

Nautilus Data Loggers

Reference Guide



Copyright © 2010 ACR Systems Inc. All Rights Reserved.

Nautilus Data Loggers

Copyright © 2010 ACR Systems Inc. All Rights Reserved.

All rights reserved. No parts of this work may be reproduced in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems - without the written permission of ACR Systems Inc.

Products that are referred to in this document may be either trademarks and/or registered trademarks of the respective owners. The publisher and the author make no claim to these trademarks. For more information regarding trademarks, see the "Trademark Notices" section of this manual.

ACR Systems Inc. assumes no responsibility for errors or omissions, or for damages resulting from the use of information contained in this document or from the use of programs and source code that may accompany it. In no event shall the publisher and the author be liable for any loss of profit or any other commercial damage caused or alleged to have been caused directly or indirectly by this document.

TRADEMARK NOTICES

TrendReader is a Registered Trademark of ACR Systems Inc.

LIMITED WARRANTY

ACR Systems Inc. warrants the hardware to be free from defects in workmanship and components provided they are not abused or subjected to detrimental conditions. Refer to the warranty information included with your logger for details.

Software is warranted for one year from the date of purchase, to operate in accordance with its programmed instructions. It is not warranted to be error-free. If the product does not perform in accordance with this Limited Warranty, ACR will at its discretion, either repair or replace the product free of charge. There will, however, be a charge for freight and Canadian Customs clearance (if applicable). Any replacement hardware or software will be warranted for the remainder of the original warranty period. To the maximum extent permitted by applicable laws, ACR Systems Inc. disclaims all other warranties, either expressed or implied, including but not limited to, implied warranties of fitness for a particular application. In no event shall ACR Systems Inc. be liable for any inconveniences, loss, damages, etc., whatsoever arising out of the use of this product.

ACR's policy is not to proceed with any repairs or replacement unless first discussed with ACR's Technical Support Analysts and an RMA (Return Material Authorization) number is issued.

Table of Contents

Section I Nautilus Data Loggers	1
1 Introduction to Nautilus	1
Features	1
Description	1
Programmed Operation	2
How Nautilus Loggers Take Readings	2
How to Use Nautilus Loggers	3
Specifications	4
Product Approvals	6
2 Nautilus Software Driver	7
Logger Status	7
Logger Sampling.....	7
Logger Memory	8
Logger Channels	10
Channel Information.....	10
Channel Calibration.....	11
3 Nautilus 85/135 Temperature Logger	12
Description	12
Setup	12
Troubleshooting	13
4 APPENDIX A Nautilus 85/135 Sample Rates	14
How a Data Logger Stores Readings	14
Sample Rate Tables	14
Index	18

WELCOME

Congratulations on your purchase of a Nautilus data logger. We are confident that you will find it to be a most valuable and useful tool for your data collection applications.

This Reference Guide is designed to be used hand-in-hand with TrendReader Standard software and frequently refers to TrendReader Standard conventions and procedures. To get the most from your logger, please take time to familiarize yourself with TrendReader Standard and its Reference Guide.

For important information on how Nautilus data loggers work and how to use them, read the Introduction to Nautilus chapter. It will give you an overview of how the loggers work and how to configure them for your application. Next, read the chapter that deals with Nautilus logger you have.

SECTION 1 Nautilus Data Loggers

1.1 **Introduction to Nautilus**

Nautilus data loggers are an easy-to-use, battery-powered data logger. Pocket-sized and rugged, it can be used in a wide range of environmental and industrial applications. The Nautilus directly measures and records temperature variables. It can reliably record time-based data for later analysis by TrendReader software.

[****]



TrendReader software must be installed and ready to run prior to making use of the setup instructions in this section of the guide.

1.1.1 **Features**

Nautilus data loggers features make them a useful tool for data collection:

- Pocket-sized
- Solid-state components - no moving parts
- Low-power microprocessor controlled circuitry
- 8-bit high resolution readings
- Precision on-board thermistor temperature sensor
- High capacity lithium battery
- Quartz clock crystal
- Locking hole on cap
- Waterproof stainless steel or aluminum casing

1.1.2 **Description**

ACR Nautilus data loggers are single channel, waterproof temperature data loggers with the ability to record temperature in water, food or other liquids. Designed for rugged applications, Nautilus loggers are available in stainless steel or aluminum. Nautilus loggers can hold over 500 days of data and features data compression capability. With extremely durable and robust construction and 10-year battery life, Nautilus loggers are your choice for temperature monitoring and logging in wet environments.

Nautilus loggers can run continuously, constantly measuring and recording temperature readings. They can also start logging at a specified time. Your Nautilus can work independently from any external power supply or computer. When you are ready to look at the data it has collected, you can transfer all information to your computer through the use of TrendReader software.

Main Components

The main components of the Nautilus data loggers include:

- a memory chip that has the capacity to store up to 244,800 readings (see [Specifications](#))
- a microprocessor and an 8-bit analog-to-digital converter (A/D) that converts all temperature signals to digital values
- a quartz clock crystal that accurately keeps track of time and regulates the taking of readings
- an accurate on-board thermistor that the logger uses to measure ambient temperature via changes in resistance
- a lithium battery that provides power to the logger and internal sensors

1.1.3 Programmed Operation

Nautilus data loggers run according to settings that you program. These pre-selected settings are stored in the logger's memory and instruct it to:

- take readings at regularly spaced intervals
- associate the channel with an equation in TrendReader software
- start readings with or without a delay
- take readings continuously, or stop when memory is full

1.1.4 How Nautilus Loggers Take Readings

Each Nautilus data logger has an on-board temperature sensor that you can use to record ambient temperature. You can turn this monitoring capability on or off using software.

Nautilus data loggers can store readings to memory using one of two sampling methods:

1. First-in, First-out (FIFO). In this method the logger continues to take readings when its memory is full (to make room, it discards the oldest reading every time it adds a new one). Thus, the memory will contain a "sliding window" of information.
2. Stop when Full. The logger stops recording when its memory is full.

You can set the time interval at which your logger saves readings using TrendReader software. At a sample rate of eight seconds, one reading is taken every eight seconds and saved to memory. Nautilus data loggers can store readings using one of two sampling modes:

1. Average. As you slow the sample rate the logger begins to average readings before saving them to memory. To do this the logger takes a reading every eight seconds, but instead of transferring this directly to the logger's memory, it stores the readings in an accumulator (a temporary memory) where it is retained until the sampling interval is over. Then the accumulator is averaged and the result is stored to memory.
2. Spot. The logger records the value of the reading at the selected sample interval and stores it to memory. No averaging is done.

When you backup a logger's data to your computer, the correct time and date are referenced

to each reading. All readings are then individually time and date stamped and processed by an equation associated with each logger channel. The result is a collection of accurate time-based data ready for detailed graphing and analysis.

1.1.5 How to Use Nautilus Loggers

Using your Nautilus data logger for most applications is a simple process. With proper planning, setup and installation of your data logger, you can be assured that the information you collect will be both correct and useful. The following provides general procedures for using Nautilus data loggers. For additional and specific information on these steps, refer to the chapter in this manual.

Planning

Proper planning is the key to successful data logging. Time spent in this stage will help you save time and frustration later. To help you plan, answer these questions:

- *What exactly do I want to measure?*
- *Where is the best place to measure?*
- *How long do I want to monitor for?*
- *Should other variables be monitored simultaneously?*

Setup

To set up your Nautilus data logger you must first have TrendReader software installed and running on your computer. You can then configure your logger with various options by talking to it via the interface cable.

Set Sample Rate

Always confirm the sample rate (how often the logger saves readings) to make sure it will be acceptable for your application. You can alter the frequency at which your Nautilus logger records readings by changing the sample rate. You can choose rates from 8 seconds to 34 minutes. The sample rate chosen will apply to all the active channels on the logger.

To help determine which sample rate you should choose, answer these questions:

- *How long do I need to record data?*
- *How much time will elapse between when I retrieve the logger and download the data to my computer (for example, the trip back to the office)?*
- *How often do readings need to be taken?*

Clear Memory

Before starting a logging session, clear the logger's memory. This will help to keep the collected files smaller as well as decrease the time needed to backup the logger later. Note that clearing the memory is automatic if you save or apply the setup changes (for example, assign different equations, change sample rate, etc.).

Test

You can directly read the values that your Nautilus data logger is sensing using the Realtime capability of TrendReader software. This test gives you the opportunity to check your logger setup and make any necessary changes before starting the logging session.

Label

If you are working with more than one data logger, label each logger, identifying the task and location before you distribute them throughout a building or system. To do this, you can simply use a shipping tag. Later, when you retrieve them to graph their data, you will know what each graph refers to. There is a description field in the Setup that can be used for entering the tag information. Note that after editing and saving the Description you will need to click Contact to update the new Description in TrendReader Explorer and in the Diagnostic Log.

Mounting

Use the locking hole on the cap to conveniently secure your logger. If you are concerned about theft lock your logger to a permanent fixture using the loop or take advantage of its small size and hide it completely out of view. Because Nautilus loggers are so light, you can use special mounting fasteners like Velcro® to attach them to almost any surface. Make sure your logger's mounting method will last the full length of your logging session.

Cold or Humid Environments

Make sure that the environment you will be placing your logger into will be acceptable by referring to the [Specifications](#) in this chapter.

Keep Track

Make sure you keep a record of where you have placed each logger in a building or system plan. You will save time looking for them when your data gathering session is over. Also, keep track of when you placed the loggers in the area you are monitoring. This will help when producing graphs on your computer. It may be helpful to label (shipping tag) each logger so you can properly identify and differentiate it from other loggers.

Analysis

After sufficient time has passed for the logger to obtain a representative profile of data, it is time to analyze the information. If you are retrieving the logger from the field, bring it back immediately to your computer for analysis.

In order to analyze your Nautilus logger's data, you must first transfer a backup copy of its data to your computer. To do this, see Backup in the TrendReader guide. After transferring your information to the computer, the data is automatically copied to disk and time and date stamped.

You can find a detailed description of all software functions in the TrendReader guide.

1.1.6 Specifications**General**

<i>Size:</i>	18 mm x 127 mm (0.71" x 5.00")
<i>Weight:</i>	Aluminum enclosure: 51 grams (1.8 ounces) Stainless steel enclosure: 112 grams (4 ounces)
<i>Enclosure Material:</i>	Anodized aluminum or stainless steel
<i>O Ring:</i>	Size: AS568A 111

Fluids:

Material	Use with These Fluids	Do NOT Use with These Fluids	ACR Part #
DuPont Dow Viton	Petroleum Oils, Gasoline, Transmission Fluid	Acetone, H ₂ S, Hot Water, Amines	21-0071
Ethylen Propylene (EPDM) <i>Loggers are shipped with this</i>	Alcohols, Brake Fluids, Refrigerants, Steam	Petroleum Oils, Diester Lubricants	21-0070

<i>Mounting:</i>	Locking hole on cap
<i>Operating Limits:</i>	Up to 2000 PSI Temperature limits dependent on model (Nautilus 85 , Nautilus 135)
<i>Clock Accuracy:</i>	±2 seconds/day
<i>Memory Size:</i>	32KB Without Compression: up to 32,640 readings With Compression: up to 244,800 readings 64KB Without Compression: up to 65,408 readings With Compression: up to 490,560 readings
<i>Memory Usage:</i>	<ol style="list-style-type: none"> 1. Continuous (First-in, First-out) 2. Stop when full (Fill-then-stop)
<i>Sample Intervals:</i>	User-selectable rates from every 8 seconds to 34 minutes.
<i>Sampling Mode:</i>	<ol style="list-style-type: none"> 1. Average (over sample interval except for 8 second interval) 2. Spot
<i>Resolution:</i>	8-bit (1 part in 256)
Nautilus 85	
General	
<i>Battery:</i>	3.6 Volt Lithium, 0.95 Amp-hour
<i>Battery Life:</i>	10 years under normal use (factory replaceable)
Internal Temperature Sensor	
<i>Type:</i>	Negative temperature Coefficient (NTC) Thermistor 10,000 ohms @ 25°C (77°F)
<i>Range:</i>	-40°C to 85°C (-0.7°F to 77°F)
<i>Accuracy:</i>	± 0.2°C (± 0.36°F)
<i>Calibration:</i>	Factory calibration verification and NIST certificates are available upon special request.

Equation: Use Equation [45] ET-016 Temperature in TrendReader software. Other equations for this thermistor type may be selected but will give incorrect results. You may also create your own equations, please refer to the Equations section or contact [Customer Service](#) at [ACR Systems](#).

Nautilus 135

General

Battery: 3.6 Volt Lithium, 0.85 Amp-hour

Battery Life: 3 years under normal use (factory replaceable)

Internal Temperature Sensor

Type: Negative temperature Coefficient (NTC) Thermistor
10,000 ohms @ 25°C (77°F)

Range: 10°C to 135°C (50°F to 275°F)

Accuracy: ± 0.5°C (± 0.9°F)

Calibration: Factory calibration verification and NIST certificates are available upon special request.

Equation: Use Equation [47] ET-081 Temperature in TrendReader software. Other equations for this thermistor type may be selected but will give incorrect results. You may also create your own equations, please refer to the Equations section or contact [Customer Service](#) at [ACR Systems](#).

Specifications are subject to change without notice.

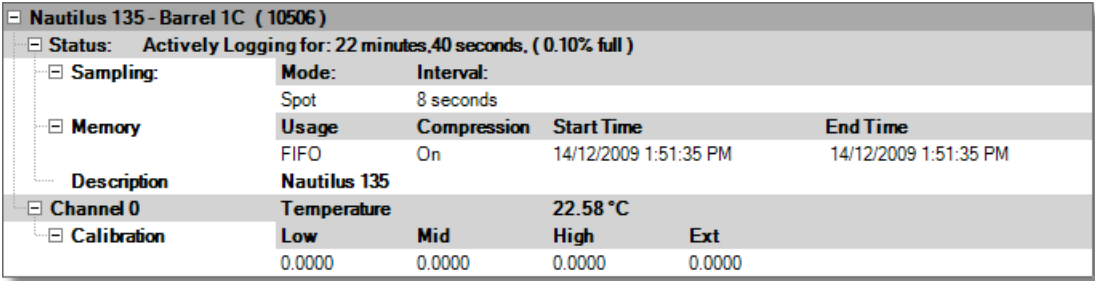
1.1.7 Product Approvals

Certified to CE standard EN61326: 1977 + A1: 1998 (European Emissions and Immunity) covering ESD, RFI, EFT /B, Surge, Conducted Immunity, and Voltage Dips and Interruptions

Meets FCC standard 47 CFR Part 15, Subpart B: 1999, Class B, (US Radiated and Conducted Emissions)

1.2 **Nautilus Software Driver**

TrendReader software uses a software driver to communicate with Nautilus data loggers. The software driver takes the form of two windows. The Status window, shown when you contact the logger, is used to display the settings currently stored in the data logger. The Setup window, shown when you select Edit Setup, is used to alter the current settings and apply the changes to the data logger. The settings are divided into two main sections: [Status](#) and [Channels](#). Status contains information about sampling, memory and logger description. The channel of the logger contains information about the channel type (temperature), equation and Realtime value, and calibration associated with the channel. You can control the level of detail that you see for the settings by clicking on the "+" and "-" buttons at the left side to expand and collapse the nodes.



When you want to clear the logger's memory and start a new logging session with the existing or new parameters, select **Edit Setup** from TrendReader. In the Edit Logger Setup window, make any necessary changes. To implement your changes, you can either click on **Apply** or **OK**. OK will implement the changes and close the window whereas Apply will leave the window open, thereby allowing you to make changes in other features.

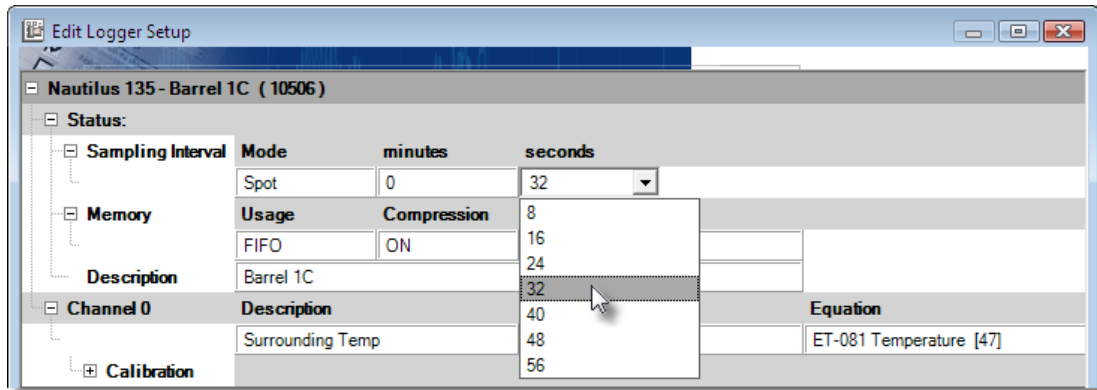
1.2.1 **Logger Status**

When you contact the logger, the logger status is displayed. The Status line indicates whether the data logger is actively logging, waiting to start or dormant. If you set up the logger with no delay, it will immediately start logging and the status will show if the logger is actively logging, dormant or set to start at a given time. It will also show the status of the logger's capacity. The Status subsections are [Sampling](#) and [Memory](#).

1.2.1.1 **Logger Sampling**

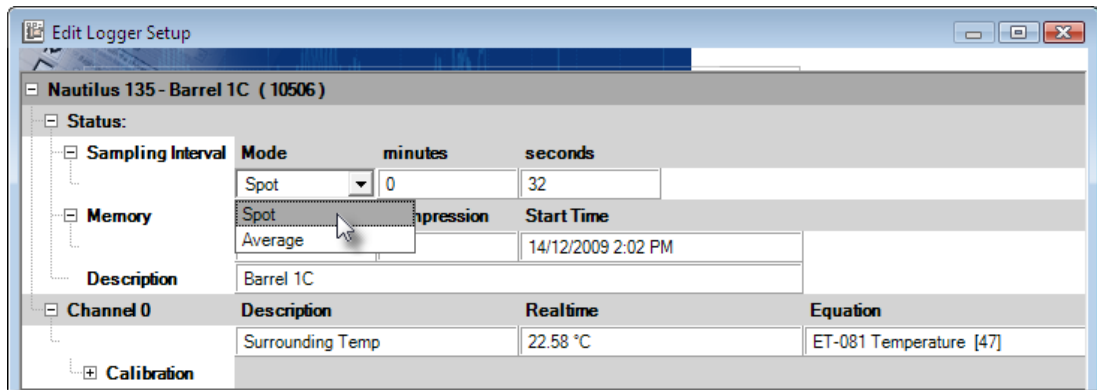
The sample rate is the frequency with which a logger stores readings to memory. The Sampling subsection indicates what the sample rate is. In normal sampling, the rates available are from once every 8 seconds to once every 34 minutes.

To set the sample rate, click on the desired time unit and select the value from the drop-down list as shown.



To find out more about sample rates and to view a set of sample rate tables, see [Appendix A Sample Rates](#).

The Mode is the way the logger stores the data. The Average method stores an averaged reading of the data read every 8 seconds over the sample interval you have chosen if the sampling mode is set to Average (this does not apply to a sampling interval of 8 seconds). The Spot method still takes readings every 8 seconds but only stores the reading taken at the selected interval.



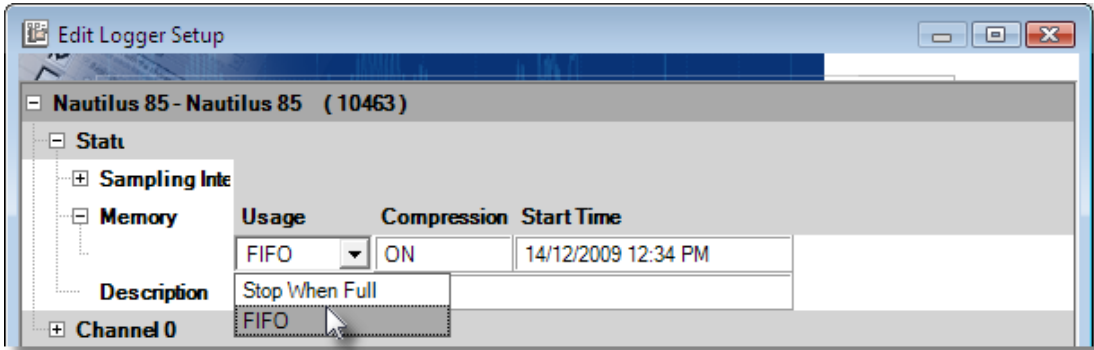
1.2.1.2 Logger Memory

The Memory subsection indicates how the data is stored in memory and what the start and end times (or capacity) are for the data logging. In the FIFO (First In, First Out) mode, the logger continually stores data and when the memory limit is reached, the new readings start to overwrite the oldest readings. In this method, the logger is always collecting data, but only saves the most recent data in its memory. In the Stop When Full mode, when the memory limit is reached, the logger stops recording.

The length of time for data capture of the logger is determined by the number of active channels and the sampling rate. To find out more about how the capacity is affected by the sample rate and active channels, see [Appendix A Sample Rates](#).

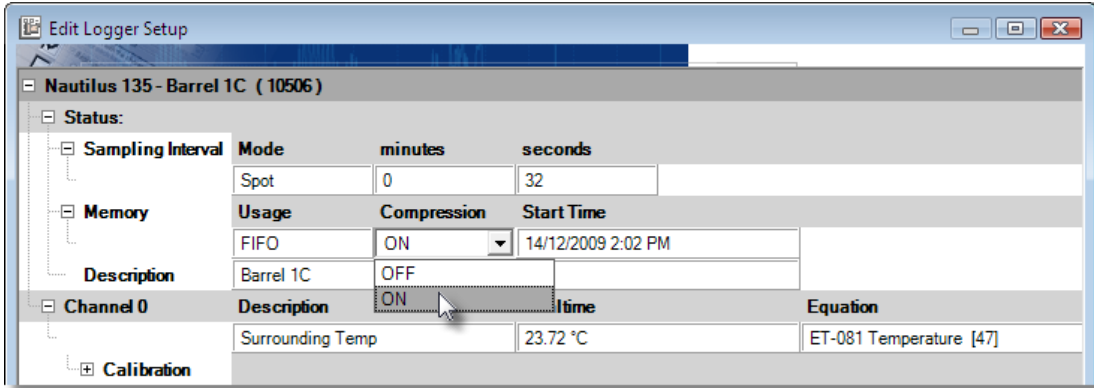
To set how the logger stores its data, click on the Usage field and select FIFO or Stop When

Full.

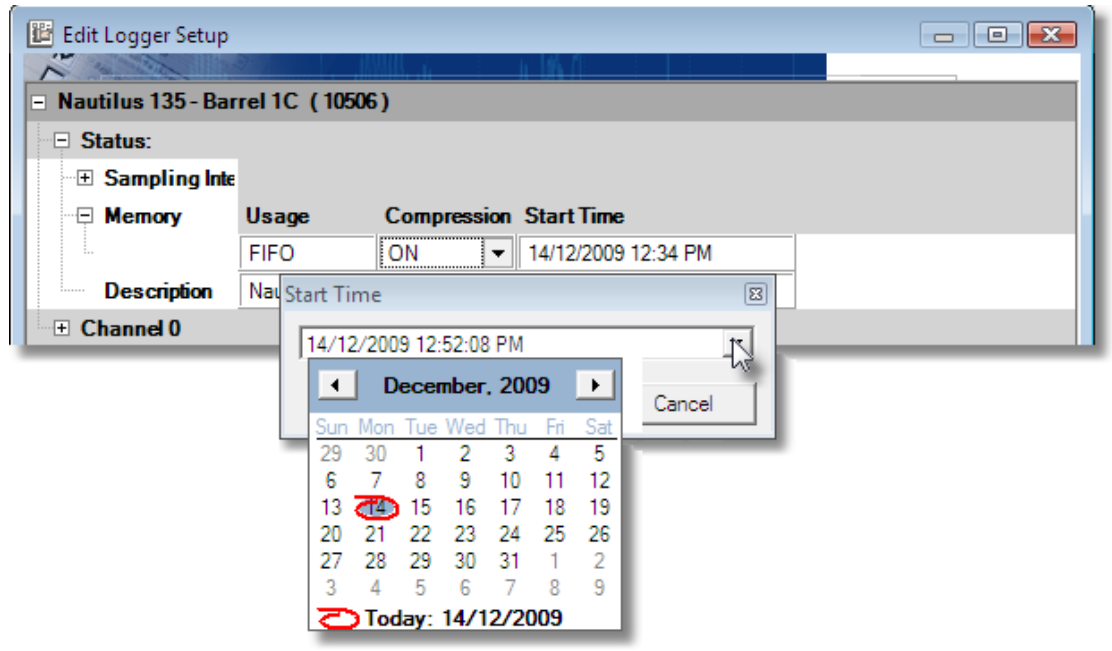


To set the compression method click on the Compression field and select ON. A run length compression method is used. Run length compression stores the reading plus the number of consecutive times the same reading was measured. This means that the logger will store 2 values to memory, the data value and a counter value. If the reading were 22°C for 3 sample periods then the logger would store 22°C and the count of 3. Once the reading changes a new compression session begins. The compression session will last to a maximum of 15 consecutive readings that are the same. If the 16th reading is still the same a new session will start.

Note that when the compression is set to ON the Start Time will display as NA in the Status window. If you want to see that Start Time do a Backup of the logger, the Start Time will be displayed in the Statistics tab of the graph



To set when the logger will start recording click on the Start Time field. Next, click on the small button that appears at the right. This will pop up a form allowing you to set the date and time. Highlight the date or time and enter the appropriate value. You can also click on the drop-down list arrow to bring up a calendar. You can set the logger's starting time for just over 65535*8 seconds (6 days, 1 hour, 38 minutes) ahead of the current time. Note that the start time will default to the closest time sampling within 8 seconds of the selected time.



1.2.2 Logger Channels

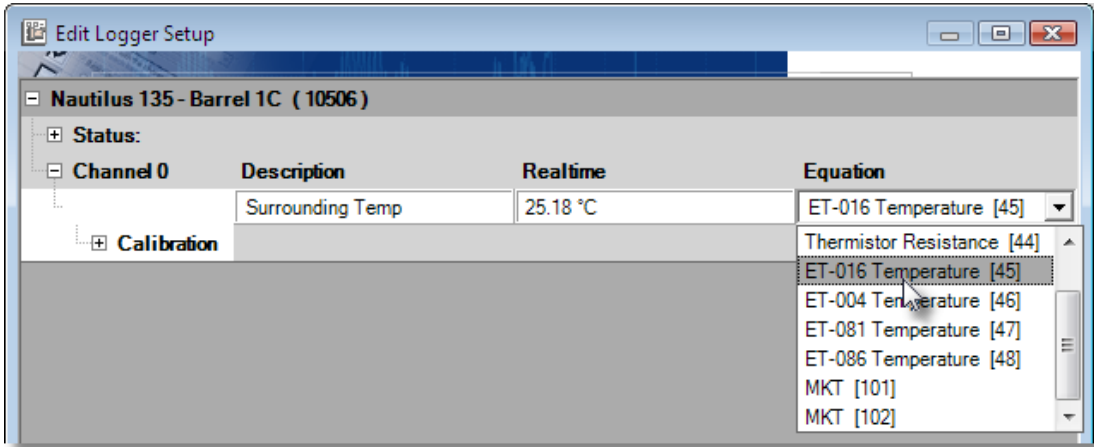
The Channels section indicates provides information specific to the channel. The channel on the logger is always enabled and continually recording readings and storing them in the logger's memory. The Channel subsections are [Channel Information](#) and [Channel Calibration](#).

1.2.2.1 Channel Information

When you contact the logger, the logger status is displayed. The Channel line gives the description and the Realtime value, if Realtime is turned on. The Description field is editable. The Realtime value is based on the equation that you select for the channel. The equation is selected in the Setup window but is not shown in the Status window.

The logger collects and stores raw data readings. An equation is used to transform the raw data into measurement units, such as °C, with the current reading shown as a Realtime value. You can use built-in equations or you can create your own custom equations. See Equations in the TrendReader guide for further information. To set the equation, click on the Equation field and select the equation from the drop-down list. To help you select the proper equation,

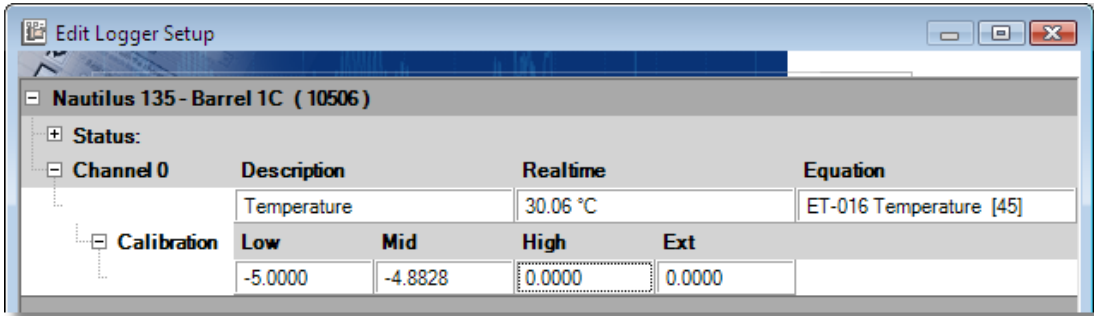
the Realtime value using the currently selected equation is shown. *



* Note that if a custom equation is not available when Edit Setup... is selected (e.g.: deleted) then the equation will be shown as unknown. If a new equation is not selected the Realtime value will not display correctly. If the logger is backed up the channel will be disabled then changes to the equation can be made in the graph using the Lines Tab in Graph Settings."

1.2.2.2 Channel Calibration

The Calibration subsection shows the Low, Mid, High, and Ext calibration values. These values are used to adjust the readings of the logger in order to make the output more accurate. To set each calibration value, click on the appropriate calibration field and enter the value. The factory equations for the Nautilus use the Low, Mid, and High values. Ext is not used.



Note that the calibration values are based on 255 increments between -5 and +5, the field will default to the closest value of what is entered. E.g.: -4.9 will default to -4.8828.

1.3 **Nautilus 85/135 Temperature Logger**

A self-contained temperature logger, the Nautilus 85 can be used easily in a wide variety of applications to collect a wide range of temperature data.

A self-contained, waterproof temperature logger, the Nautilus 135 can be used easily in a wide variety of applications to collect temperature data in extreme temperature conditions.



1.3.1 **Description**

The Nautilus 85 is a durable, robust data logger that can monitor temperature in a variety of applications but is particularly well suited for the food and beverage, biomedical, pharmaceutical, and industries with hostile or "wet" environments (i.e. wastewater treatment plant). Housed in a stainless steel or aluminum casing, it can withstand virtually any environment and with an operating pressure range up to 2000 PSI, it is ideal for monitoring temperature in any type of water including oceans, ponds, rivers, streams and wastewater.

The high temperature capabilities of the Nautilus 135 make it the ideal logger for monitoring temperature in extreme environments or environments where conventional data loggers are not able to survive.

1.3.2 **Setup**

Once the logger is connected to your computer select the communications port in TrendReader and click Scan For Loggers.

Logger	Channel	Description	Equation
85	0	Internal Temperature	45
135	0	Internal Temperature	47

NOTE: The temperature channel is enabled by default.

Precautions

The Nautilus 85's sensor is designed for long-term trouble-free performance, but there are a few precautions to keep in mind to maximize the benefit it can give you.

- Inspect the O ring regularly and replace every 3 months or earlier if wear and tear is visible. You can order more O rings through ACR Systems Inc.,
- The type of O ring to be used with the Logger depends upon your application. Each O ring is designed for use with certain fluids only. see [Specifications](#) for details.

1.3.3 **Troubleshooting**

If you are getting what appear to be wrong readings, consider the following before recalibrating the sensors. Sensors sample the atmosphere (or medium) only in the immediate vicinity of the sensors themselves. The physical state of the atmosphere and its degree of uniformity and turbulence will limit the validity of a measurement at some distance from the sensor. This becomes especially apparent for the measurement of ambient temperature

In a room, temperature levels may vary dramatically from location to location. Such factors as air stratification, drafts, and proximity to heat or humidity sources (people, equipment, moisture, solar gain, etc.) can contribute to a wide variance in conditions even within a small, confined area. The individual sensor associated with your Nautilus 85 measures and records temperature only in one location. They do not, in any way, represent an overall reading.

1.4 **APPENDIX A Nautilus 85/135 Sample Rates**

Nautilus 85/135 Sample Rates

1.4.1 **How a Data Logger Stores Readings**

The sample rate of your data logger is the frequency with which it stores readings in its memory. A selected sample rate applies to the channel on a Nautilus.

If you set your data logger's sample rate to eight seconds, it reads its input channels and stores the readings once every eight seconds. If you choose a sample rate longer than eight seconds, the logger still reads its input channels once every eight seconds, and stores an averaged reading at the end of the sample interval you have chosen if the sampling mode is set to Average.

For example, if you use a two-minute sample rate, the data logger takes fifteen separate readings over each two-minute interval. At the end of each two-minute interval, the logger calculates the average of the fifteen readings, and stores that average in its memory.

Otherwise if the sampling mode is set to Spot the logger still takes readings every 8 seconds but only stores the reading taken at the selected interval.

1.4.2 **Sample Rate Tables**

The following tables list the maximum time spans over which your Nautilus will record readings. The time spans depend on the length of the sample rate. A Nautilus has a memory capacity of up to 32,640 readings when data compression not selected and up to 244,800 readings when data compression is selected.

In each table, the *Sample Rate* column lists the available sample rates. The *Days*, *Hours*, *Minutes* and *Seconds* columns list the time spans over which your logger will record readings at each sample rate.

For example, a 32KB Nautilus with 5 times compression (4-5 times is typical) and using a sample rate of ten minutes will store readings for 3 years, 38 days and 8 hours. After that time, depending on how it was set up, the logger will either continue to take readings and replace the oldest readings with the new readings (FIFO), or it will stop taking readings (Stop When Full).

Table B-1: 32KB Nautilus 85/135 Sample Rate Table with Compression (max)

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	22	16	0	0

16 sec.	0	45	8	0	0
32 sec.	0	90	16	0	0
56 sec.	0	158	16	0	0
2 min.	0	340	0	0	0
4 min. 56 sec.	2	108	16	0	0
10 min.	4	240	0	0	0
20 min.	9	115	0	0	0
30 min.	13	355	0	0	0

Table B-2: 32KB Nautilus 85/135 Sample Rate Table with Compression (min)

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	1	12	16	0
16 sec.	0	3	0	32	0
32 sec.	0	6	1	4	0
56 sec.	0	10	13	52	0
2 min.	0	22	16	0	0
4 min. 56 sec.	0	55	21	52	0
10 min.	0	113	8	0	0
20 min.	0	226	16	0	0
30 min.	1	88	8	0	0

Table B-3: 32KB Nautilus 85/135 Sample Rate Table with Compression (5 times)

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	15	2	40	0
16 sec.	0	30	5	20	0
32 sec.	0	60	10	40	0
56 sec.	0	105	18	40	0
2 min.	0	226	16	0	0
4 min. 56 sec.	1	194	2	40	0
10 min.	3	38	8	0	0
20 min.	6	76	16	0	0
30 min.	12	153	0	0	0

Table B-4: 32KB Nautilus 85/135 Sample Rate Table without Compression

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	3	0	32	0

16 sec.	0	6	1	4	0
32 sec.	0	12	2	8	0
56 sec.	0	21	3	44	0
2 min.	0	45	8	0	0
4 min. 56 sec.	0	111	19	44	0
10 min.	0	226	16	0	0
20 min.	1	88	8	0	0
30 min.	1	315	0	0	0

Table B-5: 64KB Nautilus 85/135 Sample Rate Table with Compression (max)

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	45	10	8	0
16 sec.	0	90	20	16	0
32 sec.	0	181	16	32	0
56 sec.	0	317	22	56	0
2 min.	1	316	8	0	0
4 min. 56 sec.	4	220	14	56	0
10 min.	9	121	16	0	0
20 min.	18	243	8	0	0
30 min.	28	0	0	0	0

Table B-6: 64KB Nautilus 85/135 Sample Rate Table with Compression (min)

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	3	0	40	32
16 sec.	0	6	1	21	4
32 sec.	0	12	2	42	8
56 sec.	0	21	4	43	44
2 min.	0	45	10	8	0
4 min. 56 sec.	0	112	0	59	44
10 min.	0	227	2	40	0
20 min.	1	89	5	20	0
30 min.	1	316	8	0	0

Table B-7: 64KB Nautilus 85/135 Sample Rate Table with Compression (5 times)

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	15	3	22	40

16 sec.	0	30	6	45	20
32 sec.	0	60	13	30	40
56 sec.	0	105	23	38	40
2 min.	0	101	1	20	0
4 min. 56 sec.	1	195	4	58	40
10 min.	3	40	13	20	0
20 min.	6	81	2	40	0
30 min.	9	121	16	0	0

Table B-8: 64KB Nautilus 85/135 Sample Rate Table without Compression

Sample Rate	Years	Days	Hours	Minutes	Seconds
8 sec.	0	6	1	21	4
16 sec.	0	12	2	42	8
32 sec.	0	21	4	43	44
56 sec.	0	42	9	27	28
2 min.	0	90	20	16	0
4 min. 56 sec.	0	224	1	59	28
10 min.	1	89	5	20	0
20 min.	2	178	10	40	0
30 min.	3	267	16	0	0

Index

- D -

Data Logger 1

- L -

Logger 1

- N -

Nautilus 1

Approvals 6

Channel Calibration 11

Channel Information 10

Channels 10

Data Logger 1

Description 1

Features 1

How to Use 3

Introductions 1

Logger 1

Memory 8

Operation 2

Readings 2

Sampling 7

Setup 7

Software 7

Specifications 4

Status 7

Unknown Equation 10

Nautilus 135 4

Nautilus 85 4

Nautilus135 1, 12

Description 12

Setup 12

Troubleshooting 13

Nautilus85 1, 12

Description 12

Setup 12

Troubleshooting 13

- S -

Sample Rates 14

- T -

Temperature 12



ACR Systems Inc.

Building 210 - 12960 84th Ave.
Surrey, British Columbia, Canada V3W 1K7

Telephone: (604) 591-1128
North American Toll Free: 1-800-663-7845
Fax: (604) 591-2252

General Enquiries Email: enquiry@acrsystems.com
Sales Department Email: sales@acrsystems.com
Customer Service Email: customerservice@acrsystems.com
www.acrsystems.com