for none or just return to keep original *the URL of the second relay server to be tried in the event of primary server failure.*
- **Tertiary exchange server** = *www3.myserver.co.uk/relay*. Enter a new server, **N** for none or just return to keep original *the URL of the last relay server to be tried in the event of primary and secondary server failure.*
- **GSM retries** = 1000. Enter retries 1 - 30 or just return to keep original *how many retries before a pause in retries*
- **GSM retry delay** = 5. Enter retries 1 - 60 or just return to keep original *delay in minutes when GSM retries is reached.*
- **Data sending interval** = 1. Enter 1, 2, 5, 10, 20, 30, 45, 60, 120, 180, 240 in minutes or just return to keep original *the number of minutes between each combined send / retrieve of data to the remote unit (via the relay server) this should be short enough to ensure proper operation/detection of failure when combined with failsafe timeout.*
- **Fail Mode** = 3 Enter **1** for fail low, **2** for fail high, **3** for fail hold or just return to keep original *the state of the analogue and digital outputs when the failsafe timeout is reached, fail low = 0mA and inactive digital, fail high = fail 20mA and active digital and hold keeps last know analogue and digital states.*

- **Failsafe timeout = 5.** Enter 1 - 480 in minutes or just return to keep original *the Failsafe timeout is the number of minutes out of remote contact before failmode is triggered and the status relay made inactive. It should reflect the Data Interval set at each end of the system and must never be less than the longest interval. In practice this should be several times longer than the Data Interval or false Failure Indication could result.*
- **SMS fallback = No.** Enter **Yes** or **No** or just return to keep original *in the event of data failure attempt to use SMSs sent directly to the remote unit. A very expensive option on Roaming SIM charges as will be charged per text and will only be available if you have a package from the SIM card provider with texts activated.*
- **SMS fallback number =** ie +447905213124. Enter paired units phone number or just return to keep original *in the event of using SMSs, the phone number of the remote unit (See above)*
- **Sensor Card fitted to CH2 =** ie 1. **0** for not fitted, **1** for 4-20 input or **2** for 4-20 output then return *if an optional card is fitted then chose 1 for an input, 2 for an output or 0 (zero) if it is unpopulated. This is repeated for CH2 to 7*
- **Averaging =** Enter **Y** for yes, **N** for no, or just return to keep original *in normal operation the inputs are read continually and averaged to provide the most accurate results and reduce perceived sensor jitter. If power consumption is an issue then the averaging may be turned off to prevent continually reading the sensors and instead the sensors are read periodically in accordance with the 'Data Interval' setting.*

Press an uppercase V - to view the current settings and GSM status etc

STATUS	
Current Operator	vodafone UK
Signal	- 96dB
Connection Status	Connected 3G
Operators in area	vodafone UK 3G
	vodafone UK 2G
	EE 2G
	O2 - UK 3G
	O2 - UK 2G
	EE 3G
Current Server	ww1.myserver.com/relay

IO

Id	Reading	Units	Info
Digital Input 1	OFF	on/off	
Digital Input 2	OFF	on/off	
Digital Input 3	ON	on/off	
Digital Input 4	OFF	on/off	
Relay Output 1	ON	on/off	
Relay Output 2	OFF	on/off	
Relay Output 3	OFF	on/off	
Relay Output 4	OFF	on/off	
Failsafe Relay	ON		ON = system OK, OFF = failed
Analogue CH1 (IN)	5.620	mA	10.1%
Analogue CH2 (IN)	8.980	mA	31.1%
Analogue CH3 (IN)	10.020	mA	37.6%
Analogue CH4 (OUT)	14.230	mA	63.9%
Analogue CH5 (OUT)	4.430	mA	8.9%
Analogue CH8 (OUT)	18.104	mA	88.1%
Supply	13.2	Volts	

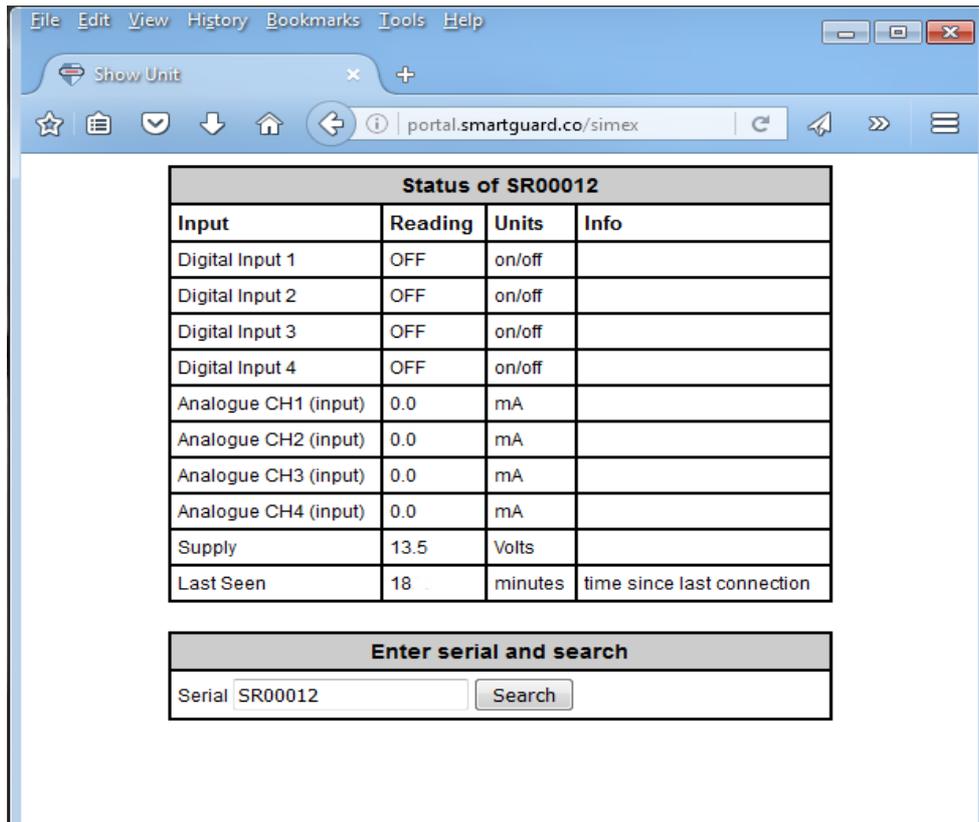
LEDs (used to check for issues / unit health and relay status etc)

During installation, there are led lights that inform the engineer of the status and progress of the system.

- **Power** - *red* if OK, *green* if outside acceptable range
- **ST1** - if *red* lit then GSM connection issues with this unit
- **ST2** - if *red* lit then GSM connection issues at remote unit
- **GSM** - network registration. At first a *blue* light will flash once every two seconds – this is the unit searching for a connection. After approximately 30 seconds it should slow down to once every four seconds. This indicates that it has logged onto the network. If it never slows down to one in four then a network is not present or has too low a signal.
- **Signal** – (currently used GSM mobile signal strength) denoted by four *red* led's 0 to 4 bars
- **D I/P** – digital input (1-4) relay status - *red* led illuminated if active (ie switch closed)
- **D O/P** – digital output (1-4) relay status - *red* led illuminated if active (ie switch closed)
- **System** – digital output relay *red* led - illuminated if comms and system all ok.

Additional Checks to Ensure the Information Reached the Server

Using the web page located at the relay server enter the serial number of the unit and click search. The state of the inputs, supply and last contact can be viewed.



The screenshot shows a web browser window with the address bar displaying 'portal.smartguard.co/simex'. The page content is titled 'Status of SR00012' and contains a table with the following data:

Input	Reading	Units	Info
Digital Input 1	OFF	on/off	
Digital Input 2	OFF	on/off	
Digital Input 3	OFF	on/off	
Digital Input 4	OFF	on/off	
Analogue CH1 (input)	0.0	mA	
Analogue CH2 (input)	0.0	mA	
Analogue CH3 (input)	0.0	mA	
Analogue CH4 (input)	0.0	mA	
Supply	13.5	Volts	
Last Seen	18	minutes	time since last connection

Below the table is a search form titled 'Enter serial and search' with a text input field containing 'SR00012' and a 'Search' button.

Dimensions and Specifications

Enclosure

Dimensions:

- Length: 213mm 8.4inches
- Width: 185mm 7.3 inches
- Height: 102mm 4.0 inches

Materials:

- Material: Polycarbonate
- Base colour: RAL 7035 - light grey
- Gasket material: EPDM & PUR

Ratings:

- Ingress Protection (EN 60529): IP65
- Impact Resistance (EN 62262): IK07/IK08
- Electrical insulation: Totally insulated
- Halogen free (DIN/VDE 0472, Part 815): 1
- UV resistance: UL 508
- Flammability Rating: UL 746C 5V
- Glow Wire Test (IEC 695-2-1) °C: 960
- NEMA Class: NEMA 1, 3, 3R, 4X, 12, 13

Supply

- 10-30VDC.

Current

- 120 ma with no additional channel boards fitted. Add 25 ma for each additional channel board fitted. Max 270 ma when fully populated.

Temperature Range

- -20 to +85 Deg C

Inputs/ Outputs

Programming

- USB 2.0
- Connector type B
- Virtual Com Port

Digital I/P

- volts free

Digital O/P

- change over relay
- 5A@30VDC
- 10A@250VAC

Analogue input

- 0-22Ma
- Isolated => 150VAC

Analogue output

- 0-20mA into 1.2K Ohm

Wireless

Connectivity

- Dual-Band UMTS: 900 and 2100MHz
- Dual-Band GSM: 900 and 1800MHz
- SMS

SIM

- Standard (micro and nano with adapter)

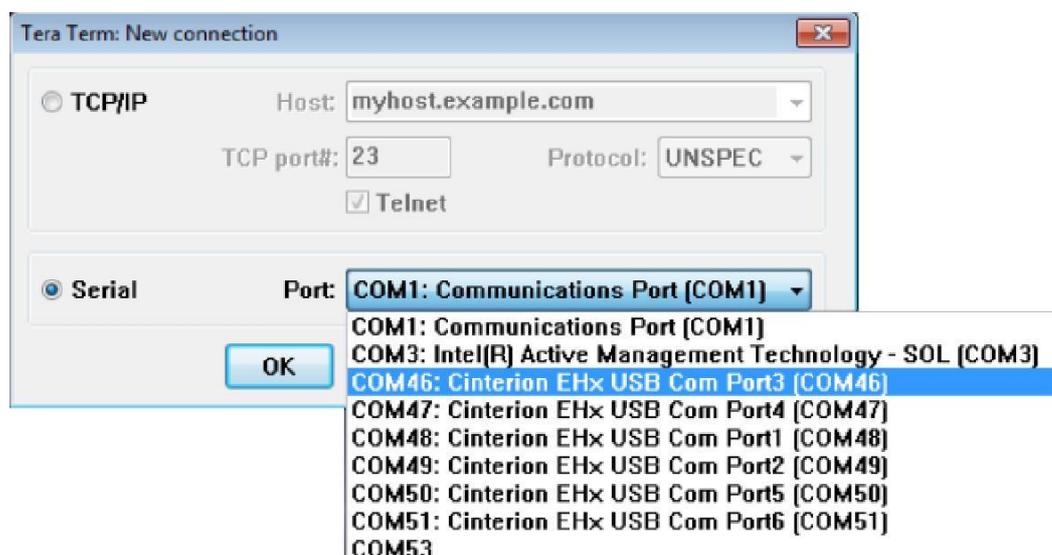
Antenna

- SMA connector

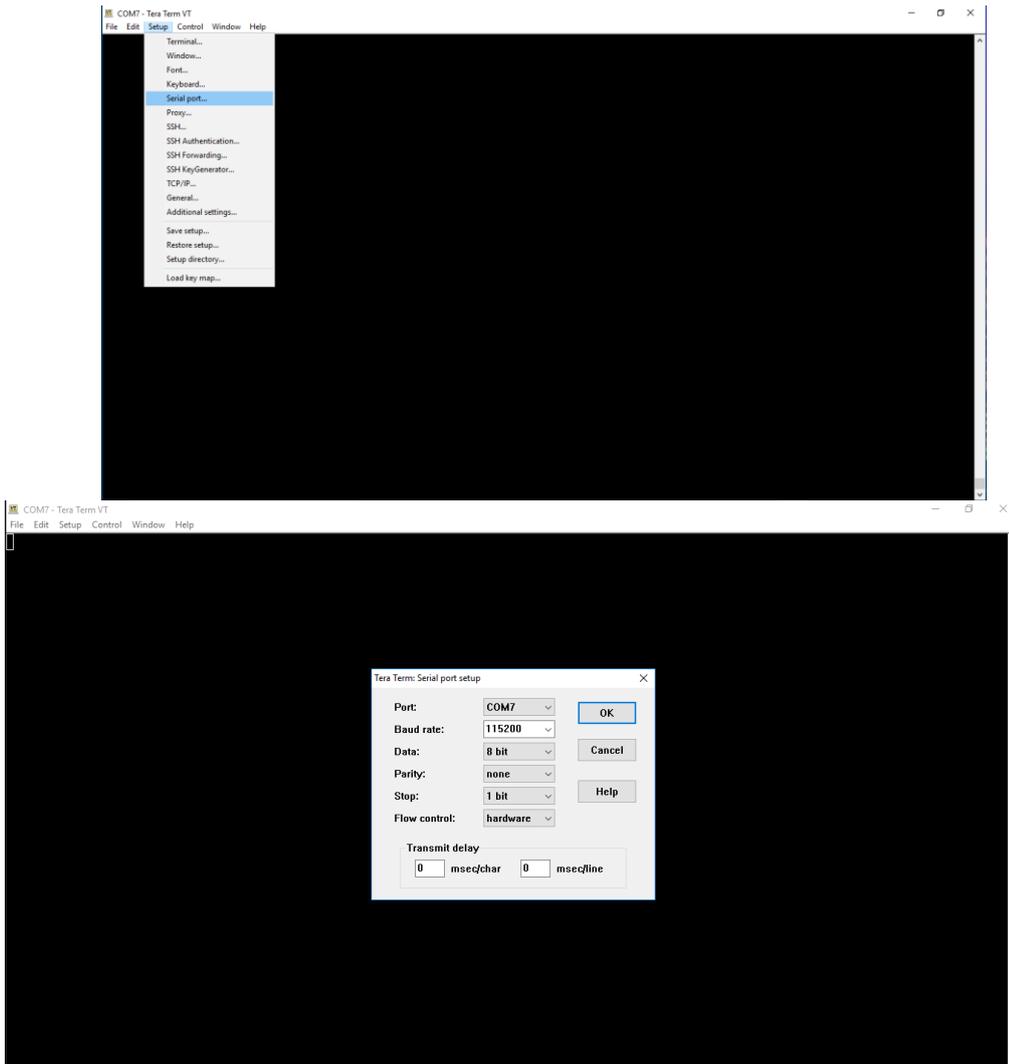
Appendix 1

How to Install 'Teraterm' onto a PC / Laptop

- Download both 'Teraterm' software and 'USB Driver' files from www.simranger.com programme and driver files area.
- Execute 'Teraterm' software install file onto your PC / Laptop.
- Connect USB cable from GSM 2 to PC / Laptop.
- Switch unit on or if already switched on press the reset button on the GSM 2.
- Depending on which version of windows you are running your PC will either install drivers itself or prompt you for a file.
- If prompted browse to the usb driver downloaded from the Simranger website and use the files as directed by your PC.
- Start 'Teraterm' – you will be prompted for connection type.
- Select serial and just select one of the free comms ports for now.(Finding which port the PC/Laptop has chosen is dealt with next.
- OK the selection



- Open Setup and serial port.



- Then set the serial comms terminal programme with the following com port settings below.

Baud 115200

Bits 8

Parity None

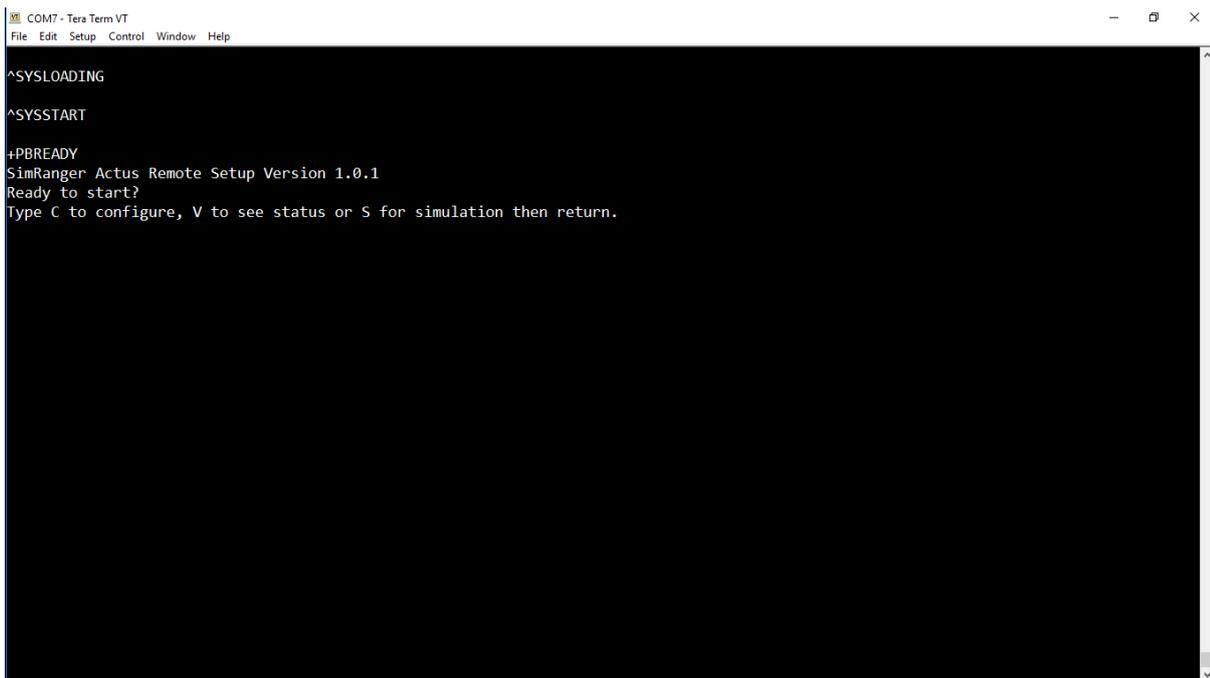
Stop bit 1

Flow control hardware

Port - Open the drop down and select the correct port.

(This is the trial and error bit as your PC / Laptop will have set itself up against one of these ports but no one knows which one...!) Open each one up and try each comms port number (with a fresh reset of the GSM 2 each time) until one comms port eventually allows the screen to come up as per below.

- Then make a note of this comms port as this should always be the comms port used on this PC /Laptop :



```
COM7 - Tera Term VT
File Edit Setup Control Window Help
^SYSLOADING
^SYSSTART
+PBREADY
SimRanger Actus Remote Setup Version 1.0.1
Ready to start?
Type C to configure, V to see status or S for simulation then return.
```

- You may additionally wish to change the setup> font (consolas in 12 point is restful) and pull the size of the window deeper to accommodate the Status screen view.
- When you are happy select 'Setup' > 'Save setup' and then from now on 'Teraterm' will start configured properly each time you run it with a GSM 2 unit.