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RMS compact

User Manual

Conventions Used In This Guide

This guide uses these conventions:

Bold italic print, as shown in this example, indicates field names, menu items, or values in the RMS compact software agent.

Bold print, as shown in this example, indicates filenames, directories, or items that you must type exactly as they appear.

Italic print words or letters in braces { } indicate values that you must supply. For example: *{drive}:\setup*

Italic print words or letters in brackets < > indicate keys to press. If two keys are separated by a + plus symbol, then the first key should be pressed and held down while pressing the second key. For example: *<alt+enter>*.

Note: Notes contrast from the text to emphasise their importance.

Warning! : These messages alert you to specific procedures or practices; serious consequences may result including injury if you disregard them.

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Introduction

RMS compact is a hardware adapter that enables monitoring of the micro-environment of the rack. This Ethernet-compatible network adapter uses networking protocols, such as SNMP, TCP/IP, Web and Telnet to bring the non-networked components of the rack within view and control of the system manager.

RMS compact remotely monitors up to eight digital inputs and includes two analogue ports for temperature and humidity sensing. It also includes three power switching outputs. It polls the monitored devices for status information and this information is then 'translated' into SNMP and provided back to the network management station via the in-built Ethernet link.

The output capabilities of the RMS compact allows it to take actions given a pre-defined set of input conditions – e.g. if a fan failure is reported, and the temperature rises above a certain level, the an additional set of fans could be activated.

RMS compact is a highly compact and cost effective solution to the difficulties posed by the rack environment, where space is at a premium. What's more, it deploys off the shelf without the need for specialist installation skills and after the initial set-up, the password protected web browser interface can be used for remote configuration.

Types of Sensors

A number of different types of sensors can be monitored by the RMS compact, some examples are:

- Temperature
- Humidity
- Smoke
- Shock
- Door Contact

Further sensors available on request

Note : Maximum cable length for each type of sensor is 50 metres

Note : It is not possible to use the vowel mutations "Umlaut" and "ß" for any of the text fields in the RMS compact at present

RMS compact Package

The standard RMS compact package contains an RMS-Compact Unit with supporting hardware and software.

RMS compact Package Contents

The components of your package are:

£	RMS compact Unit
£	RMS compact Support software CD-ROM (containing MIB file Viewer/Programmer, manual etc.)
£	Power Supply
£	Configuration Cable (DB9 Female to Female Null Modem)

The RMS compact Unit

The following photographs show the RMS compact front and rear panels:



Figure 1 RMS compact Front

LED's

There are four LED's on the front of the RMS Compact, their function is described below:

Status: Green when in normal operating mode, Red if an internal fault has occurred

Alarm: Yellow if an input alarm condition is present

RS232: Flashes green when data passing through RS232 port

TCP/IP: Flashes green indicating network traffic.

Manual Reset Switch: The unit can be manually reset by pushing a narrow object such as a small screwdriver through the hole in the front of the unit, to activate the reset switch.

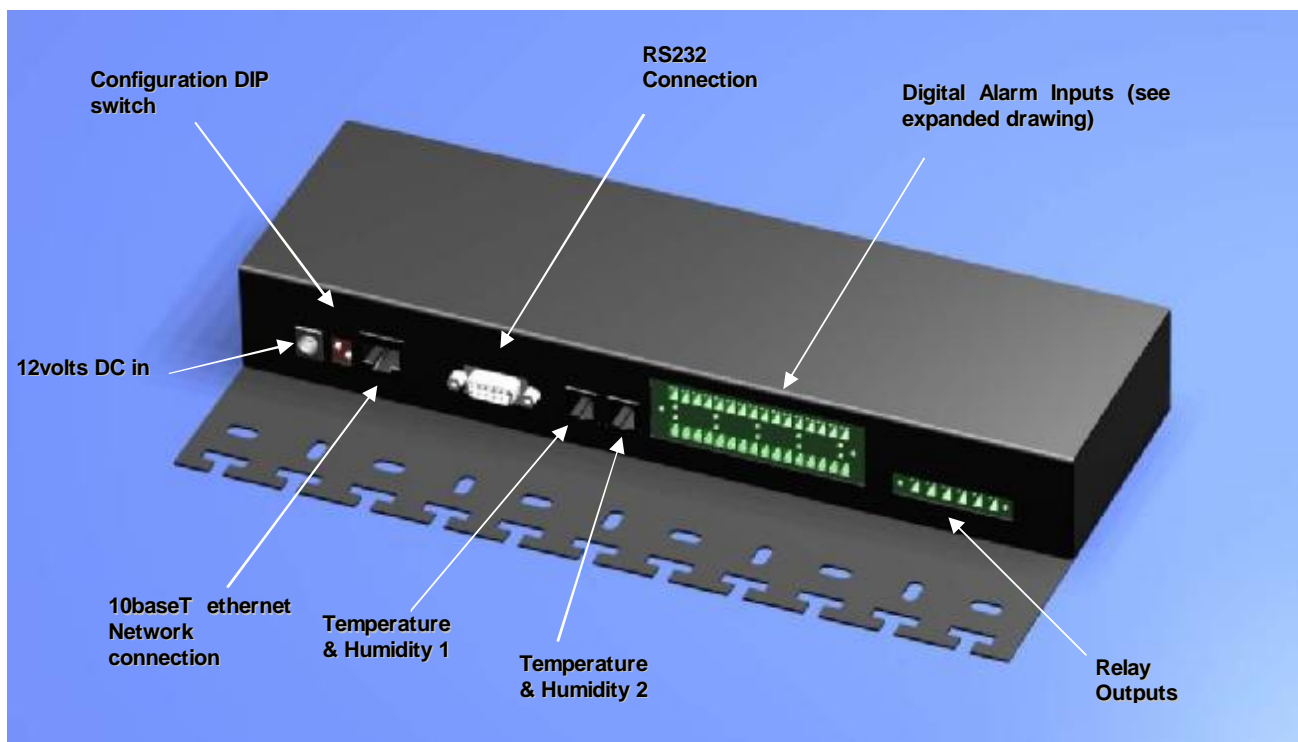


Figure 2 RMS compact Rear panel

The rear of the RMS compact unit houses all connection points to inputs and output, as follows

12 volts DC In: Power in.

Warning! : USE POWER SUPPLY SUPPLIED WITH THE RMS COMPACT UNIT ONLY. FAILURE TO DO SO MAY BE DANGEROUS AND WILL AFFECT YOUR WARRANTY RIGHTS.

Configuration DIP switch - To set the device into configuration mode, and to configure for serial firmware upgrade.

10baseT Ethernet Network connection: For connection to a 10Mb/s ethernet LAN via UTP/STP cable. The Network interface operates in half-duplex mode..

RS232 Connection: For serial configuration and serial firmware upgrades.

Temperature & Humidity 1: For connection of Temperature & humidity sensor.

Temperature & Humidity 2: For connection of Temperature & humidity sensor.

Digital Alarm Inputs: For connection of digital (i.e. voltage free), contact alarms. The picture below illustrates how each digital input should be wired:

Warning! : CONNECT ONLY VOLT FREE ALARM SIGNALS TO THE DIGITAL ALARM INPUTS OF THE RMS COMPACT. CONNECTION OF ANYTHING OTHER THAN A VOLT FREE SIGNAL MAY DAMAGE THE RMS COMPACT AND INVALIDATE YOUR PRODUCT WARRANTY

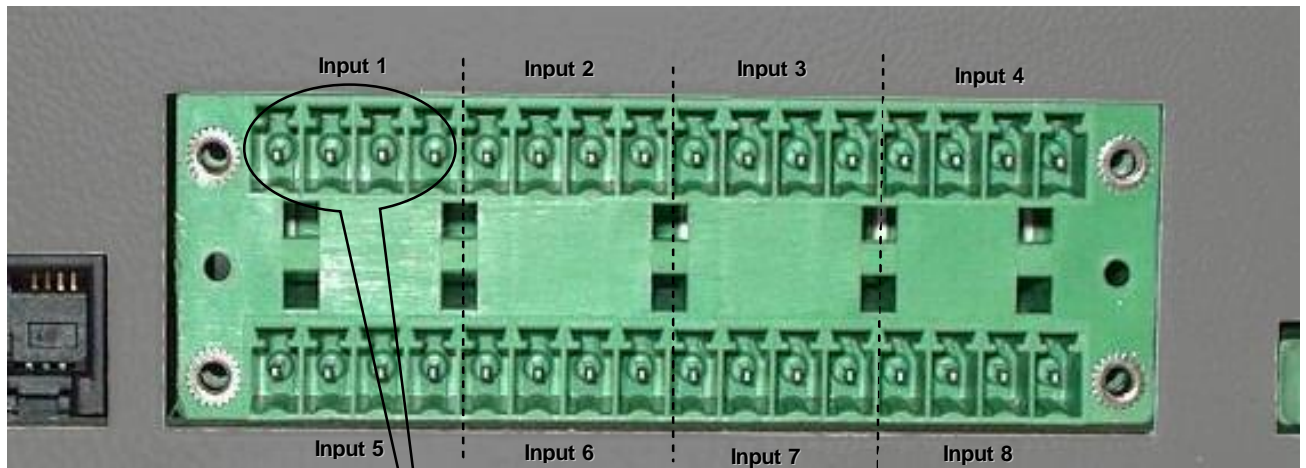


Figure 3: Digital Input Connections

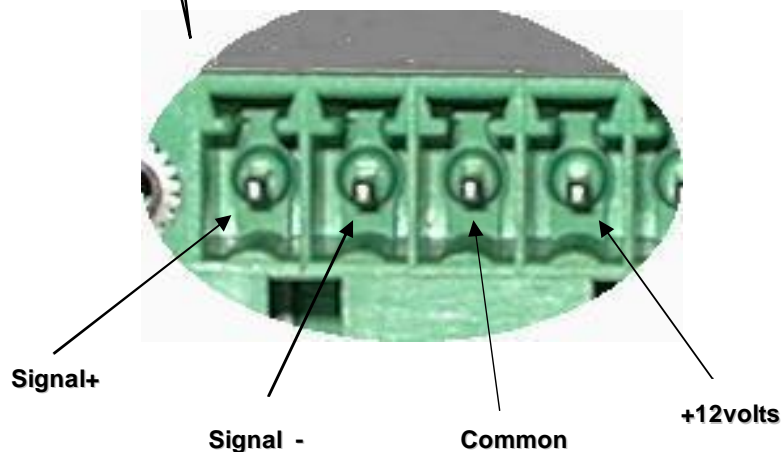


Figure 4: Input Pin configuration

As we can see, there are 8 possible digital inputs available. These inputs are split into of 4 poles per input, as follows:

- Signal + :** Volt free contact connection
- Signal - :** The common connection for voltage free contact
- Common:** The common connection for a +12volt input
- +12Volts:** Input Connection for an alarm at +12volts

Note: The maximum load for the 12v output should not exceed 200mA – should this load be exceeded, then an internal fuse will be blown. This fuse should only be replaced by a qualified electrician.

Relay Output Connections: For connection of external devices (such as fans etc)

The output relay connections are wired as follows:

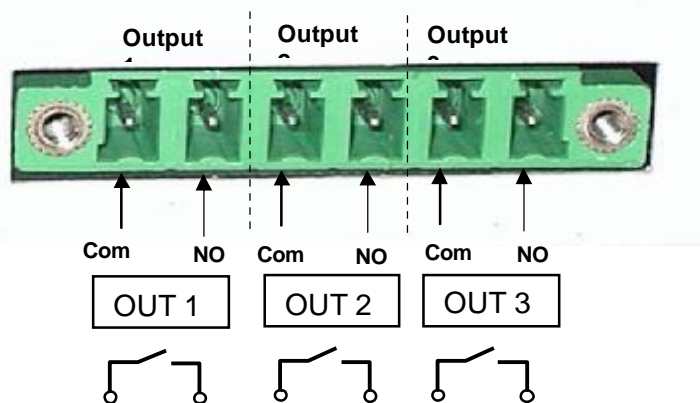


Figure 5: Output Relay Pin configuration

There are three physical relay outputs on the RMS Compact, all of which are wired in a Normally Open (NO) configuration. These relays are capable of switching mains voltage at a current of up to 5A (230 VAC, 30VDC) each.

Software

The software shipped with RMS compact is on CD-ROM. This CD-ROM contains the RMS compact MIB file, the Viewer/Programmer software, along with this manual and any other relevant tools (such as Terraterm Pro terminal emulation software and SerialTFTP firmware upgrade program). The MIB will need to be compiled into your NMS database.

Configuration Cable

Your package contains a configuration cable (DB9 female-to-female Null Modem). Use this cable to connect the RMS compact serial port and a dumb terminal or PC for configuration. When you configure the RMS compact, be sure to set the DIPswitch to the proper setting see the Installation section in this manual. Any dumb terminal or terminal emulation package, such as Microsoft Windows 95/98/NT HyperTerminal will work fine, providing it is capable of running at up to 38400 baud.

Power Supply

The type of power supply offered is:

Power Supply Type	Input	Output
Plug Top	230 VAC, 50 Hz	12 VDC, 500mA

System Requirements

RMS compact requires a terminal or terminal program for configuration and a network connection with an NMS or supplied Viewer/Programmer software for operation. The following is a description of all required components and a list of the most widely used NMSs.

- The components of your standard RMS compact package
- Connection to an 10baseT Ethernet network
- An SNMP-based management station
- A dumb terminal or a PC with an emulation package capable of running at 38400 baud, to configure the RMS compact SNMP Agent, e.g. Windows 95/98/NT HyperTerminal or supplied Terraterm software
- An RS232 communication port on your PC or terminal
- Network identification values for the RMS compact :

IP Address

Net Mask

IP Addresses for the NMS

Definitions of Communities

IP Address of the Gateway/Router on the same segment as the RMS compact

Installation

Fitting into the 19" rack

There are two ways of mounting RMS compact into a 19" rack system. These are explained below:

Using the 1U frontplate adapter

- Unpack the RMS compact from its packaging.
- Attach the 1U frontplate to the RMS compact as follows:
 1. Remove the 3 fixing screws from the front of the top of the RMS compact
 2. Slide the 19" adapter plate over the front of the unit, and replace the fixing screws. The diagram below shows the position of these screws:

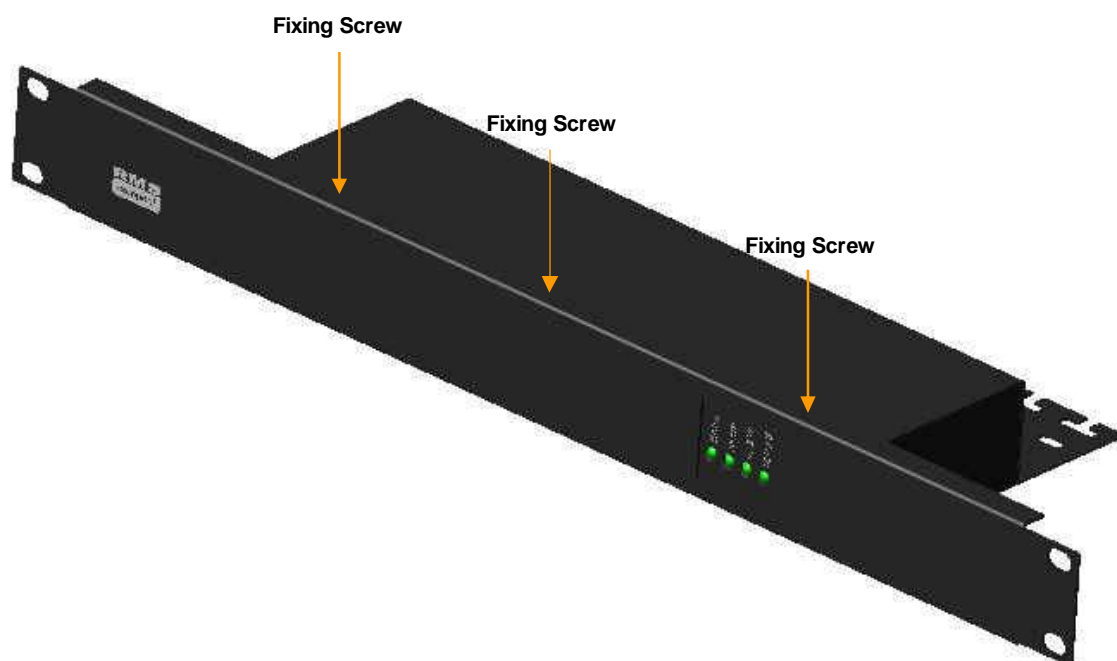


Figure 6: Mounting the 19" Adapter frontplate

and bolt into the 19" racking. The following diagrams shows how this is done:

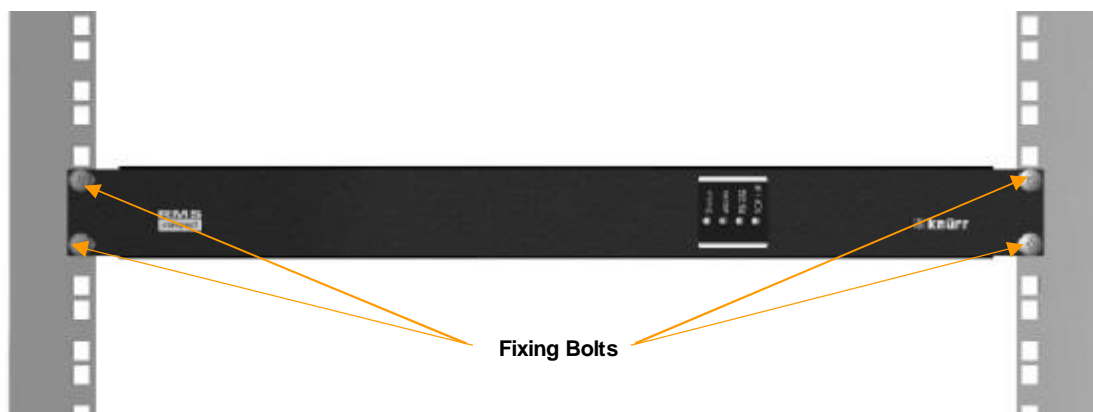


Figure 7: RMS Compact with 19" front plate, rack mounted (Front View)



Figure 8: RMS Compact with 19" front plate, rack mounted (Top View)

Without the 1U adapter

It is also possible to mount the RMS compact in a rack without the 1U frontplate, using the supplied adapter bracket.

The following figure shows how the mounting plate is fixed to the unit:

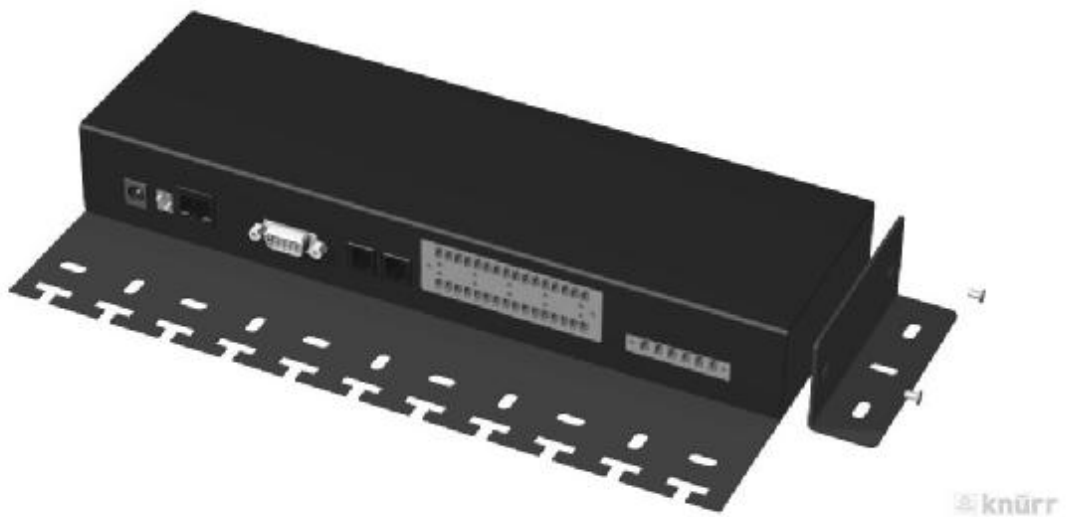


Figure 9: Attaching the mounting plate

The figures below show an example of where the RMS compact could be mounted

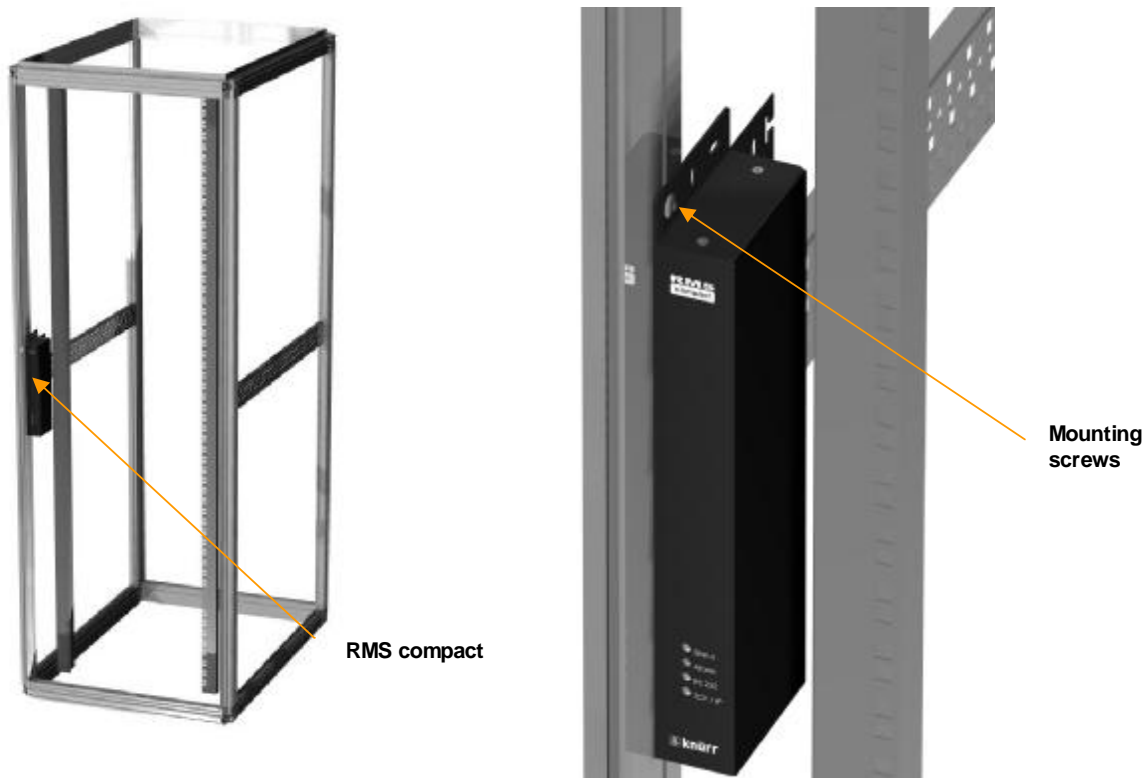


Figure 10: RMS compact mounted without 19" Front plate

Cable Management

The RMS compact has a cable management tray attached to the casing of the unit. This enables the user to route and attach cables to prevent any accidental disconnection.

Preparing to Configure

For configuration, connect the RMS compact temporarily to a PC with a terminal emulation package such as Terraterm, (contained on the RMS compact Cdrom), or to a dumb terminal capable of communicating at 38400 baud. The following steps guide you in connecting the RMS compact to the network and UPS.

1. Adjust the DIPswitches on the RMS compact for Configuration. Switch 1 down (ON); switch 2 up (OFF).
2. Temporarily, connect the RMS compact adapter to a dumb terminal or to a PC with the terminal emulation package.
 - a) Using the supplied configuration cable, connect one end of the cable into a dedicated RS-232 serial port on the configuration PC.
 - b) Connect the other end to serial port 1 on the RMS compact.
4. Configure the communications settings.

Use the following settings to configure the dumb terminal or PC.

Baud rate à	9600	Flow Control à	None
Data bits à	8	Handshaking à	None
Stop bit à	1	Terminal Type: à	ANSI (VT100)
Parity à	None	Local Echo à	Off

5. Press **OK** if you have the Windows Communications screen or accept your communication settings in the terminal emulation package. The terminal is now configured to communicate with the RMS compact adapter.
6. Connect the power supply with the 12VDC connector to the RMS compact adapter's power input. Connect the other end of the power supply input cable to a UPS supplied power socket or power distribution unit. The adapter should display the introductory screen on your terminal.
7. You are now ready to configure the RMS compact adapter. Refer to the *Configuration* section for a detailed discussion.
8. Once configuration is complete, turn DIPswitch 1 on the RMS compact from the **DOWN** (ON) position to the **UP** (OFF) position.
9. Disconnect the configuration cable from the RMS compact adapter and the dumb terminal or PC. Store this cable for future use.
10. Disconnect the RMS compact adapter from the PC or terminal and from the power supply.
11. DIPswitch 1 is still set to **OFF** (UP) position.
12. Place the RMS compact in the rack, and connect up all required sensors to the relevant connectors on the RMS compact, along with any required output connections and Network cable (see the **RMS compact Package** section of this manual for details)
13. Connect the RMS compact to the Ethernet cable.
14. Re-insert the power jack into the RMS compact 's power connection.

Verify RMS compact Operation

15. After you complete all configuration settings and connect the RMS compact to the network, check that the STATUS led is lit, and is GREEN

LED Status After Power Up

- A. The STATUS led should be permanently ON and in a GREEN state.
 - B. The TCP/IP led should start flashing intermittently.
 - C. If any input alarm conditions have been previously set, then the ALARM led may be YELLOW
- II. PING the RMS compact. Issue a PING command from the NMS (Network Management Station).
- A. If you do not get a response, check the RMS compact 's network connection and IP address.
 - B.** Test the adapter with an NMS. Perform a **"GET"** and a **"SET."** (assuming an NMS is to be used, if this is not the case, then test for communication by using the RMS compact Viewer/Programmer software (see the section of the manual called **Configuration using the RMS compact Programmer Software** in this manual for instructions on how to do this)

Note: The RMS compact MIB file, (contained on the accompanying CD-ROM), must be compiled into the NMS before this can be done – instructions on how to do this will vary depending upon the type of NMS being used, please refer to the NMS documentation for further information

- C. If the GET or SET commands fail, check the RMS compact access controls. The manager must have read permission to execute a **GET** command successfully and read/write permission to execute a **SET** command successfully.

Configuration

Serial Port Configuration

You are now ready to configure the RMS compact to work on your network. RMS compact is temporarily connected to a PC with a terminal emulation package or to a dumb terminal.

Note: Refer to the *Installation* section for the proper setting of the hardware adapter, and for terminal program settings prior to configuring the device.

Main Menu

From the main menu you can select to change the Network Configuration, i.e. enter the IP address, Gateway address, and MIB system group; you can set the access controls of SNMP communities; set the NMS and trap receiver configuration; configure temperature and humidity; configure contact closure setup, set output settings and save the new values and exit the program.

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  1.  Network Configuration
  2.  Net Access Configuration
  3.  NMS Configuration
  4.  Trap Host Configuration
  5.  Temp & Humidity Configuration
  6.  Contact Closure Configuration
  7.  Shutdown Targets Configuration
  8.  Restore Default Settings
  9.  Set Output and Boolean Settings
 10.  Exit Setup

Enter choice (ESC to exit):

```

Figure 11 Main Menu

Note: When configuration is complete, changes must be saved to take effect, by selecting 'Exit Setup' followed by '2' to save.

To select any option on the *Main Menu*, enter the number of the option you want at the Choose at the Enter choice (ESC to exit): prompt. The program displays the desired screen.

Network Configuration Group

To set the IP address, Gateway address, subnet mask, and other system configurations, type 1 at the prompt. The following screen displays:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  IP Address:      1.1.222.222
  Net Mask:       255.255.0.0
  Gateway:        0.0.0.0
  Agent Location: <No sysLocation Set>
  HTTP:          enabled
  HTTP username:  admin
  HTTP password:  knuerr
  Card Host Name:  RMSC
  Boot Type:     DHCP

  1.  Change IP Address
  2.  Change Net Mask
  3.  Change Gateway
  4.  Change Agent Location
  5.  Change HTTP User Name
  6.  Change HTTP User Password
  7.  [en/dis]able HTTP daemon
  8.  Change Card Host Name
  9.  Change Boot Type
 10.  Exit Network Setup

```


Figure 12 Network Configuration Group

Note: The minimum requirement to operate RMS compact is to set the IP address (or have DHCP/BootP set one), and to enter an NMS into the NMS table.

Note: Invalid Addresses in the Trap Host table may cause problems with traps not being sent, SNMP SET commands not working etc.

To enter values, enter the number of the option, Press <enter>. Enter your new value after the prompt

If you want to return to the *Main Menu*, press **10** and press <enter>.

For more information on IP addresses and net masks, see the [Reference](#) section of the *Appendix C* in this manual.

Enabling Web Browser Access

To enable access for configuration and monitoring via a Web browser using HTTP, the user must enable HTTP access in this menu. They must also assign a user name and password.

DHCP/BootP Setup

To enable the RMS compact to have an IP address automatically assigned by a DHCP or BootP server, select option 9 **Change boot type** and set for either DHCP or BootP operation. The **Card Host Name** field, is the information that will be displayed on the DHCP server to identify the RMS compact unit.

Net Access Configuration

This section configures the Telnet and passthrough options for the RMS compact :

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  1.  Telnet Configuration
  2.  Serial Port 1 Configuration for pass-thru
  3.  Exit Net Access Setup

Enter choice (ESC to exit):

```

Figure 13 Net Access Configuration Group

Telnet Configuration

Selecting option 1 in the above menu will display the following sub-menu:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

          Telnet:      enabled
          password:
inactivity timeout:   30 seconds
          passthru port: disabled
passthru terminator:  0

  1.  [en/dis] Telnet Access
  2.  Set Telnet Access Password
  3.  Set Telnet Inactivity Timeout
  4.  Set Pass-thru Port
  5.  Set Pass-thru Terminator
  6.  Exit Telnet Setup

Enter choice (ESC to exit):

```

Figure 14 Telnet Configuration screen

This menu is used to enable/disable Telnet access to the RMS Compact, also to set a Telnet username and password. The RMS compact also has the ability to make a 'passthrough' connection to a device attached to the serial port – this section sets the serial port to be used for this purpose.

Pass-thru port parameters

Option 2 in the Net Access menu deals with the actual configuration details of the serial port when used in passthrough mode (see above). Selecting option 2, will display the following menu:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

Current Settings for Port 1

      Baud Rate:      9600
      Parity:         NONE
      Data Size:      8 bits
      Stop Bits:      1 bits

1.  Set baud rate
2.  Set parity
3.  Set data size
4.  Set stop bits
5.  Exit Serial Port Setup

Enter choice (ESC to exit):

```

Figure 15 Serial Port pass-thru Configuration screen

NMS Configuration

The following screen displays a column of four Network Manager IP addresses with their access permission and SNMP community string. Use this screen to specify which managers have access to the RMS compact agent, the community names, and what type of access the IP managers have—read only or read and write.

```

Entry   IP Address      Community String  Access
  1     001.001.020.023      public          rw
  2     000.000.000.000
  3     000.000.000.000
  4     000.000.000.000
                                     ro

Select Table entry to change (ESC to exit):

```

Figure 16 NMS Configuration

To set access for an NMS:

Enter the number of the column from 1 through 4 and return, then select the parameter that requires configuring from the list as below

Note: All required RMS compact Viewer/Programmer Stations and NMS IP addresses MUST be defined in the NMS configuration table, also, it is advised that the community string be entered in lower case.

```

      IP Address:      1.1.14.17
      Community String: public
      Access:          READ/WRITE

1.  Change NMS IP Address
2.  Change NMS Community String
3.  Change NMS Access Privileges

```

```

4. Exit NMS Setup

Enter choice (ESC to exit):

```

Figure 17 NMS Parameters

The **Community String** setting is **public** by default, this parameter works like a type of snmp password. This parameter can be changed, but this change must also be reflected at the NMS and RMS compact Viewer/Programmer.

The top of the screen reflects your changes:

To return to the Main Menu, type **4** and press `<enter>`.

Trap Host Configuration

Use this screen to determine which IP managers receive TRAPs (alarm messages) from your RMS compact. This screen permits you to send TRAPs about your UPS to up to ten IP addresses (managers). To access the trap setting screen, type **4** from the Main Menu. The following screen displays:

Entry	IP Address	Community String	Trap Ctl	Auth
1	001.001.020.23	public	yes	yes
2	001.001.014.015	public	yes	yes
3	000.000.000.000		no	no
4	000.000.000.000		no	no
5	000.000.000.000		no	no
6	000.000.000.000		no	no
7	000.000.000.000		no	no
8	000.000.000.000		no	no
9	000.000.000.000		no	no
10	000.000.000.000		no	no

Select Table entry to change (ESC to exit):

Figure 18 Trap Receivers

To set TRAPs, at the prompt type the entry number to be edited and `<enter>`. The following screen will be displayed:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup
    IP Address:      1.1.124.124
  Community String: public
    Flag 1:         YES
    Flag 2:         YES

1. Change Trap Host IP Address
2. Change Trap Host Community String
3. Change Control Trap Flag
4. Change Enable Trap Flag
5. Exit Trap Host Setup

Enter choice (ESC to exit):

```

Figure 19 Trap Host information

Enter the number for the parameter that is to be edited and `<enter>`.

The Control Trap flag, enables/disables sending of traps to this address. The Enable trap flag, enables trap authentication for this NMS address.

The top of the screen reflects your changes:

To return to the Main Menu, type **5** at the prompt and press `<enter>`.

Note:

Please ensure that only valid Trap Receiver IP addresses are entered into the *Trap Host* table within the RMS compact. Adding invalid trap receiver addresses may result in the RMS compact being unreachable across the network

Temperature and Humidity Configuration

To set Temperature & Humidity thresholds and other values, select 5 at the main menu (please note that an additional optional temperature & Humidity sensor is required for this). The following menu should be displayed:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  1.  Change Temperature 1 Settings
  2.  Change Humidity 1 Settings
  3.  Change Temperature 2 Settings
  4.  Change Humidity 2 Settings
  5.  Select Centigrade or Fahrenheit
  6.  Exit Enviromental Inputs Setup

Enter choice (ESC to exit):

```

Figure 20 Temperature and Humidity Configuration

Temperature Configuration

Option 1 in this menu sets the temperature parameters for temperature sensor 1, and displays the following menu:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

Temp Monitor Enabled:      YES
      Temp Name:           Temperature 1
      Temp Offset:         0.0
      Temperature units:   Centigrade

  1.  Change Temperature Monitoring Flag
  2.  Change Temperature Name
  3.  Change Temperature Offset
  4.  Change Temperature Limits
  5.  Change Temperature OFF to ON Traps Setup
  6.  Change Temperature OFF to ON Traps Repeat Timers
  7.  Change Temperature ON to OFF Traps Setup
  8.  Change Temperature ON to OFF Traps Repeat Timers
  9.  Exit Temperature Setup

Enter choice (ESC to exit):

```

Figure 21 Temperature parameter Configuration

This menu enables the user to ENABLE/DISABLE temperature monitoring, change the TEXT descriptor of the alarm, set OFFSETS, select THRESHOLD limits (this includes limits for the warning traps to indicate that a temperature is nearing its threshold), and also to set TRAP REPEAT TIMERS.

Note: The Minimum Setting for a Trap Repeat Timer is 30 seconds.

This option should display the following menu:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

Temperature Lower Control Limit:  -20.0
Temperature Lower Warning Limit:  -20.0
Temperature Upper Warning Limit:   35.0
Temperature Upper Control Limit:   40.0

  1.  Change Lower Control Limit
  2.  Change Lower Warning Limit
  3.  Change Upper Warning Limit
  4.  Change Upper Control Limit
  5.  Exit Limits Setup

Enter choice (ESC to exit):

```

Figure 22 Temperature threshold Limits Configuration

Also, in the Temperature Parameter screen, the user is able to enable traps for off to on transitions and on to off transitions, as well as setting timers for repeat traps if required.

The same options are available for Temperature 2 (the second temperature sensor port).

Note: If a Temperature only sensor is being used (i.e. no humidity), then the humidity monitoring must be **MANUALLY DISABLED**, in order to prevent an error reading from the RMS Compact.

Humidity Configuration

Selecting the **change Humidity 1 Settings** option in the main temp/humidity menu should display the following menu:

```
Knuerr RMS Compact ver 0.1.14
Embedded Agent Setup by Sinetica

Humidity Monitor Enabled:      YES
      Humidity Name:           Feuchte Abluft
      Humidity Offset:         0.0
      Sensor Type:             ROHS COMPLIANT

1.  Change Humidity Monitoring Flag
2.  Change Humidity Name
3.  Change Humidity Offset
4.  Change Humidity Limits
5.  Change Humidity OFF to ON Traps Setup
6.  Change Humidity OFF to ON Traps Repeat Timers
7.  Change Humidity ON to OFF Traps Setup
8.  Change Humidity ON to OFF Traps Repeat Timers
9.  Select Humidity Sensor Type
10. Exit Humidity Setup

Enter choice (ESC to exit):
```

Figure 23 Humidity Parameter Configuration

This menu enables the user to enable/disable humidity monitoring, change the name of the sensor input, set offsets, and select threshold limits (this includes limits for the warning traps to indicate that the humidity reading is nearing its threshold). The user is also able to enable traps for off to on transitions and on to off transitions, as well as setting timers for repeat traps if required.

Note: The Select Sensor Type option gives the option to select between either ROHS COMPLIANT sensors or NON-ROHS COMPLIANT sensors. The reason for this, is that the former, non-ROHS compliant sensors have slightly different hardware to the rohs compliant units, and will therefore give erroneous readings if this field is not set correctly

Centigrade or Fahrenheit?

Option 5 in the main Temperature & Humidity menu, enables the user to select the units of temperature preferred, i.e. degrees Centigrade or Fahrenheit.

Contact Closure (digital input) Configuration

To set up the parameters for the contact closure (voltage free) inputs, select 6 at the main menu. The following menu should be displayed:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  1.  Change Contact Names
  2.  Change Contact Normal States
  3.  Change Contact Input Type
  4.  Change Contact OFF to ON Trap Setup
  5.  Change Contact OFF to ON Trap Repeat Timers
  6.  Change Contact ON to OFF Trap Setup
  7.  Change Contact ON to OFF Trap Repeat Timers
  8.  Exit Contact Closure Setup

Enter choice (ESC to exit):

```

Figure 24 Contact Closure Configuration

This menu enables the user set text descriptors for each contact input, as well as set the normal state for each input (i.e. normally open/closed), and also to set the trap generation parameters for each of the contacts. The user is able to specify when traps are generated – when the contact goes from OFF to ON, as well as when going from ON to OFF. You are also able to set an option to repeat the sending of each trap, and also to set how often the repeat trap is sent (assuming the alarm state is still present).

The other option in the Contact Closure configuration menu is *Contact Closure Input Type*. This refers to the method by which an alarm condition is triggered. Selecting this option will display the following menu:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  Contact 1 : LEVEL
  Contact 2 : LEVEL
  Contact 3 : LEVEL
  Contact 4 : LEVEL
  Contact 5 : LEVEL
  Contact 6 : LEVEL
  Contact 7 : LEVEL
  Contact 8 : LEVEL

  1.  Change Contact 1 Input Type
  2.  Change Contact 2 Input Type
  3.  Change Contact 3 Input Type
  4.  Change Contact 4 Input Type
  5.  Change Contact 5 Input Type
  6.  Change Contact 6 Input Type
  7.  Change Contact 7 Input Type
  8.  Change Contact 8 Input Type
  9.  Exit Contact Input Type Setup

Enter choice (ESC to exit):

```

Figure 25 Contact Closure Type

In the above example, all contacts are set to LEVEL – selecting one of the inputs will display the following options:

```

Enter choice (ESC to exit): 1
Enter new Input Type 0=LEVEL,1=POSEDGE,2=NEGEDGE :

```

Figure 26 Contact Closure Type choices

These three types have the following meanings:

LEVEL: This option monitors the input in ‘real time’ and will reflect any changes in state that take place. This means that if the input is switched on momentarily, then switched off, - both changes of state will be registered by the RMS Compact. So, for example, if the RMS compact has been configured to send a trap for ‘alarm on’ and ‘alarm off’, the NMS will see these traps in real time.

The following example (a normally closed contact - e.g. a door) should help to illustrate this:

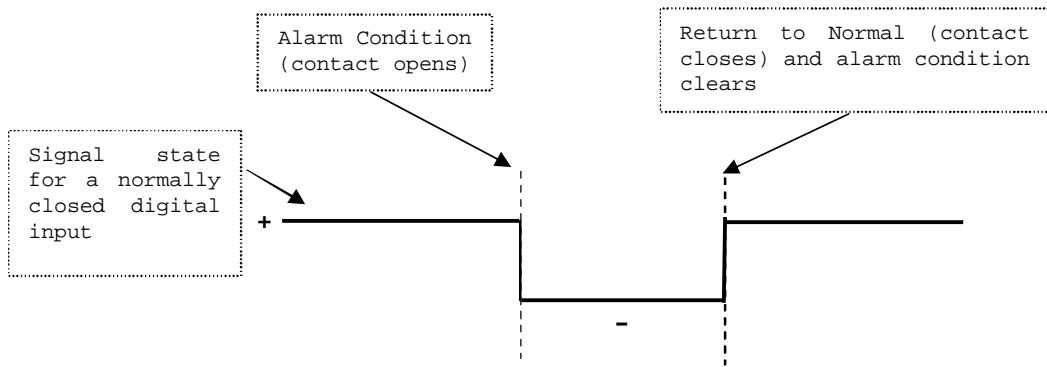


Figure 27 : LEVEL Contact Closure monitoring

The following options are used when the user wishes to 'latch' an alarm signal. I.e. if an alarm occurs momentarily, but the user wishes the alarm to remain present until manually reset by the user:

POSEDGE: Primarily used when monitoring **Normally Closed (NC)** contacts, the alarm will be triggered when the contact closure goes from a closed state (negative edge signal) to an open state (positive edge signal). Once the alarm has been set, it will need to be manually reset by the user (using either an SNMP set or using the 'Reset' button on the Viewer Programmer application – this will be explained in more detail later).

The following diagram should help to explain this:

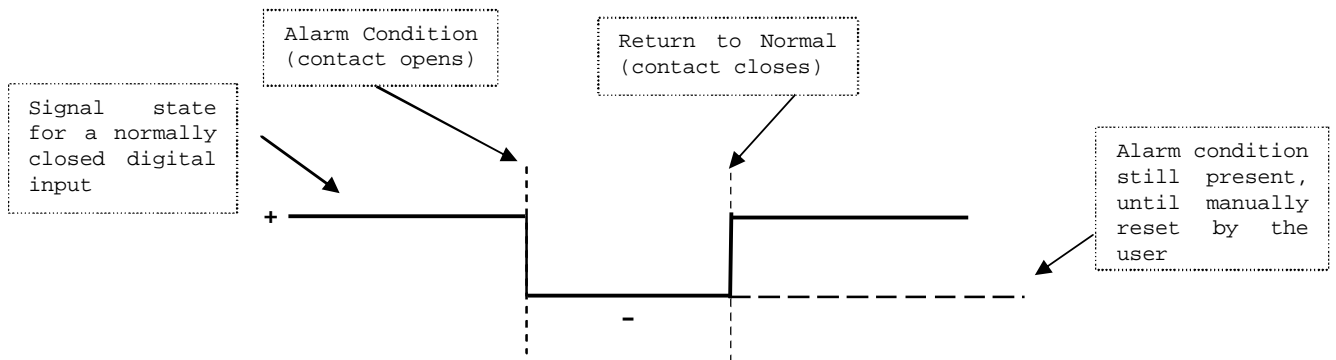


Figure 28 Positive Edge (POSEDGE) Monitoring

If POSEGDE monitoring were used on a Normally Open contact, then the alarm would be triggered when the contact returns to its normal state.

NEGEDGE: Primarily used when monitoring **Normally Open (NO)** contacts, the alarm will be triggered when the contact closure goes from an open state (positive edge signal) to a closed state (Negative edge signal). Once the alarm has been set, it will need to be manually reset by the user (using either an SNMP set or using the 'Reset' button on the Viewer Programmer application – this will be explained in more detail later).

The following diagram should help to explain this:

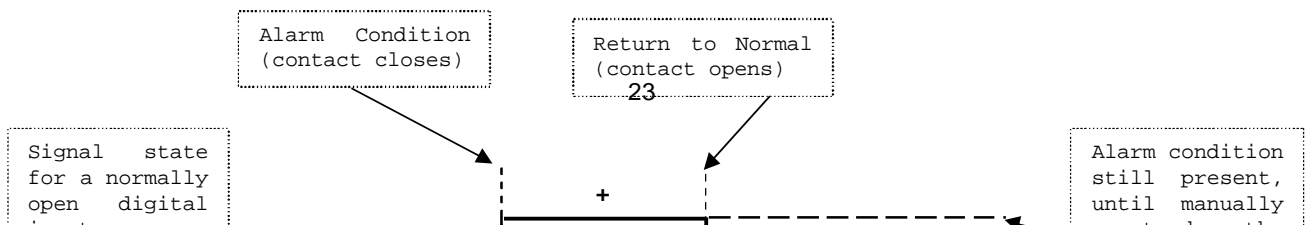




Figure 29 Negative Edge (NEGEDGE) Monitoring

If NEGEDGE monitoring were used on a Normally Closed contact, then the alarm would be triggered when the contact returns to its normal state.

Note: POSEDGE and NEGEDGE are used when monitoring sensors which generate transient signals, such as shock sensors.

Shutdown Targets

The shutdown targets option refers to a feature whereby the user can configure the RMS compact to send a shutdown signal to servers across the network which are running the appropriate 'Network Shutdown Software', upon receipt of an alarm from an Uninterruptible Power Supply

Note: If you wish to use this feature, you must purchase an additional 'Network Shutdown Software' to run on each server on which shutdown is required, plus a licence key to enable this feature on the RMS compact. To obtain more information about this software, please contact info@sinetica.co.uk

This feature is designed for use with an Uninterruptible Power Supply only

- Firstly, Select "Shutdown Targets" in the RMS compact configuration screen (via HyperTerminal), this should display the following screen:

```

Knuerr RMS compact version X.X.X
Embedded Agent Setup

Number of Targets Licenced: 0

1. Update Target Licence Key
2. Powerfail timer
3. Battery depletion timer
4. Shutdown Targets 1-20
5. Shutdown Targets 21-40
6. Shutdown Targets 41-60
7. Shutdown Targets 61-80
8. Shutdown Targets 81-100
9. Exit Shutdown Target Setup

Enter choice (ESC to exit):

```

Figure 30 Shutdown Targets Configuration

- Enter your Network Shutdown shutdown license key (this should have been provided with the RMS compact if this feature was ordered).
- Enter the IP addresses of the computers on the network you wish to shutdown
- Setup the Power Fail and Low Battery timers to suit.
- Exit and Save the configuration

Reset to Default Settings

This option resets the RMS compact to factory presets. Selecting this menu item will display the following menu options:

```
Knuerr RMS Compact ver 0.1.13
      Embedded Agent Setup by Sinetica

1.  Knuerr Default Settings
2.  Exit Setup

Enter choice (ESC to exit):
```

Figure 30 Restoring default settings menu 1

If menu item 1 is selected, the following confirmation is requested:

```
Knuerr RMS Compact ver 0.1.13
      Embedded Agent Setup by Sinetica

=====
WARNING THIS WILL OVERWRITE ALL CURRENT VALUES
AND WILL SET THE EEPROM TO THE DEFAULT SETTINGS
=====

Enter 1 to ignore 2 to proceed.

Enter choice (ESC to exit):
```

Figure 31 Restoring default settings menu 2

Restoring default settings will set all parameters within the RMS compact to those used during the testing of the unit, this includes default IP information for both the RMS itself and for NMS and Trap receiver. Other default settings include

- Telnet enabled with default password of **knuerr**
- HTTP access enabled with default user name of **admin** and a password **knuerr**
- Temperature and humidity monitoring enabled on both ports
- Default Contact Closure names with a default state of normally **open** and type **level** with all traps disabled
- No output Boolean logic configured

Set Output and Boolean Settings

This section is used to setup the configuration of the digital outputs, along with the Boolean logic, which drives these outputs. Selecting option 9 from the main menu displays the following screen:

```
Knuerr RMS compact version X.X.X
      Embedded Agent Setup

1.  Set Boolean values
2.  Set Output values
3.  Exit output/boolean menu

Enter choice (ESC to exit):
```

Figure 32 Boolean Logic Configuration Screen

Note: It is recommended that setup of Boolean logic and output functions are configured using the supplied RMS compact Viewer/Programmer software package, not using the serial interface option (SEE the Viewer_Programmer section of this manual). The serial interface configuration for logic and

outputs should only be performed by users who have a thorough working knowledge of the RMS compact PLEASE NOTE : NOR logic operations are not supported by the firmware

Setting up Boolean Logic Values

Selecting option 1 from the above menu will display the following screen:

```
Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  1.  Set Boolean Input settings
  2.  Select AND or OR
  3.  Time On Delay
  4.  Time Off Delay
  5.  Exit Boolean Settings menu

Enter choice (ESC to exit):
```

Figure 33 Boolean Logic Configuration Screen

The Boolean logic function of the RMS compact enables the user to setup logic functions to switch the relay outputs of the RMS compact, and/or generate an SNMP trap. For example, in the event of receiving a contact input alarm indicating that an air conditioning unit has failed, AND that an over temperature alarm has been triggered, you may wish to receive a trap, and also switch on an additional cooling unit.

The RMS compact has a total of four logic operations (AND or OR), and 3 physical relay outputs.

The sequence of configuring a logic operation is as follows:

1. **Set Boolean Input settings**
2. **Select which type of logic operation you wish to use for each output (AND or OR)**
3. **Add any ON or OFF delays required**
4. **Enable logic outputs**
5. **Name Outputs**
6. **Configure traps for logic outputs**

1. Set Boolean Input settings

As outlined above, the first step is to specify which inputs will trigger a Relay output to be triggered. As explained, there are 4 logical outputs in total, and these logic outputs can be all AND calculations, all OR calculations or a mixture of both.

Selecting 'Set Boolean Input Settings' will display the following menu:

```
Knuerr RMS compact version X.X.X
  Embedded Agent Setup

  BOOLEAN INPUT LOGIC 1:  1,2
  BOOLEAN INPUT LOGIC 2:  3,4
  BOOLEAN INPUT LOGIC 3:  5,6
  BOOLEAN INPUT LOGIC 4:  7,8

  1.  Change Boolean 1
  2.  Change Boolean 2
  3.  Change Boolean 3
  4.  Change Boolean 4
  5.  Back to prev menu

Enter choice (ESC to exit):
```

Figure34 Configure Logical Inputs

This screen enables configuration of up to four logic operations.

To add an input number to the relevant logic calculation, select the relevant logic calculation (e.g. 'Change Boolean 1'), and add the input number (-ve number mean that the input is inverted for logic purposes). The above applies to both AND and OR calculations

The Inputs are numbered in the following way:

Input Number	Input Description
1	Contact Closure 1
2	Contact Closure 2
3	Contact Closure 3
4	Contact Closure 4
5	Contact Closure 5
6	Contact Closure 6
7	Contact Closure 7
8	Contact Closure 8
9	Temperature 1 LowerControl Limit
10	Temperature 1 Lower Warning Limit
11	Temperature 1 Upper Warning Limit
12	Temperature 1 Upper Control Limit
13	Humidity 1 LowerControl Limit
14	Humidity 1 Lower Warning Limit
15	Humidity 1 Upper Warning Limit
16	Humidity 1 Upper Control Limit
17	Temperature 2 LowerControl Limit
18	Temperature 2 Lower Warning Limit
19	Temperature 2 Upper Warning Limit
20	Temperature 2 Upper Control Limit
21	Humidity 2 LowerControl Limit
22	Humidity 2 Lower Warning Limit
23	Humidity 2 Upper Warning Limit
24	Humidity 2 Upper Control Limit
25	Temperature 1 Upper (Hysteresis)*
26	Temperature 1 Lower (Hysteresis)*
27	Temperature 2 Upper (Hysteresis)*
28	Temperature 2 Lower (Hysteresis)*
29	Feedback Latch

Table 1: Input Numbering

*The functions of the Temperature 1 (Hysteresis) and Temperature 2 (Hysteresis) inputs will be explained in Appendix A

2. Select AND or OR for each output

Choose 'Select AND or OR' from the Boolean logic menu, and the following screen will be displayed:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

BOOLEAN SELECTED 1:  AND
BOOLEAN SELECTED 2:  AND
BOOLEAN SELECTED 3:  OR
BOOLEAN SELECTED 4:  OR

1.  Change Boolean Selection 1
2.  Change Boolean Selection 2
3.  Change Boolean Selection 3
4.  Change Boolean Selection 4
    
```

```

5.   Back to prev menu

Enter choice (ESC to exit):

```

Figure 35 Select AND or OR Screen

Choose AND or OR for each logical output

3. Add any ON or OFF delays required

Once a desired logic condition has occurred, (e.g. inputs 1 AND 2 are present), then the user may introduce a delay before the output is set (to allow for rapid or erroneous changes in input condition). The same is true for clearing of an output once the condition has cleared. These timers are set by selecting the 'Time On Delay' or 'Time Off delay' from the Boolean menu

4. Enable Logic Outputs

Selecting the 'Set Output Values' option from the Boolean menu will display the following screen:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

1.   Enable Outputs
2.   Change Output Names
3.   Trap Controls
4.   Exit settings Menu

Enter choice (ESC to exit):

```

Figure 30 Setting Output Values Configuration Screen

To enable logic outputs. Select option 1 in the above menu, this should display the following screen:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

OUTPUT 1:   Enabled
OUTPUT 2:   Enabled
OUTPUT 3:   Enabled

1. EnableOutput 1
2. EnableOutput 2
3. EnableOutput 3
4. Back to prev menu

Enter choice (ESC to exit):

```

Figure 31 Enable Outputs Screen

This screen enables or disables Relay outputs.

3. Name Outputs

Option 2 in the Setting Output Values Configuration Screen, enable the user to configure a text descriptor for each output.

4. Configure traps for logic outputs

Selecting this option will display the following menu:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

1.   Trap Off to On Enables
2.   Trap Off to On repeat Timer Settings
3.   Trap On to Off Enables
4.   Trap On to Off repeat Timer Settings

```

```

5.  Exit Output Traps Menu

Enter choice (ESC to exit):

```

Figure 32 Configure Output Traps Screen

In this screen the user sets the conditions for sending traps on each output being triggered (OFF to ON or ON to OFF), as well as setting repeat timers for each type (if required).

To Save and Exit

If you are satisfied with your configurations, save them and exit. To save, press *'Exit Setup'*

The screen displays the following message:

```

Knuerr RMS compact version X.X.X
  Embedded Agent Setup

1.  Network Configuration
2.  Net Access Configuration
3.  NMS Configuration
4.  Trap Host Configuration
5.  Temp & Humidity Configuration
6.  Contact Closure Configuration
7.  Shutdown Targets Configuration
8.  Restore Default Settings
9.  Set Output and Boolean Settings
10. Exit Setup

Enter choice (ESC to exit): 10

*** WARNING *** Configuration changed

Esc to ignore changes, 1 to use for this session, 2 save:

```

Figure 33 Exit setup Messages For Configuration

The user can choose to save or discard changes made.

Note: Changes must be saved to take effect (select *'Exit setup'* followed by (2) to save).

When configuration complete, remove power & turn DIP switch 1 on the RMS compact from the DOWN (ON) position to the UP (OFF) position

Configuration using an Internet Browser

This section explains which parameters can be configured using an Internet browser such as Internet Explorer. Once the unit has been given an IP address, (see previous section), then it can be configured using the HTTP interface.

To connect to the HTTP interface, start your browser, and point it at the IP address for the RMS compact (e.g. <http://10.1.1.162>). This should display the following logon screen:

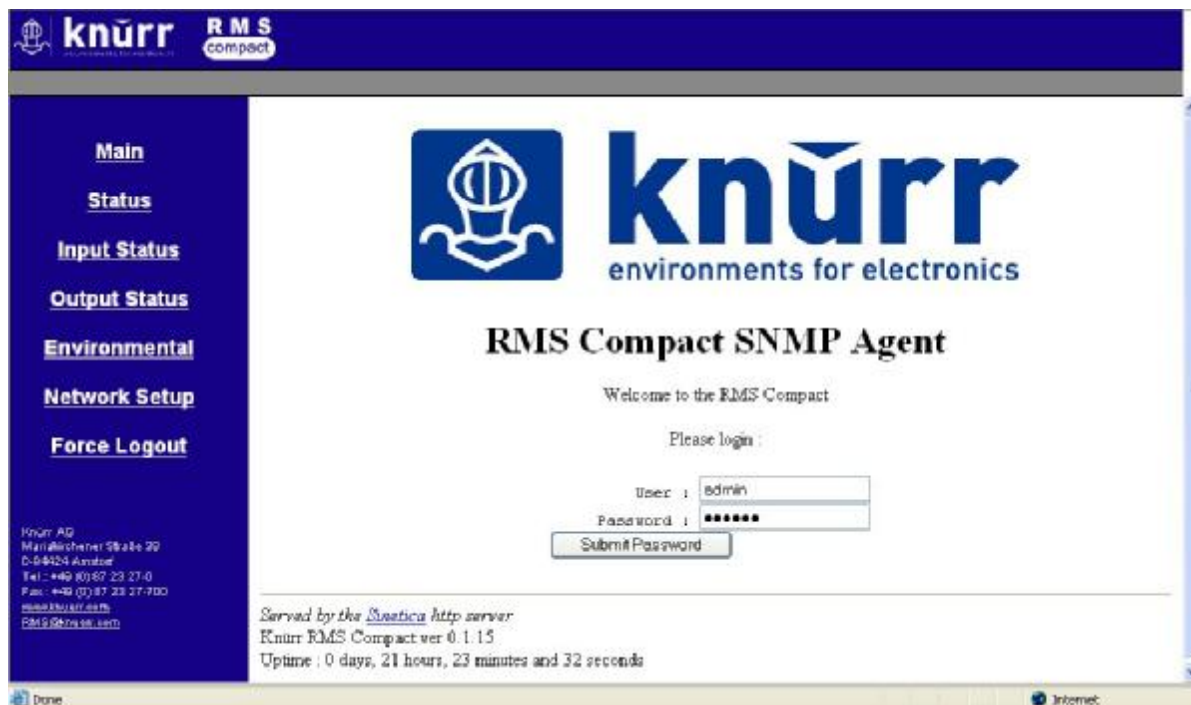


Figure 34: Login screen

Login using the HTTP username & password configured during the serial port configuration session. The default settings are **User: admin, password: knuerr**

Main Status Page

Once logged in, the following main status page is displayed:

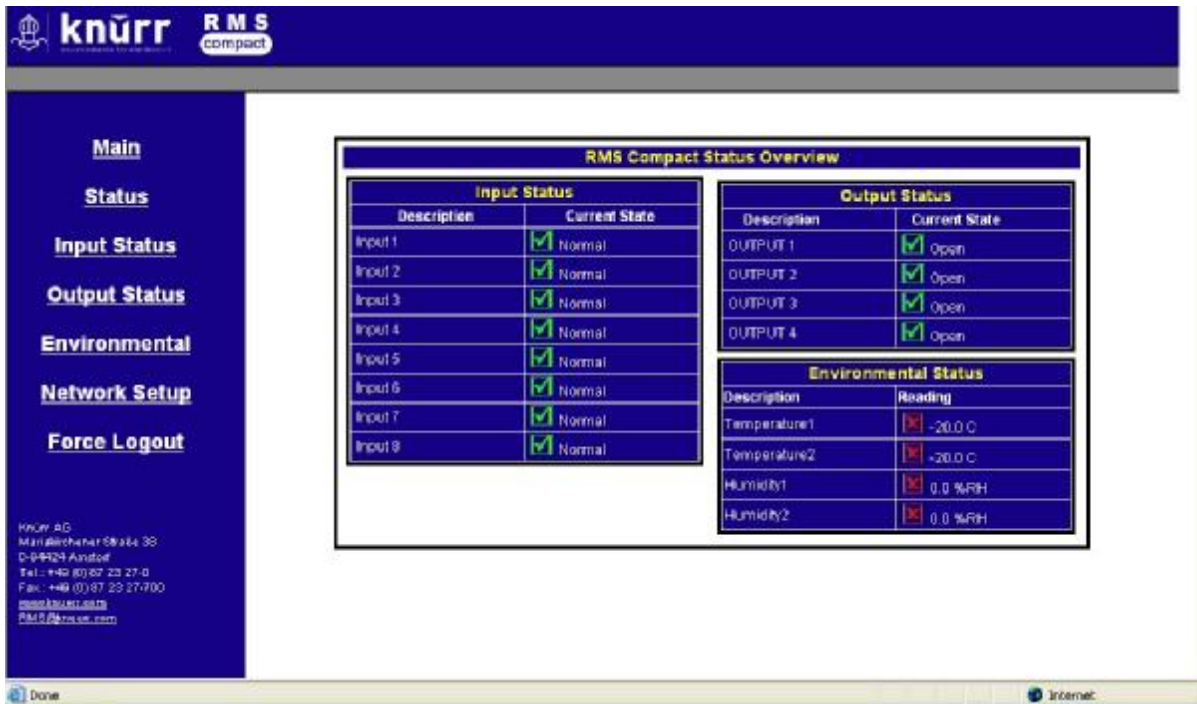


Figure 35: Main Status Page

This page is designed as a status summary page, showing the current status of digital inputs and outputs, along with the current temperature and humidity readings, with a green tick showing normal/non-alarm status and the red cross showing non-normal/alarm status. In the Environmental status window, an amber icon states that the temperature has breached one of the warning limit thresholds.

Input Status

The **Input Status** page gives more information about the configuration of the digital inputs, along with an indication of the current status of each contact, as follows:

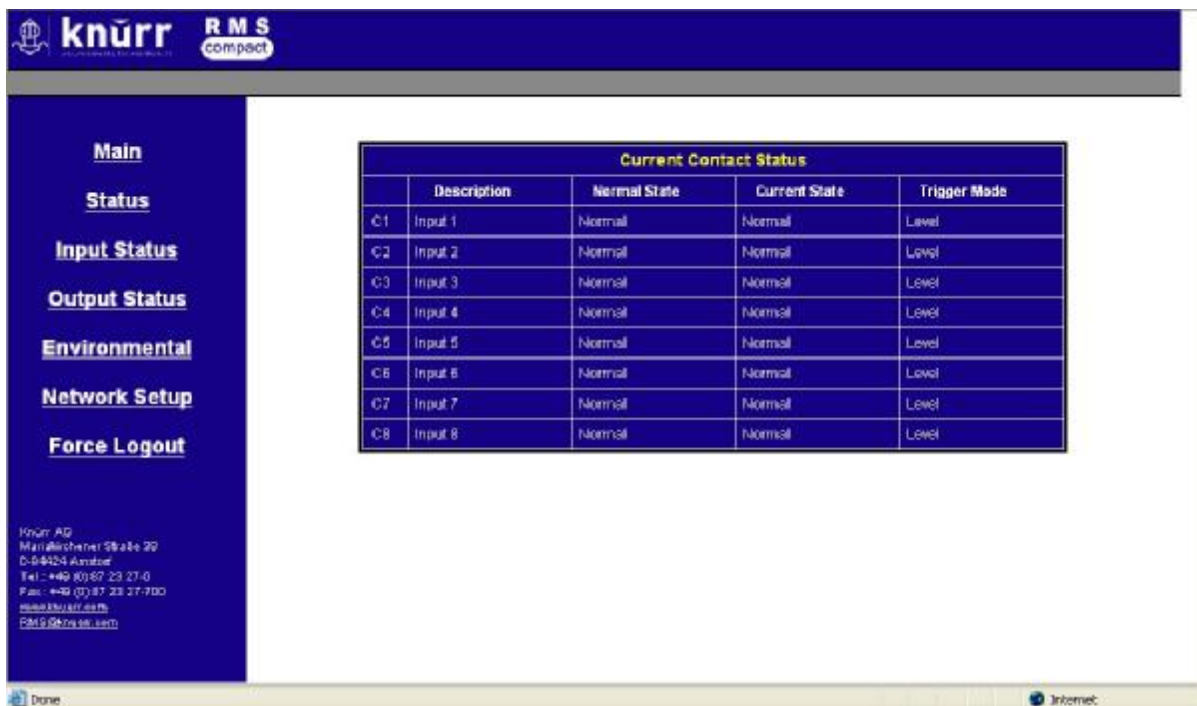


Figure 36: Input Status Page

Output Status

The **Output Status** screen shows configuration information relating to the digital Outputs of the RMS compact, including its configuration status (either **Enabled** or **Disabled**), and any ON or OFF delays configured (see serial configuration section for an explanation of how these delays function). It also displays the current status of each output, as follows:



Figure 37: Output Status Page

Network Setup

The **Network Setup** page shows configuration details for the RMS compact, its associated Network Management Stations (NMSs), and trap receivers. The user is also able to check the MAC address of the RMS compact and its **BootType** (preconfigured IP address, DHCP assigned or BOOTP assigned) from here.



Figure 38: Network Setup Page

Selecting the '**Force Logout**' option from the menu, will log the user out of the session

Configuration using the RMS compact Programmer Software

Introduction

RMS compact Programmer is a custom designed viewing and management package for the RMS compact unit. It enables the user to configure and monitor the RMS compact unit without the need for an NMS, (although RMS compact Programmer can also be used in conjunction with an NMS), and provides an intuitive Graphical User Interface (GUI), with which the RMS compact can be monitored and configured.

The RMS compact Programmer uses SNMP and Java technologies to view and manage the RMS compact , and allows the user to monitor the state of the inputs and outputs.

System Requirements

The version of RMS compact Programmer contained in this package supports systems running:

- Windows 2000/XP/2003

The software also requires the following:

- Connection to the network that the RMS compact is connected to.
- Internet Explorer 4 or above (To utilise its Java Runtime Environment) / Netscape Navigator 4.0 or above
- The network address of the PC that the RMS compact Programmer is running on must be entered into the NMS table of the RMS compact (see configuration section).

Installation

This section describes installation of the RMS compact Programmer software on a Windows 2000/XP/2003 platform.

- Insert the supplied CD-ROM 'RMS compact Support Software' and select the 'RMS compact' directory, followed by the 'Programmer' directory.
- Select the 'RMS Compact Install.exe' file and run. Follow onscreen instructions.

Once installed, the program is started by selecting the 'RMS compact Programmer' icon from the SINETICA directory in the Start Menu.

Note: The IP address of all PC's accessing the RMS compact using the Viewer_Programmer software tool, MUST be in the NMS table of the RMS Compact

Configuration

Once RMS compact Programmer has been started, the first thing the user must do is select **Connect** from **File** menu as follows:

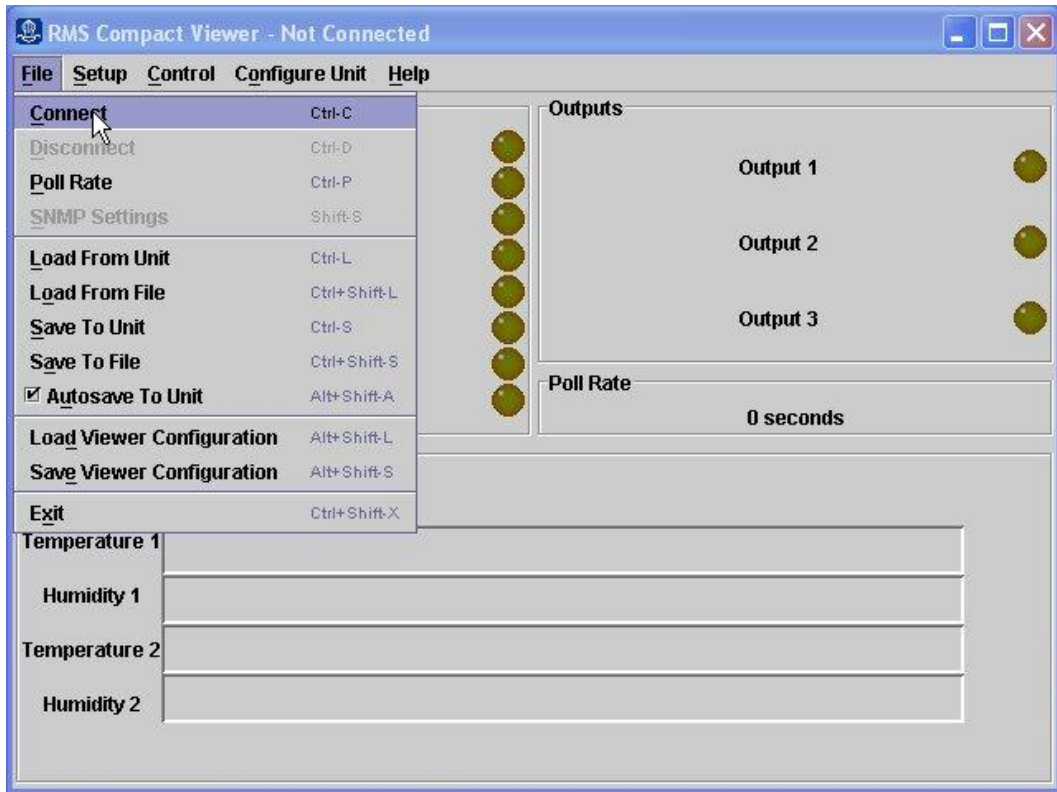


Figure 39 Connect to unit

Next, the user needs to enter the IP address and SNMP community of the unit, (as configured in the Serial Port Configuration section of this manual).

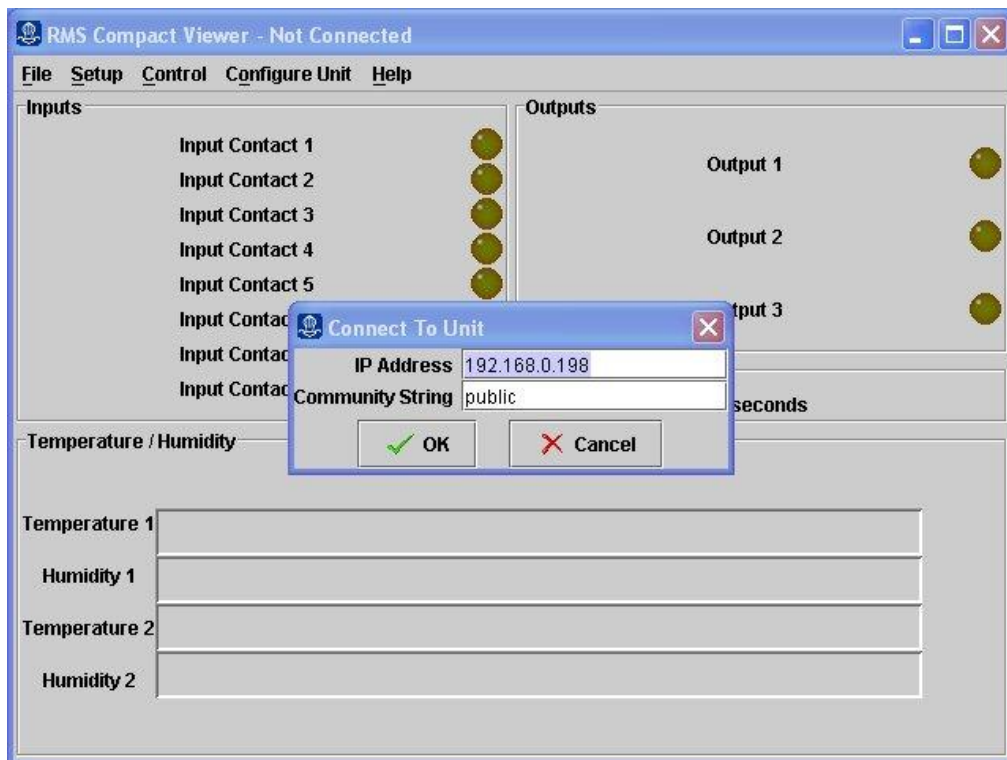


Figure 40 IP Address & SNMP community string

The following screen shows the main viewing screen for the RMS compact Programmer:

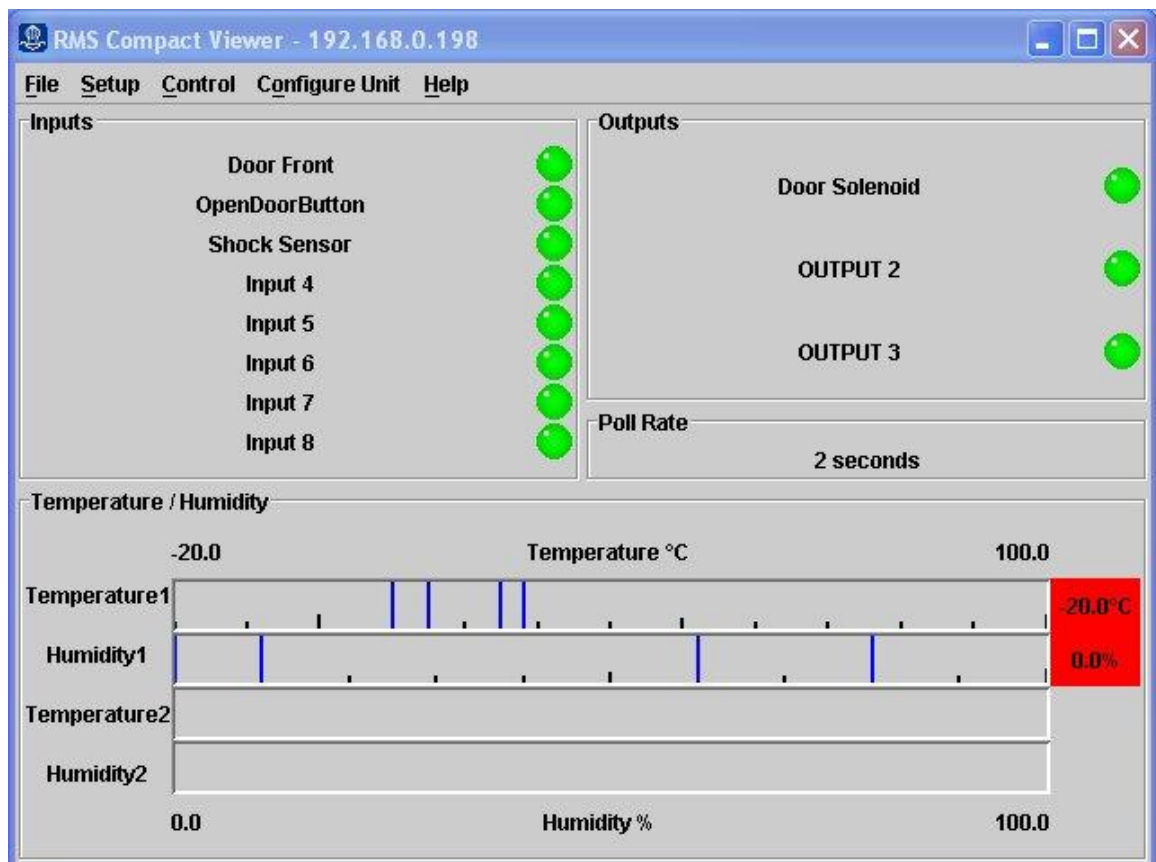


Figure 41 : RMS compact Programmer Main viewing screen

This screen displayed the current state of the contact closures along with the current temperatures & humidities, (if temperature and humidity sensors are installed), along with the state of the logic outputs.

Configure Unit Menu

The drop down menu with the heading **Configure unit**, has the following options:

The Show Configuration screen

Selecting **Show Configuration Screen** from this menu starts the main configuration window. This screen is the main setup screen for the RMS compact, and it is from this screen that it is recommended that the bulk of the RMS compact setup is done. Selecting this option displays the following screen:

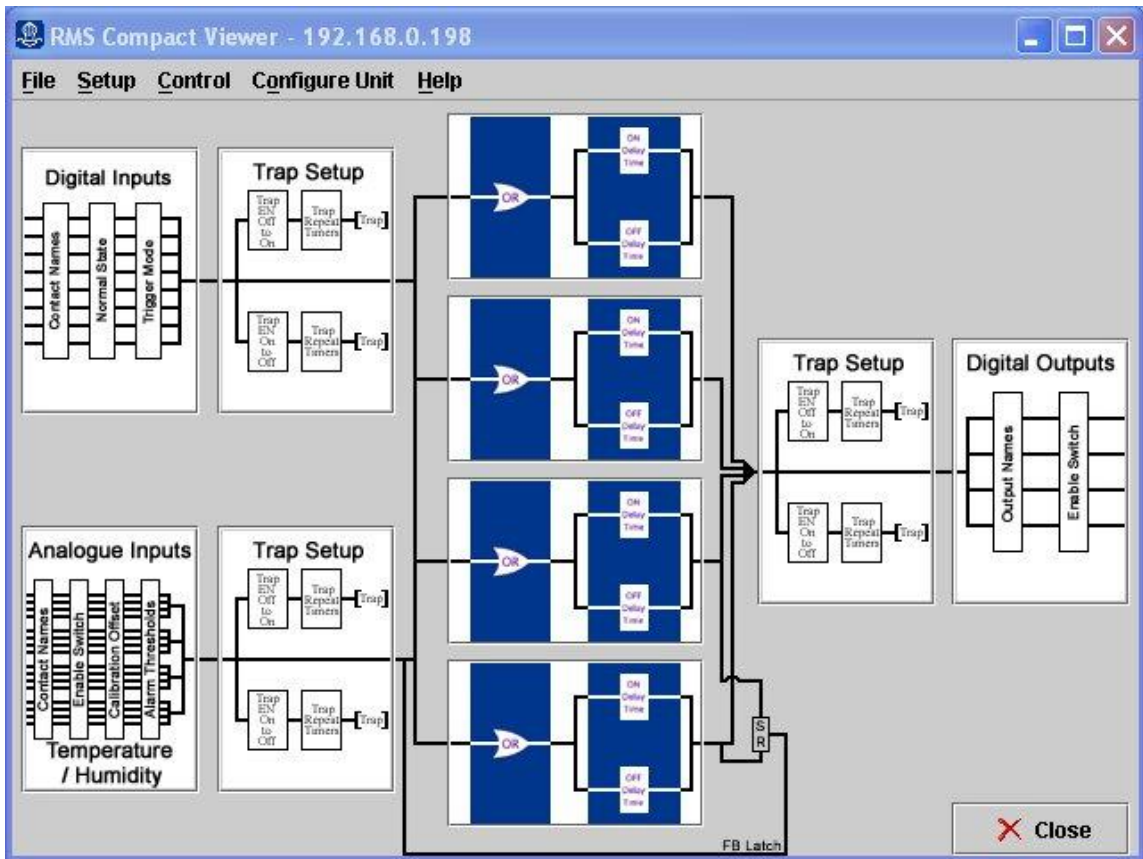


Figure 42: Main Configuration Screen

This screen is a logic diagram of the inputs on the left-hand side, running through the layers of logic, to the outputs on the right hand side. Most configuration options (other than TCPIP can be performed from here).

Note: Changes are not actually committed to the RMS compact until the data is saved using the 'Save to RMS compact' button on the configuration screen.

Digital Input Configuration

To select the option to be configured Single click on the **'Digital Inputs'** box in the main configuration screen window – this should display the following screen:

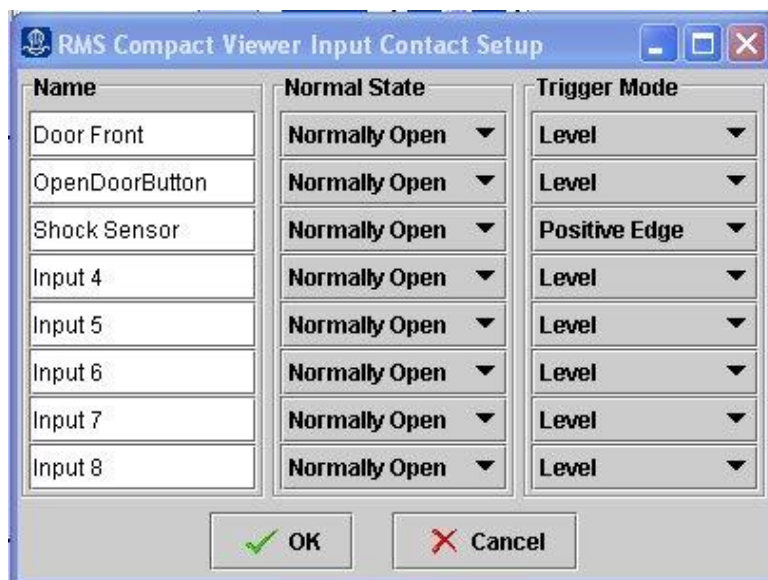


Figure 43 : Digital Inputs Configuration

This screen allows the user to configure the NAME of the digital Input, its NORMAL STATE (normally open or normally closed), and its TYPE (i.e LEVEL, POSEDGE or NEGEDGE – see serial configuration section of this manual for an explanation of each type)

Note : It is not possible to use the vowel mutations “Umlaut” and “ß” for any of the input or output names

Temperature & Humidity Input Configuration

Selecting the **Analogue Inputs** section on the main configuration, will display the following screen:

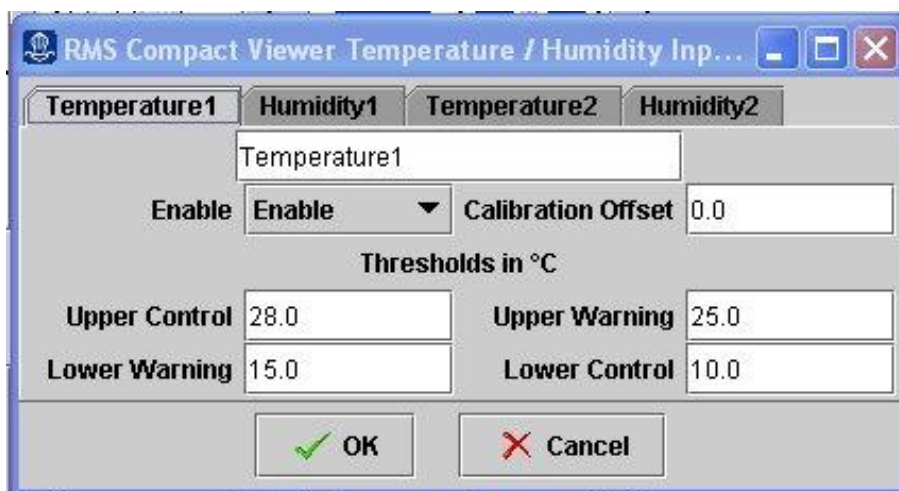


Figure 44: Temperature & Humidity Input Configuration

From here, the user can set the THRESHOLDS for Temperature and Humidity limits, ENABLE OR DISABLE Temperature or Humidity monitoring, change the NAMES of the Temperature & Humidity inputs and set a CALIBRATION OFFSET.

Digital Input Trap Configuration

Selecting the **Trap Setup** window connected to the **Digital Inputs** window on the main configuration screen, will display the following window:

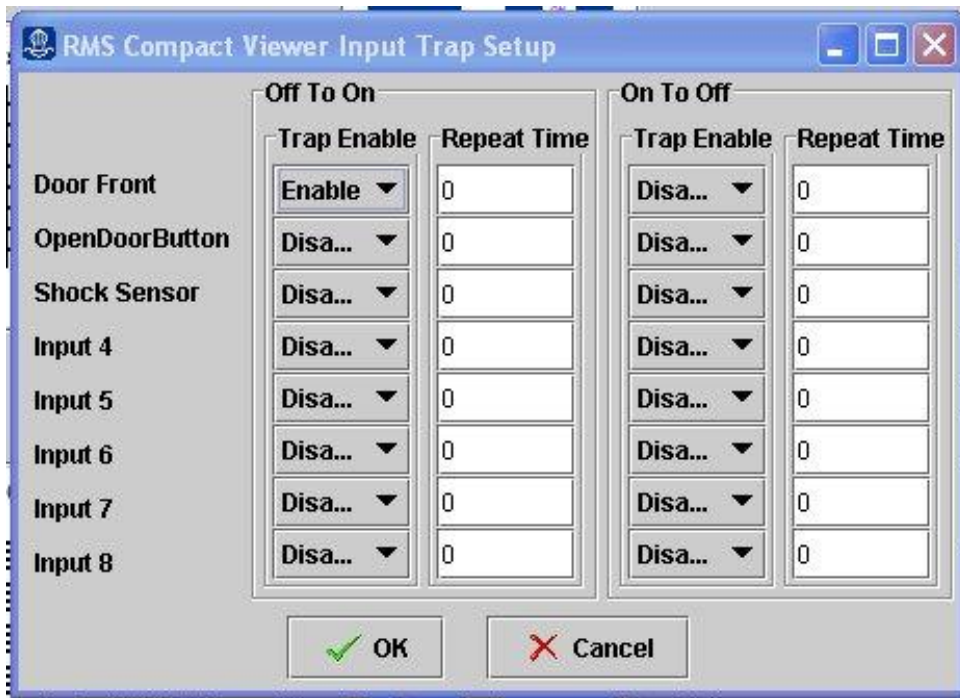


Figure 45: Contact Closure Trap Configuration

This screen enables the user to setup the circumstances by which an SNMP trap is generated in relation to the contact closure inputs. Firstly traps can be ENABLED or DISABLED for an OFF to ON or an ON to OFF transition, and also REPEAT TIMERS can be set if traps need to be continually send in an alarm situation.

Note: The Minimum Setting for a Trap Repeat Timer is 30 seconds.

Temperature & Humidity Trap Configuration

Traps for the Temperature & Humidity inputs are setup by selecting the **Trap Setup** box connected to the **Analogue Inputs** window in the main configuration window. This will display the following window, whose options are the same as the Contact Closure Trap options.



Figure 46: Temperature & Humidity Trap Configuration

Note: The Minimum Setting for a Trap Repeat Timer is 30 seconds.

Logic Configuration Screens

The four central blocks on the main configuration window relate to the four logic outputs available within the RMS compact. Selecting one of these blocks will display a window as follows (output 1 selected):

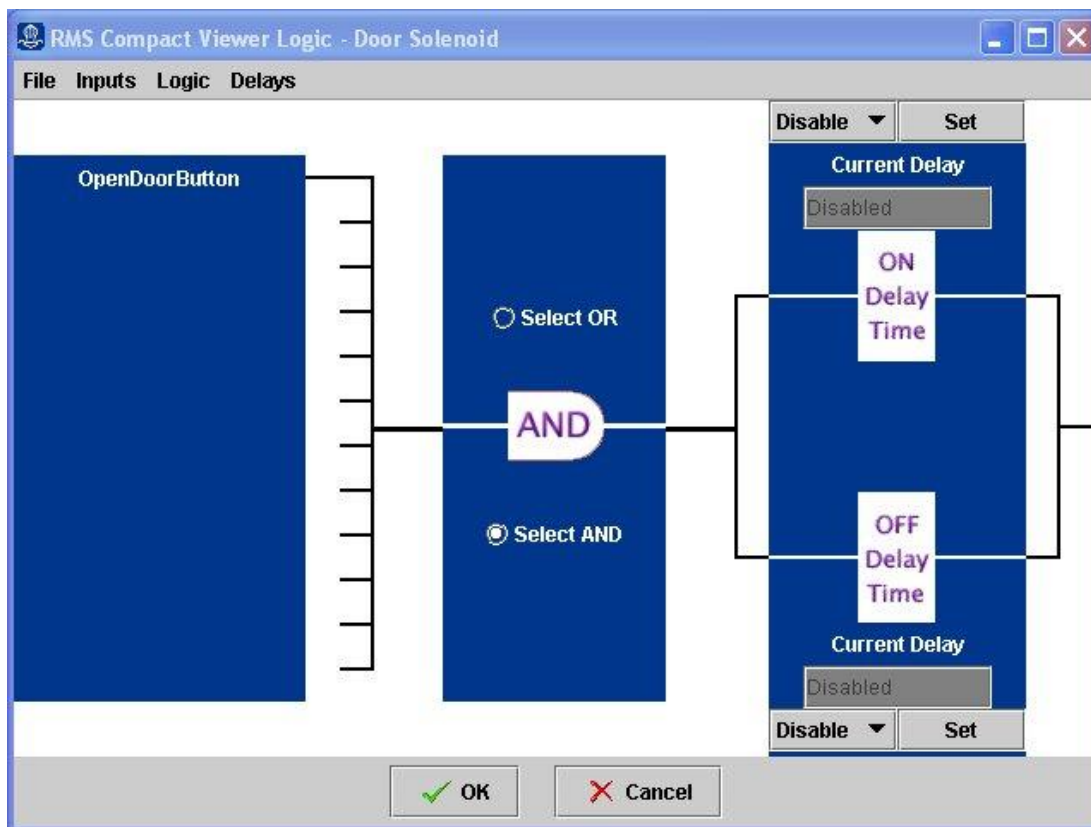


Figure 47: Logic Configuration Screen

The inputs are displayed on the left of the screen – to select an input to be used in this logic calculation, select **Add New Input** from the **Inputs** drop down menu. The user then selects the type of logic operation (AND or OR), followed by any delays that need to be introduced - the user may introduce a delay before the output is set (to allow for rapid or erroneous changes in input condition). The same is true for clearing of an output once the condition has cleared. These timers are set by selecting the 'ON Time Delay' or 'OFF Time Delay'.

Note: Although there are only 3 relay outputs on the RMS Compact, there are 4 possible logic calculations available. The calculations 1 –3 relate to the physical outputs, whilst number 4 is a purely logic based calculation used for generating traps based upon a pre-defined set of input parameters. **PLEASE NOTE : NOR logic operations are not supported by the firmware**

Output Trap Configuration

The second from right box configures the output trap parameters as follows:



Figure 48: Logic Output Trap Configuration

Firstly, the user may ENABLE or DISABLE traps for OFF to ON or ON to OFF transitions of the logic outputs, plus change the REPEAT TIMERS if required.

Note: The Minimum Setting for a Trap Repeat Timer is 30 seconds.

Relay Output Configuration

The final area of configuration is the settings for the physical relay outputs:



Figure 49: Relay Output Configuration

This screen enables the logic previously configured, to switch a physical output on the RMS compact . From this screen, the physical outputs are ENABLED OR DISABLED and assigned a NAME.

The 'File' Menu

Connect & Disconnect

Selecting **Connect** will prompt the user to enter the IP address of the RMS compact required (see the beginning of this section of the manual, titled **Configuration**).

Poll Rate

This defines how often the RMS compact is polled over the network. This will obviously have an impact on network traffic, and should therefore be used with some care.

SNMP Settings

Selecting this option will display the following screen:

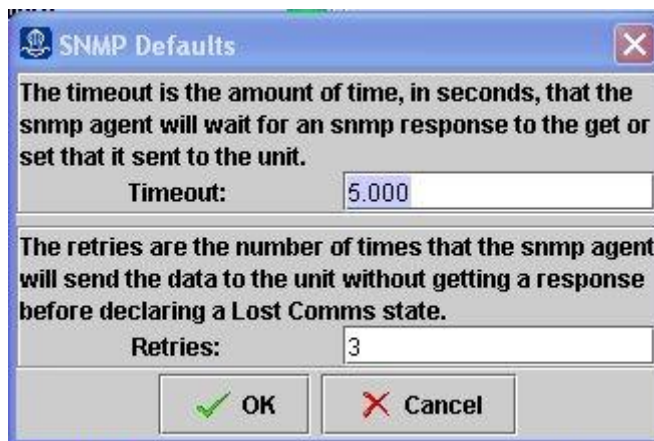


Figure 50: SNMP Default settings

Explanations of both settings are given in the window above.

Load from unit

Uploads the existing configuration from the RMS compact into the Viewer/Programmer. – NOTE: Unless **Autosave to Unit** is enabled (see below), this will overwrite any changes made in the configuration in the viewer until **Save to Unit** has been executed.

Saving the Configuration to the RMS compact

Once all configuration options have been set, it is necessary to save the configuration to the RMS compact, by selecting the 'Save To RMS compact' button. Selecting this button should send the configuration to the RMS Compact, displaying a progress bar during the download.

Saving the configuration to a file for downloading into another RMS compact

Under the **Configure RMS compact menu**, there are two options, called **Save to File** and **Load from file**, this enables the user to save the configuration of the RMS compact unit to a file on a PC or server. This configuration file can then be recalled and downloaded into an alternative unit (or into the same unit for backup purposes).

Once the configuration of the unit is complete, select the **Save to File** button from the **File** menu. You will then be prompted for a file location and filename.

To recall this configuration file at a later time, just select the **Load from File** button and locate the file. The settings from this file will be recalled into the Viewer/Programmer for downloading into another unit.

Saving Viewer Configuration

It is possible to save the configuration of the viewer/programmer software in addition to the configuration of the RMS compact itself. This will save the following settings:

- Poll Rate
- SNMP Settings
- Any Actions set
- SMS Settings
- Logging settings

Selecting **Save Viewer Configuration** will prompt the user to save the config (.ini) file to a user defined location. **Load Viewer Configuration** will restore settings made in this file.

Note: There are two different software streams of the RMS compact Viewer/Programmer software (version 1.x.x and version 2.x.x) – Version 1.x.x of the viewer WILL NOT support configuration files created on

a 2.x.x version of the Viewer/Programmer. Configuration files created on Version 1.x.x ARE SUPPORTED on Viewer/Programmer version 2.1.1 and above only.

Setup Menu

Configure Actions

This screen enables the user to setup pre-defined actions for each alarm using batch files. A batch file can be run for each alarm generated by the RMS compact, including all input alarms (Contact Closures & temp/humidity), plus boolean logic output alarms. Selecting the **Actions** menu, will display the following screen:

In the event of any alarm, the Viewer will run a user defined timer. If the alarm condition remains for the duration of the timer, the Viewer will execute a user defined batch file and / or send a user defined message to a pager or mobile phone.

Contact Names	Timer	Batch File	SMS Message
Door Front	0		
OpenDoorButton	0		
Shock Sensor	0		
Input 4	0		
Input 5	0		
Input 6	0		
Input 7	0		
Input 8	0		
Temperature1 UCL	0		
Temperature1 LWL	0		
Temperature1 LWL	0		

OK Cancel

Figure 51: Set Actions screen

Running Batch Files

To run a batch file in the event of an alarm on the RMS compact, first enter a value for the **Timer**— this value is displayed in minutes, and refers to the delay between receiving the alarm condition, and running the batchfile. For example, we will use the **Temperature 1 UCL** alarm as a trigger:

RMS Compact Viewer Action Setup

In the event of any alarm, the Viewer will run a user defined timer. If the alarm condition remains for the duration of the timer, the Viewer will execute a user defined batch file and / or send a user defined message to a pager or mobile phone.

Contact Names	Timer	Batch File	SMS Message
Door Front	0		
OpenDoorButton	0		
Shock Sensor	0		
Input 4	0		
Input 5	0		
Input 6	0		
Input 7	0		
Input 8	0		
Temperature1 UCL	2	c:/broadcast.bat	
Temperature1 UWL	0		
Temperature1 LWL	0		

OK Cancel

Figure 52: Batchfile Setup

Once the timer value has been set, enter the FULL PATH to the batchfile into the **Batch File** field (including the drive letter). In the example above, we have a batchfile that will send a broadcast message to an administrator, informing the temperature threshold has been breached. The contents of this file might be:

net send administrator Rack over temperature

(for example) This batchfile will run 2 minutes after the alarm has been raised by the RMS compact unit.

Sending an SMS Message

An SMS message is configured, simply by typing a text string into the **SMS Message** field of the action screen, for example :

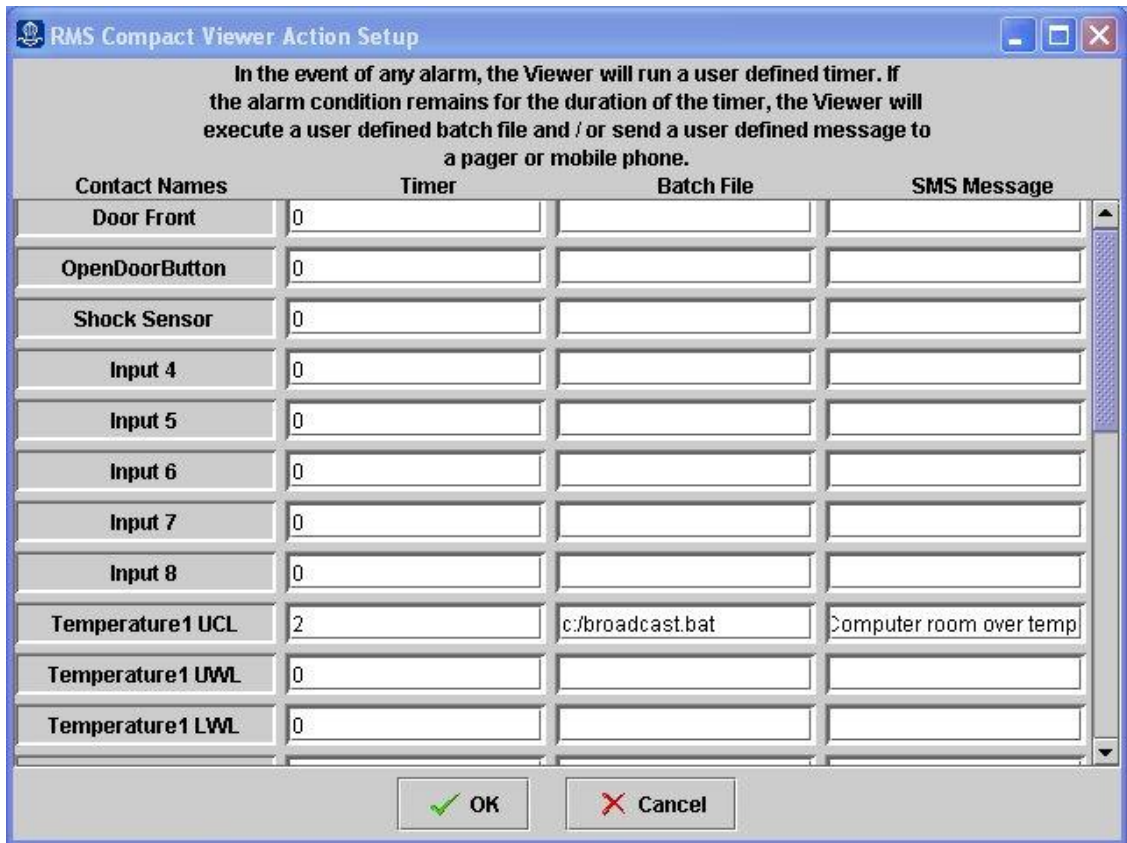


Figure 53: SMS Action

Once the Temperature 1 (UCL) alarm has been triggered, the text in the **SMS Message** Field will be sent to the SMS number configured in the **Configure SMS** menu of the Viewer/Programmer software (see previous section)

SMS Screen

This screen configures the parameters need to send to send a message (using SMS) to a mobile phone or pager. The RMS compact viewer/programmer software uses the TAP ('Telocator Alphanumeric Protocol'). Communication protocol to send messages to the SMS bureau.

Note: The SMS bureau to be used must support the TAP communication protocol. Your network supplier should be able to tell you if they have a TAP bureau.

Note: A Hayes compatible modem installed on the PC running the Viewer/Programmer software is required to send SMS messages

First, select **SMS** from the **Setup** menu. The following screen should be displayed:



Figure 54: SMS setup screen

This first thing to do is to setup the modem that is being used, by clicking on the **Setup Modem** button. This should display the following screen:

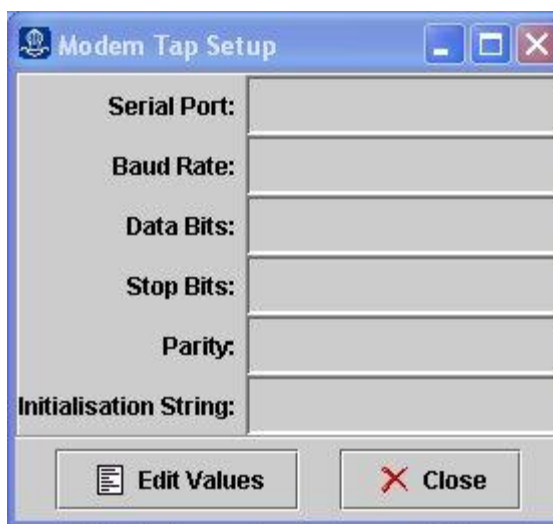


Figure 55: Modem setup screen

Enter parameters for your modem including **Com Port**, **Baudrate**, **databits**, **Stopbits**, **Parity** & Modem **initialisation String**. The data format will depend upon the specific TAP bureau that is being used.

Once the modem is configured, **Save Values** and **Close** to return to the SMS setup screen. Back in the **SMS Setup** window, enter an outside line access number if required, then enter the SMS TAP **Bureau Number** this number should be obtained from your Network supplier. Enter a password for the bureau if required (it is rarely required), then enter the mobile phone or pager number that you wish to send the message to, into the **Pager/Mobile ID Number** field.

The following screen shows an example, using the UK based O2 bureau:

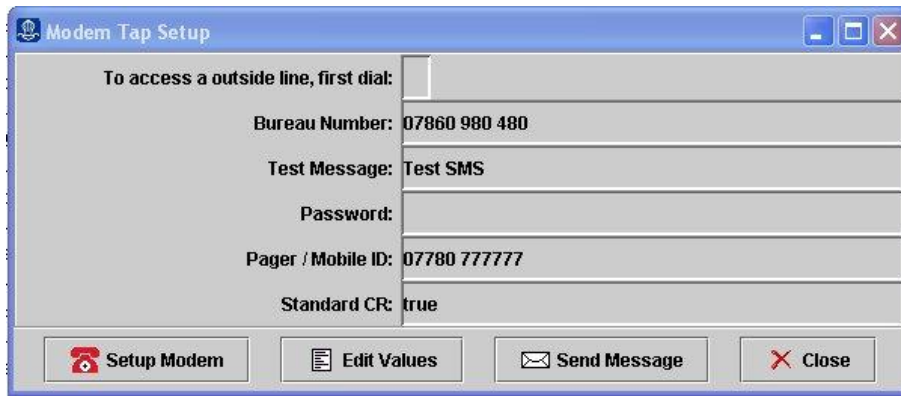


Figure 56: Example SMS setup

The **Standard CR** field will also depend on whether the bureau supports standard Carriage Return or Carriage Return and Line Feed – again, the bureau supplier should be able to tell you this.

It is possible to send a **Test Message** to check your configuration details. Just enter a message in the **Test Message** field, and hit the **Send Message** button.

If the Test Message is successfully received, then you can now go onto configuring the Viewer software to send an SMS message for specific alarms, using the **Configure Actions** feature as explained in the following section.

Logfiles

This screen gives the option to setup logfiles for values and for alarms (and to set a maximum logfile size). There are two types of data logging that the user can perform, these are **Values** and **Alarms**.

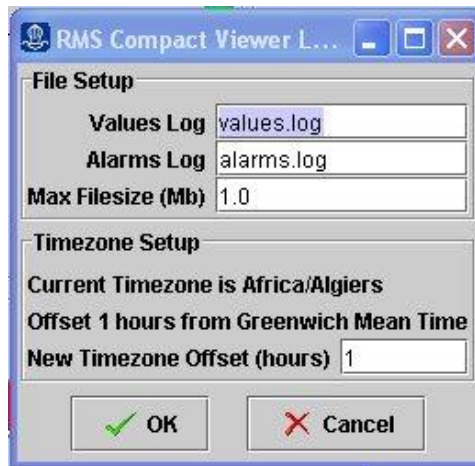


Figure 57: Advanced Features

Values Logging

If Values logging is selected (i.e. a logging filename is provided), then a 'snapshot' of the status of the RMS compact will be logged to a file every time the unit is polled. The status of all inputs will be logged on each poll. For example:

```

11/09/2002 15:00:00 GMT
Contact_1      normal
Contact 2     normal
Contact 3     normal
Contact 4     normal
Contact 5     normal
Contact 6     normal
Contact 7     normal
Contact 8     normal
Temperature1 Warning  22.5°C
Humidity1 Warning   40.6%
Temperature2 Warning  22.9°C
    
```

Humidity2 Warning	37.3%
-------------------	-------

Figure 58: Values Logfile

Alarms Logging

If Alarms logging is selected (i.e. an Alarms log filename is provided), then an entry will only be added to the logfile when an alarm condition occurs.

For example:

```

11/09/2002 15:08:47 GMT
Humidity1 Warning      Entering alarm state
Humidity1              Entering alarm state

11/09/2002 15:09:02 GMT
Temperature1 Warning  Entering alarm state

11/09/2002 15:09:12 GMT
Temperature1          Entering alarm state

11/09/2002 15:09:17 GMT
Temperature1 Warning  Returning to normal state
Temperature1          Returning to normal state
    
```

Figure 59: Alarms Logfile

Timezones

It is also to set the local timezone (based on an offset from GMT), plus the option to listen for SNMP traps in addition to the normal polling routine and also the option to save a RMS compact setup profile and load a pre-defined profile.

The Control Menu

Input Contact Reset

If **Positive Edge or Negative Edge** trigger mode is selected in the **Input Contact Setup** section, then if an alarm condition is detected on the digital input, it will 'Latch' the condition – i.e. it will stay in alarm mode until manually reset. Selecting this menu, and hitting the **Reset Trigger** button for the relevant contact, will reset the digital input to its non- alarm state.



Figure 60: Digital Input contact reset screen

Output States

The RMS compact Viewer/Programmer software, also offers the ability to manually set the status of the output relays, overriding the status of the input logic. Firstly, select **Output States** from the **Control** menu. This should display the following screen:

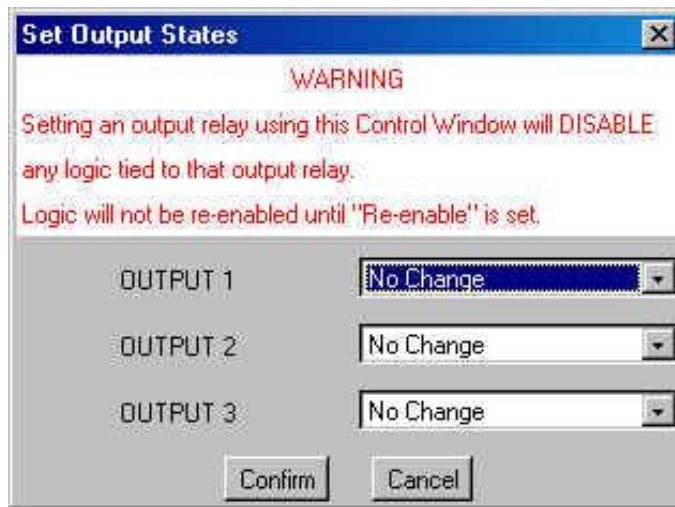


Figure 61: Set Outputs

To set an output **ON** or **OFF** regardless of the state of its input logic, just select either **ON** or **OFF** from the pull down menu.

Note: The logic inputs will not be re-enabled until *Re-Enable* is selected from the pulldown menu.

Appendix A: Using the Temperature Hysteresis Function

How it Works

The Hysteresis functionality on both Temperature 1 and Temperature 2 inputs, is an additional temperature threshold, which enables the RMS compact to switch on a cooling fan or heater unit within a rack, once the temperature reaches the Upper Warning Limit (UWL) threshold or Lower Warning Limit (LWL) threshold.

In the case of *Temperature Upper Hysteresis*, the cooling fan will remain on until the temperature drops 4 degrees centigrade below the UWL.

For *Temperature Lower Hysteresis*, the heater unit will remain on until the temperature rises 4 degrees above the LWL.

This is done to try and prevent 'bounce' of the relay output, and the temperature hovers around the UWL or LWL threshold, i.e. so that the relay does not continually switch on and off.

This is illustrated in the graph below:

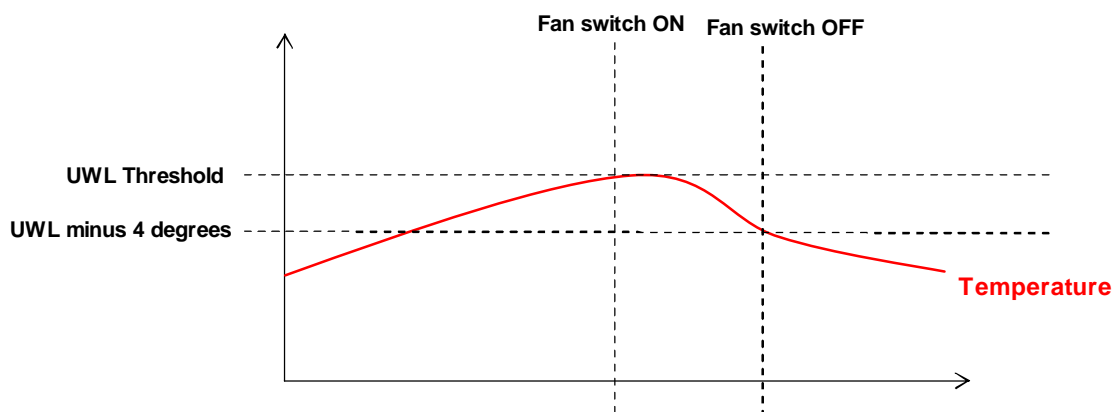


Figure 62: Temperature Hysteresis function

The inverse of the above is true for *Temperature Lower Hysteresis*.

Setup

The best way to configure the Temperature Hysteresis function is to use the RMS compactViewer/Programmer software provided. Below is a description of the steps required:

Enable Temperature monitoring & set thresholds

The first step is to make sure that temperature monitoring is enabled, and to set your temperature threshold to the desired levels.

Start up the RMS compactViewer/Programmer software, and go to the **Configure RMS compact** section, and click on the **Analogue Inputs** box- you should see the following window:

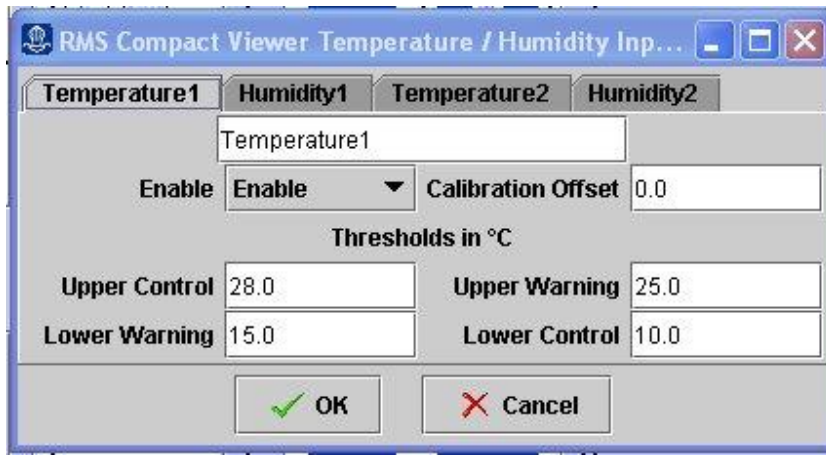


Figure 63: Enable Temp inputs & set Thresholds

As explained above, the threshold that will trigger the fan to switch on, is the UWL threshold, the threshold to trigger the heater to switch on is the LWL threshold – therefore ensure that these are correct.

Setup logic

The next step is to setup the RMS compactlogic to perform the switch on of the fan or heater.

Depending upon which output the fan or heater is wired into, select the relevant logic block (we will use output 1 as an example – i.e the Fan triggered by *Temperature Upper Hysteresis*)

Once opened, select **Add new Input** from the drop down menu, and select **Temperature 1 Upper Hysteresis** (or Temperature 2 Hysteresis if required), as follows:

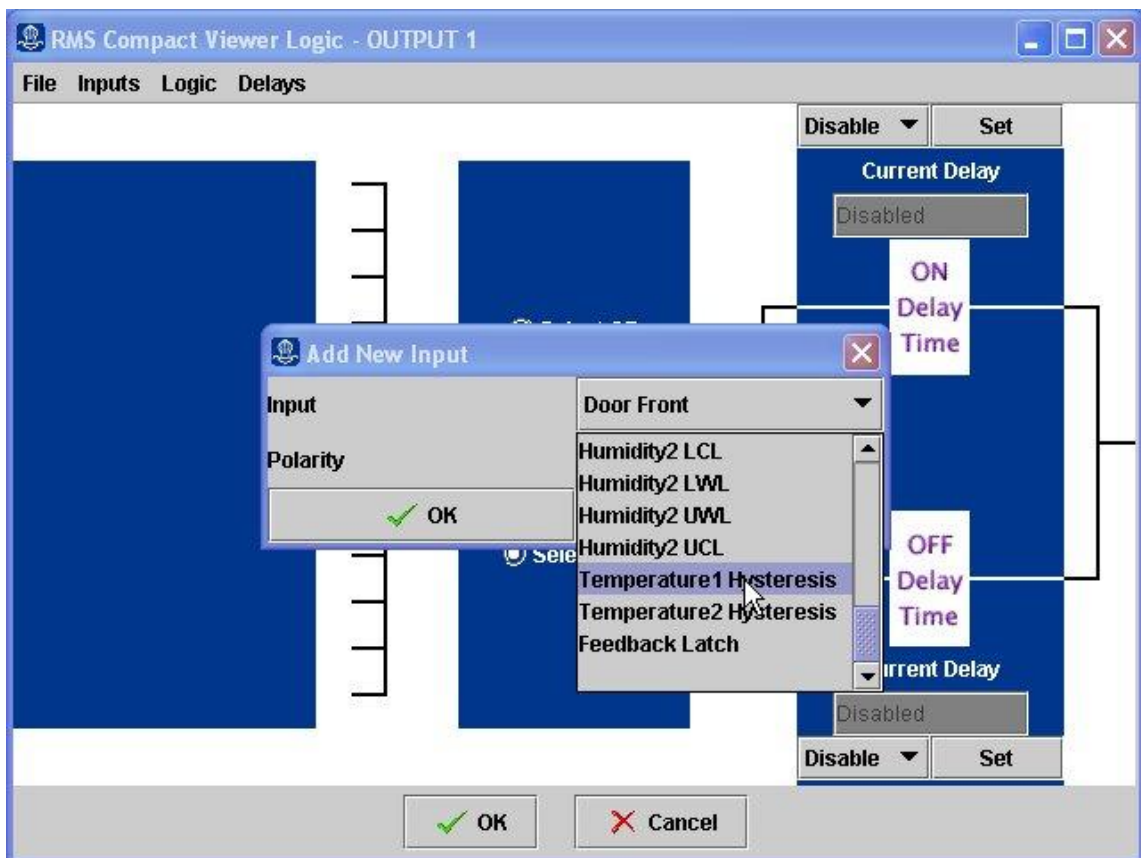


Figure 64: Select logic Input

As this is the only input to this logic block, change the logic block type to OR, as follows:

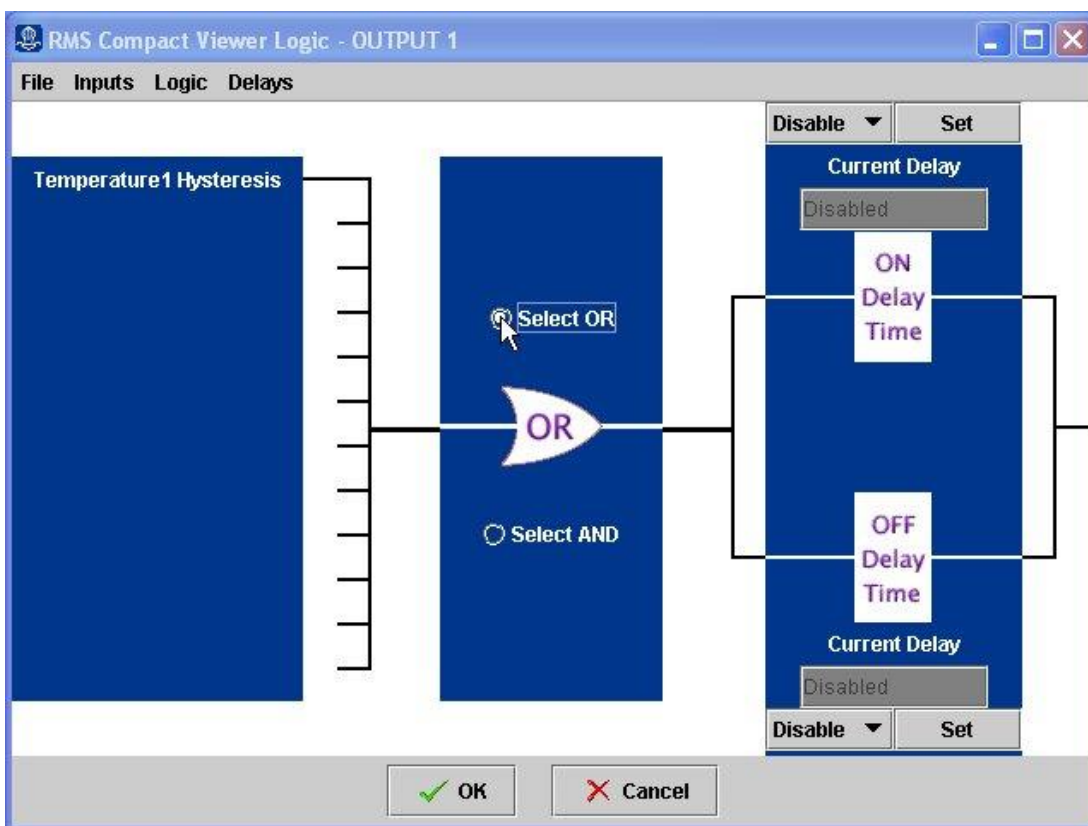


Figure 65: Select OR function

Add any ON or OFF delay timers (if required).

Now ensure that the relevant relay output is enabled:

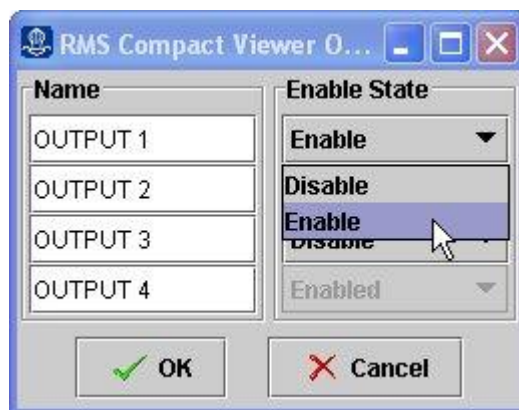


Figure 66: Enable Fan Output

Using the above example, the following sequence of events should now occur:

- When **Temperature1** reaches 25 deg C, the fan connected to **Output 1** should switch on.
- When **Temperature1** drops to 20 deg C, the fan should switch off, and not switch on again until the temperature returns to 25 deg C.

As previously mentioned, for *Temperature Lower Hysteresis*, the procedure is the same as above, but using *Temperature Lower Hysteresis* as a logic input.

Appendix B

Sensor Details

This section explains the sensor options available with the RMS compact product, along with a brief explanation of how they interface to the unit.

Digital Input sensors




This section explains a selection of sensors that can be connected to the **Digital Inputs** of the RMS compact

Door Sensor

P/N 01.108.115.9

Used for monitoring access to a cabinet or room, these magnetic bridge sensors operate on all magnetic materials.

Supplied with 4m cable & fixing material.

Physical Appearance	Connector	Plugged into RMS compact
	 <p data-bbox="778 1218 901 1245">Bare Ended</p>	 <p data-bbox="1059 1171 1442 1223">Example shows sensor plugged into Digital Input 1</p>

Shock Sensor

P/N 06.108.113.9

Monitors movement of a rack – for example if forced entry is attempted.

Non-positional vibration sensor. , ABS plastic enclosure measuring 70x70x25mm

Contacts open when unit is at rest.

Operating Temp –10 to +70 deg C

Supplied with 4m cable

Note: For effective operation, the +ve and –ve wires must be connected up correctly to the +ve and –ve terminals on the RMS compact digital input connector

Physical Appearance	Connector	Plugged into RMS compact
---------------------	-----------	--------------------------



Smoke Sensor

P/N 06.108.111.9

For smoke detection within a rack or room.

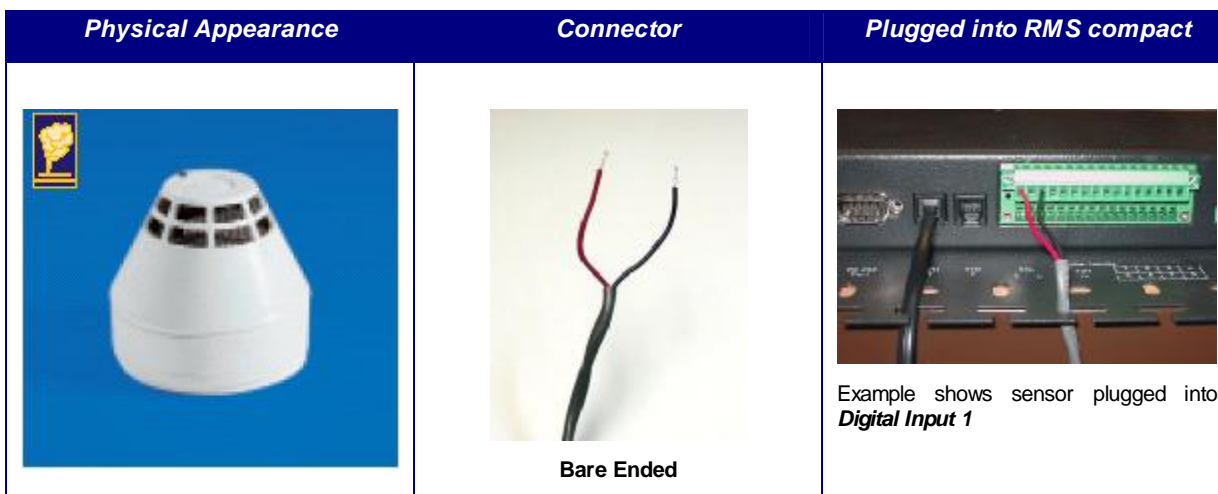
Scattered-light sensor for early detection of fires, with alarm memory and alarm indicator

Low voltage operation 8v – 28v. The optical smoke sensor is particularly suitable for detecting visible smoke from smoldering fires (light smoke) or fires with restricted oxygen supply, as well as open fires.

Sensor specification DIN EN 54 T 7, German insurance accreditation (VdS) G 292 19

Standby current: 40µA; Alarm Current: 9mA; Temp range: -20 to 72 degC; Humidity range: 95% RH; Dimensions: 95mm, 94mm height

Supplied with:
 4m cable
 Mounting material
 Description



Water Level Sensor

P/N 06.108.117.9

Float type water level sensor

Supplied with 4m cable





Analogue Input Sensors

Temperature & Humidity Sensor

P/N 06.108.112.9

Provides both temperature and relative humidity monitoring within one unit. ABS plastic enclosure measuring 70x70x25mm

Supply voltage 5v DC +/- 5% (supplied by Hawk-I); Current: Max 5A;

Temperature range – 0 to 60 deg , accuracy +/- 5%

Humidity Range 30% to 90% relative humidity, accuracy 5% RH @ 25degC, 60% RH.

Supplied with 4m cable



Temperature Sensor

P/N 06.108.110.9

Temperature only sensor. ABS plastic enclosure measuring 70x70x25mm

Operating Temp: -40 to +250 degC; Thermal time constant: 7 sec (cooling in air); Dissipation factor: 3mw/K; Resistance: 50k ohms +/-3%

Supplied with 4m cable:





ECO Temperature Sensor

P/N 06.108.120.9

Temperature only sensor. ABS plastic enclosure measuring 70x70x25mm

Operating Temp: -40 to +250 degC; Thermal time constant: 7 sec (cooling in air); Dissipation factor: 3mw/K; Resistance: 50k ohms +/-3%

Supplied with 4m cable:



AC Voltage Monitoring Sensor

P/N 06.108.122.9

Monitors AC Power via a fixed IEC Euro connector.

Monitored AC Voltage 230V 50/60

Supplied with 4m cable & Mounting kit:





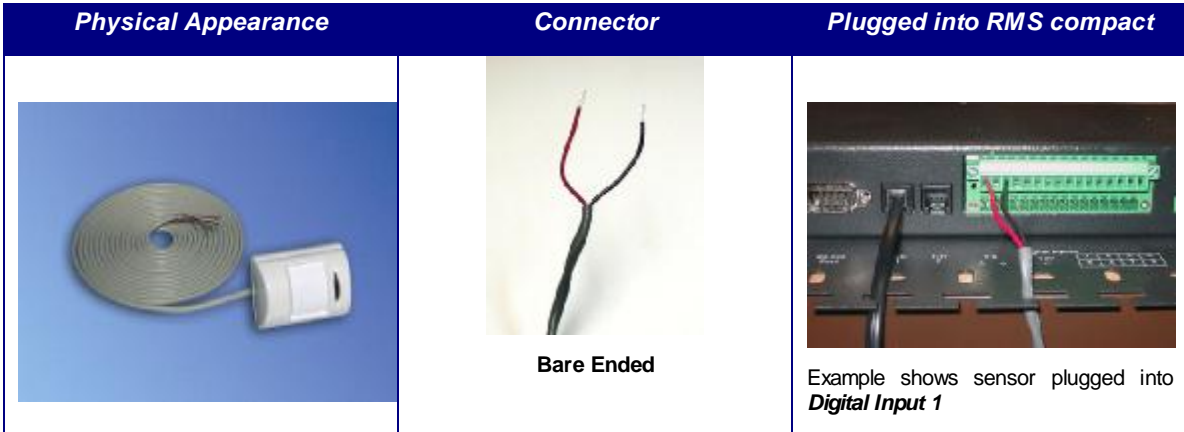
Passive Infrared Movement Sensor

P/N 06.108.114.9

Room Monitoring with the latest state of the art technology

VdS approval : Classes A +B, Volumetric lens range 2-16m, Long Lens range 29-50m, Curtain lens range 17-30m, manipulation monitoring, digital fault evaluation, corner or wall mounted

Supplied with 4m cable & Mounting kit:



This list is continually being updated, please contact [Knürr](#) for further information.

Appendix C: Serial/TFTP Firmware Upgrades

Using the supplied **RMS compact Serial/TFTP software**, it is possible to upgrade the firmware version of the RMS Compact, to add patches and new features.

Install

To install the SerialTFTP upgrade software, simply cd to the relevant directory on the supplied Cdrom, and run the **SerialTFTP.exe** installation script.

Now copy the firmware files to an accessible directory on your hard drive (these should be supplied by Sinetica Corporation)

Run SerialTFTP

From the Start menu of your PC, select the **SerialTFTP** option.

The user now has two methods of upgrading the RMS compactfirmware, either using a serial port to serial port connection between the RMS compactand the PC, or using the TFTP protocol over the TCP/IP network.

Starting the SerialTFTP program should display the following screen:

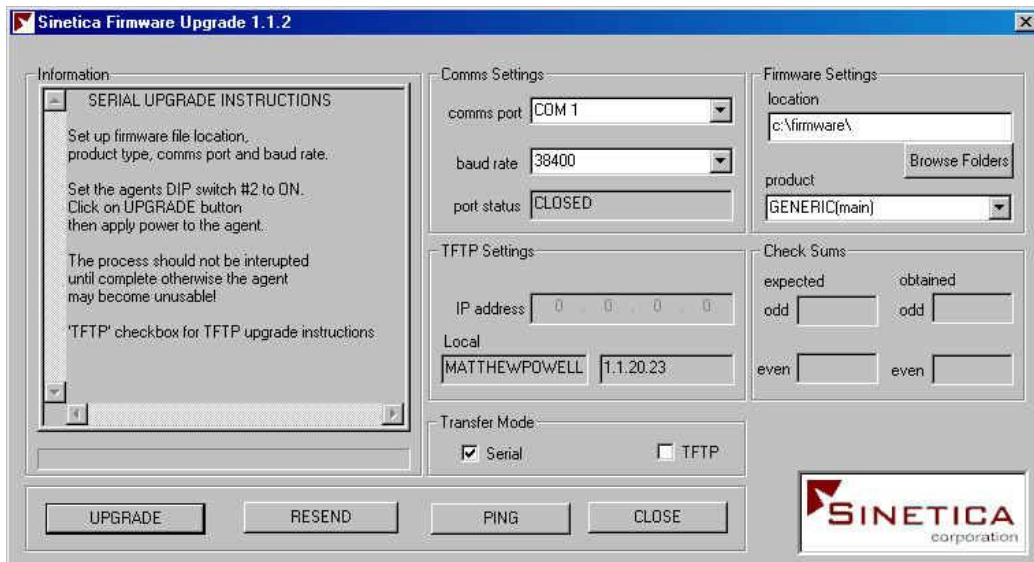


Figure 67: SerialTFTP Firware Upgrade Tool Screen

TFTP Upgrade

TFTP is the quickest, and preferred, method of upgrading the firmware in the RMS Compact. Instructions for performing the upgrade are shown below:

- In the **firmware settings** box, select the location of the firmware files that you saved on your hard drive, and select **Generic (main)** as a product type
- in the **transfer mode** box, select **TFTP**
- In the **TFTP Settings** box, enter the **IP address of the RMS compact** to be upgraded
- Hit the **Upgrade** button
- At the end of the process, you should see an **Upgrade Successful** message, and the checksums should match.
- Online instructions are also given in the **Information** window of the software tool itself.

The following screenshot shows an example the SerialTFTP upgrade software, in TFTP mode:

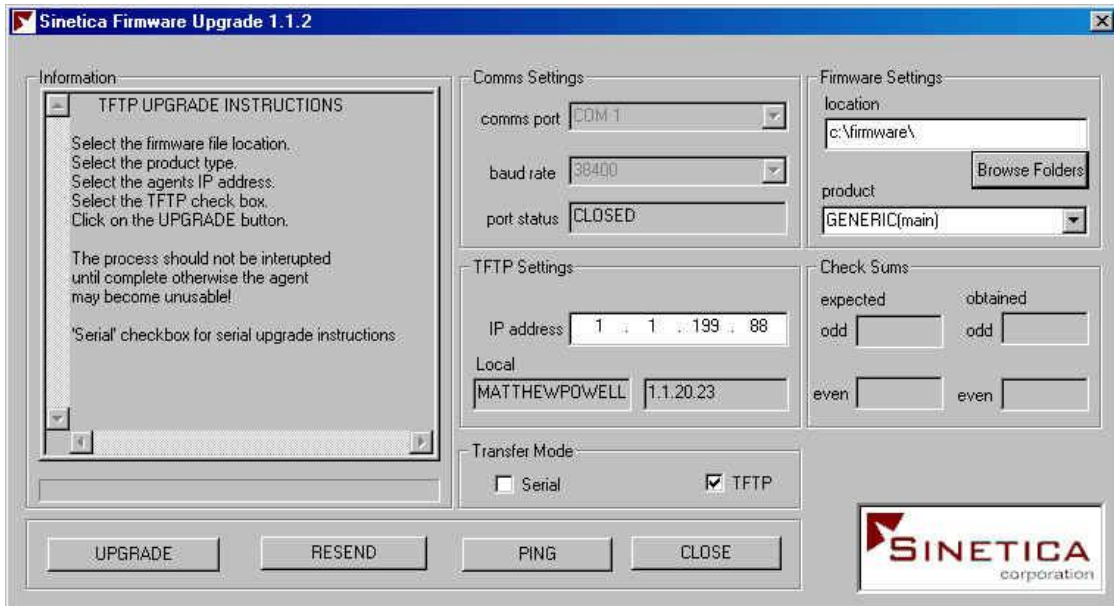


Figure 68: SerialTFTP Tool in TFTP Mode

Serial Upgrade

The serial upgrade option utilises a serial port to serial port connection between the RMS compact and the PC running the upgrade tool.

There are a number of parameters which must be setup before the downloader can be used, as follows:

Port : Select the Com port being used on your PC/Server

Baud: Set the baud rate at which the serial download process runs (product dependent).

Location: The location of the download files on your disk drive – these must be copied to a directory on your hard disk before attempting the download process.

Product: Select the product and variant type from the drop down menu.

- Connect the configuration cable (NC-CFG) between the Comm port of your PC and the port labeled 'RS232' on your RMS Compact.
- Ensure that the DIP switch settings on the RMS compact are as follows – DIP switch 1 UP, DIP switch 2 DOWN.
- Disconnect the power from the RMS Compact.

The RMS compact is now ready to be upgraded:

- On the SerialTFTP Upgrade tool screen select the UPGRADE button – this should set the *port status* to OPEN, and display the expected checksums for this version.
- Now re-apply the power to the RMS compact– you should see text displayed in the *Data* window of the downloader, and the progress bar should start to increment, until the first block of data is complete, then it will start on the next block.
- When complete, you should see UPGRADE SUCCESSFUL displayed in the data window.

If this process fails, and the checksums do not match up, resend the data using the RESEND button on the downloader.

Appendix C

This appendix has two sections: *Reference* and *Troubleshooting*.

Reference

This section discusses Communities, IP Addresses, Sub net masking, and routers/gateways.

Communities

A community is a string of printable ASCII characters that identifies a user group with the same access privileges. For example, a common community name is "public."

For security purposes, the SNMP agent validates requests before responding. The agent can be configured so that only managers that are members of a community can send requests and receive responses from a particular community. This prevents unauthorized managers from viewing or changing the configuration of a device.

IP Addresses

Every device on an internetwork must be assigned a unique IP (Internet Protocol) address. An IP address is a 32-bit value comprised of a network ID and a host ID. The network ID identifies the logical network to which a particular device belongs. The host ID identifies the particular device within the logical network. IP addresses distinguish devices on an internetwork from one another so that IP packets are properly transmitted.

IP addresses appear in dotted decimal (rather than in binary) notation. Dotted decimal notation divides the 32-bit value into four 8-bit groups, or octets, and separates each octet with a period. For example, 199.217.132.1 is an IP address in dotted decimal notation.

To accommodate networks of different sizes, the IP address has three divisions - Classes A for large, B for medium, and C for small. The difference among the network classes is the number of octets reserved for the network ID and the number of octets reserved for the host ID.

Class	Value of First Octet	Network ID	Host ID	Number of Hosts
A	1-126	first octet	last three octets	16,387,064
B	128-191	first two octets	last two octets	64,516
C	192-223	first three octets	last octet	254

Any value between 0 and 255 is valid as a host ID octet except for those values the InterNIC reserves for other purposes.

Value	Purpose
0, 255	Subnet masking
127	Loopback testing and interprocess communication on local devices
224-254	IGMP multicast and other special protocols

Subnetting and Subnet Masks

Subnetting divides a network address into subnetwork addresses to accommodate more than one physical network on a logical network.

For example: A Class B company has 100 LANs (Local Area Networks) with 100 to 200 nodes on each LAN. To classify the nodes by its LANs on one main network, this company segments the network address into 100

subnetwork addresses. (If the Class B network address is 150.1.x.x, the address can be segmented further from 150.1.1.x through 150.1.100.x.)

A subnet mask is a 32-bit value that distinguishes the network ID from the host ID for different subnetworks on the same logical network. Like IP addresses, subnet masks consist of four octets in dotted decimal notation. You can use subnet masks to route and filter the transmission of IP packets among your subnetworks. The value "255" is assigned to octets that belong to the network ID, and the value "0" is assigned to octets that belong to the host ID.

For the example above, if you want all the devices on the subnetworks to receive each other's IP packets, set the subnet mask to 255.255.0.0. If you want the devices on a single subnetwork only to receive IP packets from other devices on its own subnetwork, set the subnet mask to 255.255.255.0 for the devices on that subnetwork.

Subnet Mask	Routing and Filtering
0.0.0.0	IP packets are transmitted to all devices.
255.0.0.0	IP packets are only transmitted to devices whose IP address's first octet matches the sender's IP address's first octet.
255.255.0.0	IP packets are only transmitted to devices whose IP address's first two octets match the sender's IP address's first two octets.
255.255.255.0	IP packets are only transmitted to devices whose IP address's first three octets match the sender's IP address's first three octets.

Gateways

Gateway, also referred to as a router, is any computer with two or more network adapters connecting to different physical networks. Gateways allow for transmission of IP packets among networks on an internetwork.

Troubleshooting

Problem: The TES (Terminal Emulation Software) does not display anything.

Solution: **Make sure the Dipswitch is set correctly. Switch 1 is ON when DOWN and Switch 2 is UP.** This applies only when you power up.

Make sure the TES's communication parameters are correct. They should be 38400 baud rate, no parity, 8-data bits, and 1 stop bit.

Make sure the ends of the NC-CFG cable are plugged into their respective ports.

The ends of the cable indicate which belongs to the CPU and which belongs to the RMS compact .

The end of the hooded cable nearest the label belongs to the CPU, and the end farthest away belongs to the RMS compact .

If DIP switch set correctly and cable correctly connected, power off/on the RMS compact and the main menu should be displayed.

PROBLEM: The NMS cannot ping the RMS compact .

Solution: **Make sure there is a network connection to the RMS compact.**

Sporadic incompatibilities to switch ports can be fixed by disabling auto-negotiation mode at the specific switch port and setting it manually to 10Mbps and halfduplex mode.

Solution: **Make sure the cable is in good condition.**

Solution: **Try pinging the RMS compact from another computer on the same network segment as the RMS compact .**

Solution: **Make sure to set the Community String [Set Access Controls, Type 2, Set 1 through 4]. Follow these steps:**

Name the community with any lowercase name. (A UPS monitors a designated community.)

Solution: **Make sure to set the Manager Table. Set Access Controls, Type 3, Set 1 through 4]. Follow these steps:**

Define the Manager IP Address, Community string, and Access Permission together.

The trap manager's community should be the same name as the name of the community it monitors.

The trap manager's status is set to Accept YES to enable sending TRAPs or to Accept to No to disable.

Appendix D: Configuring the NMS

Note: These instructions are only a guide, please refer to the NMS manufacturer manuals for accurate instructions.

To complete the RMS compact installation and configuration process, you must compile the necessary MIB to configure the NMS.

Any suitable SNMP based NMS with a MIB compiler can manage the RMS compact adapter. For instructions on how to compile MIBs please refer to the documentation supplied with the NMS.

General Network Management Stations

Follow these general procedures to configure an NMS:

- Compile the device MIBs.
- Add the RMS compactobject to the *Management Map*.
- Ping the RMS compact

RMS Compact Common Setup Error Checklist

Before Contacting Knuerr technical support, please browse through the following list of common setup problems:

Serial Communications Setup

1. Unable to establish serial communications:	Yes/no
• Is the unit powered up?	
• Is the configuration cable supplied with the RMS compact being used?	
• Is the cable connected between the RMS compact serial port, and the computer Com port?	
• Ensure that your terminal emulation program is set to the correct settings (9600 8N1)	
• Ensure DIP switch 1 is down, and reset the unit	
• Is the user using 'Hyperterminal', if so, suggest that they use 'Terraterm' (supplied on the RMS compact CD).	

If serial communications are not established following the steps above, please contact knuerr support RMS@knuerr.com

Network Communication

1. Unable to 'ping' the unit	Yes/no
• Is the unit powered up?	
• Is the Network cable connected?	
• Using serial communication, ensure that the IP address settings are correct for the unit, making sure that the subnet mask and gateway address is correct	
• Check that there are no invalid entries in the NMS or Trap receiver tables	
• Quit the serial configuration menu, and retest, is there any activity on the TCP/IP led on the unit or on the switch/hub/router?	
• Check that the PC being used is configured correctly (on the same subnet etc), can the PC ping other devices on the same subnet?	
• Check that the unit has a valid MAC address – start a serial configuration session with the RMS compact, and, at the main system menu, type gomac (this will not be displayed as you type), hit return, and the MAC address should be displayed. If the MAC address is displayed as all 0's, refer to Sinetica.	

If Network communications are not established following the steps above, please contact knuerr support RMS@knuerr.com

SNMP communication

1. No communication with Viewer or NMS software	Yes/no
• Check that the unit is 'pingable' – see above	
• Using either serial configuration, telnet or HTTP, ensure that the IP address of PC running the Hawk-I Viewer or the NMS software is in the NMS table of the RMS compact	
• Check that the community strings match up at both ends, and that 'read write' access is enabled if required (this will be required to use much of the functionality within the Viewer software).	
• Check that there are no invalid entries in the NMS or Trap receiver tables	
• Double check that the correct IP addresses are being used at the PC and the RMS compact ends	

If SNMP communications are not established following the steps above, please contact knuerr support RMS@knuerr.com

2. Traps not being received at the NMS	Yes/no
• Check that the unit is 'pingable' – see above	
• Check that the IP address of the NMS has been entered correctly into the Trap receiver table of the RMS compact, using either serial/telnet or HTTP communications.	
• Check that the community strings in the Trap receiver table match up at both ends, and that the 'Trap CTL' flag is enabled in the RMS compact for this entry.	
• Check that there are no invalid entries in the NMS or Trap receiver tables	
• Double check that the correct IP addresses are being used at the PC and the RMS compact ends	

If Traps are not received following the steps above, please contact knuerr support RMS@knuerr.com

Placing a Technical Support Call

In order to diagnose the problem you are having, our engineers will need the following information from you:

Installation Site:

Company Name: _____

Address: _____

City: _____

Country: _____

Post Code: _____

Installation Site Contact:

Full Name: _____

Phone Number: _____

Fax Number: _____

Email _____

If you are a consultant,

Consultant Name: _____

Phone Number: _____

Fax Number: _____

Computer System:

Operating System and version: _____

System Manufacturer: _____

System Model Number: _____

Address of the Port/Modem : _____

UPS:

Manufacturer: _____

Model Name/Number: _____

Serial Number: _____

Nature of the problem :

Note: In the event of a hardware failure, Knürr has a strict returns policy. Please do not return the unit without first calling Knürr on the number below to obtain an Returns number, so that the return can be promptly processed.

Technical Support

Have the information listed above ready. You can reach us on the following numbers :

Telephone +49 8723 27-0

Fax +49 8723 27-347

email : RMS@knuerr.com

Reference Worksheet

Local Address: _____.____.____.____ Serial No: ____:____:____:____:____

Gateway Address: _____.____.____.____

Network ID: _____.____.____.____

System's Contact Name: _____

System's Name: _____

System's Location: _____

Current access controls of SNMP communities:

Manager IP Address	Community String	Access Permission

Current trap receivers:

Receiver IP Address		Community	Accept

Appendix E: The Waste Electrical and Electronic Equipment (WEEE) Regulations

In order to conform to the European Parliament and Council Directive on Waste Electrical and Electronic Equipment (2002/96/EC) ("the WEEE Directive"), you as the end user are responsible for the correct disposal of this unit. Below you will find details of how to correctly dis-assemble the product' ready for recycling.

1. *Remove the metal lid*

Unscrew the screws on the TOP and BOTTOM of the RMS compact and slide off the metal lid as follows:



Figure 69: Removing Screws on Top of RMS Compact

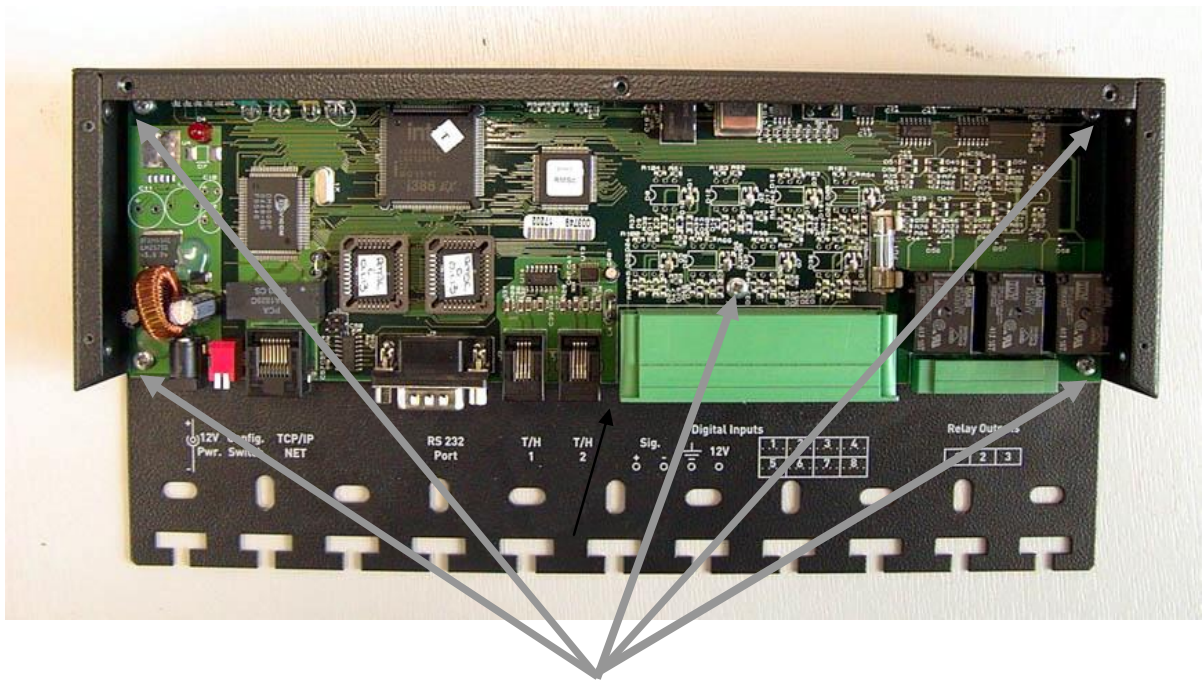


Figure 72: Diagram showing location of Securing Screws for PCB

3. **Remove the PCB**

Remove the PCB from the unit

The RMS compact must then be recycled at an approved WEEE recycling centre.

