Messenger System

Overview

for

Remote Site/Equipment Alarm Monitoring

And

Pulse Counting/Meter Reading Functions

www.nhds.co.uk

November 03

Contents

1 Introduction

New Hampshire Digital Services (NHDS) specialise in supplying monitoring products and systems to industry.

The Messenger system comprises of a range of products each with specific functionality to accommodate various applications as briefly detailed below.

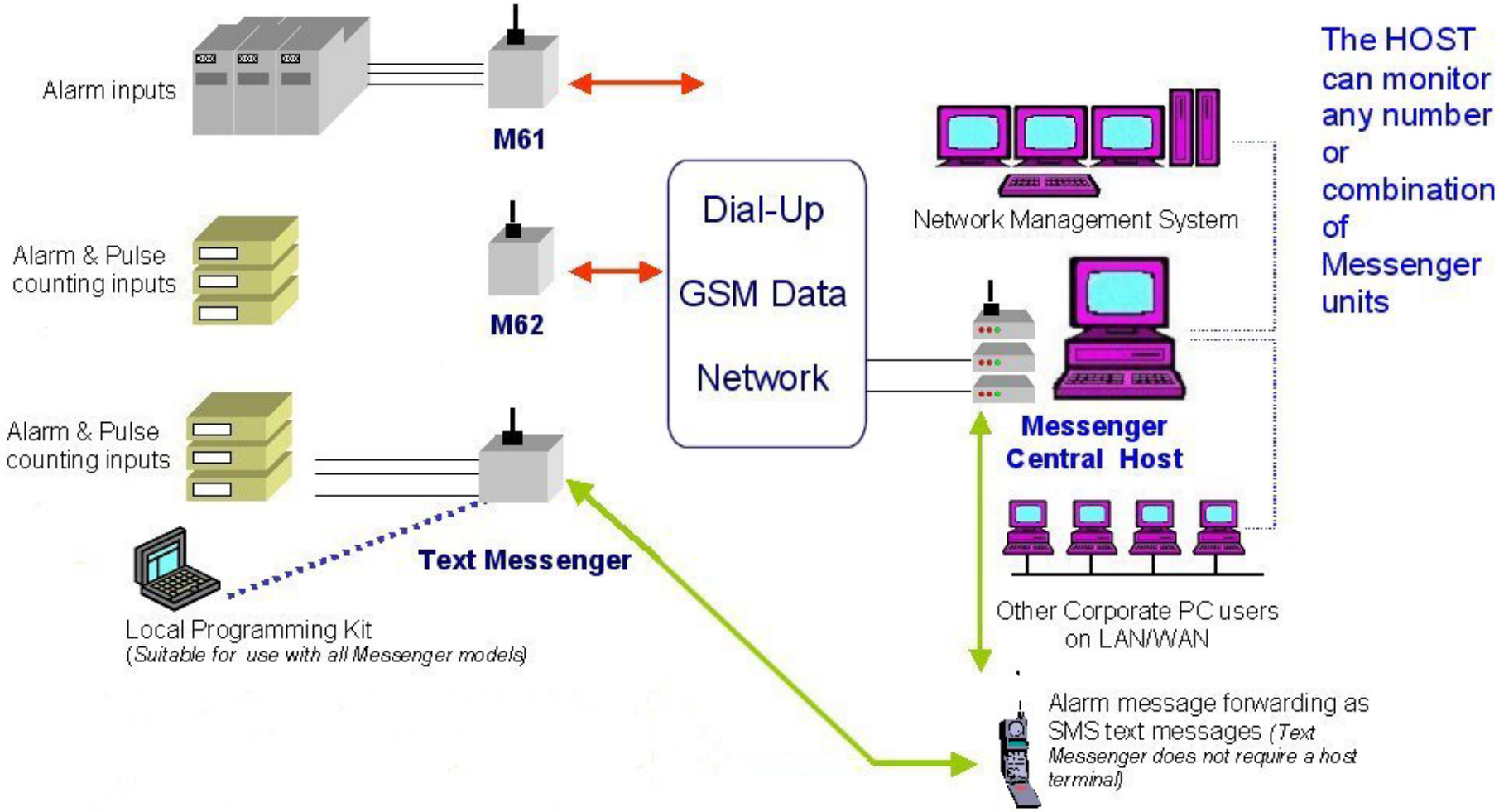
Messenger M62 monitors output contacts for status change reporting such events in real time. It is also equipped with pulse counting inputs. Meters and other equipment that generate electrical pulse outputs can be monitored and current readings downloaded to a host terminal at a pre-configured interval or in real time.

Messenger M61 monitors output contacts for status change. These changes are reported as alarms in real time. This unit requires no external power source and has an operating life of 10 years

Text Messenger has the same functionality as the M62 but reports event alarms and meter/pulse counting readings directly to a mobile phone(s) as SMS text messages.

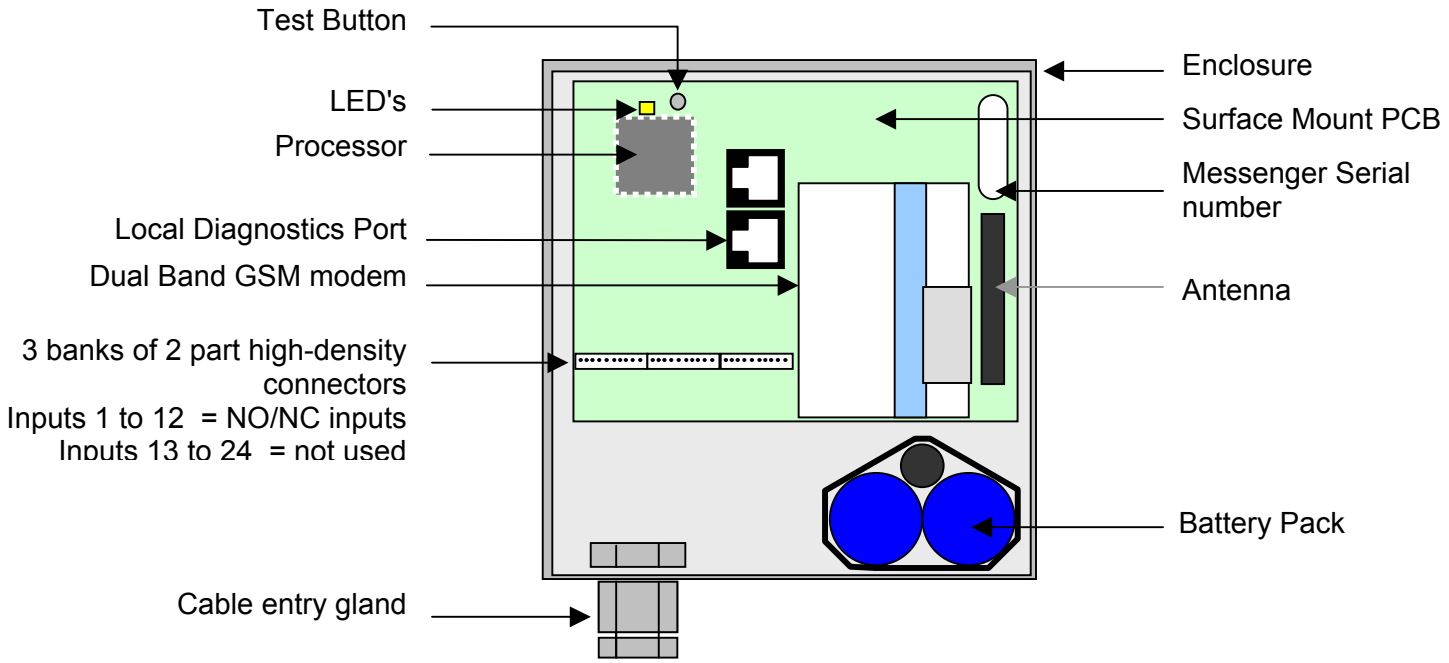
This document outlines all products and the central host application used to collect and display Messenger units site information and associated data.

2 System Schematic



3 M61

M61 Internals



Pole mounted M61

4 M61 & Text Messenger Features

Power Supply
DOES NOT REQUIRE ANY EXTERNAL POWER SUPPLY
3.6v, 36Ah Lithium battery with lead acid component. The battery has a 10-year life and has been tested to make more than 3,000 calls.

Modem
Type: WMOI3 dual band 900/1800Mhz GSM (Optional Tri Band 900/1900Mhz GSM). The modem requires a data enabled SIM card to enable connection to the GSM network. The SIM card can be replaced if necessary to accommodate networks with greater coverage.
The M61 Messenger unit make outgoing calls only, to preserve battery life.

Local Diagnostics Port
Used for configuration to program input settings and host number, although this is usually done prior to delivery. The diagnostics port is also used for fault finding.

Processor
Single low power PIC processor design. The current drain from the processor during standby mode is as little as 10 micro Amps. The PIC's real time clock is synchronised with the host during each contact. Events are stored in separate non-volatile memory.

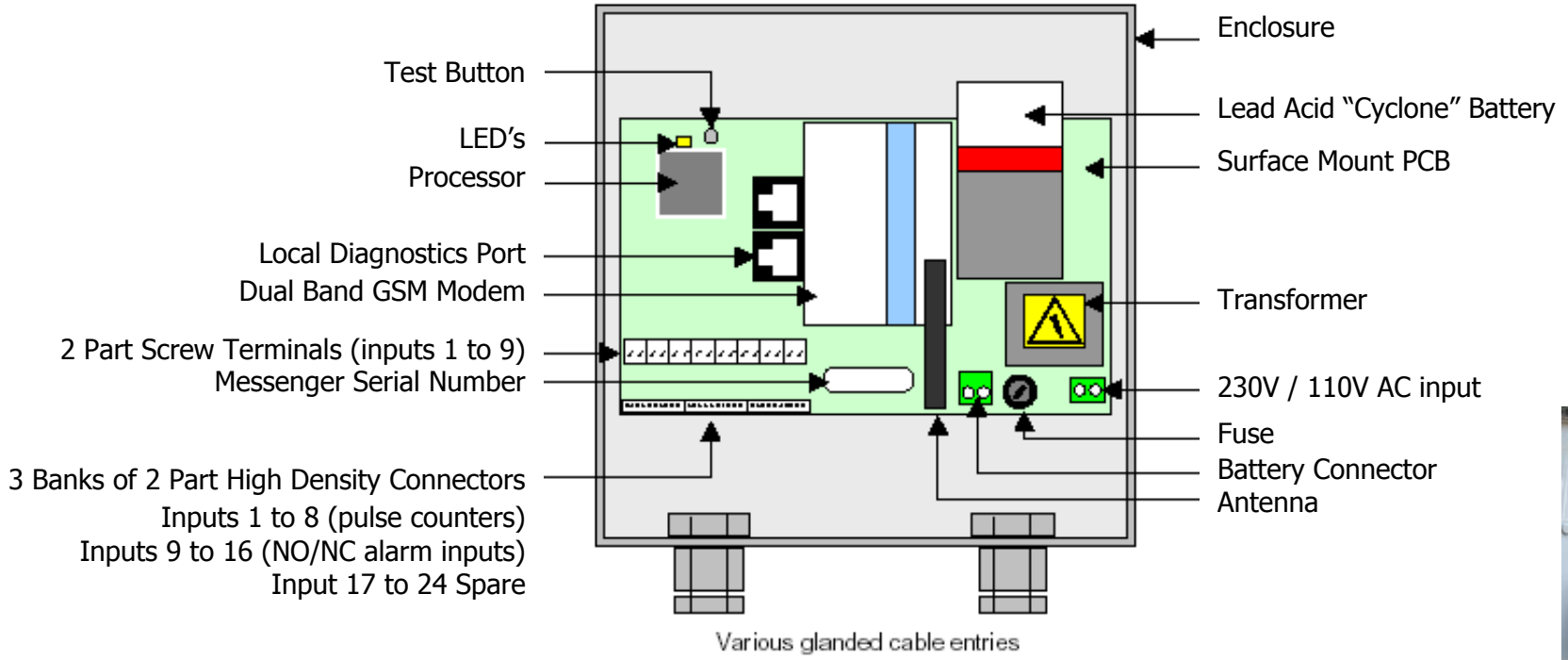
Digital Inputs
Inputs 1 to 12:
Digital status bits. Changes in status are date and time stamped and reported to the host in real time. The host can display the inputs as normally open or normally closed. Inputs can be displayed as alarms, status only or disabled by the host.
Inputs 13 to 24:
These are available for future expansion at the request of customers.

Enclosure and Glanding
The enclosure provides protection to IP67 and is fitted with a Goretex™ gland to prevent moisture build up (unavoidably caused by atmospheric changes). Alternative enclosures can be supplied as requested.

Test Button
Forces the unit to call the host. Not usually used except during on-site commissioning.

LED
Reports TX/RX retry status of modem

5 M62 & Text Messenger Schematic



M62 Internals

M62 mounted in a meter cabinet

6 M62 & Text Messenger Features

Power Supply
Requires an AC mains supply. Standard 230V / 110V transformer (other voltage options available on request). The unit is fitted with a replaceable 3A fast blow fuse and the transformer is potted.

Battery
12V Hawker Cyclone rechargeable lead acid. Provides power to the modem and processor during periods without AC mains power.

Modem
Type Wavecom WMOi3 dual band 900/1800 or optional 900/1900 GSM. The modem requires a valid SIM card in order to connect to the GSM network. The SIM card is removable. Connection to the network is via the "Data" service.
The M62 makes outgoing calls and also receives incoming calls from the host.

Local Diagnostics
Used during faultfinding. Can also be used for local programming and configuration of input settings, although the M62 meter can be programmed remotely over air.

Processor
Single low power PIC processor design. The current drain from the processor during standby is as low as 10 micro amps. The PIC's real time clock is synchronised with the host PC clock during each contact. Counters and events are recorded in separate non-volatile memory.

Pulse Counting inputs
Inputs 1 to 8:
16 bit counters. Suitable for use with volt free, dry contact inputs. Space saving high–density connectors. Alternatively screw terminals can be supplied.
Inputs can be disabled for monitoring by the host.

Digital inputs
Inputs 9 – 16:
Digital status bits. Changes in status are time and date stamped and then called into the host. The host can display the inputs as Normally Open or Normally Closed.
Inputs can be disabled from monitoring.

Spare Inputs
Inputs 17 to 24:
For future use when requested by customers.

Test Button
Forces the unit to make a call to the host. Not usually used except during fault diagnosis and configuration.

LED
Reports TX/RX/Retry status of modem.

7 Messenger Operation

Digital Inputs
The Messenger units can be connected to any equipment with volt-free auxiliary contacts, such as circuit breakers, relays, fault indicators, door alarms etc. When an input changes state, the date and time and the type of change (open to closed or closed to open) is logged and stored in a local non-volatile memory. At the same time an "alarm call" to the Messenger host terminal is initiated. While the Messenger unit is calling the host any further changes to the status on any of the inputs are logged in the same way and reported to the host during communication.

During each contact with the host the current status of the inputs is reported, date/time stamped and the site information screen updated with any changes.

All alarm events will be saved to a database on the Host PC hard drive and can be viewed and sorted by the host operator.

Pulse Counter Inputs – M62 & Text Messenger only
Pulses of 100 ms or greater can be detected by the above units to perform metering or counting functions. Each of the 8 pulse counting inputs has a 16-bit (65,536) counter associated with it. Each pulse on the input increments the counter by a value of 1, scaling factors can be set up by the host where large counts are appropriate (i.e. 1000 pulses scaled by 100 shows a value of 10). These counter values are again stored in a non-volatile memory.

During each communication between the Messenger host and associated remote units the counter values are downloaded. In addition the host operator can make a call at any time and download the values in real time.

Counter values are saved to the host PC hard drive and can be reported in a number of different standard reports using the host terminal report generator. The data can also be exported for use with existing software such as Microsoft Excel.

Two way calling
The unit can be configured to make routine calls to the host terminal, download logs and check health status. The host operator can also make a call to any Messenger M62 site on demand. The M61 Messenger can be configured to make routine outgoing calls to the host, but calls from the host to the unit cannot be made in order to preserve the life of the lithium cell.

7 Messenger Operation Cont.

Test/Health check Calls
During normal operation all Messenger units will make a routine test call to the host on a weekly (or other user programmable interval) basis. During this contact with the Host a variety of information is passed in both directions, including:

- Digital input status
- The current value of all input counters
- Communication statistics (successful calls, failed calls)
- Date / time at the PC
- Next routine call date / time
- Host telephone numbers for next call

AC Failure - M62 &Text Messenger only
The 230V/110V AC mains supply to these units is monitored. Loss and restoration to the supply is date and time stamped and called into the host terminal as an alarm. During AC mains failure conditions the units will continue to monitor and report any input alarms.

During short periods without AC mains power (approx 48 hours) the battery will keep the unit operational. As battery power gets low a warning alarm will be sent, before an auto shut down sequence is initiated to prevent any damage to the unit.

Cold Start
When the units are first connected the battery will be fully discharged. The charging circuit will therefore commence battery charge. The processor recognises that the time and date will be incorrect and initiates a call to the host number stored in the non-volatile memory. During this information exchange, as with all calls, the date and time is synchronised with the host and a "cold start" event is logged in the database.

8 Host Terminal – Introduction

Software
The Messenger Host Terminal is a bespoke application designed and developed by NHDS. Running in a Windows environment it provides a user-friendly front end to all the central operation and maintenance activities required by the Messenger system. The software is based on an open platform with a number of pre installation, configurable options available to cater for a wide audience. Whilst a number of these features are hidden, as in most cases they will not all be appropriate, they can be added as future requirements dictate.

Hardware
The application runs on a standard Pentium grade PC platform. The only additional hardware required will be the communication ports for systems with multiple Host modems.

Modems
Up to 16 modems can be connected to a single Host terminal. This means that for the very largest of systems, 16 simultaneous calls can be handled. Modems can either be PSTN (landline network) modems or GSM (mobile network) modems.

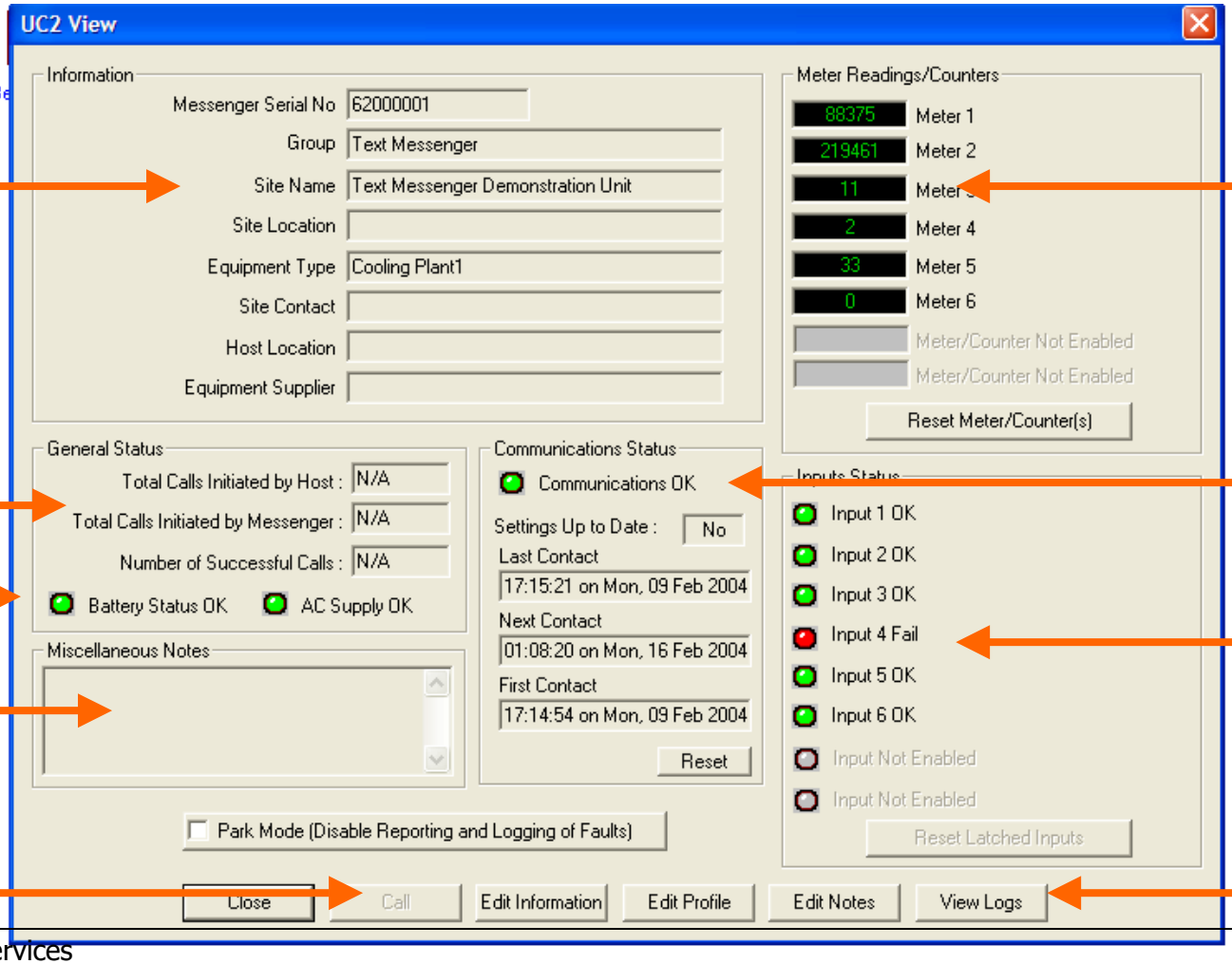
Any Number of Sites
There is no limit to the number of Messenger units that can be monitored from a single host. In practical terms however we would advise that with a modem limit of 16, if more than approximately 3000 units are to be connected, a sub system prior to a central system should be considered.

Easy to Install & Maintain
Installation is via a single CD. The comprehensive and easy to follow user manual has a section on configuring the Host Application and modem set ups etc. Maintenance is also made easy with features like "System Alarm" and "Archive" functions.

Scalability
The Host terminal can be increased in size as units are added. NHDS have considerable experience of integrating with existing management systems. This has been accomplished both from the outset and as system structures have grown. (See later section for interfacing).

Flexibility
The Host terminal application supports all types of Messenger models manufactured by NHDS. This caters for all types of metering and monitoring functions within a customer's organisation regardless of geographical, power supply or communication restriction.

9 Host Terminal – M62 Site Information Display



Site Location Details

Communication Details

Power Supply Status

User Notes

Force a Polling Call to the unit button

Counter Input Readings

Communication routines and status

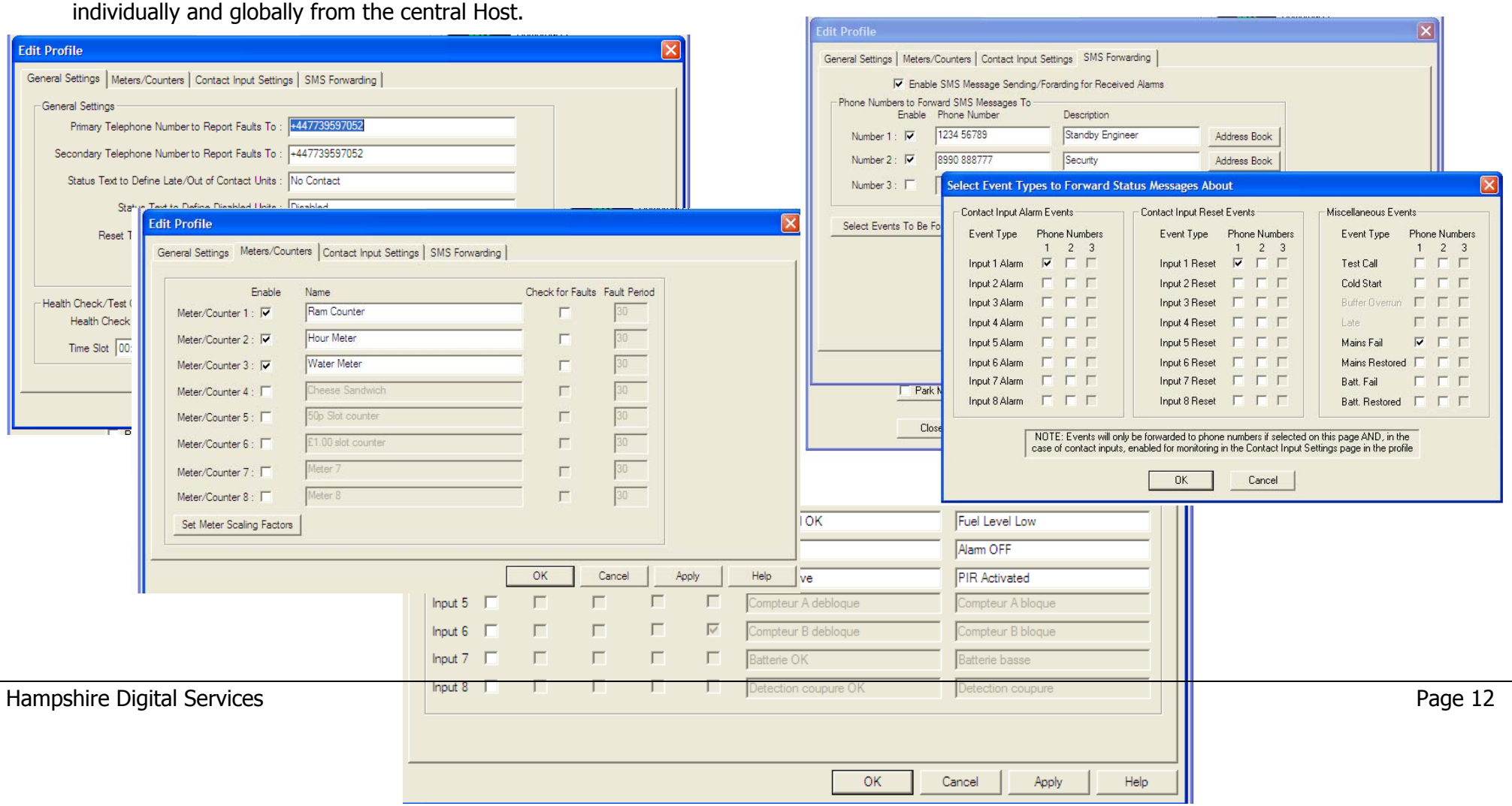
Digital Input Status

View date/time stamped event history

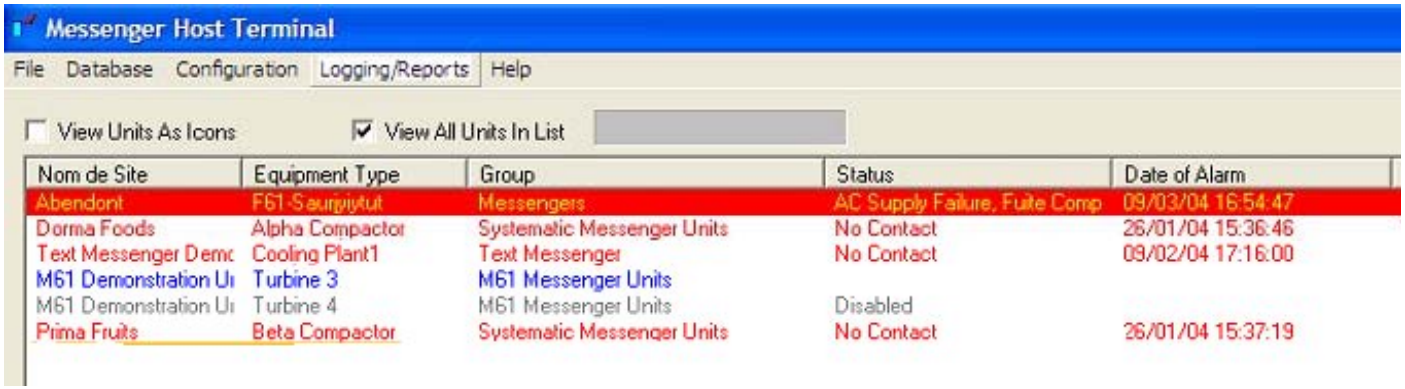
Change Unit Settings

10 Host Terminal – Messenger Profile

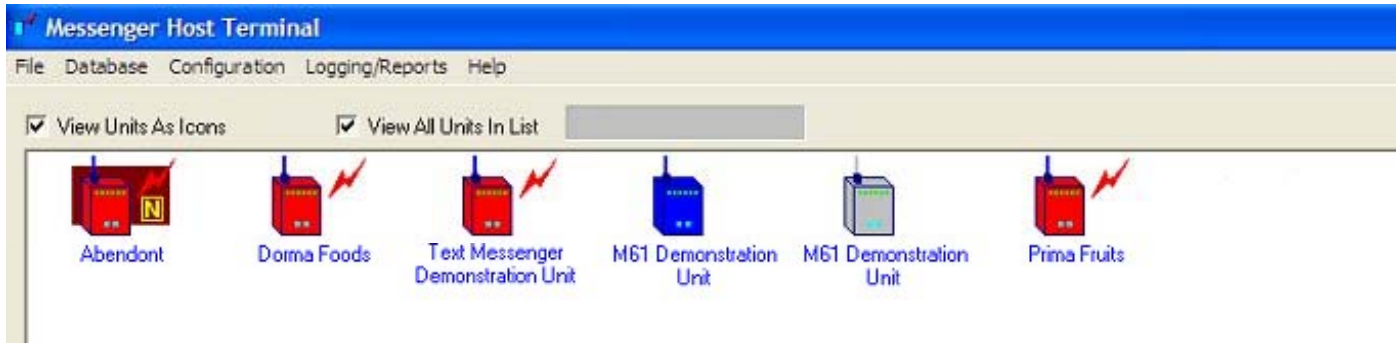
Each Messenger unit's operational settings are stored in a "Profile" both in the unit and at the Host. It is a simple task to edit settings individually and globally from the central Host.



11 Host terminal – Alarm Monitoring Features

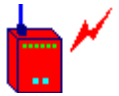


Messenger units can be displayed in a **list** or as **icons**



Icon key

RED ICON WITH BACKGROUND: This indicates a new alarm that has not been acknowledged. An alarm is acknowledged by double clicking on the alarm to view the details.



RED ICON: This indicates a Messenger in an alarm condition that has been acknowledged (viewed).

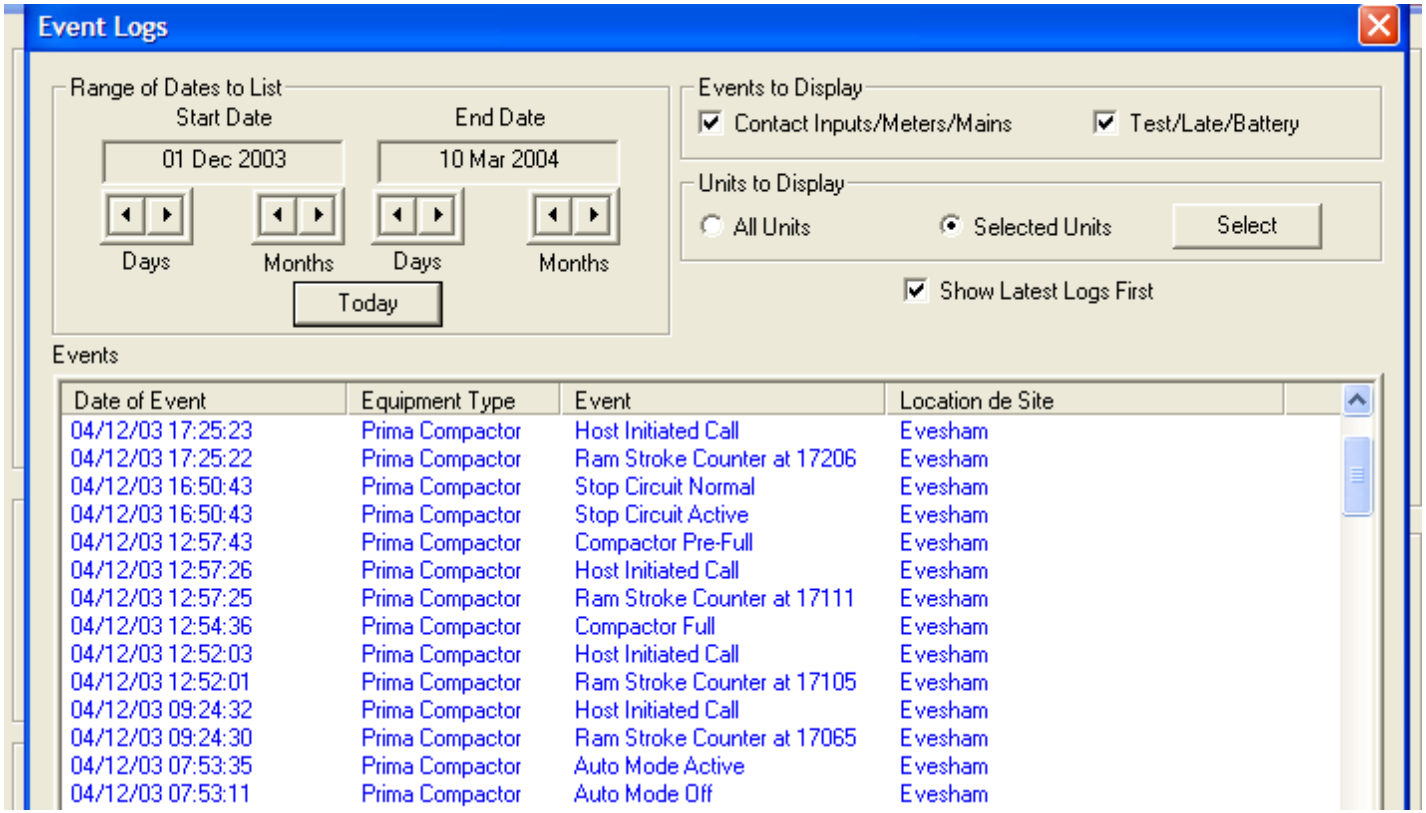
BLUE ICON: This indicates a Messenger with no alarm conditions (i.e. healthy).

GREY ICON: This indicates a Messenger that has been disabled and is therefore no longer displaying alarm conditions. (i.e. Out of Service).

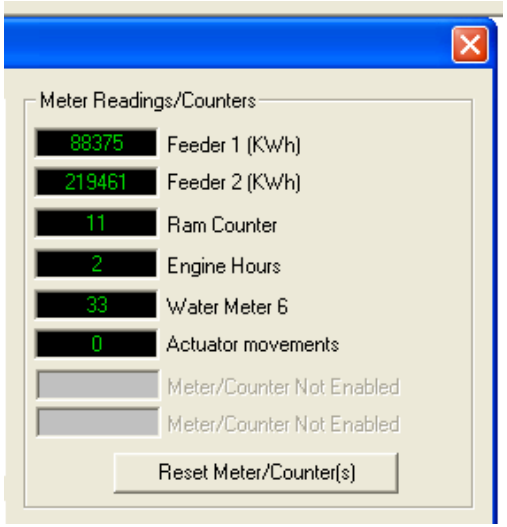
GREEN ICON : This indicates a MESSENGER that has been powered for the first time. This usually denotes a newly commissioned Messenger.

12 Host Terminal – Event History Information

One click views date/time stamped event history for one or all sites, the reported timescale can be selected by "Range of dates to List"



13 Host Terminal – Meter Reading/Pulse counting Features

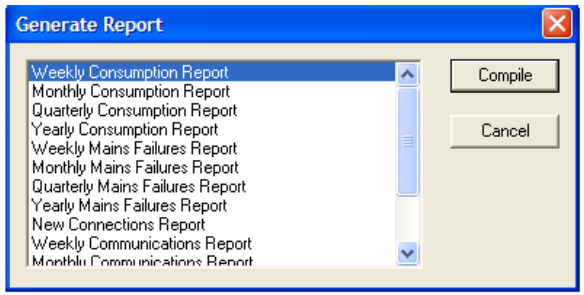


Current Counter Value Display

The site information screen displays information on the most recently updated pulse counter or meter reading value of the 8 counter inputs.

When a Messenger is installed in a new site or moved to a new location, if required, the operator can reset these values to Zero. The previous values can remain stored within the Host Terminal database for historical reporting purposes.

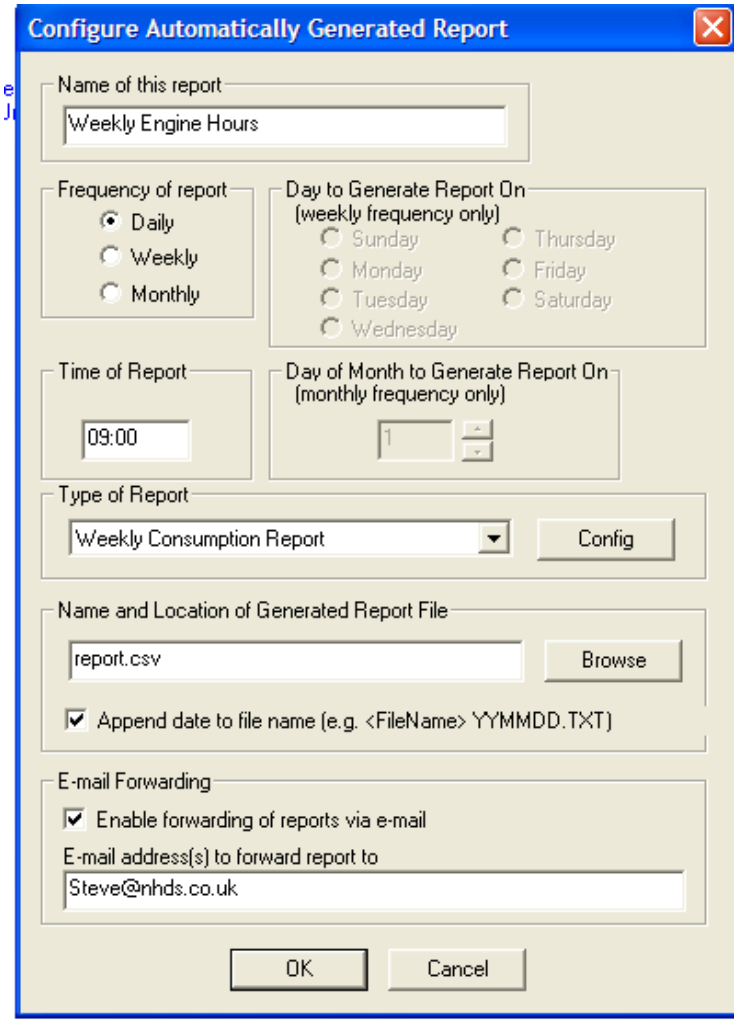
Inputs that are not connected can be disabled or removed as shown.



User Reports

The Host offers the functionality to generate reports on counter operations using a variety of pre installed report templates. For convenience and interoperability the reports can be viewed using 3rd party software such as Microsoft Excel or other existing management systems. From this the data can be displayed in a number of different ways, for example graphically.

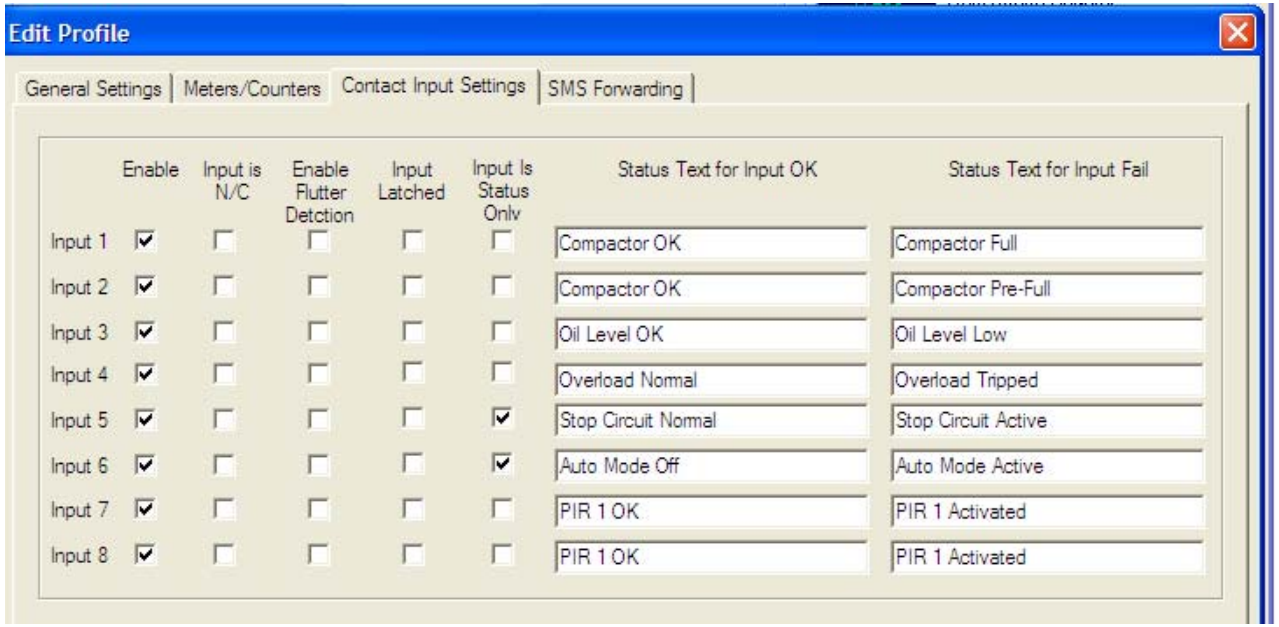
14 Host Terminal – Meter Reading/Pulse counting Features Cont.



Automatic report Generation

Automatic reports can be generated by the system, these can be produced at pre-defined intervals. They can be written to disk (network drive if required) in CSV format for viewing via 3rd party software. The reports can also be generated and automatically forwarded to any number of e-mail addresses.

14 Host Terminal – Input Naming and Configuration



Input Naming
Alarm and pulse counting inputs can be enabled/disabled and given configurable text names to help with identification.

Other Configuration options: -

- Normally open or Closed
- Flutter detection
- Latched or un latched
- Status only (alarmed state is displayed as a blue button and no visible or audible warning given)

Scaling factors can be set for the pulse counting inputs i.e. divide by X or multiply by X. The telephone number(s) for the Messenger host to report to are also set up here, along with mobile phone numbers to forward alarms as SMS text messages. Inputs to be forwarded are selectable and all configurations can be unit specific or global.

15 Host Terminal – Other Main Features

Creating New Sites
Adding a new Messenger to the Host System is a very easy procedure with no special training required.

During commissioning of the Host a "Default Profile" is created. This includes operational settings such as primary and secondary Host terminals, which inputs are enabled, frequency of routine health check/test calls etc.

To add a new unit simply click the following menu options *Database > Edit Records > Add New Record*. Enter the serial Number and that's it.

Backup
The Messenger system uses very few database files. These are stored in the user configurable directories and therefore can be readily backed up.

Archive
For larger Messenger systems the size of the event history can become cumbersome. The system allows archiving of data via a single screen, which allows users to specify what events should be archived and where files should be stored.

Data Export
Event, counting and unit location data can be exported in CSV format.

System Status
A single screen displays the key performance indicators for the system including modem and port status, database file size and licence information.

Interfacing with other systems
There are four standard options available

- Serial RS232 ASCII
- CSV event file, updated as events are received
- DNP3 protocol, level 1 slave
- OPC

One of NHDS's primary skills in providing host terminal packages is our extensive experience in communication protocols. NHDS have over 20 years experience in interfacing with equipment using an ever increasing variety of protocols, from simple ASCII serial interfaces, through to full SCADA protocols, such as DNP3.0 or IEC807 and including specific protocols from a variety of industries such as security, road transport, telecommunications, mobile data, etc.