Diligence Evg

N3014 EVOLUTION GRAPHIC MONITOR OPERATOR MANUAL

COMARK

A Fluke Company

CONTENTS

1. DESCRIPTION

The Comark N3000 Diligence EVG Graphics Monitor range of new instruments is designed to meet all your data recording needs. These monitors take data recording to another level with the introduction of a large backlit LCD for a clear view of the data in both list (tabular) and graph mode.

Paper and pen chart-recording of data will become a thing of the past with Diligence EVG Monitors. The N3000 range combines all the features associated with the successful Comark Diligence EV data loggers and adds additional features never seen before on a Comark instrument.

Comark Diligence EVG Graphics Monitors have been designed for applications throughout industry and processing, including the food industry and scientific and research laboratories.

Each Diligence EVG Graphics Monitor has a very large memory (up to 64,000 readings) for the most demanding applications and can be used with the existing range of Comark temperature probes.

The stored data points can be displayed directly on the large LCD display or sent to a PC or to a printer.

The large LCD display is used to indicate all programming and set up, as well as for the display of valuable information on the status of the instrument and the measurement channels. Throughout this manual the various presentations of information on the LCD are referred to as “screens”. This also differentiates the LCD presentations from the software presentations, referred to as “pages”.

The proven Evolution software provides for the programming of Diligence EVG Monitors and enables the stored data to be saved on a PC and displayed in list or graphical form.

The first instrument in the N3000 range is the N3014 detailed in this manual.

1.1 Accessories Available

The following accessories are available for the N3000 Graphic Monitor range:

- EVSW or EVSWPRO Multi-lingual Logger Software
- ADP46 Centronics Parallel Printer Cable
- ADP 53 N3000 Comms Lead
- ADP54/UK Power Adaptor UK
- ADP54/EU Power Adaptor EU
- ADP54/US Power Adaptor US
- ADP55 Ni-Mh Rechargeable Cells (Pack of 4)
- LC30 Carrying case

2. OVERVIEW OF EVOLUTION GRAPHIC MONITORING

The N3014 stores readings at pre-set intervals for all active channels in its large memory. Each reading stored is time and date stamped. The interval time is programmable from 1 second to 99 hours. There are a number of user programmable options including alarm intervals, sensor type, channel set-up, and start/stop times. These options are detailed elsewhere in this manual. There are also options available for setting the times for data recording. These include:

Manual start/stop
Manual start/timer stop
Timer start/stop
Wraparound (continuous logging)
Daily logging.

Manual start/stop. The N3014 will only start to record data and stop recording when manually instructed from the keypad.

Manual start/timer stop. The N3014 will only start logging when manually instructed from the keypad. The pre-programmed stop time will be automatic.

Timer start/stop. The pre-programmed start and stop times will be automatic.

Wraparound recording. Data will be recorded until the N3014 memory is full and new data will be written over the oldest data in the memory.

Whenever the N3014 starts a new logging cycle after a time during which no logging has taken place, a new section is created within the data. Each separate logging section is therefore related to a specific logging time period and is referred to as a period. The N3014 can store a maximum of 128 periods.

Data can be displayed in real time on the large graphic LCD while also being stored in the internal memory for later transfer to a printer or upload to a PC for storage, and analysis.

3. OVERVIEW OF KEYPAD SYMBOLS

The keypad has a number of buttons for the operation of the instrument and a number of LEDs for active indication of events. The button functions are:

ON/OFF – Use this button to power the EVG display on and off to save power. The instrument will not stop logging or lose data if the display is turned off.

Backlight – This button will operate the backlight for the LCD. This will switch off after five minutes.

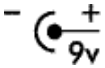
Help – A unique feature on an instrument of this type. Press this button for on-screen help. Each operaton screen has its own help screen to assist with programming and data viewing.

Alarms – This button displays a screen where any alarms not acknowledged will be highlighted with an asterisk (*). At this point, these alarms can be acknowledged. This feature can be password protected.

Cancel – This button will either return the display to the previous screen or will cancel any operations or option.

Multifunction Buttons – These 6 blank buttons have unique functions related to each displayed screen. Appropriate words and symbols will appear at the bottom of each screen above the buttons.

LEDs
The instrument is fitted with a number of LEDs:



Mains Adaptor Connected – GREEN Constant

Alarm Indication – RED Flashing

Active/Logging – GREEN Flashing

Low Battery - YELLOW Flashing/constant for battery charging

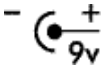
4. OVERVIEW OF CONNECTIONS TO THE INSTRUMENT

There are a number of connections on each side of the instrument case.

The left side of the case has connections for:

PC connection RS232 (9-Way D Type Connector) and Axiohm serial small hand held thermal printer model A621B.

Printer (25-Way D type connector) Centronics parallel, Hewlett Packard PCL5 compatible or 24-pin Epson ESC/P2 dot matrix compatible.



Mains/adaptor

3.5mm jack socket with 24V 500mA maximum rated input for connection of external alarms and auto-diallers. There is one volt-free contact available, either normally closed (auto-diallers) or normally open (external buzzers etc).

The right side of the case has connections for probes. Please refer to the instrument specification for more details.

5. OVERVIEW OF HOME SCREEN

The home screen is the main screen for the EVG monitor. This screen will detail the current status of the instrument, including battery condition, memory used, and mode. It will also show the current monitoring mode and if the instrument is currently recording or not. The left hand side of the screen shows the main menu for the monitor. It is possible to start/stop the instrument in manual start mode from here. The lower portion of the display will show the monitor task description as programmed.

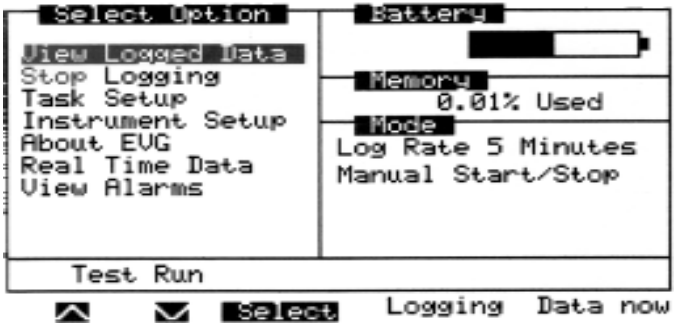


Fig.1 Home Screen

6. OVERVIEW OF EVOLUTION ALARMS

Each channel on the instrument can be programmed with a high (Hi) and low (Lo) alarm limit and an alarm time delay. The delay can be set to pause the activation of an alarm by a pre-determined amount of time. There is also an “auto-reset alarms” function used to set alarms as either non-latching or latching alarms.

6.1 Non-Latching Alarms

If “auto-reset alarms” is set to ON, an alarm indication will turn on and off if the programmed alarm thresholds are broken.

6.2 Latching Alarms

If “auto-reset alarms" is set to OFF, any alarm that has been activated will not be reset when the recorded temperature returns to within the programmed alarm thresholds.

7. CONNECTING PROBES TO THE INSTRUMENT

The first N3000 instrument is the N3014. This is an eight-channel thermocouple monitor fitted with industry standard sub-miniature connectors.

When connecting probes, the polarity of the plug must be checked before fitting. N.B. In order to obtain correct results make sure that the correct thermocouple type for the probe in use has been selected.

Comark type K thermocouple probes have a Green (Red in USA) lead and type T themocouple probes have a Brown (Blue in USA) lead.

Note: It is recommended that insulated thermocouples are used with the N3014 eight channel instrument.

8. SWITCHING ON AND OFF

8.1 Display Test/Mode

The logging function is available as long as power is supplied to the instrument, from batteries or mains, but the large LCD can be switched off using the ON/OFF button. Whenever the display is turned on it will perform a self-test during which time the Comark logo will be displayed. After the self-test is completed, The LCD will return to the previously displayed screen or the home screen as appropriate.

9. PROGRAMMING THE INSTRUMENT

The instrument can be programmed in two different ways. Firstly, it has been designed to be compatible with the existing Evolution software for programming via a PC. Secondly, it can be programmed via the keypad. The next section ‘Using the Evolution Software’ will deal with programming via the software and the following chapter ‘Manual Setup for EVG’ will cover the setting up the instrument without software or a PC.

10. USING THE EVOLUTION SOFTWARE

The N3000 range of monitors can be used with N1SW version 3.1 or above, however EV or EVSWPRO is recommended. If required, software upgrades can be obtained from the Comark Sales Office or a local Comark distributor.

Note: Before attempting to install the software please read the software installation guide supplied with the software.

10.1 Writing a Task for the EVG

Note: It is recommended that this part of the manual be read while referring to an instrument connected to a PC.

With the software installed and preferences set (see software installation guide) the system is ready for a task to be written. All programming of Evolution models is via TASKS. In this way the task may be saved as a record of the program given to the monitor and as such may also be retrieved for later use. Connect the EVG monitor to the PC via the cable supplied. This will fit only the 9-Pin RS232 connector on the side of the EVG. From the Evolution software select Quick Program from the Shortcuts menu. After a few seconds the Static Task screen will be displayed on the LCD of the instrument.

10.1.1 Channel Setup

The number of channels available will be shown across the screen as a series of 'TABS'. To set up a particular channel click on the relevant TAB.

Each tab will allow the configuration of a number of options pertaining to that channel. The display will show a tick box to turn the channel on and off and a description field for the specific channel, which will be displayed on the EVG LCD. Settings also include the sensor type, if applicable, individual High and Low alarms for each channel, and finally the alarm time delay. For example an alarm time delay can be set to cover defrost cycles e.g. A delay can be set between 0-99 seconds or minutes.

Note: Alarms will be triggered if the measured value rises above, or drops below, the entered Hi and Lo limits.

The rest of the settings are not specific to any N3000 model.

10.1.2 Recording Setup

The 'logging' section of the Task allows programming of the interval time 1-99 seconds, minutes or hours, manual start/ stop reording, specific date/time recording with or without a manual start and daily recording between two times. Daily recording can be over midnight and set for specific day or days of the week.

If manual start/stop is selected, the option start or stop is presented on the home screen of the instrument display.

10.1.3 Miscellaneous

The miscellaneous settings will allow for setting up of the alarms, turn on or off, setting latched alarms and turning the bleeper on and off. Memory wraparound (continuous logging) is also enabled from here.

10.2 User Details

The User details screen allows the programming of 12 text fields, headed title and description. The title field can be up to 16 characters while the description field can be up to 24 characters. Finish with OK or Cancel to abort.

10.2.1 Instrument Clock

The instrument date/time can be set either to synchronise with the PC clock or manually. The manual setting is useful if the clock in the instrument is to be set to a different time from the PC clock, e.g. set to GMT Greenwich Mean Time when the local time differs, i.e. BST British Summer Time. Note: The instrument timeclock will not adjust for BST.

10.2.2 Password Protect

Use the Password protect fields to enter an alphanumeric password of up to four characters to protect programming or data retrieval, or both. Only one password can be set and this protects both programming and data retrieval. More options are available via manual programming, see section 13.1.

10.3 Saving the Task

The task is now complete and can be saved for later reference by using the 'Save Task' button. This will display a standard File-Save-As Window. From here a filename can be entered for the task and saved on the PC.

10.4 Program Task

Progamming tasks is made simple by the 'Program-Now' button. Press this button with the instrument switched on and connected to the PC and the software will send the new Task information to the instrument. If the instrument is password protected then the password will have to be unlocked, see Unlock Password below. Once programmed the instrument monitor is ready to go. If the instrument has been programmed for manual start, this option will appear on the home screen. If the instrument has been programmed for daily or dated recording then it will start recording automatically and requires no further input.

10.4.1 Unlock Password

From the menus at the top of the screen, select File-Unlock Password. Enter the password to unlock the instrument for programming or data download.

Note: If the password programmed into the instrument is forgotten, the instrument will have to be returned to Comark Ltd.

10.5 Retrieving Data

Once the logger has completed the task, the data can be downloaded for viewing. Connect the instrument to the PC with the ADP53 N3000 Comms Lead and select the Retrieve Data shortcut. The software will scan the instrument for data and will ask for a filename for the data file. If the logger is password protected and the password has not been unlocked then the data cannot be retrieved. See Unlock Password above.

At this point the software will ask for a filename for the data. It will then ask if the memory is to be cleared and if the instrument is to be returned to 'non-logging' basic mode. Once these questions have been answered the data will be displayed on the screen. It is now possible to print and graph the data.

10.6 Data Manipulation

10.6.1 Graphing, Printing and Data Export

The data will be displayed in list mode but can be graphed or printed at the touch of a button. The quickest way to print or graph the whole file is to select the ALL tab and then select either Print Current Tab or Graph Current Tab. Additionally a portion of the data can be highlighted by using the mouse. This selection can then be copied and pasted on to a blank graph. (A new graph Window is created by selecting File-New-Evolution Graph). Additionally the data can be also pasted into a Word Document or Excel Spreadsheet.

10.6.2 Quick Calcs

The Quick Calcs function will calculate the following values from the selected data: mean, minimum, maximum, standard deviation and elapsed time. These calculations will only apply to data previously selected using the mouse. Select the whole or part of the data and press Quick Calcs to view the results. N.B. The calculated results cannot be printed or exported.

10.7 Help

More comprehensive help is available from the software by using the F1 key. This can be via context sensitive help or a software 'Tutorial'.

11. MANUAL SETUP AND RECORDING

11.1 Instrument Display Home Screen

A number of functions can be performed from the instrument home screen. If the instrument is not already recording and manual start has been selected, then the first option is to start recording. Then the rest of the options are listed as follows:

- View Logged Data
- *Start/Stop Logging
- Task Setup
- Instrument Setup
- About
- View Alarms

* Manual Start or Stop only

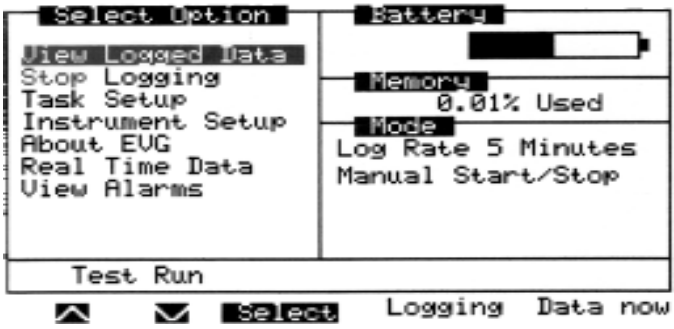


Fig. 1 Home Screen

11.2 View Data

Using the up/down arrow buttons, select the View Data menu from the home screen and confirm with Select. A View menu and will be displayed with several options. Use the up/down arrow buttons to choose an option and finish with Select or Cancel to abort back to the home screen.

11.2.1 Graph

In this mode the instrument will default to show all data for the latest period (see section 2 for a definition of "period") for the first active channel. It will show the start and stop time for the graph. It will indicate the scale in use, the channel name, the channel number and the period. The relevant multifunction buttons will be displayed at the bottom of the screen.

The graph will auto scale for best fit.

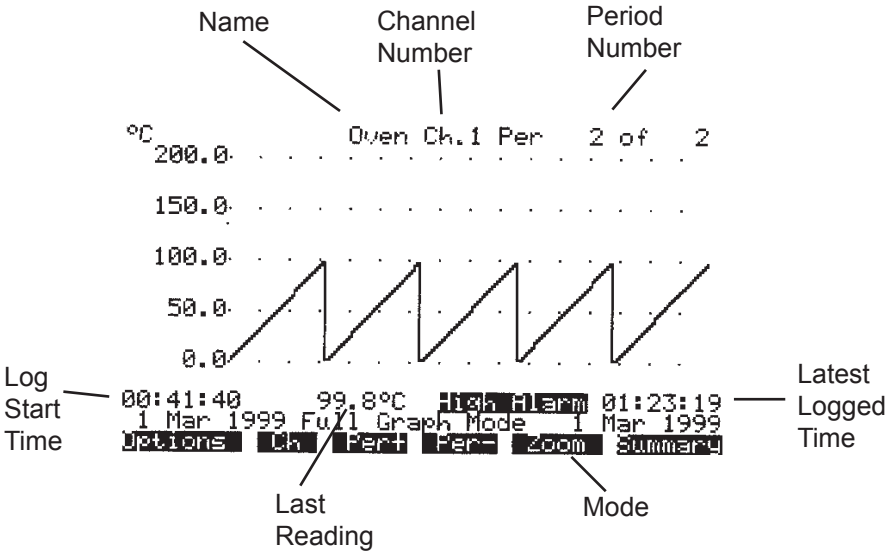


Fig. 2 Graph

11.2.2 Options

Use the options buttons to toggle through additional menu items:

- Full Graph Mode
  - Return to full graph mode

- Roll Mode
  - Show the last 192 readings continually updated
  - Dates will be displayed showing start and end of roll mode data.

- Print Graph
  - Print the current graph as displayed

11.2.3 Ch

Press this button to move from one channel to the next. It will cycle round all enabled channels.

11.2.4 Per + (if applicable)

Press this button to move from one period to the next.

11.2.5 Per - (if applicable)

Press this button to move back to the previous period.

11.2.6 Zoom

In ‘zoom’ mode it is possible to select a portion of the graph to be displayed on the screen. This is done by selecting a first and second data point. The instrument will then display the graph between these two points. To select the first point move the cursor using the left/right and up/down arrows. When ready press ‘1st pt’ to make the selection. Then repeat for the second point and finish by pressing ‘2nd pt’. The graph will enter zoom mode. Two scroll bars will be displayed to indicate the zoom location in respect of the full graph. At this point it is possible to zoom further or scroll left, right, up or down. Use the options menu to select from ‘Return to Full Graph Mode’, ‘Print Graph’ or ‘Return to Roll Mode’, or 'List Data from Cursor Point'.

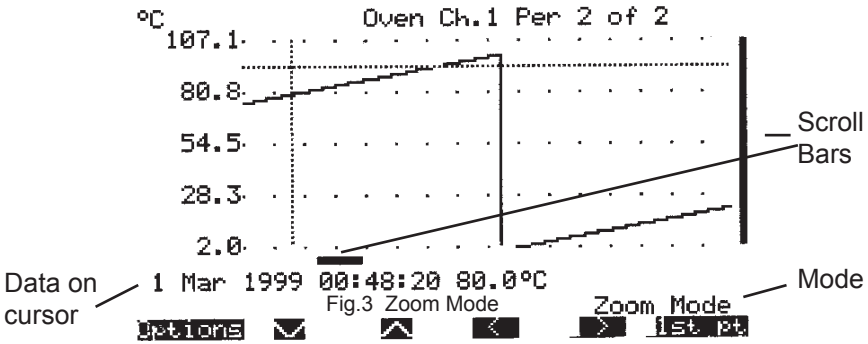


Fig.3 Zoom Mode

Note: Due to the limited resolution, the cursor may display more than one date and temperature when placed on the graph. Zoom in to see a single date and temperature. If more than one date is shown, this indicates there is more than one reading over the cursor. The dates will show the period the cursor is on and the minimum and maximum temperature.

11.2.7 Summary

This screen details the channel number/description, period from and to period time/date, log rate, high and low alarm values, maximum and minimum recorded value for the period and the last recorded reading.

11.3 Single Channel

In single channel mode the instrument will display:

- Last recorded reading for the first active channel
- Channel number
- Channel description
- If reading input is in/out of alarm
- When last reading was taken
- Time since last alarm or duration of current alarm
- Time resolution of the log rate
- Minimum and maximum values for the period

From here it is possible to print summary or view alarms. There are several option buttons available from this screen:

- Ch+ Use this key to move up a channel
- Ch- Use this key to move down a channel
- Scan Off Use this button to toggle between automatic channel scanning and manual scanning. Each channel will be shown at approximately 5 second intervals.
- Summary As above.

Escape by using the Cancel button.

11.4 All Channels

In all channels mode the instrument will display the last logged reading for all the active channels, with the channel number, description, and alarm status. Each logged reading will be displayed along with a time/date stamp indicating exactly when the reading was taken. Escape by using the Cancel button.

11.5 List

In list mode the instrument will display the last ten readings for the current channel, along with its log number, temperature, date/time and alarm status. The period will be indicated. Use options to list all data, list to and from date/time, print the list, show summary and graph from top of list (or nearest possible point).

Use CH to move to the next channel and up arrow button to move back through data. Use Per + and Per - to change period. Select cancel to return to previous screen. A scroll bar is provided to show the relative position in the list.

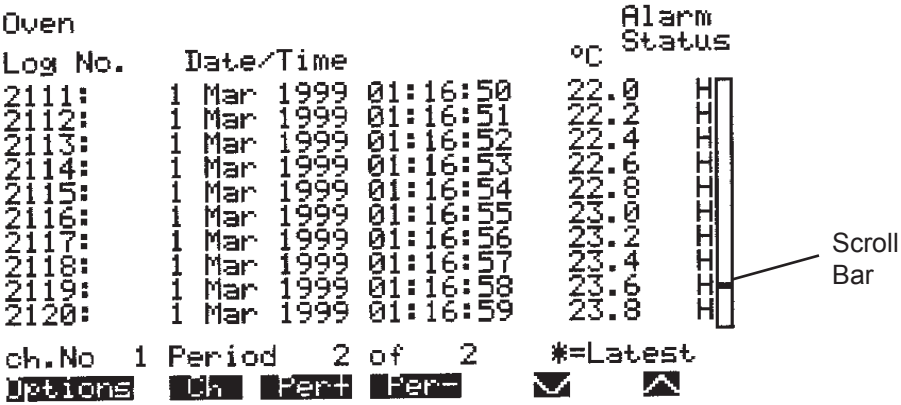


Fig.4 List Mode

11.6 Task Setup

In Task Setup there are two basic options.

- General Settings
- Channel Specific Settings

Use the up/down arrow buttons to choose an option and then Select. Select Program Task to finish or Cancel to return to the home page.

11.7 General Settings

These settings are common to all channels. Use the up/down arrow buttons to choose and Select to change. Choose from

- Logging Mode
- Log interval
- Alarms
- Wraparound
- Description
- User Details
- Date
- Time

11.7.1 Log Interval

Use the up/down arrow buttons to change the value of the monitoring interval and then select the monitoring units as either Hours/Minutes/Seconds. To finish select Done or Cancel to abort.

11.7.2 Alarms

Use the up/down arrow buttons to select from either:

- Alarms Disabled
- Alarms Enabled
- Alarms Enabled with Auto Reset

Press Select to finish or Cancel to abort.

11.7.3 Wrap around

In wrap around mode the instrument will continue to record when its memory is full by overwriting the first recorded readings.

Use the up/down arrow buttons to select from either:-

- Disabled
- Enabled

Press Select to finish or Cancel to abort.

11.7.4 Recording Mode

Use the up/down arrow buttons to select from either:

- Manual Start/Stop
- Manual Start/Dated End
- On Date/Time
- Daily

‘Manual Start/Stop’
If manual start stop is selected then no further action is required. An option to start/stop recording will appear on the home screen.

‘Manual Start/Dated End’
Having selected manual start/dated stop, an option will be placed on the home screen to start recording. A date and time for dated end needs to be entered. Use the up/down arrow buttons and press Select to chose either the stop date or stop time. Use the up/down arrow buttons to select the number required then use the Day/Month/Year button to toggle between fields. To finish press Done or Cancel to Abort. Repeat for the Stop Time.

‘On Date/Time’
Use the up/down arrow buttons to select/enter the start time and date and the stop time and date. Select Done to finish or Cancel to abort.

‘Daily Recording’
In Daily Recording mode a start/end time must be selected, this can be over midnight, and then the day(s) of the week to record. Enter the start/stop time as previously. Then use the up/down arrow buttons to highlight each day. Then using the up/down arrow buttons select either Yes or No to logging on that day. Finish with Select or Cancel to abort. Repeat for all seven days if required. Select Done to finish or Cancel to abort.

11.7.5 Description

A description of no more than 32 characters in length can be entered. Use the left and right arrow buttons with the up and down arrow buttons to select each character at a time. Press Select to choose the character, Done to finish and Cancel to abort.

11.7.6 User Details

Free form text can be entered into the 12 user details boxes. Each title has a maximum of 16 characters and each description has 24 characters. Press select to enter. Use the up/down arrow buttons and the left/right arrow buttons to choose the character. Press Select to confirm, Done to finish and Cancel to abort.

12. CHANNEL SPECIFIC SETTINGS

Use the up/down arrow buttons to choose and Select to enter. Press Done to finish or Cancel to abort. Select from:

- Name
- Enabled
- Sensor Type
- Scale Units
- Alarm Hi
- Alarm Lo
- Alarm Delay

12.1 Name

Use the up/down arrow buttons and left/right arrow buttons to chose a character. Then press Select to confirm, Done to finish and Cancel to abort.

12.2 Enabled

Use the up/down arrow buttons to select channel enabled (ON) or channel disabled (OFF). Confirm with Select and Cancel to abort.

12.3 Sensor Type

Use the up/down arrow buttons to select the sensor type for the channel, if applicable. Confirm with Select, or Cancel to abort.

12.4 Scale Units

Use the up/down arrow keys to select the scale of measurement. Press select to confirm or Cancel to abort.

12.5 Alarm Hi

High alarms will be triggered when the value recorded exceeds the Hi alarm value.

Use the up/down arrow buttons to change the value of the alarm high setting in the scale previously chosen. Finish with Done or Cancel to abort.

12.6 Alarm Lo

Low alarms will be triggered when the measured value drops below the Lo alarm value.

Use the up/down arrow buttons to change the value of the alarm Lo setting in the scale previously chosen. Finish with Done or Cancel to abort.

12.7 Alarm Delay

Use the up/down arrow buttons to select the value of the alarm delay. Use the Minutes/Seconds button to confirm the time. Finish with Done or Cancel to abort.

13. INSTRUMENT SETUP

Instrument set up contains the following settings for the logger. These are all global settings and are not channel specific.

Please use the up/down arrow buttons to select from the following:

- Password
- Display Auto Power Off
- Alarm Speaker
- Alarm Switch Output
- 50/60Hz Rejection
- Printer Setup
- Demo Mode

Finish with Done or Cancel to abort.

13.1 Password

Use this to enter a password and select those functions to be password protected.

Note: Alarm Acknowledge, Start/Stop Logging and Instrument Setup can only be password protected if Program New Task is also protected. Also, these features cannot be set-up from the Evolution software.

13.2 Display Auto Power Off

The display can be set to auto power off at a choice of fixed time periods or to stay on.

13.3 Alarm Speaker

The alarm speaker can be set to ON or OFF.

13.4 Alarm Switch Output

This has two options. Option one enables the output and option two determines whether the switch is opened or closed on alarm.

13.5 50/60Hz Rejection

Set mains rejection as applicable for the region. For example the UK is 50Hz and the USA is 60Hz.

13.6 Printer Set-up

Choose from three printer options: parallel Hewlett Packard PCL5 compatible, Epson 24-pin dot matrix ESC/P2 compatible or Axiohm serial small hand held thermal printer model A621B compatible.

13.7 Demo Mode

In this mode the instrument will display 'Sample Data' to enable all the features of the instrument to be viewed. If the instrument was recording prior to being set to Demo Mode, readings will be lost.

14. ABOUT EVG

The About EVG screen advises the instrument part number and firmware versions for reference to upgrades. It will also show the available memory capacity. Select Cancel to exit.

15. REAL TIME DATA

In this mode the instrument will show a new reading for each of the active channels every 10 seconds (independent of task). These readings are not logged.

16. VIEW ALARMS

This screen details all the alarm occurrences recorded by the instrument by channel and will show them as Hi or Lo alarms. Use the up/down arrow buttons to select a channel and then the alarms for that channel will be displayed for all periods. A period can then be selected and the alarms for that period displayed by selecting Show Hi or Show Lo respectively.

The alarms will be shown by date/time complete with duration. Use the up/down arrow buttons to select an alarm for 'List' or 'Graph' to view.

17. HELP

Uniquely with a product of this type, on-line Help is available for every screen. Simply press the (?) button when required.

After reading the text select Cancel to return to the previous sreen.

18. CARE OF THE INSTRUMENT

Use a damp cloth to remove dusty deposits. Use a mild soapy solution to remove hard or sticky deposits. Do not use solvent-based cleaners or methylated spirit, etc. The instrument is not waterproof.

Only use the power supply/battery charger supplied.

19. CHANGING THE BATTERIES

The instrument is fitted with 4 rechargeable AA Ni-Mh cells and these should last many years before replacement is required. In the event that these go flat or where a mains supply is not available, standard alkaline cells can be fitted. When the battery needs changing the Low Battery LED will flash. At this point, either connect the power adaptor to recharge the batteries or replace the alkaline cells. To replace the batteries, slide off the battery compartment cover and replace all four cells. Never mix new and old cells and do not under any circumstances mix rechargeable cells with non-rechargeable ones. Be careful to observe the correct polarity.

The switch in the battery compartment must be used to select rechargeable or normal batteries.

Note: If a low battery warning is indicated at switch-on, replace or recharge batteries immediately to continue to use the instrument. To avoid losing date and time, batteries must be replaced as soon as possible. The data in the instrument is always protected.

Battery charging starts from the moment external power is supplied. It takes about 48 hours to fully charge the supplied batteries. This is indicated via the yellow LED. If the external power is removed and replaced within 4 minutes the charge timer will not restart.

Once charging is completed the batteries will be trickle charged.

20. SPECIFICATIONS

Instrument

Part Number	N3014	
Measurement	Thermocouple types K, N, T, J, R, S, E, B 2-pin sub-min connector	
Measurement Range	-200°C to Maximum of +1776°C	
Scales	°C, °F and K.	
Resolution	0.1°	
Instrument Accuracy (Type K)	better than ± 0.1 % of reading ± 0.2°C (± 0.3°C during battery charging)	
Temperature Coefficient (Type K)	less than ± 0.01 % of reading ±0.05 °C per °C change from 23°C.	
Channels	8	
Ambient Operating Range	0°C to +50°C operating 0 to 97% RH non-condensing	
Battery	Four Type I.E.C. LR6 Size AA rechargeable Ni-Mh or IEC LRG Alkaline External DC input for mains operation/battery charging	
Battery Life - Log rate 5 minutes, without backlight	2 Ah Rechargeable Ni-Mh	2.7 Ah Alkaline readings
Display always on Display on for 5 mins/day	10 hours 80 days	13 hours 110 days
Logging Memory (all modes)	Readings per channel enabled 1 Ch 64,000 2 Ch 32,000 3 Ch 16,000 4 Ch 16,000 5 Ch 8,000 6 Ch 8,000 7 Ch 8,000 8 Ch 8,000	
EMC	Tested to EN 61326-1 Criteria A performance	

Input/Output

Ports	RS232 port for data communications for programming and data download. Printing to optional portable printer
Display	Large monochrome LCD display, 240 x 180 pixels, for display of data in graphical form.
Alarm Indication	Red LED for indication of alarms
Low Battery	Yellow LED flashing for low battery indication/ constant for charging
Logging Active	Green LED flashing
DC Power	Green LED constant
DC Power Adaptor	Supplied
Alarm Switch	24V 500mA maximum switching current

Enclosure

Material	High impact polystyrene
Wall Fixing	4 point wall fixing supplied
Sounder	Piezo
Weight	780g
Dimensions	Approx. L190mm x W138mm x D45mm

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