Tide Level Monitoring Solutions

Real Time Information System

Based upon NDACS 6000 Instrumentation

Options For

Pressure & Acoustic Tide Level Sensors
GSM & GPRS Modem
Internet Ready Instruments
Environmental Sensor Inputs
Web Browser Interface
Spread Sheet Compatible Data Files
FTTP & HTTP Data Downloads

IP66 Level Enclosures
AD & DC option Power Supplies
Battery Backup for logging & Sensors
Network For Data Downloads
Real-time Results Screens
Automatic E-mail Data Reports
E-mail Alarm Messages

KEYNES CONTROLS

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Tide Monitoring Solutions

The Keynes Controls tidal monitoring systems offer a range of flexible solutions to monitor and report tide information and any other environmental parameters associated with these measurements such as humidity, barometric pressure, wind speed and direction.

The systems are flexible and allow many different manufacturers wave sensors to be installed and can be used with acoustic as well as pressure tide sensors.

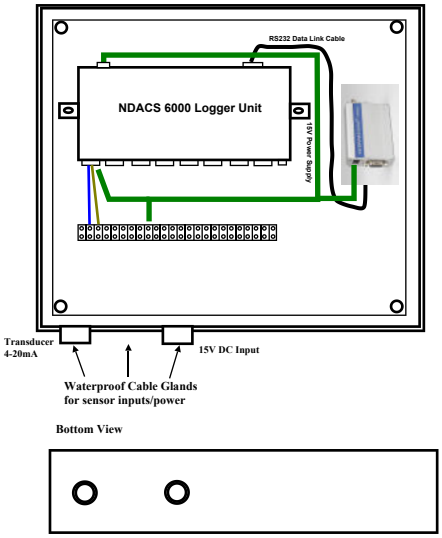
The systems can record information for later download, send automatic reports to a number of users and notify an operator when a specified event has occurred. An alarming system can be used to show when a sensor signal is outside defined limits and can be used to notify a user should an instrument be tampered with.

All the data recording units are Internet ready and allow data to be examined and the instruments configured using a web browser no matter which type of data connection is being used.

- **Wide Range of Sensor Support**
- **Common User Interface**
- **Automatic Data Reports across the Internet**
- **8 or 16 Sensor Inputs**
- **Automatic E-mail Alarm System**
- **Acoustic & Pressure Sensor Support**
- **Real-time information in Engineering Units**
- **Spreadsheet compatible data files**
- **Easy Expansion**
- **Choice of Modem Types**

Systems Specifications

NDACS 6000 Series Loggers



The system schematic above shows exactly the layout of the data logger and modem making up the Tidal Monitoring instrumentation. The cabinet is Poly Carbonate to prevent environmental damage and yet maintain the highest signal integrity for the radio modem.

Power Supply	12-20 V DC @ 3W
Physical Size	
No of Channels	8 Diff or 16 Diff depending upon specified model
Data Loggers	2 Independently Configurable Recorders General Logger - 13,000 Records 8 Channel Unit 6,500 Records 16 Channel Unit Event Logger - 13,000 to 3 million records (Permanent data storage)
Logger Sample Rate	General Logger - User Defined - 1 sec to 3600 Sec (Hour) Event Logger 0.1,1,10,60,600,3600 Sec
Data Reports	Automatic E-mail Reports configurable for Hourly, Dairly, Weekly, Monthly, No Records FTP Server for dial-in data download
File Format	Comma Separate Variable CSV
Modem Support	GSM Mobile Phone with data link, GSM Modem, Hayes compatible Modem
Sensor Inputs	RTD, Thermocouples, Voltage, Current, Restistance, Strain Gauges, Load Cells, Current Loop 4-20 mA and 0-20 mA
Status Messages	Isalive (Dated Report) OnBootup (when unit restarts)
Network Ports	Ethernet Port, RS232 Modem Port, Internet Ready
ADC Resolution	24 Bit ADC - 16 Million Levels
Input Range	0,25mv, 50mV, 100mV, 500mV,1V, 5V
Sample Rates	1 to 100 Hz for 8 channel systems 1 to 50 Hz for 16 channel systems
WebServer	Systems Configuration and Data Viewing

For full NDACS series specifications and product ranges
see **www.keynes-controls.com/downloafiles.htm**

Acoustic Sensor

SPECIFICATION	MICROFLEX-C	MICROFLEX-C ER
Measuring Range	0.3 - 8 m	0.3 - 8 m
Enclosure	IP67 Glass filled nylon	IP67 Glass filled nylon
Power Supply	12 - 30 VDC (loop powered)	12 - 30 VDC (loop powered)
Output	4-20 mA into 750 Ohms	4-20 mA into 750 Ohms
Relays	None	2
HART Protocol	No	No
Integral LCD display	4 digit LCD	4 digit LCD
Cable Entries	2 x M20x1.5mm entries	2 x M20x1.5mm entries
Transducer Material	PVDF	PVDF
Process Connection	2" BST	2" BST
Resolution	1 mm	1 mm
Accuracy	+/- 3mm	+/- 3mm
Operating Temperature	-20 to 70 Deg C	-20 to 70 Deg C
Operating Pressure	3 bar max	3 bar max
Temp Compensation	Yes	Yes
Maximum Separation	3000 m	3000 m
Weight	850 g	850 g
Approvals	CE to EN50081-1 CE to EN50082-2	CE to EN50081-1 CE to EN50082-2

Wavecom Wireless Modem

All Wavecom series modules are supported by the NDACS 6000 data loggers.

GPRS Modem

The NDACS 6000 data logger which controls the data link operations can be fitted with a GPRS modem, use

- GPRS on part numbers to reference this option.

Product Features

Dual Band EGSM/GPRS modem (900/ 1800 Mhz) designed for data, fax SMS and voice applications.
Fully Type Aproved
Fully compliant with ETSI GSM Phase 2+ specifications (Normal MS)
Output Power:
Class 4 (2W @ 900 MHz)
Class 1 (1W @ 1800 Mhz)
Power Supply:
Input voltage: 5.5 -32V

- 5mA in idle mode, 140 mA in communication GSM 900 @ 12V
- 5 mA in idle mode , 100mA in communication GSM 1800 @ 12V
- Peak 1.7A @ 5.5V

Overall dimensions 98 x 54 x 25 mm
Weight 105g

Data circuit asynchronous transparent and non transparenet up to 14,400 bits/s MNP2, V.42bic

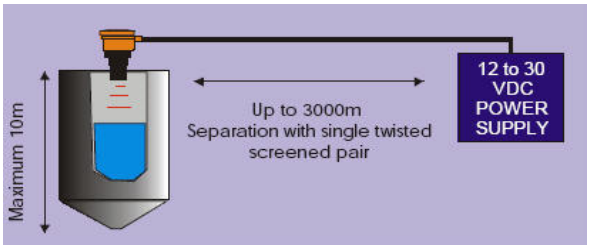
Interfaces

- RS-232 and audio through mini sub-D 15-pin connector supporting:
  Baud rate from 300 to 115,200 bits
  Autobauding

  4-pin connector
  Sliding SIM Holder
  (3V/5V SIM Interface)
- Power supply through micri-FIT
  AT commands interface:
  - GSM 07:05 and 07:07 AT commands
  - comprehensive set of enhanced AT commands
- SMS antenna connector

Approvals

The modem is approved worldwide under test standards including:
Radio @ telecommunication Terminal Equipment (R&TTE), Global Certification Forum - Certification Criteria (GCF-CC)
EMC, Safety & Chinese approvals



Deployment

The acoustic sensor can be deployed up to 3 Km away from the logger unit when using a 4-20 mA current loop to pass signals to the logger for recording purposes

The acoustic sensor should be deployed approximately 1 m from any supporting walls to prevent false readings

Tidal Monitoring Instrumentation & Data Reporting Options

Remote Outstation Data Reporting

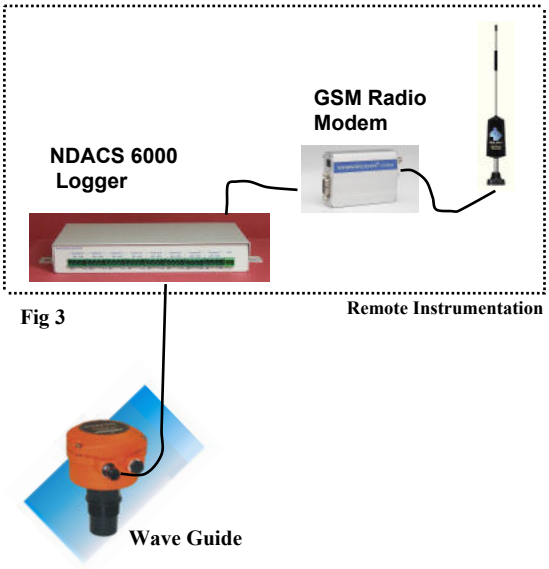


Fig 3

Figure 3 shows the basic tidal monitoring instrumentation. The NDACS makes a connection to an Internet Service Provider (ISP) modem via the GSM modem and sends an E-mail to the users E-mail server. From here the tidal monitor E-mails are forwarded to the specific user.

The instrument e-mails can be alarm messages used to indicate that a specific event has occurred and/or data reports containing the recorded measurements.

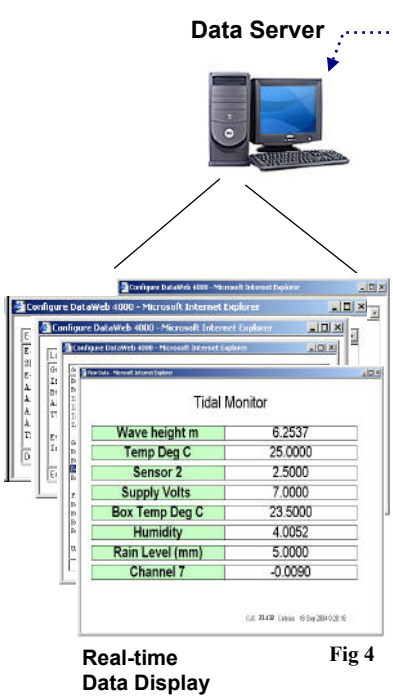
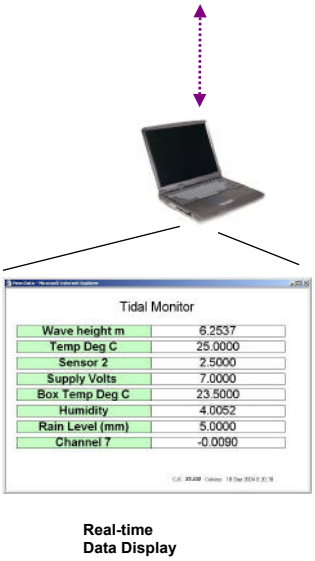


Fig 4

Figure 4 demonstrates how multiple users can see data from a remotely deployed tidal monitor via the Internet.



Software Features

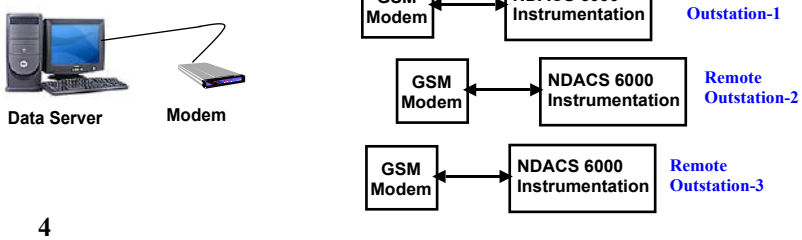
Keynes Controls support software enables new features and process options to be uploaded into the NDACS across a remote data link if required. This feature ensures that personnel need not visit the instruments to undertake upgrades and that support for most applications can be undertaken remotely. with the savings in support costs that this will achieve.

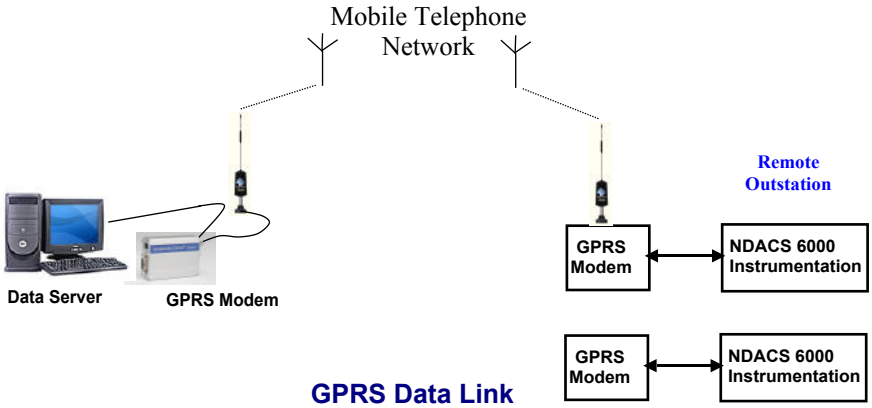
Remote Outstation - Direct Connection

The following examples shows how to connect remote NDACS 6000 based instrument outstations to a central data server using standard direct mobile phone data link (CSM) or GPRS modem.

Direct Connection (CSM)

Any PC with a modem that can make a dial-out call can be used to connect directly to the NDACS instruments. The NDACS automatically answers a call and enables the user to see real-time information, make configuration changes and download information.





GPRS Data Link

In order to maximise the dial-up data link speed and to stay connected to the instrument continually a GPRS modem option is available for use with the tide monitoring. system.

GPRS data costs are charged on the amount of data transfered and not the time over which the connection is made.

Data Collection for the NDACS

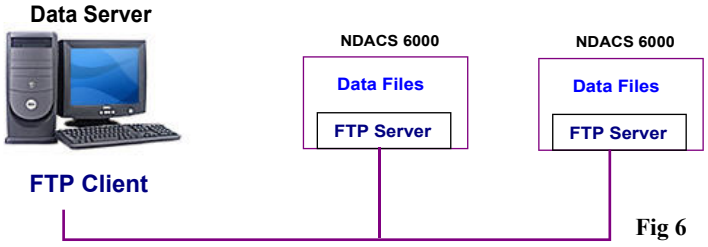


Fig 6

Standard Features

The FTP software is supplied as standard on all modern versions of the Microsoft, Linux, Unix and DOS operating systems. The Unix shell scripts and Microsoft Windows batch programs call use the FTP software to automate data collection operations.

File Transfer Protocol Operations - FTP

The NDACS 6000 supports direct data transfer by the use of the FTP file transfer software which is an industry standard package that is available in most modern operating systems.

The NDACS 6000 operates as the FTP Server and the connection is made by a FTP client running on a remote computer as shown in Fig 6. No matter how the data connection is made to the instrumentation be that via the Internet of direct connection using a mobile phone, the same software operations are carried out and the same user interface appears to the User.

For example, to read the information in the Flash memory logger for the Internet deployed instrument shown in Fig 7 the only commands are:

FTP 192.0.0.3 *makes the connection across internet*
get eventlog.csv downloads selected file and stores to disk

Internet Based Solution

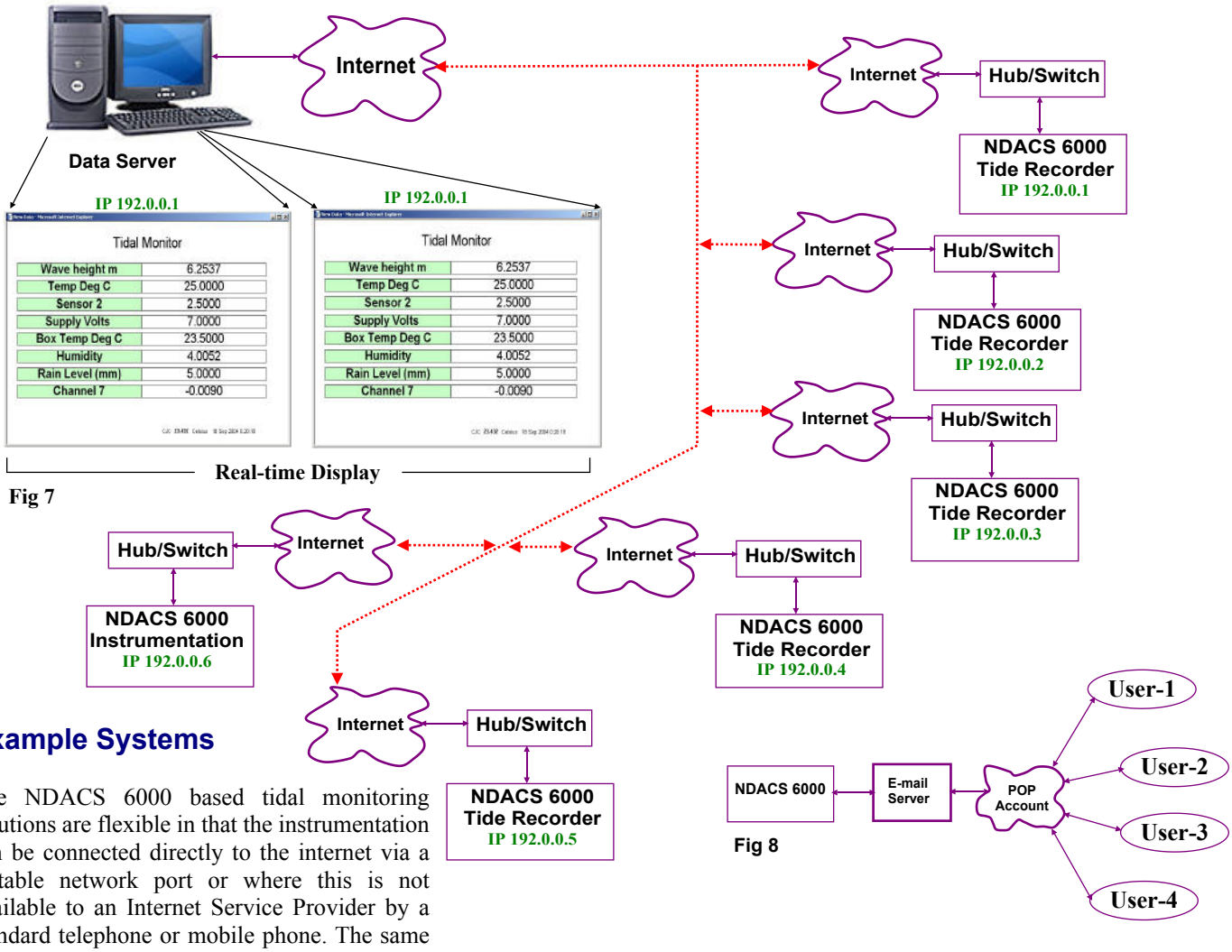


Fig 7

Example Systems

The NDACS 6000 based tidal monitoring solutions are flexible in that the instrumentation can be connected directly to the internet via a suitable network port or where this is not available to an Internet Service Provider by a standard telephone or mobile phone. The same software that can be used across the Internet can be used on a telephone data link.

Fig 7 shows how the instrumentation can be deployed directly onto the Internet and their information viewed in real-time and/or retrieved for processing. The instruments can be any where in the world as long as a data connection can be made.

Stored information can be collected across the Internet using FTP or E-mailed directly to a user for immediate analysis.

Fig 8

E-mail Reports, Alarms & Status Messages

The NDACS 6000 supports multiple address for the sending of e-mail data reports and alarms. The e-mail server POP account see Fig 8 can be configured to expand sending data to further address above those that can be pre-set into the instrument.

The NDACS also sends status messages to indicate when the instrument restarts in case of power failure and to show the unit is alive and functioning correctly at a preset time & date.

Dial-up Telephone/Mobile Data Link Solution

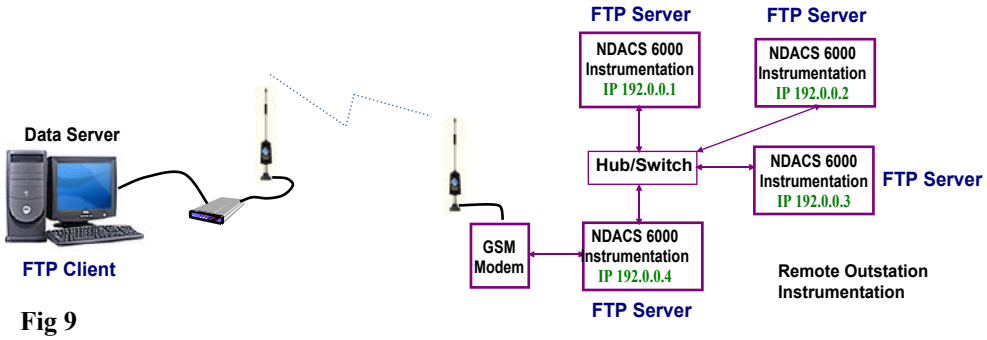
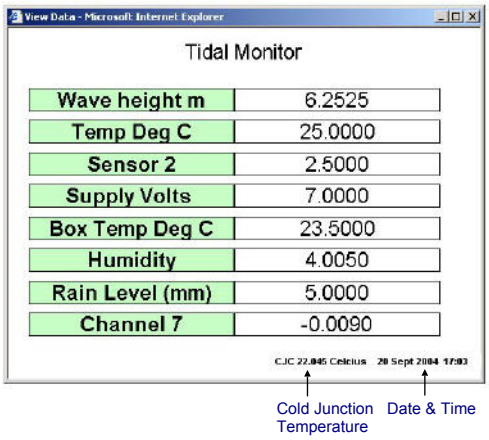


Fig 9

Figure 9 shows multiple NDACS systems connected together on a local Ethernet hub and back to the Data Server using a single mobile phone data link.

In this case data is best acquired using the FTP software to access and download data from each instrument in turn.

Standard Instrument User Interface



Introduction

The NDACS 6000 based tidal monitoring solutions can be used to acquire and view data in real-time across different types of data networks such as the Internet, Local area networks, and telephone links. No matter how the user views information the same User Interface is observed.

Results Display

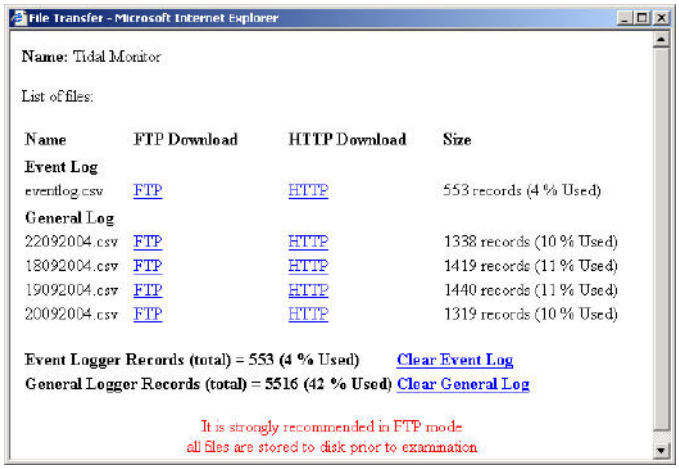
The NDACS 6000 Real-time display shows the current sensors values in engineering units and at an instance which channels have configured an alarm condition. Also displayed on the results page is the instrument time in 24 hr format and the thermocouple cold junction compensator temperature.

File Transfer

No matter which model of the NDACS 6000 is being used within the within the tidal monitor the same file transfer interface is used to control the data downloads. Downloading information can be carried out by the User via the **FTP** or **HTTP** file transfer options within the File Transfer web page. A user can download files to a PC across a network or dial-up data link.

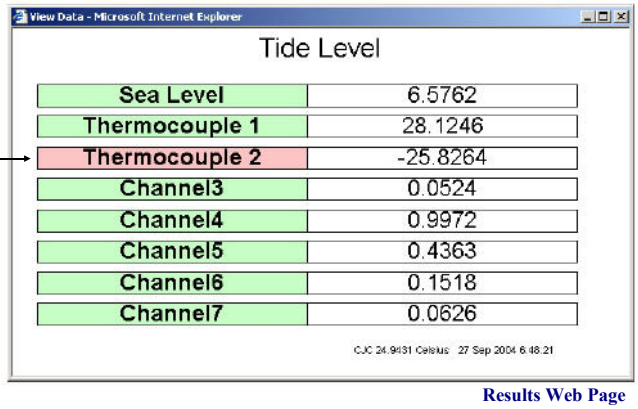
The archived data can be observed in a web page, stored to a file on a computer system or loaded directly into a spread sheet. No matter how the General Logger recording rate is configured up to 30 individual data files are recorded representing up to 1 month of data.

FTP and HTTP file transfer operations are standard features of most modern operating systems including the Microsoft Windows and Unix.



File Transfer Web Page

Figure above shows 4 data files recorded from the General data logger and also that data has been recorded into the event logger.



Results Web Page

Alarm Reports

The NDACS 6000 supports configurable Alarm levels for each of the analogue inputs. The alarms can be used trigger data recording and to send e-mail alarms upon determining that a specified channel has gone out of defined bounds.

For example the tide sensor input channel can be set to trigger an alarm if the tide range exceeds a pre-set level. This level can be used to indicate that floods are likely and that additional actions above the recording information need to be taken. The E-mail alarms can be passed to multiple users simultaneously.

Tide Monitoring System Options

The Keynes Controls tide monitoring systems are modular in construction and can be supplied to wide range of sensors from many different manufacturers, connection to different network data links such as the Internet, mobile data links, standard modems or simply to a stand-alone computer. Various power supplies can be used from DC supplies to mains operated devices with battery backup for the logger and associated sensors.

TIDEMONV108DC

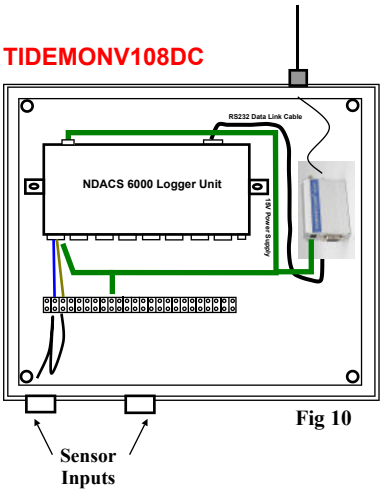


Fig 10

Options

- 8 Channel Unit
- 12 - 24V DC Power Supply
- 2 x Independent data recorders
- Acoustic & Pressure Tide Sensor
- Internet Access
- Local network port for data downloads
- GPRS Modem Option
- RS232 port for dial-up modem access
- General purpose sensor inputs
- Spreadsheet compatible data files
- 24 hour real time clock
- 6500 - 6 million records of data

TIDEMONV108AC

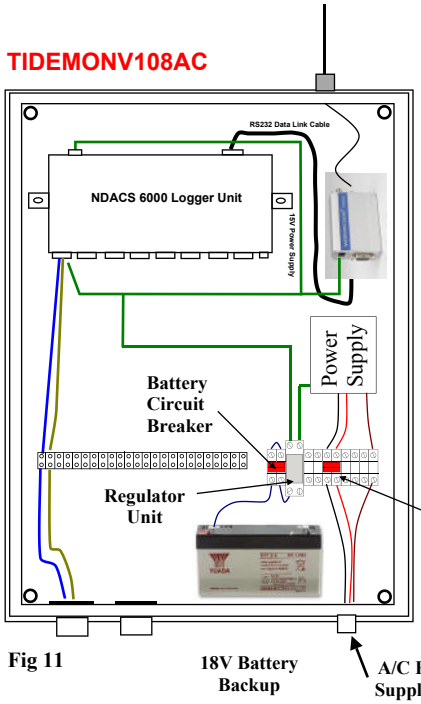


Fig 11

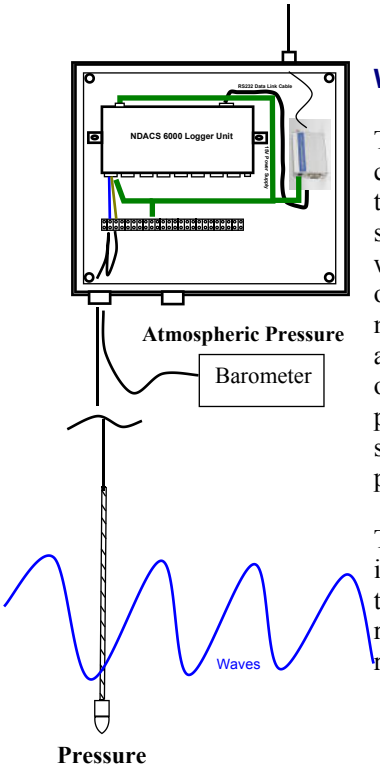
- 200-240VAC Power supply
- Battery backup for logger and sensors
- 8 sensor inputs - easily expandanable
- Real-time display
- Web Browser Interface

Tide Information

by Pressure Measurements

A pressure sensor can be deployed below the range of the tidal water level and used in collaboration with a barometer to measure tide height and wave information. An sea level barometer is used to correct the sensor pressure for local atmospheric pressure in order to to give correct tide and wave heights. The tide level is proportional to pressure and the results are shown in engineering units on the real-time display.

Most pressure sensors offering a voltage or current output can be used in with the logger unit within the tide monitoring instrument and suitable sensor configuration factors easy installed.



Wave Parameters

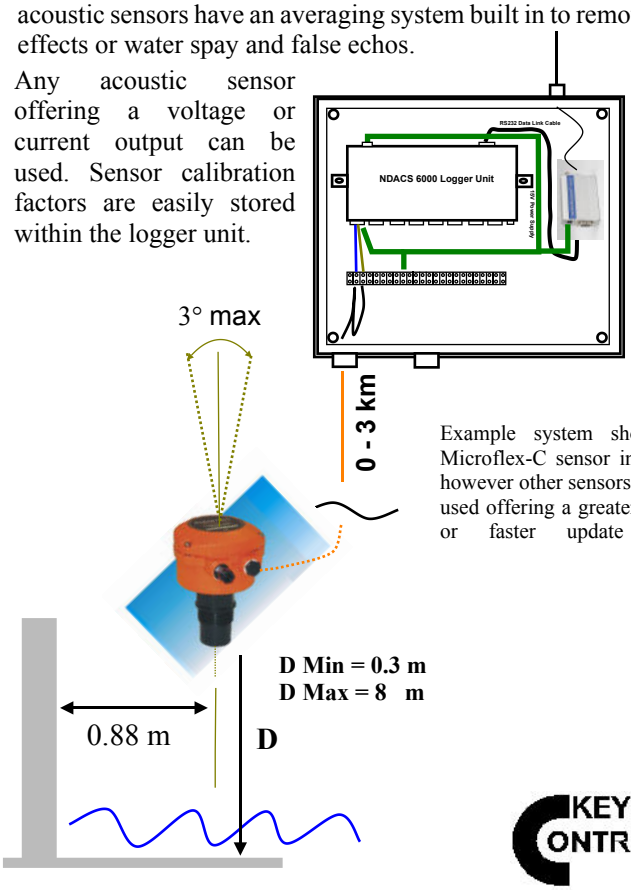
The pressure sensor gives a continuous output and setting the recorder at a suitable sample rate will enable local wave information to be observed. As long as a suitable network connection is available wave traces can be observed in real-time. Wave parameters such as height, significant wave height and period can be determined.

The examination of wave information will not prevent the tide data from being recorded and automatically reported.

by Acoustic Sensor

For fixed site installations and where it is not practical to deploy sensors underwater then an acoustic wave sensor can be used. Acoustic sensors are ideal where low sample rates are required ie just tide information, where the distance from the sensor to the tide monitoring instrument are located some distance from each other and where tide ranges are not already known. Most acoustic sensors have an averaging system built in to remove the effects or water spay and false echos.

Any acoustic sensor offering a voltage or current output can be used. Sensor calibration factors are easily stored within the logger unit.



Example system shows a Microflex-C sensor installed however other sensors can be used offering a greater range or faster update rate.

KEYNES CONTROLS

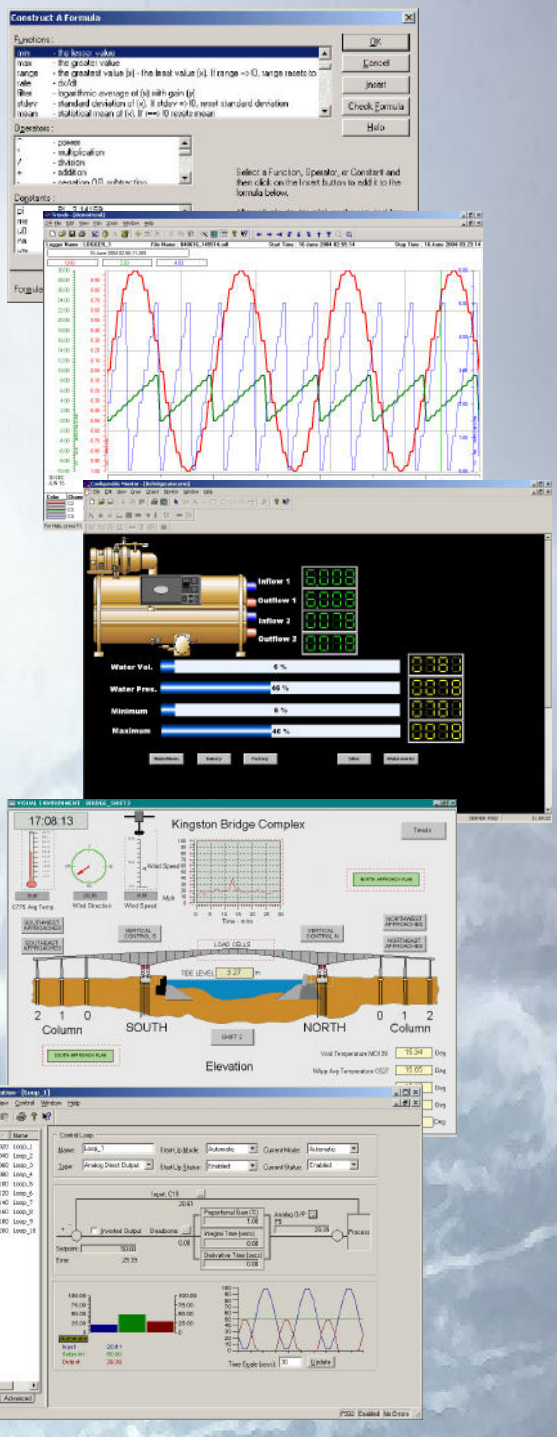
Orchestrator

NDACS 6000 Control Centre Software is a powerful new addition to the Orchestrator ™ SCADA Software. Running on a PC with Windows 98, 2000, NT or XP, it enables flexible remote Asset Monitoring systems to be built quickly and easily from rugged multi-network connection NDACS 6000 systems

Typical Applications

- Remote Asset Monitoring
- Tidal Monitoring
- Energy Management
- Structural Monitoring
- Event Recorders
- Temperature Recording
- Utility monitoring (gas, water etc.)
- Cryogenic Reporting

Orchestrator is an advanced real time information System consisting of a set of integrated modules providing automatic data acquisition, monitoring, recording, trending, man machine interface develoment, networking and process control,making it readily adaptable for a wide range of industrial and engineering applications.



Easy to use!

Its strength lies in its flexibility and in the ease with which it can be configured. Its intuitive Windows menu structure means a new user can quickly become familiar with its configuration without having to undergo intensive training courses.

Scaleable!

Orchestrator can be purchased as a small 16 I/O channel system that can be expanded up to an infinite channel count. It can constitute a stand-a-lone system or an extensive Server/client networked installation! All functionality in the way of trending, mimic displays, alarming and calculator are available in all versions.

Data Acquisition

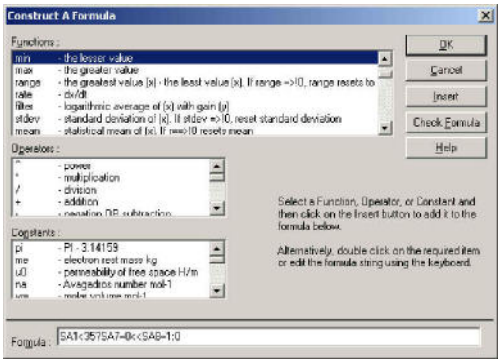
Up to Sixty-four loggers can be configured to take 64 independent groups of up to 10,000 channels of data per group. Loggers may be configured to operate on a PERIOD basis, an EVENT basis, and PERIODUNTIL-EVENT basis. Pre-event and post-event loggers may be used to evaluate the behavior of the data surrounding an

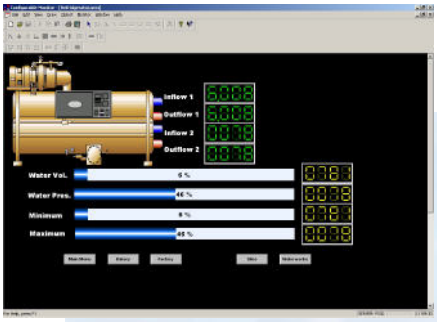
Networking and the Web

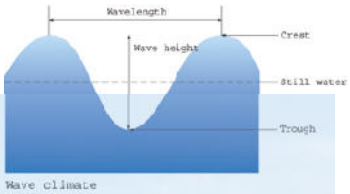
A fully implemented client/server architecture lets data, displays, and control be distributed over a standard network. Real time linking between th server and client provides a high performance update for all users on the system. As mentioned above, Orchestrator lets you share data over the network in real time, allowing others users to view the acquired data in their Orchestrator Client interface, Internet Explorer browser or to have the data go directly into their own application. Orchestrator Internet Server is a licensing solution that allows unlimited client access via the Internet.The Internet Server sits on top of an Orchestrator Server ,and allows viewing of Mimics, trends, alarms and text displays.

Real Time Calculator

Orchestrator's Real Time Calculator lets you create and calculate data directly from signal inputs. Calculations, devised free form by the user in a dialog box, can be strung together to form complex logical sequences or data processors. More than a hundred commands, operators and scientific constants are provided to assist you in building calculations. Calculated data is processed in Orchestrator in the same way as raw data inputs, that is, it can be logged, displayed, animated, or alarm processed.







Customise Displays

Orchestrator's Configurable Monitor lets you develop the interface to your process and provides dynamic representation of the phenomena being monitored. The Monitor provides a variety of ActiveX controls with the ability to customize the attributes of each item. These controls include:

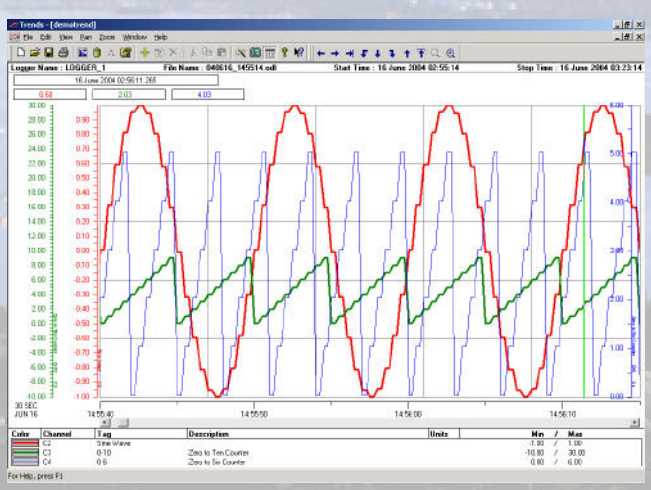
- Angular Gauges
- Control Knobs
- Linear Gauges
- Toggle Switches

Real Time Data Export

Orchestrator's built-in OLE for Process Control (OPC), Dynamic Data Exchange (DDE) and Real Time Data (RTD) allow data to be connected in real time to other Windows software like Excel, Word or Access. Reports can be automatically generated and analysis can be carried out in the software environment of your choice. Also, with Network DDE and DCOM, other clients (users) can automatically incorporate data, as it is collected, directly into their own software applications.

System Security

Orchestrator uses built-in Windows password protection for granting access to other users (clients) on the network. A system manager would have ReadWrite access to allow reconfiguration and viewing of all data channels. Read-only access might be granted to a user that needs the data only for monito ing purposes. A combination of access grants can be implemented to protect specific areas of the system.



Trends

Orchestrator's trend displays provide a powerful means for viewing, evaluating and selecting data for further processing or analysis. Data is displayed either in real time or replayed directly into the trend displays from existing log files. MDI (Multiple Document Interface) is used to present the real time trends allowing several trend displays to be viewed simultaneously. Each trend supports up to 32 channels of data and can cover any length of time, from a few seconds to several years. Within the trending module.The Data Merge facility enables data from separate trends can be time-synchronized and combined into a single trend.

NDACS 6000 Modules provide remote rugged data acquisition and logging facilities as building blocks in groups of 8 and 16 channels. All instruments support hi/lo alarm level monitoring, automatic e-mail data reports and status messages. The instruments can even inform a user that they are still operational even if no data is reported.

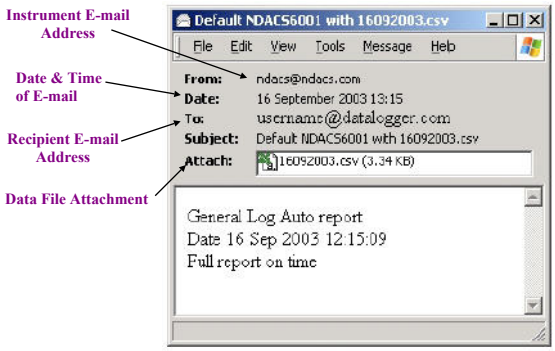
Access to the NDACS 6000 series instruments is via Ethernet port (TCP/IP) or by direct connection to the serial port. All of the NDACS 6000 range of instruments support direct connection to standard Hayes compatible modems and GSM web enabled mobile phones. *for more information see NDACS 6000 series data sheets)*

Alarm management

An important aspect of any monitoring system is the ability to handle alarms and events. Orchestrator lets you assign a unique high and low event alarm condition to each data channel. Each alarm condition can then be given a priority (1-255) and an associated block of text that is displayed when the alarm or event occurs. You can also set high and low warning limits which are used to alert operators of a developing alarm condition. Alarm channels can be sent to a mobile phone, pager or to an email address. The built-in alarm logger records all alarms, the time they occurred, and the time they were acknowledged.

E-mail Alarm & Auto Report Format

The NDACS 6000 utilises a standard E-mail format for sending alarm and automatic report data. It is possible to send e-mail messages directly from the instrument to 4 defined users however this can be expanded with the configuration of the instrument dial-up account mailbox. The Automatic report data files are CSV format and can be read directly by most Windows packages such as Microsoft Excel, Word etc.. Each E-mail alarm or record in the data files are time stamped and use the following data format:



E-mail Status Message

The NDACS supports a series of status messages that can be used to indicate how any instrument is functioning.

IsAlive: Sends a message to indicate that an instrument is still active at a predetermind time. Usefull if waiting for a random event to occurr to know that a system is still functioning.

Bootup: Sends a message each time an instrument is powered on and is used to indicate if a power supply failure has occurred or a remote system

Operations

The NDACS continually scans the inputs and converts the sensor signals into Engineering units. When a tide level exceeds a preset level a trigger signal from the NDACS can be used switch on the start and audiable alarm. On detecting that a tide level has exceeded a pre-set level the instrument send an alarm E-mail to an operator that indicates the time and date upon which the event occurred. Ideal when the event to be monitored is random.

Dial-Up Reports

The NDACS systems can be configured to send E-mail messages using a dial-up Internet accounts. It is also possible to transfer data using standard land-line and satellite modems and data link mobile phones.

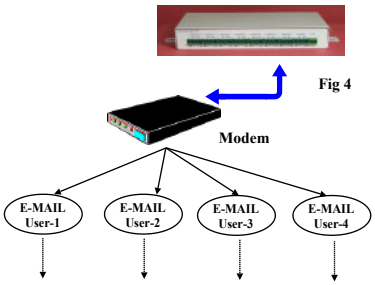
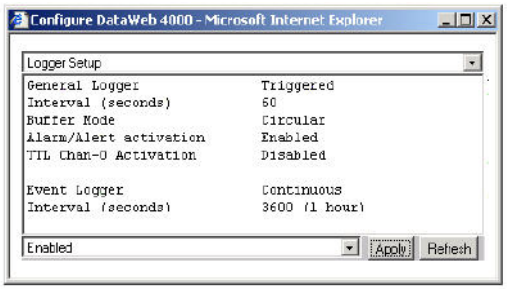


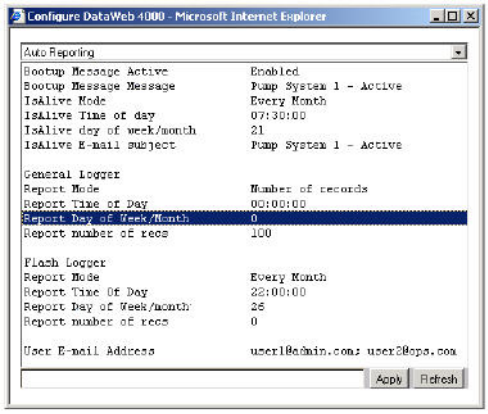
Fig 4

Logger Configuration



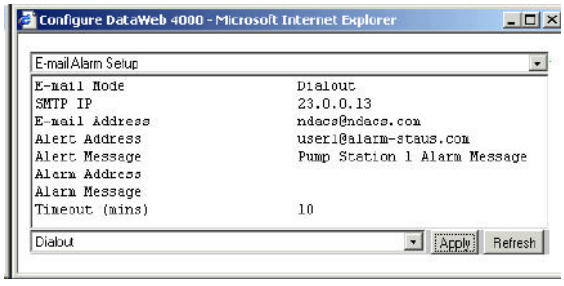
The logger Setup shows the data recording for the pump station instrument to record permanent data at 1 reading per hour and the RAM memory configured to store data at 1 reading each minute as long as alarm conditions exist on an

Automatic Report Set-up



The above Window shows a typical automatic data reporting possible for the pump monitoring

E-mail Services Configuration



The above window shows a water pump station instrument configured to send data and alarm E-mails using a dial-up ISP account E-mail server. It can be simply adjusted to send E-mails across a network..

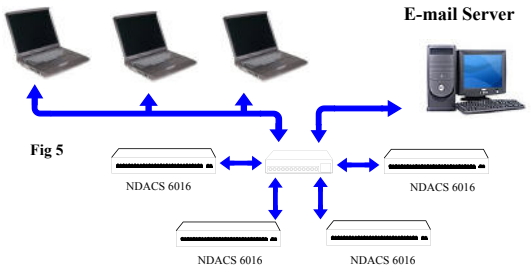
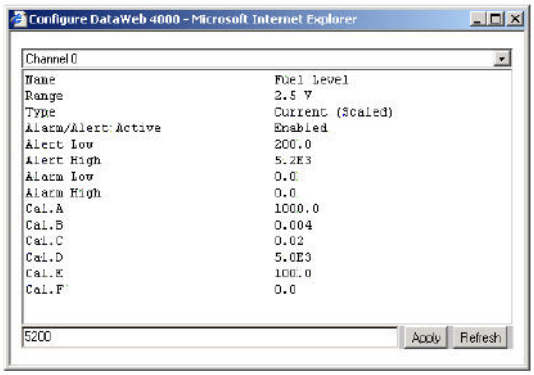


Fig 5

Analogue Input Configuration



Scaled Current input from a level meter offering a 4-20 mA signal for full scale measurement. The instrument will show 5000L at 20 mA and 100L at 4mA. An alarm message being sent when the fuel level drops

Example of an Analogue input channel configured to show alarm conditions when the input goes outside specified bounds. In this case when the fuel tank level drops below 100 litres.

CE

Version 1.02

SPECIFICATION NPAI24V5

Sensor Types	Resolution	Input Impeadence
Voltage Thermocouple Thermistor Strain Gauge Resistance RTD	24 Bit Sigma Delta	> 10 M Ohm at all sample rates

The NDACS 6000 operating with the NPAI24V5 analogue input module has 8 full differential input 24 bit channels of general purpose analogue inputs. The instrument also provides direct energisation for many different sensor types.

Calibration

Every 12 months

Calibration Temp 20 Deg C

Analogue Range Range Full scale	Accuracy	Noise @ 1 Hz (Peak-Peak)	Noise @ 1 Hz (RMS)	Noise @10 Hz (Peak-Peak)	Noise @10 Hz (RMS)	Noise @ 100 Hz (Peak-Peak)	Noise @ 100 Hz (RMS)
5V	∠ 0.01% FS	60.00 uV	13.00 uV	70.00 uV	12.20 uV	190.00 uV	29.00 uV
2.5V	∠ 0.01% FS	20.00 uV	2.00 uV	20.00 uV	4.00 uV	120.00 uV	17.00 uV
0.5 V	∠ 0.01% FS	3.00 uV	0.60 uV	5.00 uV	0.88 uV	66.00 uV	19.00 uV
250 mV	0.01% FS	2.00 uV	0.30 uV	3.00 uV	0.60 uV	42.00 uV	9.00 uV
50 mV	0.01% FS	0.80 uV	0.15 uV	1.50 uV	0.25 uV	19.00 uV	3.00 uV
25 mV	0.01% FS	0.50 uV	0.10 uV	1.20 uV	0.22 uV	19.00 uV	3.00 uV

Calibration Temp 20 Deg C. All errors are worst case using (Peak-Peak) noise.

The following results are typical of the noise levels expected when using the NPAI24V58 analogue module. Keynes does not guarantee that each board meets this exact specification only that the results shown are typical of what can be acheived when the input signals are correctly installed.

The high performance that a 24 bit analogue converter provides offers sensitivities to 1 uV

Each analogue input can be individually configured for any type of sensor and input range..

Thermocouple error = 0.2 ºC CJC error + linearisation error + Gain error

Ensemble data averaging used to improve signal-noise ratios on the lower sample rates.

Auto-calibration. The NDACS 6000 utilises a high precision voltage source to self calibrate the analogue inputs.

In built CJC (cold-junction compensation) for direct thermocouple installation.

Sensor Type Thermocouple	Temperature Range	Range Low input ranges 25 mV - 250 mV	Sensitivity Average sensitivity over specified range and sample rate of 1 Hz.	Resolution Based on specified input range and temp readings > 0 ºC unless otherwise stated
B	0 - 1820 ºC	25 mV	0.07 ºC	0.0002 ºC
E	-260 - 0 ºC	25 mV	0.01 ºC	0.00004 ºC
	0 - 661 ºC	50 mV	0.01 ºC	0.0002 ºC
	662 - 980 ºC	250 mV	0.03 ºC	0.0002 ºC
J	-200 - 0 ºC	25 mV	0.010 ºC	0.00003 ºC
	0 - 1200 ºC	250 mV	0.025 ºC	0.0003 ºC
K	-260 - 0 ºC	25 mV	0.02 ºC	0.00006 ºC
	0 - 1232 ºC	50 mV	0.02 ºC	0.00007 ºC
	0 - 1370 ºC	250 mV	0.05 ºC	0.0004 ºC
N	-260 - 0 ºC	25 mV	0.03 ºC	0.00009 ºC
	0 - 1300 ºC	50 mV	0.02 ºC	
R	-40 - 0 ºC	25 mV	0.088 ºC	0.00026 ºC
	0 - 1760 ºC	25 mV	0.04 ºC	0.00012 ºC
S	-40 - 0 ºC	25 mV	0.085 ºC	0.00025 ºC
	0 - 1760 ºC	25 mV	0.047 ºC	0.00014 ºC
T	-260 - 0 ºC	25 mV	0.02 ºC	0.000062 ºC
	0 - 400 ºC	25 mV	0.00958 ºC	0.000029 ºC
Resistance Thermometer PT100	-55 to +150 ºC		0.4 ºC	0.4 ºC
4 - 20 mA current loop 2.5V Range	All results based on using 100 Ohm sense resistor		1.5 mA @ 50 Hz 0.2 mA @ 10 Hz 0.2 mA @ 1 Hz	1.5 nA
Accuracy % of Range	Results obtained on the 5V range at 1 Hz 0.00028%		**Accuracy % of Reading**	Results obtained on the 5V range at 1 Hz 0.005% of full scale

Software Support

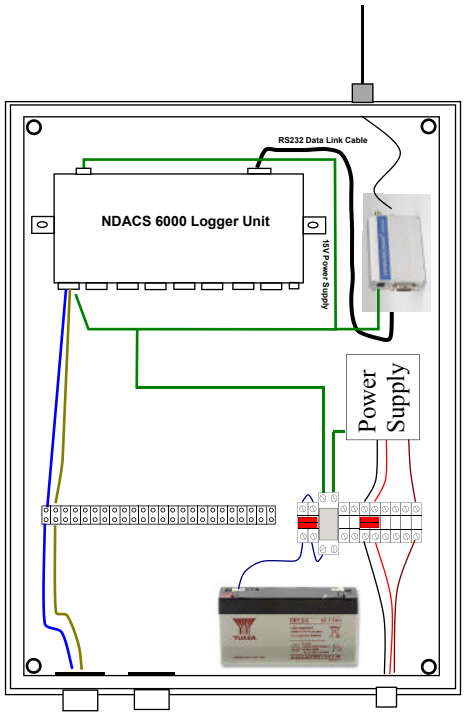
The NDACS 6000 supports a wide range of third party products for the Windows operating system.

Real-time Clock	Power	Ranges	Oper. Temp	Humidity
24 Hrs Format ±20 ppm (2 secs day)	Supply 12V DC at 6W max load	25mV, 50 mV, 250 mV 500 mV, 2.5V, 5V	-10 to 60 Deg ºC storage -20 to 80 Deg ºC	90% Non-Condensing

Network Specification	Isolation	Common Mode Rejection	Thermal Stability
Electrical Spec: 10BaseT Total/channels: Unlimited Data Rate: 100Hz/channel	1000V block isolation ±10 v common mode range	CMRR = 120dB DC @ 25mv range CMRR = 110dB DC @ 0.25V range CMRR = 90dB DC @ 2.5V range	10 ppm/Deg C @ 2.5V 30 ppm/Deg C all other ranges

Part Numbers

The tide monitoring systems are flexible in construction and operations. Any sensor input not directly supported or mentioned in this document can be added. Please contact Keynes Controls for details.



200-240 VAC Powered Instrumentation

Standard Features

1 x RS232 Port
1 x Ethernet Port
Support for Hayes Modem Command set
2 x Independent data records
Web Browser User Interface
8 x 24 Bit Analogue Full Differential Inputs
Direct Support for Environmental sensors
Acoustic & Pressure gage tide level sensors
Internal Cold Junction Compensator
Thermocouple, RTD, Current Loop &
Voltage inputs with multiple gain settings
Automatic E-mail Data Reports
E-mail Alarm System
Event specified data recording
Real-time network readings 100Hz/Channel

- GSM option for GSM Modem
- GPRS option for GPRS Modem
- MOD option for standard dial-up modem

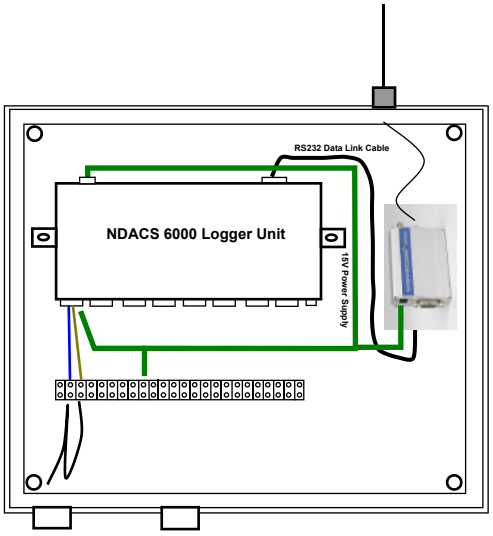
TIDEMONV108AC / GSM / GPRS /MOD

As above but with

200-240 VAC Power Supply
Battery backup - 1 hour minimum operation
13,000 sample records
GSM / GPRS / Standard telephone modem

TIDEMONV108AC / GSM / GPRS /MOD
as above but with 13000 sample records storage
8 sensor inputs

KEYNES CONTROLS



DC Powered Instrumentation

TIDEMONV108DC / GSM / GPRS /MOD

As above but with

12-24 VDC Power Supply
13,000 sample records
GSM / GPRS / Standard telephone modem

TIDEMONV1016DC / GSM / GPRS /MOD
as above but with 16 analogue inputs
6500 sample readings

TIDEMONV108DC / GSM /GPRS /MOD - FM
as above but with 16 analogue inputs
52000 sample readings

TIDEMONV1016DC / GSM / GPRS /MOD -FM
as above but with 16 analogue inputs
26000 sample readings

TIDEMONV108DC / GSM / GPRS /MOD - HD
as above but with 8 analogue inputs
6 million sample readings

AC Power Supply Instruments

TIDEMONV108AC / GSM / GPRS /MOD - FM
as above but with 52,000 sample records storage
8 sensor inputs

TIDEMONV108AC / GSM / GPRS /MOD - HD
as above but with 6 million sample records storage
8 sensor inputs

TIDEMONV1016AC / GSM / GPRS /MOD - FM
as above but with 26,000 sample records storage
16 sensor inputs

TIDEMONV1016AC / GSM / GPRS /MOD - HD
as above but with 3 million sample records storage
16 sensor inputs