User's Guide

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OM-USCAN SERIES

Datalogger

omega.com™

OMEGA®

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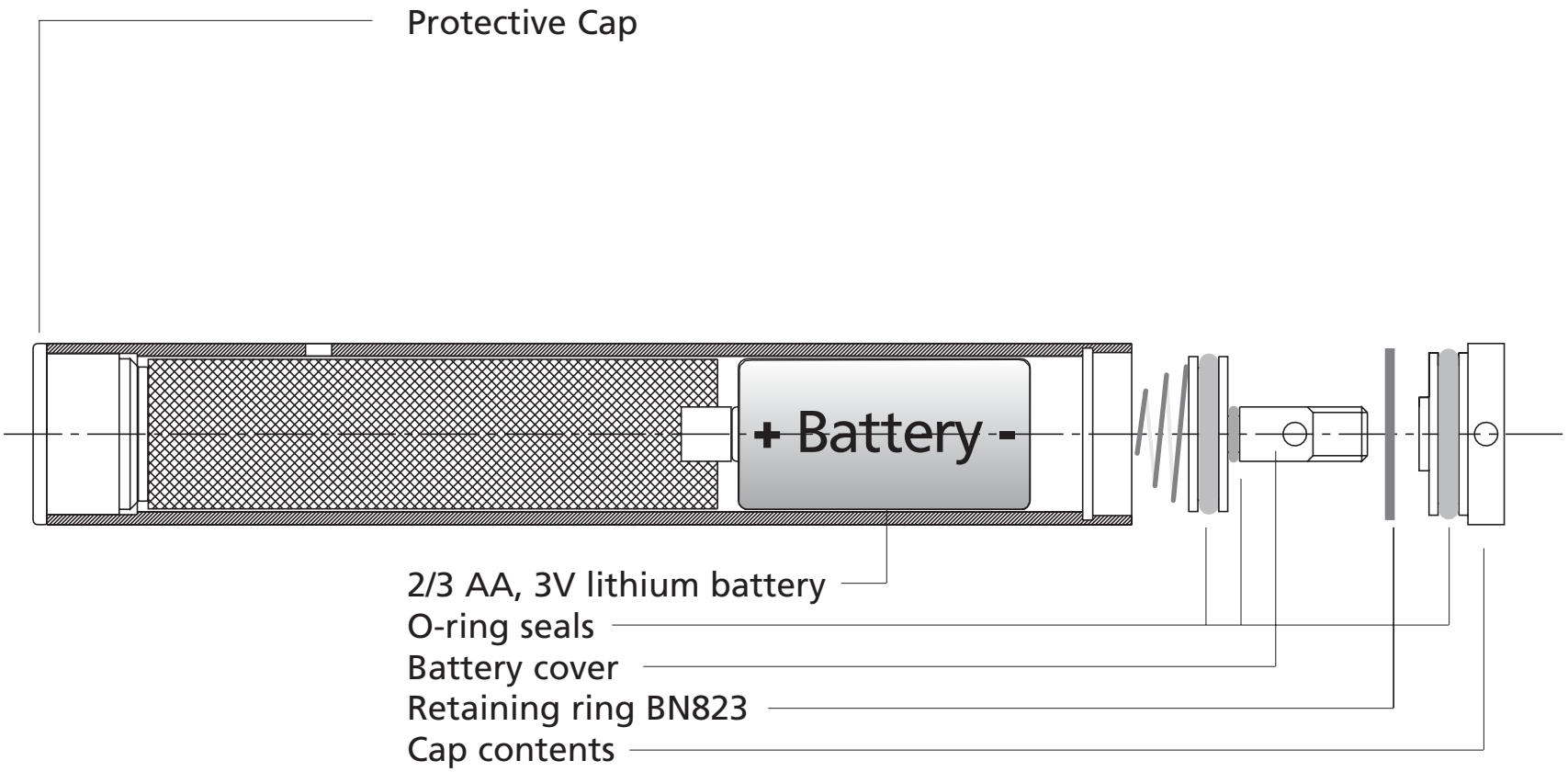
Contents

A *Datalogger* Construction

Connection socket for interface and external sensors. We recommend that the protective cap is screwed on to protect the contacts.

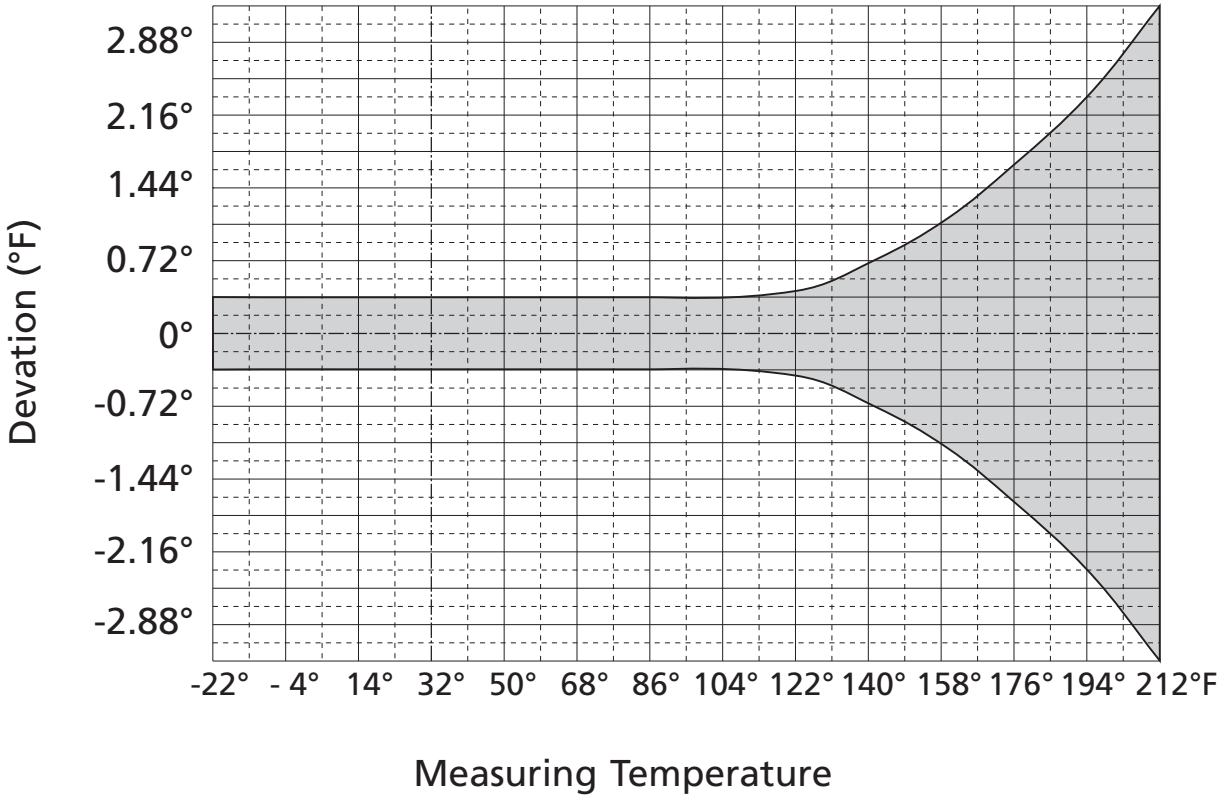


B Specifications

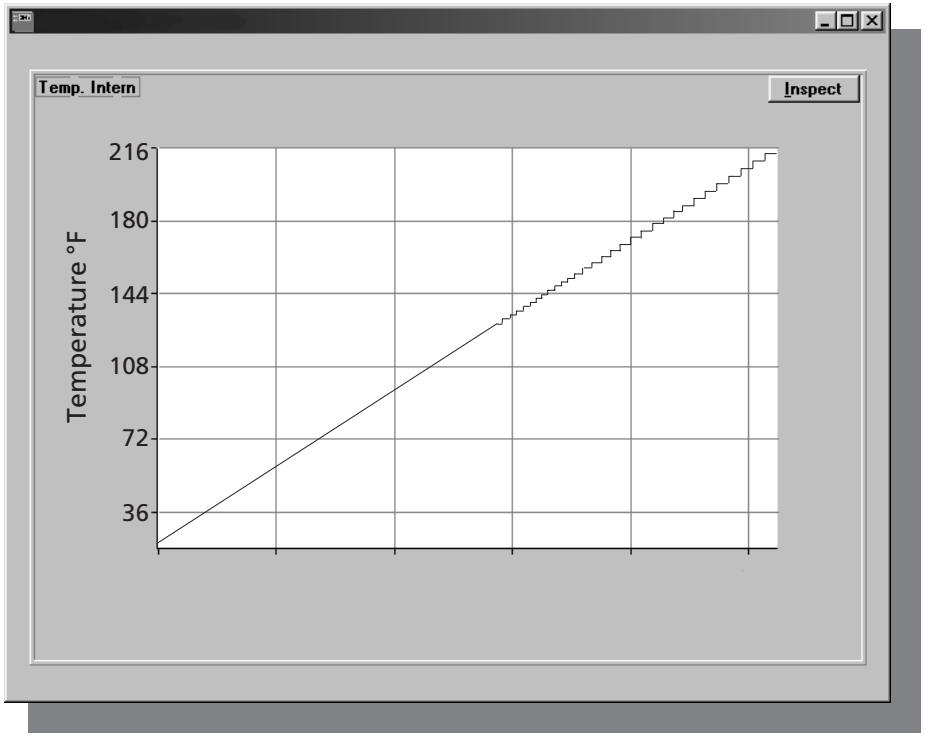
Internal sensor	Precision high-temperature conductor (NTC) Range: -22°F to 158°F (-30°C to 70°C)
External sensor	Precision high-temperature conductor (NTC) Range: -40°F to 248°F (-40°C to 120°C) Interchangeability +/- 0.36°F (+/- 0.2°C) in the range from 32°F to 158°F (0°C to 70°C)
Memory	depth 64k words, 16 bits
Sampling interval	Single-channel: 10 seconds to 20 minutes in 9 steps Twin-channel: 20 seconds to 40 minutes in 9 steps Scan Mode: 16 seconds scanning interval
Recording period	3.87 days to 454.5 days
Time base Quartz	with ± 5 minutes/year deviation
Interface RS232	with 4800 Baud transmission speed
Data format	ASCII or binary (selectable)

	Storage:	2/3 AA lithium battery, replaceable by the user. Minimum life 2.5 years at 10 sec sampling rate. In Sleep Mode 9 years (77°F / 25°C) Recommended battery: e.g. Sanyo Lithium CR 17335S, 3 V, 1700 mA at 77°F / 25°C Working range: 32°F to 158°F (0°C to 70°C) -40°F to 185°F (-40°C to 85°C)
	Case:	Stainless steel, watertight IP68, up to 10 bar pressure above atmospheric
	Shock:	resistance: up to 300 g maximum
C Interface Specification	Interface:	Connects to PC by 9-channel D-Sub sleeve plug
	RS232:	Baud rate: 4800 Baud, 8 bits, 1 stop bit, no parity Scan Mode: 300 Baud. 8 bits, 1 stop bit, no parity
	Batteries:	9 V E-Block (IEC: 6F22) alkaline or similar Battery life 20 hours Can run from external power source via 9 V universal power unit regardless of the polarity.

D Accuracy of Measurement



The NTC measuring sensor is accurate to ± 0.36°F (±0.2°C). Due to the negative temperature coefficients, the resistance increases exponentially at higher temperatures, and consequently even the high resolution of the data transducer is no longer sufficient to keep consistently to the accuracy of ± 0.36°F (±0.2°C).



The diagram shows how resolution increases as temperature rises.
At -22°F (-30°C), the resistance is 177kOhm and at 248°F (120°C) only 0.38kOhm. A change of temperature of 18°F (10°C) at -22°F (-30°C) causes a change of resistance of 80kOhm and at 248°F, only 0.057kOhm.

1. System Requirements

IBM PC compatible PC 80386/33 or higher with minimum 8 MBytes RAM (Pentium with 16 MBytes recommended):
- SVGA graphics board, 640x480
- At least 5 MBytes available space on the hard disk
- a free communication port: COM1, COM2, COM3 or COM4 (RS232 port)
- Mouse to run the program easily
- Microsoft Windows 3.1 / Windows 95 / Windows 98 / Windows NT 4.0.

If using Microsoft Windows 3.11, please use the updated "Serial.386 Driver for Windows/TM for Workgropups Rev. Date 3/94".

2. Installing the Software

Windows 3.1x:

Start Windows. Open Program Manager and click on "File". In the "File" window, select "Run ...". Now insert the program floppy disk into drive A or B. In the "Run ..." command window write "A:setup" or, correspondingly, "B:setup" and confirm the entry with the "OK" button. If you are not selecting any other directory, confirm the directory recommended. Installation now proceeds automatically.

Windows 95 / 98 / NT4.0:

Start Windows. Click on "Start" and choose "Run". Insert floppy disk into drive A or B. In the "Run" command window write "A:\setup.exe" or "B:\setup.exe" and confirm the entry with the "Enter" key. If you are not selecting any other directory, confirm the directory recommended.
Installation now proceeds automatically.

3. Installing the *Datalogger*

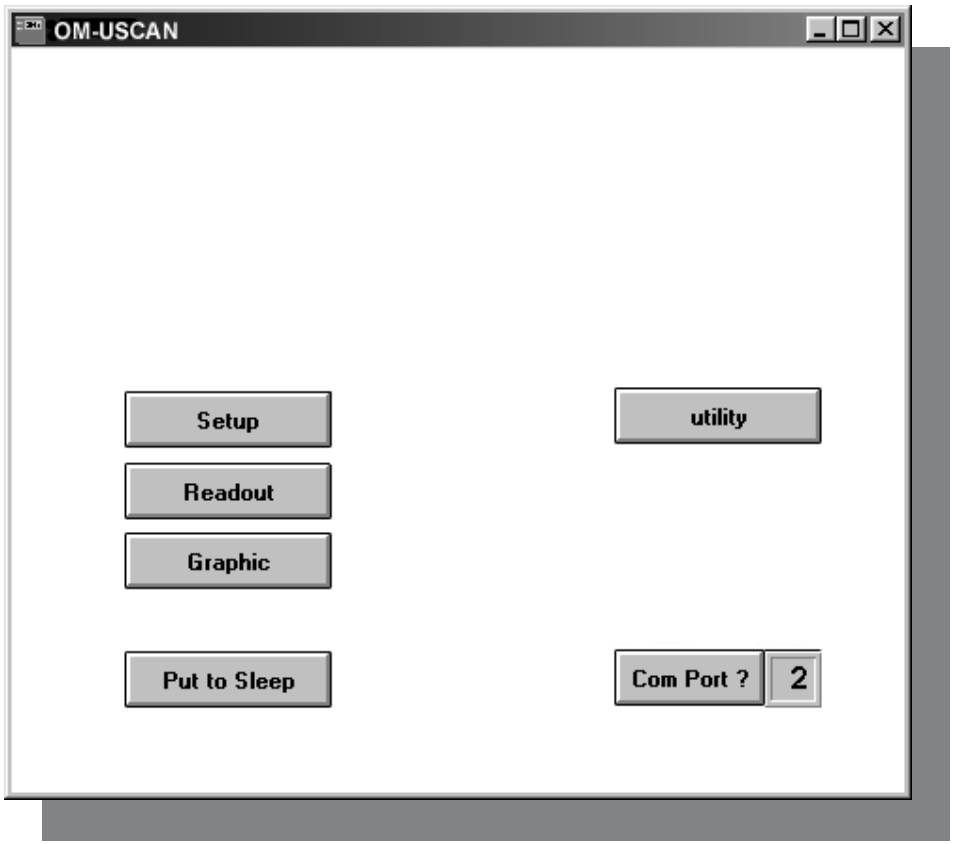
The ***datalogger*** can only be connected to the computer via the interface supplied. The interface ensures fast, reliable communication between the ***datalogger*** and the computer and does not take power from the ***datalogger*** battery. Connect the interface to a free Com Port using the cable supplied. Note the Com Port number to enable you to select it in the software. If your Com Port has a 25-channel plug, you will need a 25 to 9-pin D-Sub adapter, obtainable from any computer retailer.

N.B.: When you have connected the interface to the computer, switch the interface ON. The function is displayed by the red LED. Be sure to switch on the interface before connecting the ***datalogger*** to the interface. If you have already connected the ***datalogger*** by mistake, remove it and reconnect it with the interface switched on. If you do not follow this sequence, the ***datalogger*** battery is drained unnecessarily and communication between the computer and the ***datalogger*** is not possible. By following the setup sequence described, the ***datalogger*** is switched to its normal state when connected, and is thus ready for communication. In addition, the ***datalogger*** is supplied with power by the interface to meet the requirements of the interface.

4. Software

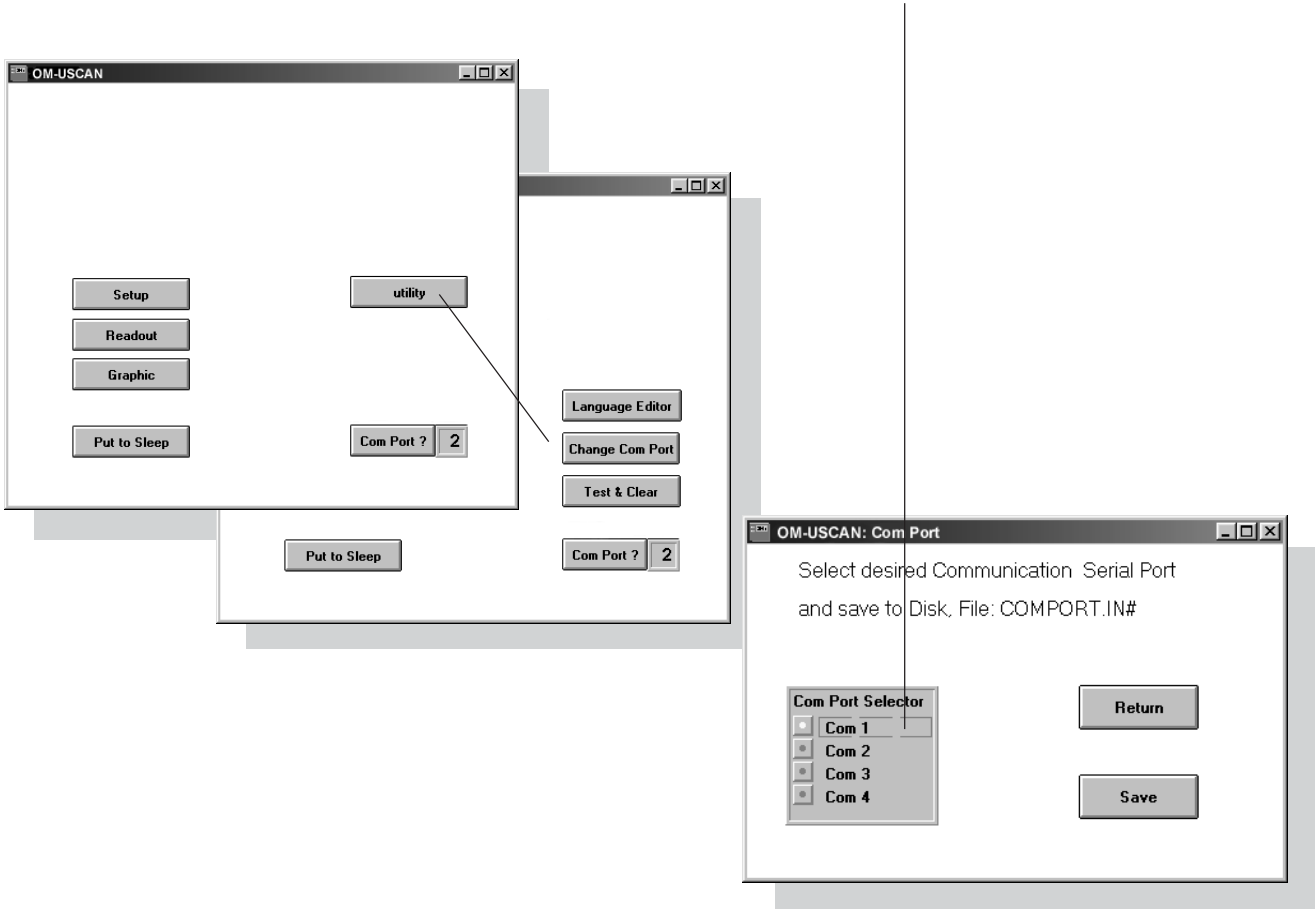
4.1 Starting Up the Software

When installing the software, the software opens a new program group in your Windows program with its own icon. Start the software by clicking twice on the icon. Once the software has been loaded, the software will display the following opening menu:

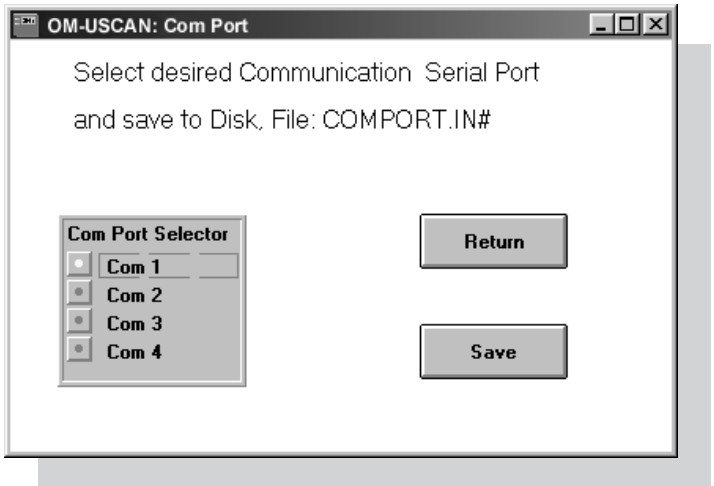


4.2 Com Port

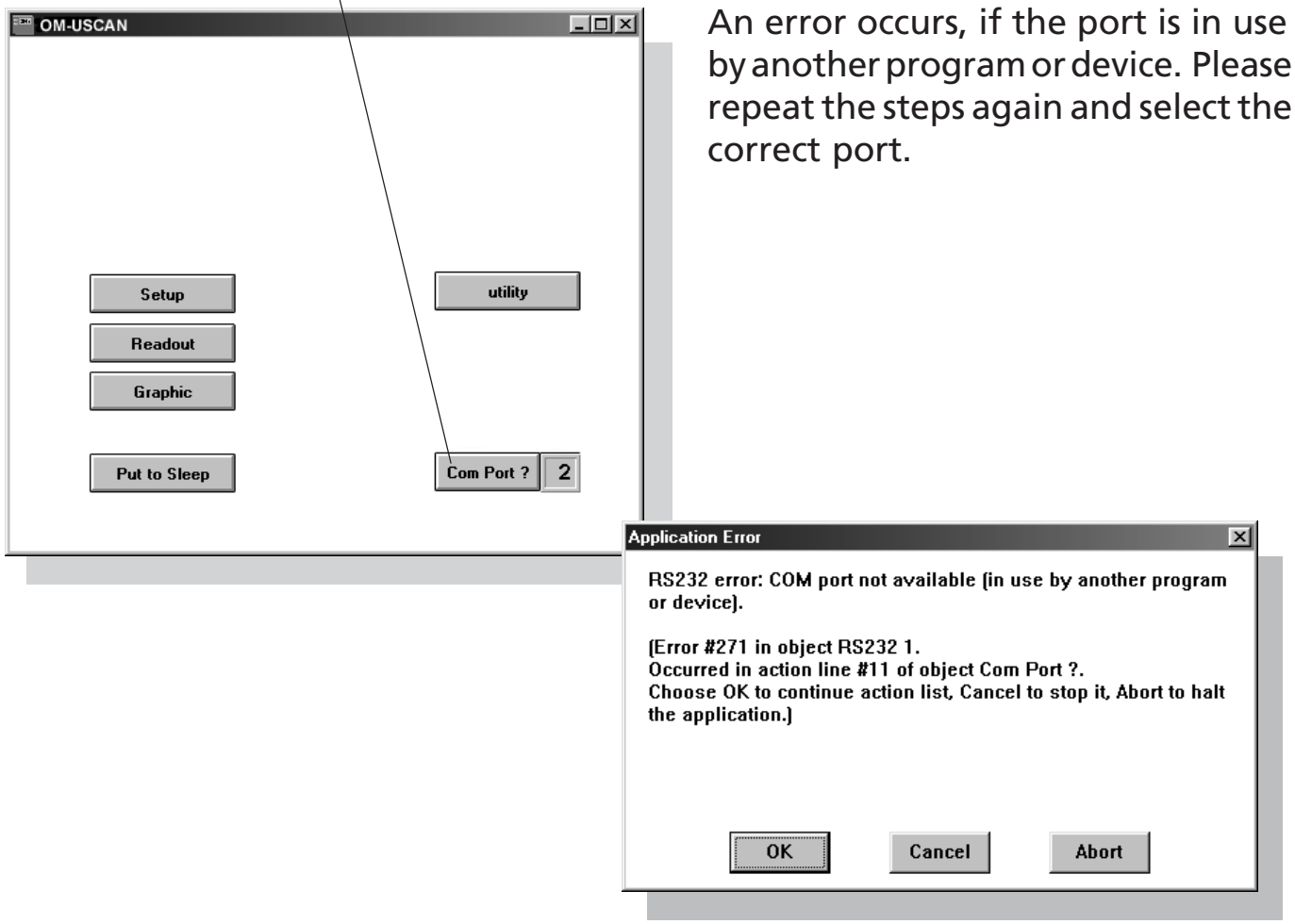
First select the Com Port to which you have connected the interface. To do this, move the mouse pointer to the appropriate "utility" key. This key will show you a new key "Change Com Port". Move again the mouse pointer to the "Change Com Port" key and activate the port by clicking with the mouse.



Save the selected Com Port by clicking on the "Save" key.



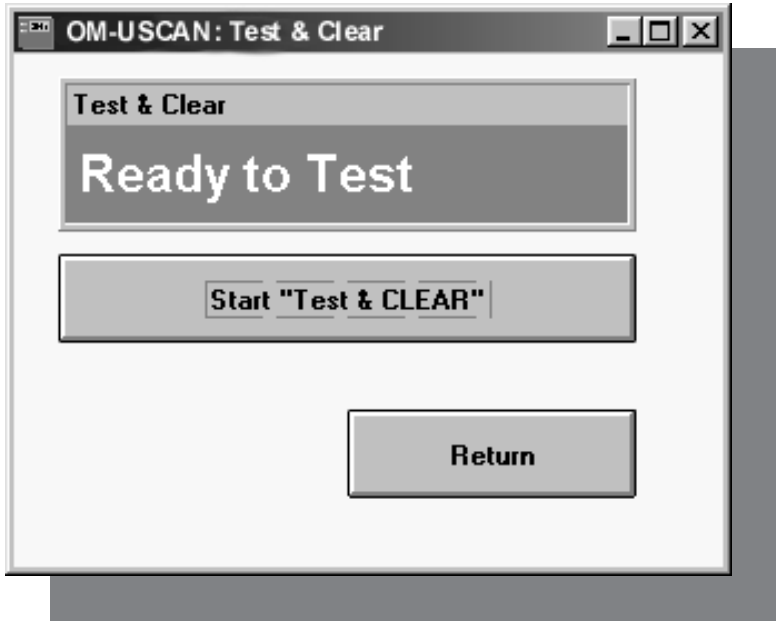
Return to the main window and activate the new Com Port by moving the mouse cursor to the "Com Port?" key and click on with the mouse.



An error occurs, if the port is in use by another program or device. Please repeat the steps again and select the correct port.

4.3 Test & Clear Data

By clicking with the mouse on the "Test & Clear" key, you will start a ***datalogger*** test program, which tests the internal function of the ***datalogger***. This tests and then clears all the memory cells. Never use this program after capturing data with the ***datalogger***, because it would then be lost before evaluation. Start the program by clicking with the mouse on the "Test & Clear" key. The display shows the test status. Exit the test by clicking on the "Return to Main" key.



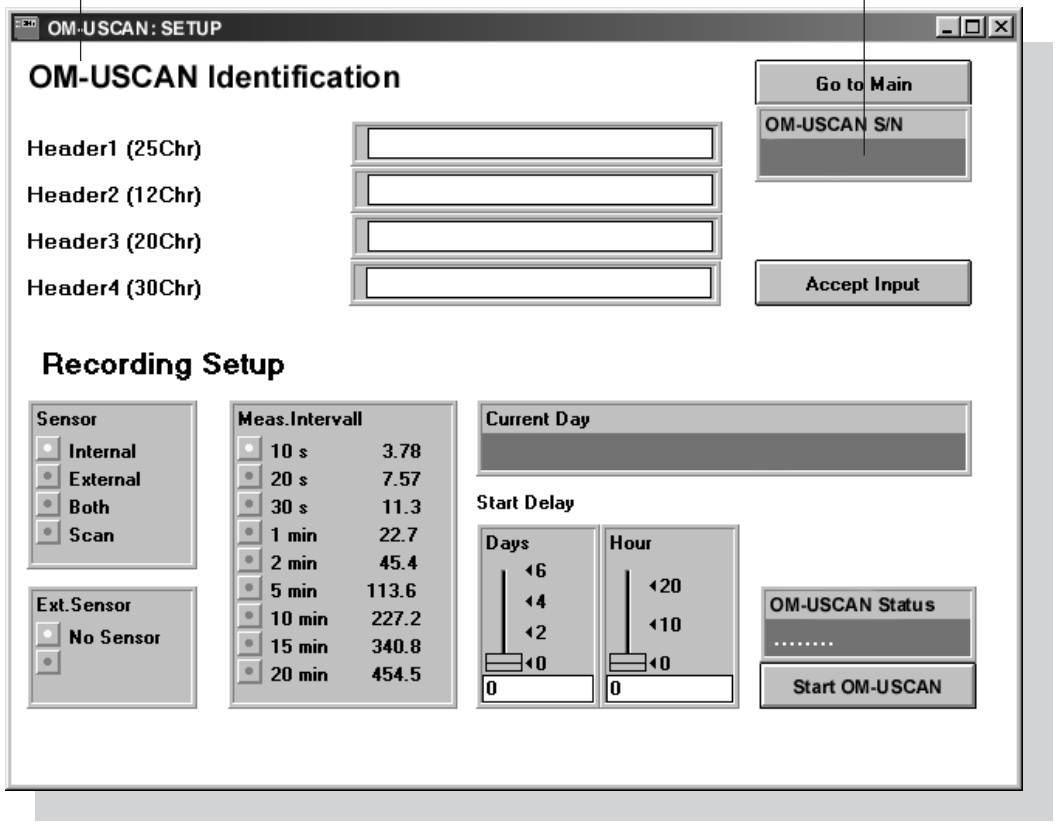
4.4 Put to Sleep

If you do not use the ***datalogger*** for some time, select the Sleep Mode to conserve the battery. When in Sleep Mode, the ***datalogger*** uses less than 17 µA. Start this program by activating the "Put to Sleep" key in the Main Menu and pressing this key again in the Submenu. Then disconnect the ***datalogger*** from the interface and put it aside.

To awake the ***datalogger*** again, reconnect it to the interface. The connection process reactivates the ***datalogger*** ready for communication.

4.5 *Datalogger* Identification

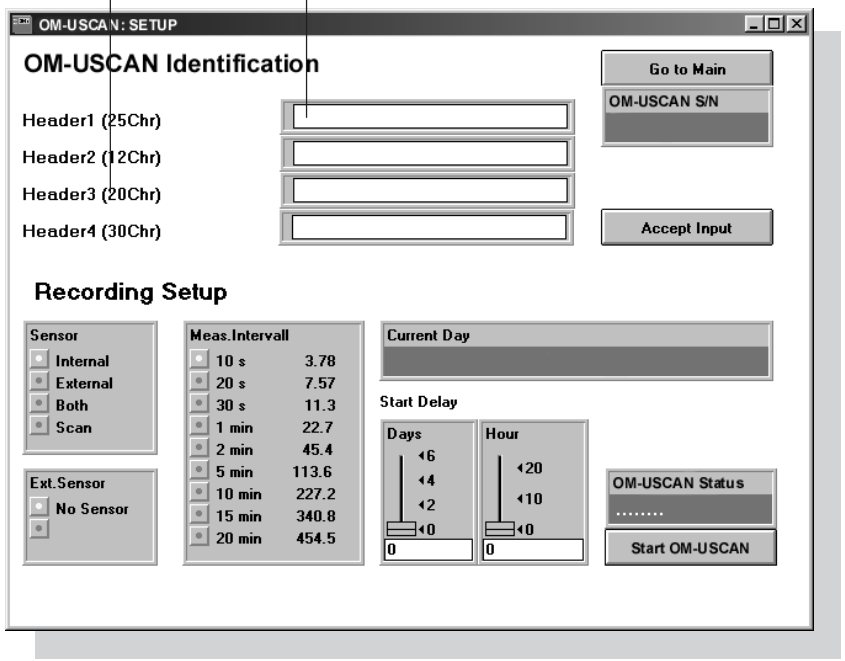
To start using the ***datalogger***, the Setup program has to be started. Do this by clicking with the mouse on the "Setup" key in the Main Menu. This will open the "***OM-USCAN*** Setup" window. This window contents two parts. One part is the ***datalogger*** identification with the serial number of the ***datalogger***.



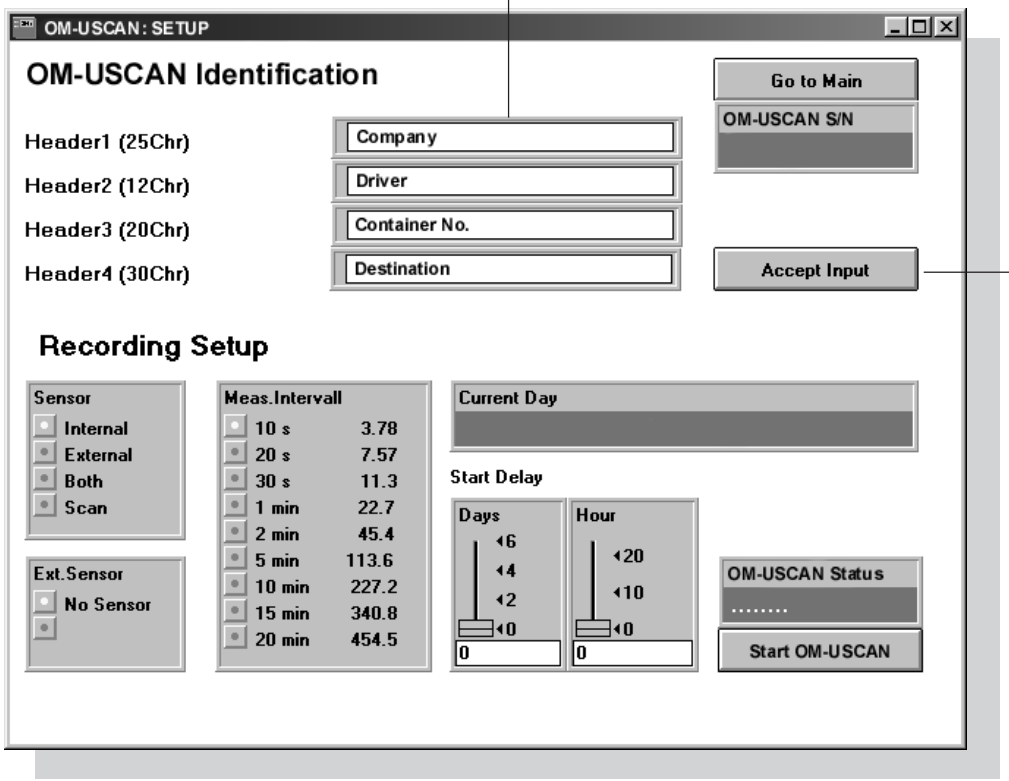
The flexibility of the ***datalogger*** software allows you to create your own application header to indentify after data recording unequivocal your ***datalogger***. (Please refer to part 6 Language Editor.) As an application example we created a header as follow:

First line: **Company**
Second line: **Driver**
Third line: **Container No.**
Fourth line: **Destination**

In the blank field on the right side you can enter now your desired infor-mation. Don´t use the character "&", this character is used as a control character and will terminate any further input.



Example:



To charge the ***datalogger*** with the header information you have to click with the mouse on the "Accept Input" key. If you start the ***datalogger*** without confirmation, the old header is kept in memory. To test the content of a previous header please go to the "Readout" menu. This menu will show you the present header. If you like to keep it unchanged, go directly to the ***datalogger*** setup menu without confirmation by the "Accept Input" key. The software charges now the ***datalogger*** with the data and afterwards reads out the data for correctness test.

4.6 *Datalogger* Setup

The second part of the setup window is intended to charge the ***datalogger*** with recording parameters as sampling-time-intervals, kind of sensor used, start delay and timing mark.

To select the setup conditions you will find the corresponding information under following items:

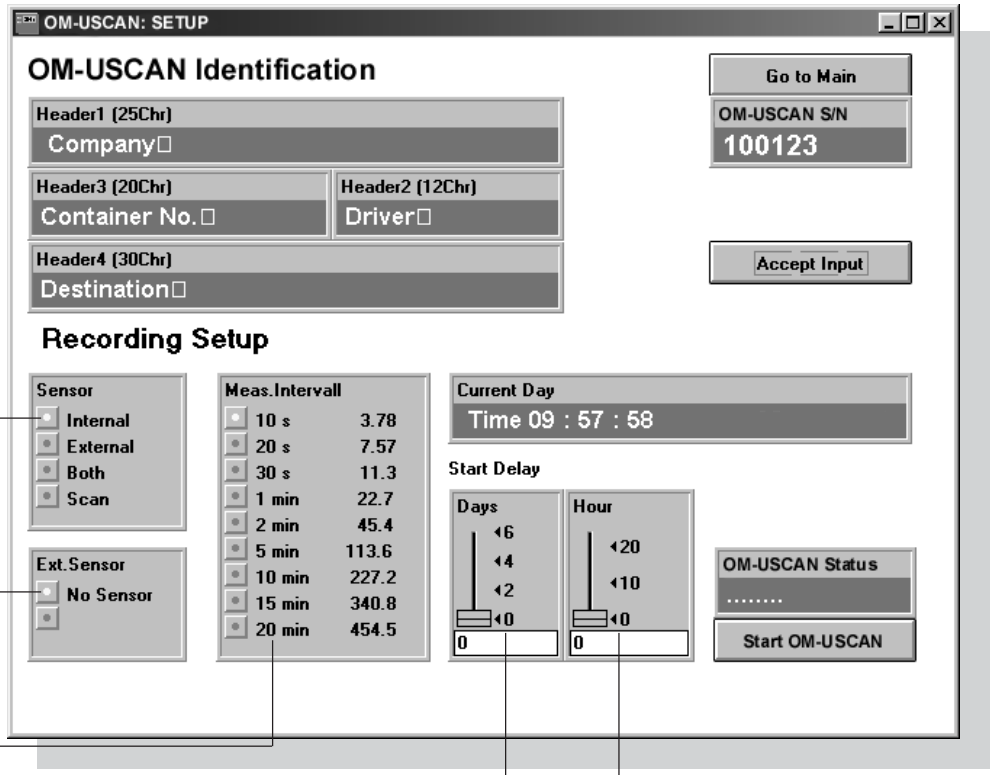
4.61 Active Sensor

4.62 External Sensor

4.63 Sampling Rate

4.64 Start Delay in Days

start Hour



4.61 Active Sensor

The ***datalogger*** can operate either with the built-in sensor or an external sensor or with both sensors in parallel. If data are recorded by two sensors, the memory capacity is halved and the sampling intervals doubled.

Use the “Active Sensor” window to select whether you want to measure with the built-in sensor or an external sensor. The external sensor should be connected to the plug after starting up the ***datalogger***. If you want to measure with both at once, use the mouse to select the “Both” key.

You will find information about the "Scanning Mode" under 4.65

4.62 External Sensor

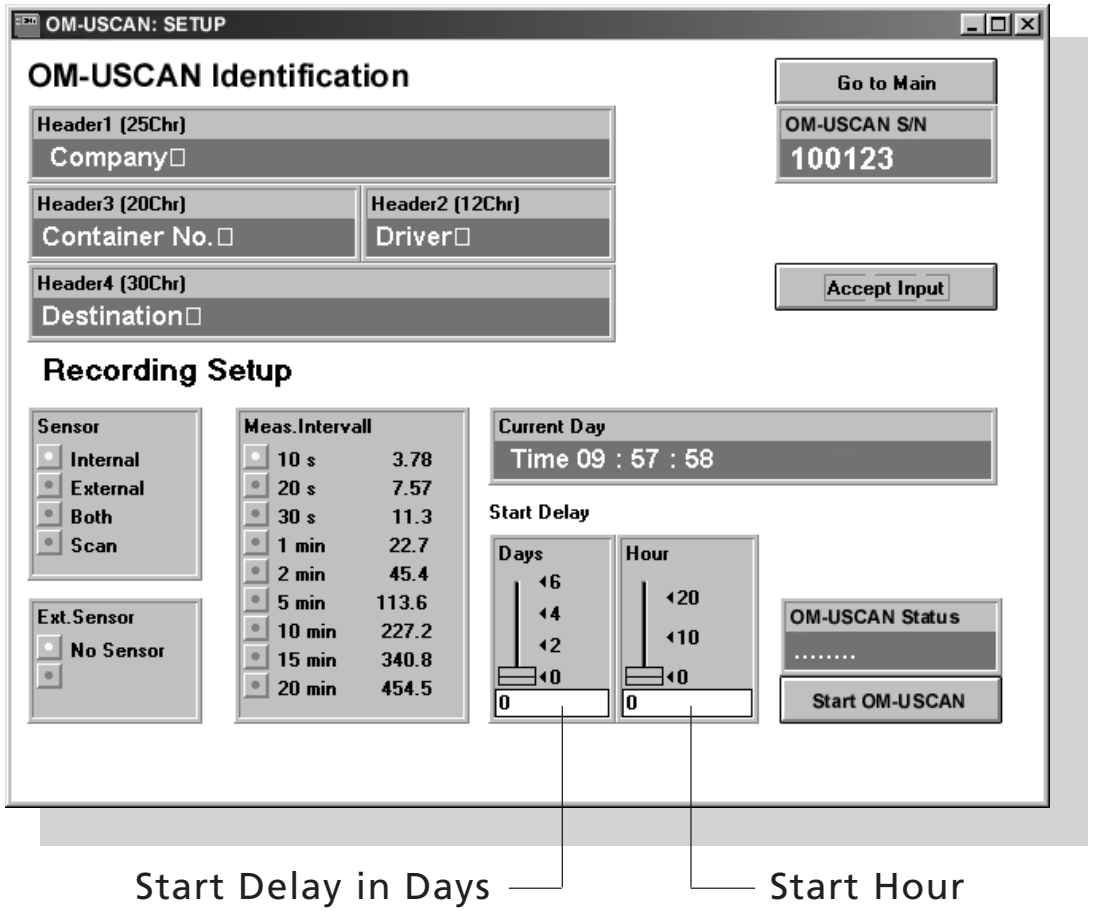
If you are working with two sensors at the same time, the “External Sensor” window will offer “Temperature”.

4.63 Sampling Rate

Use this window to select the measuring interval, i.e. the intervals of time at which you want to record data. The total recording time (in days) may be read alongside the Sampling Rate. Measuring can be halted at any time, however.

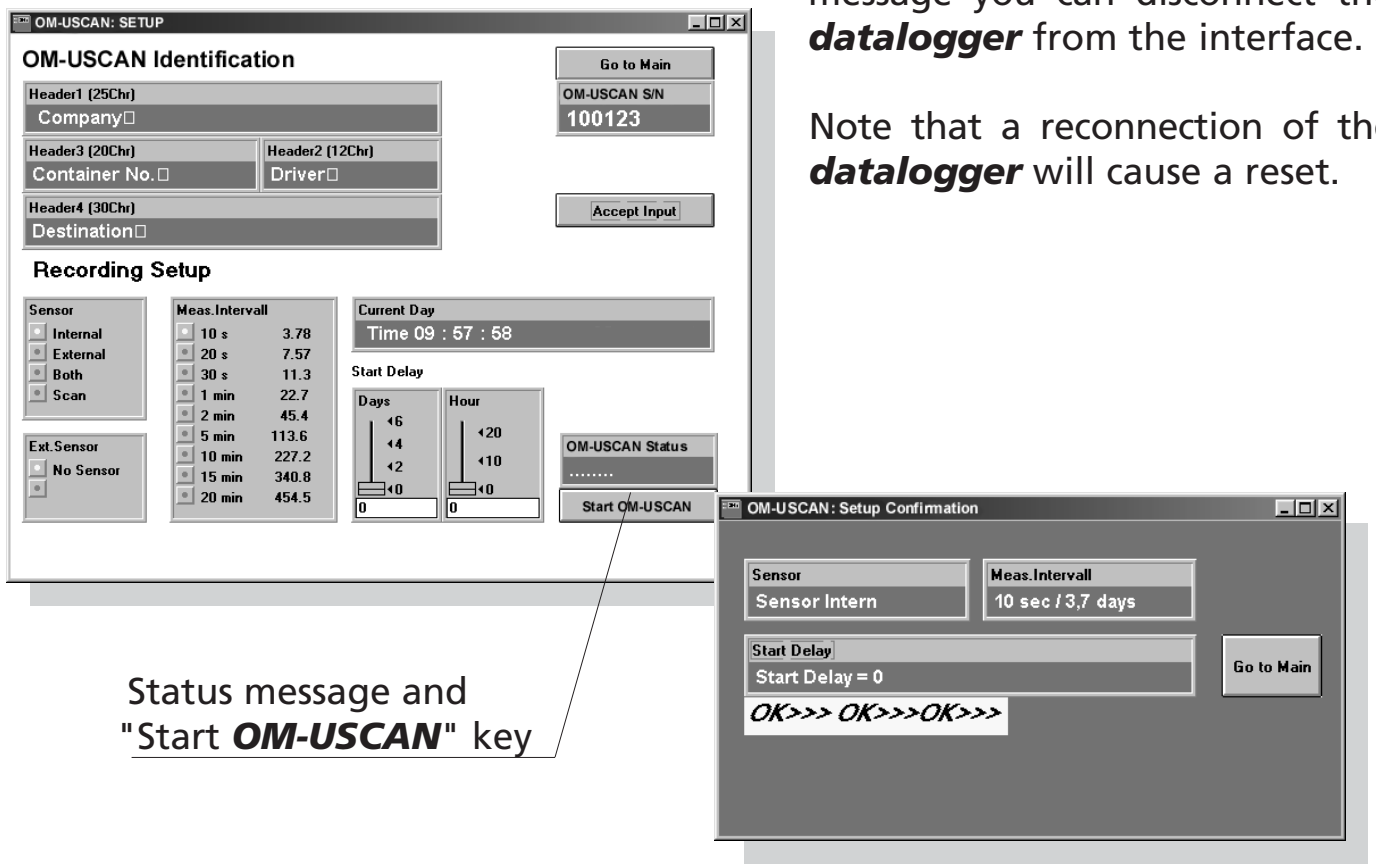
4.64 Delay

A "Start Delay" can be selected by using the Sliders for "Start Hour" and "Day Delay". As starting time the next full time period of the indicated actual time will be used. If you select for example 12 as "Start Hour" and the "Actual Time" is 09:20:54, the "Start Delay" will be 02:39:06. If the value of "Start Hour" is less than the "Actual Time", no start delay will be added. In this case, 1 day must be added.



Once you have checked all the inputs, the ***datalogger*** can be programmed and started by means of the "Start ***OM-USCAN***" key. To be quite sure that the communication and start sequence has been successful, the ***datalogger*** software shows you the status of communication and state of the ***datalogger***. When the ***datalogger*** is in measuring mode a window opens and show the "***OM-USCAN*** Setup confirmation". The display indicates "OK>>>OK>>>OK>>>....". After this message you can disconnect the ***datalogger*** from the interface.

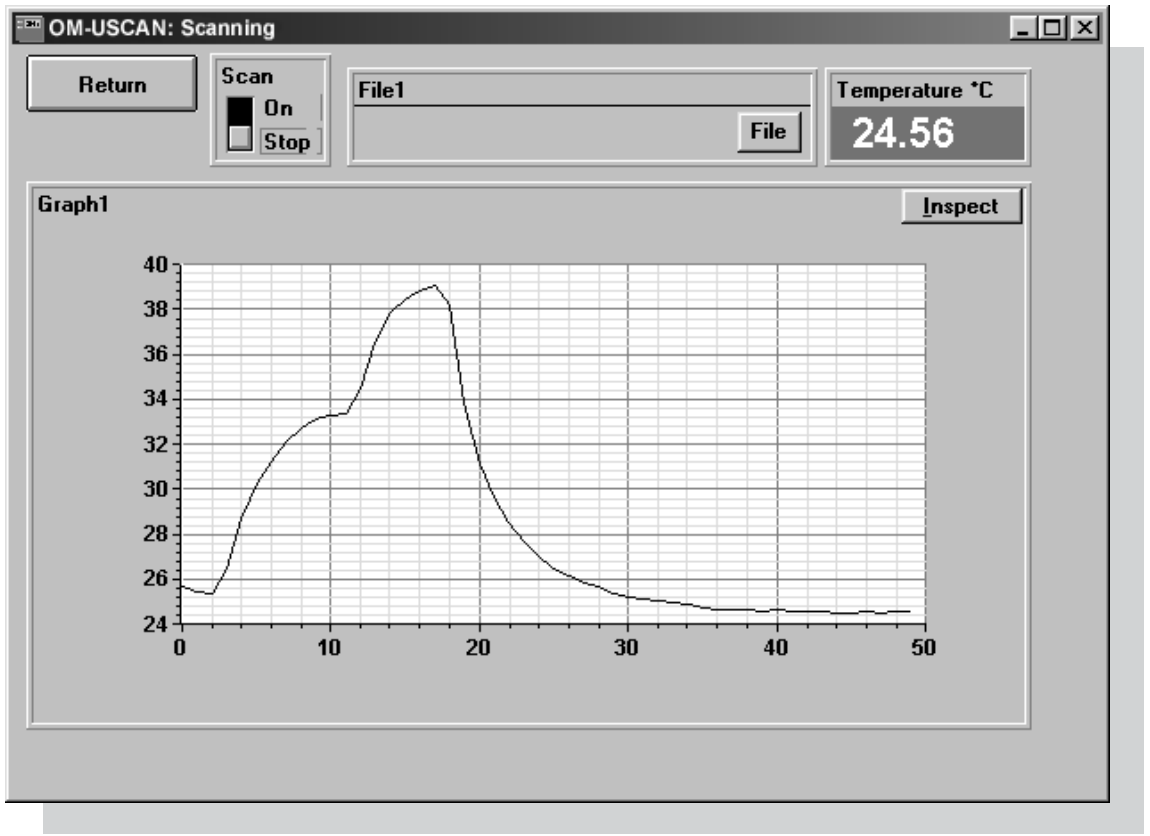
Note that a reconnection of the ***datalogger*** will cause a reset.



Status message and
"Start ***OM-USCAN***" key

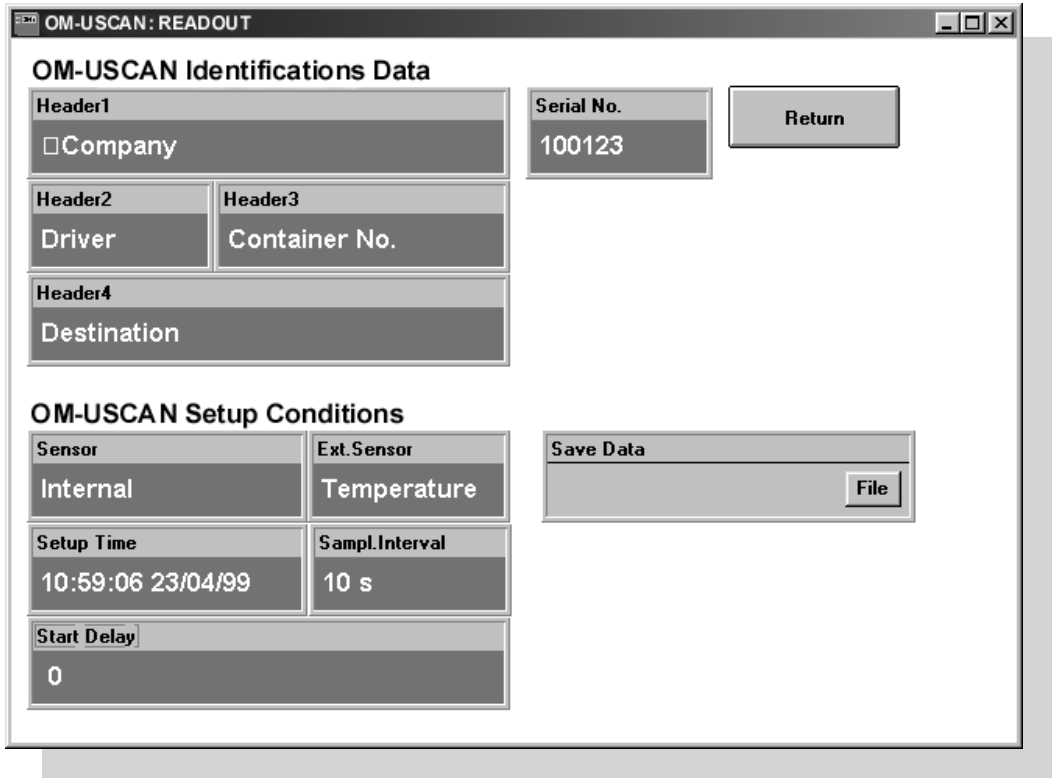
4.65 Scanning

Direct scanning of data is possible by using an external sensor. In this mode the ***datalogger*** must be connected to the interface and the sensor must be linked up to the corresponding socket. The scanning program communicates directly to the ***datalogger*** by using a baud rate of 300 baud. The sampling interval is 16 seconds. Please use the "Scan Stop" switch to halt scanning. The ***datalogger*** can be resetted by reconnection.



4.7 Read Out

When measuring has been completed or is halted, you can read out the data by means of this part of the program and store it on hard disk or floppy.

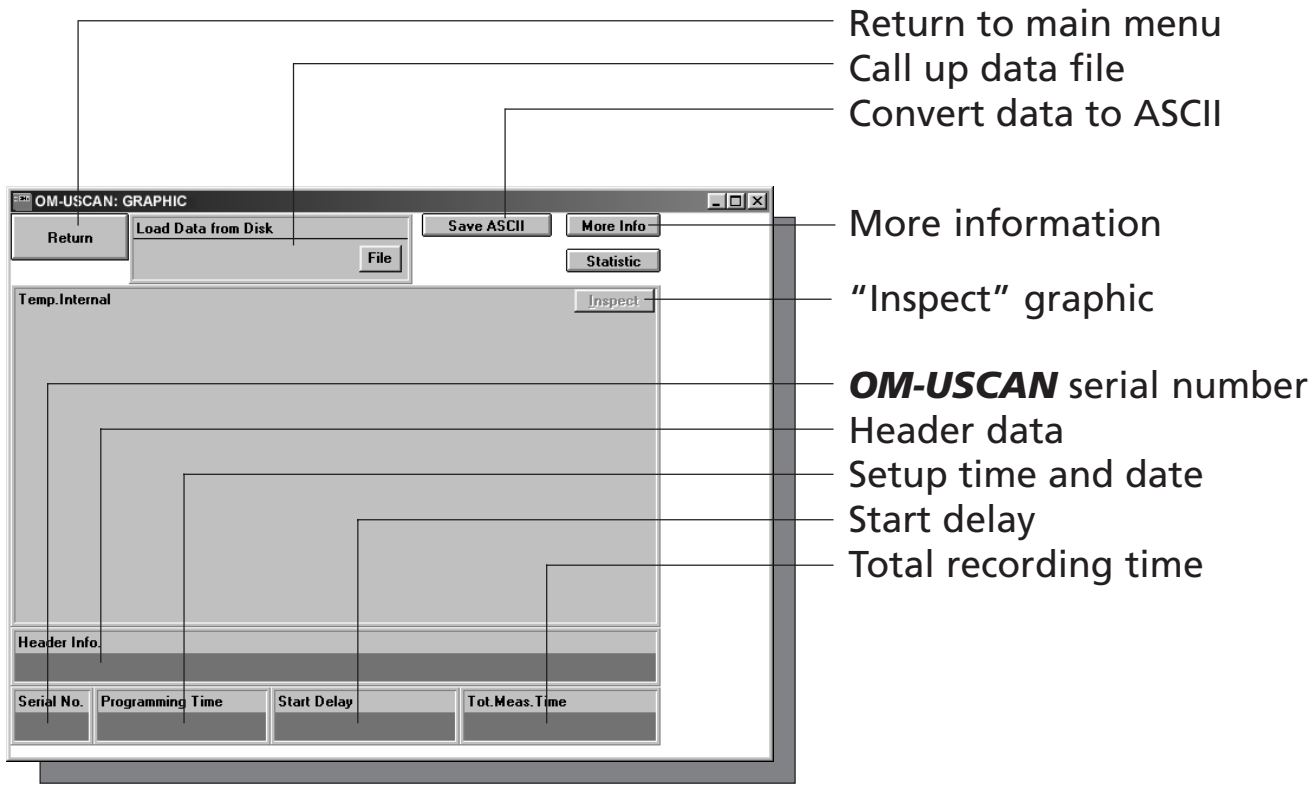


The “Read Out” window gives you details of the ***datalogger*** identification, the recording mode and start of measuring.

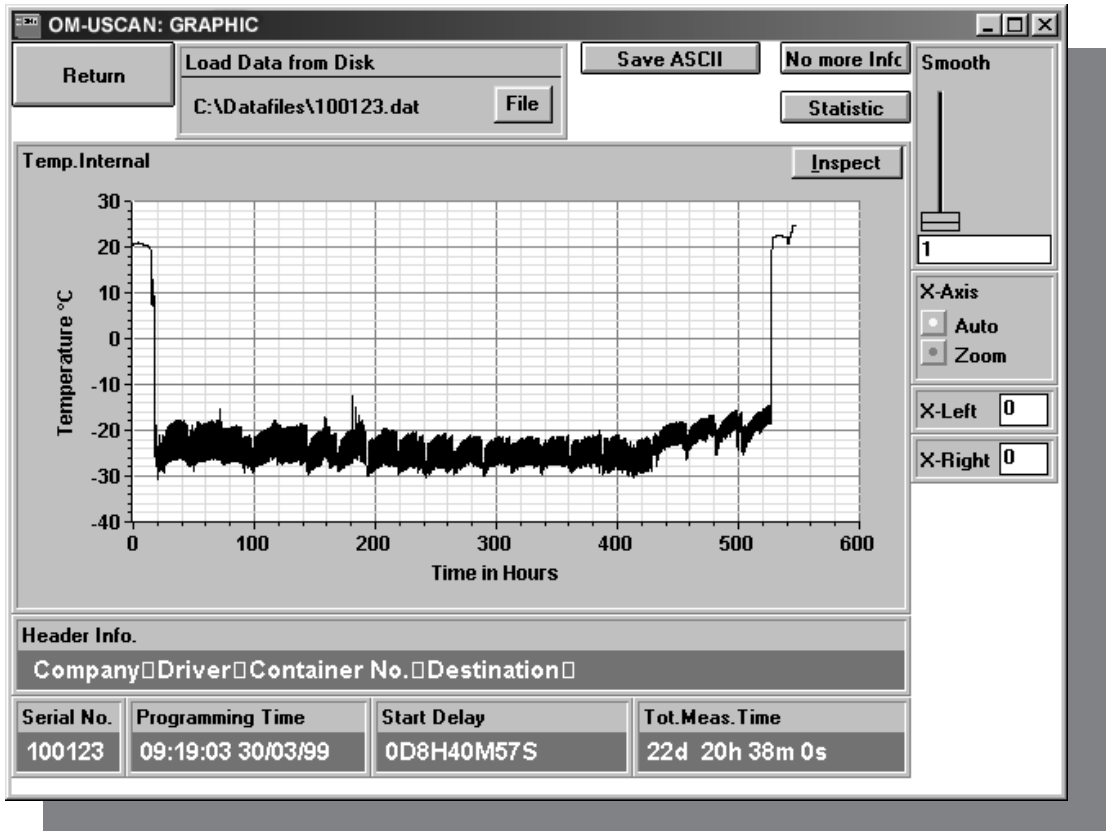
If you want to transfer and store data from the ***datalogger***, click with the mouse on the "File" key. Give the recorded trace a name under which you will be able to find it again easily in Graphic. As soon as the PC starts the read out process, the green LED on the interface lights up, indicating that data are being output by the ***datalogger***. Data transfer may take up to 10 minutes, depending on the quantity of data. When the green LED goes out, transfer is completed. You can only proceed the evaluation by clicking with the mouse on the "Graphic" key.

4.8 Single-Channel "Graphic"

The Graphic program allows you to represent the data stored beforehand graphically. The main operating features with a single-channel display are shown in the illustration below. (see 4.8 for two-channel display)

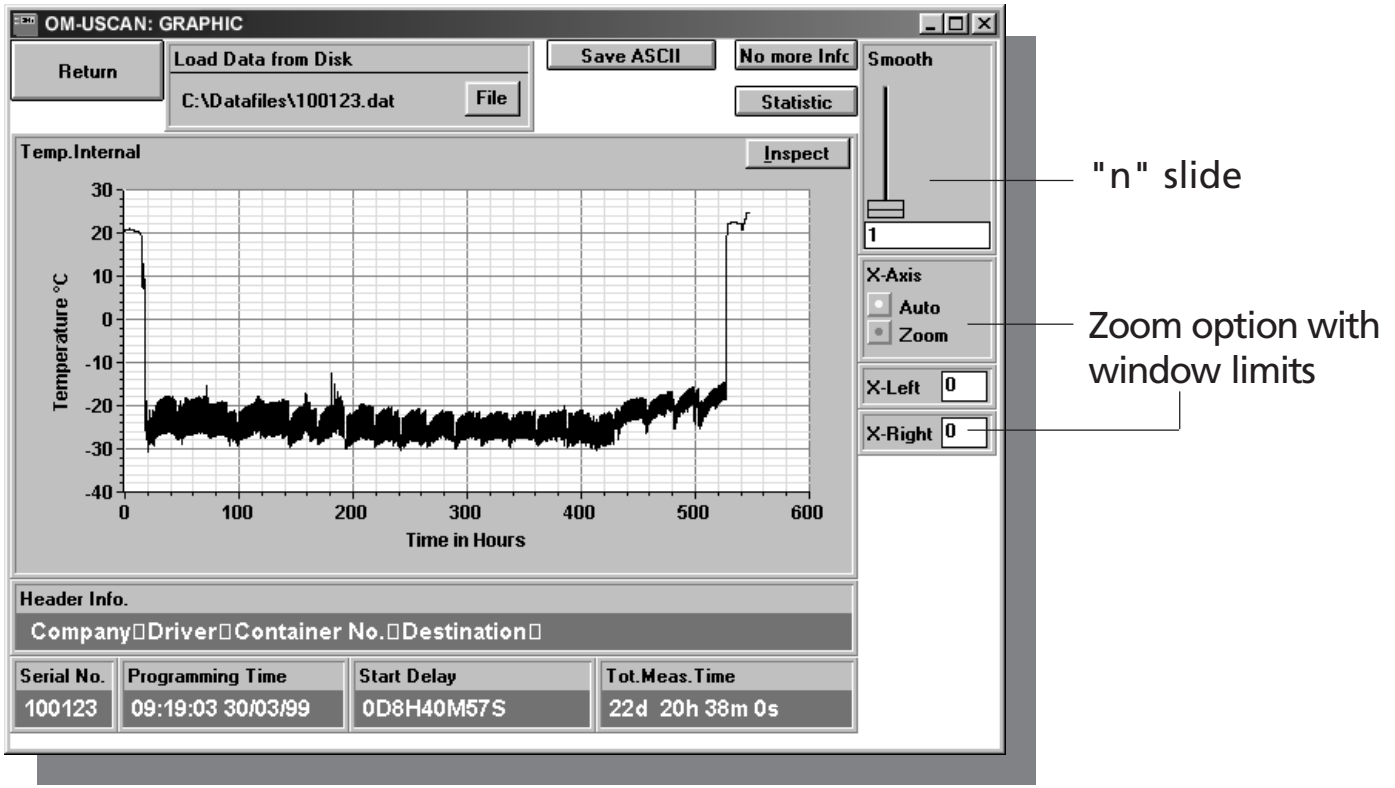


Click with the mouse on the File window and select a Data File. This may take some time, depending on the quantity of data. If the raw data have been linearized, the following screen will appear:



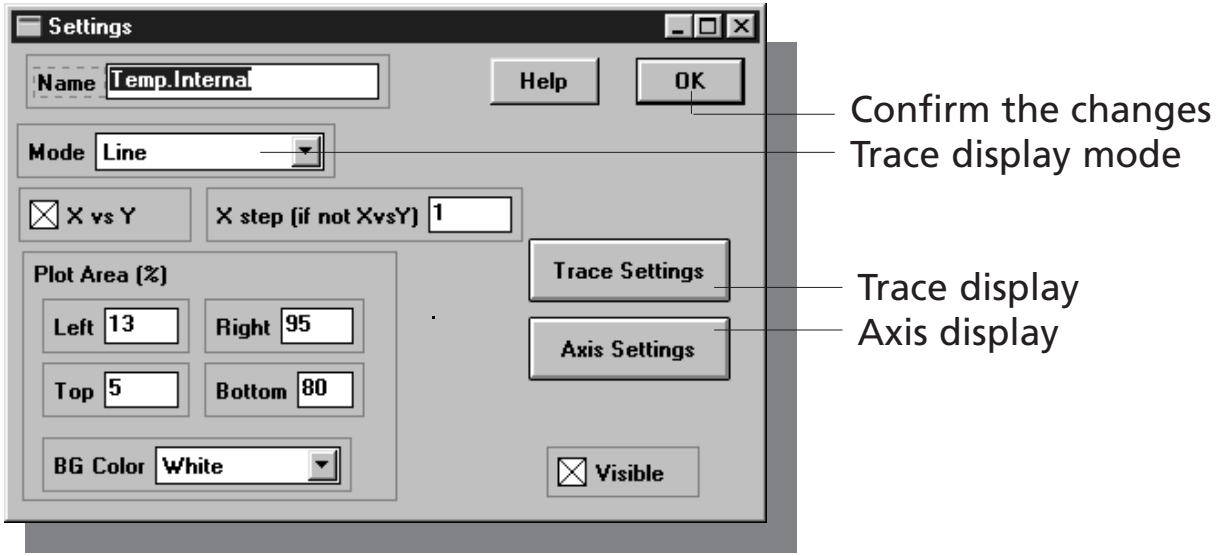
4.81 Smooth and Zoom

The Smooth function allows you to smooth the data. This is done by using "n" points around the actual point to form an average. Use the mouse to move the slide between n=1 and 100. The smooth function will not be activated until you call up the data file again. Same worth for the zoom function. Select the zoom button and the zoom limits as a window and recall the file.

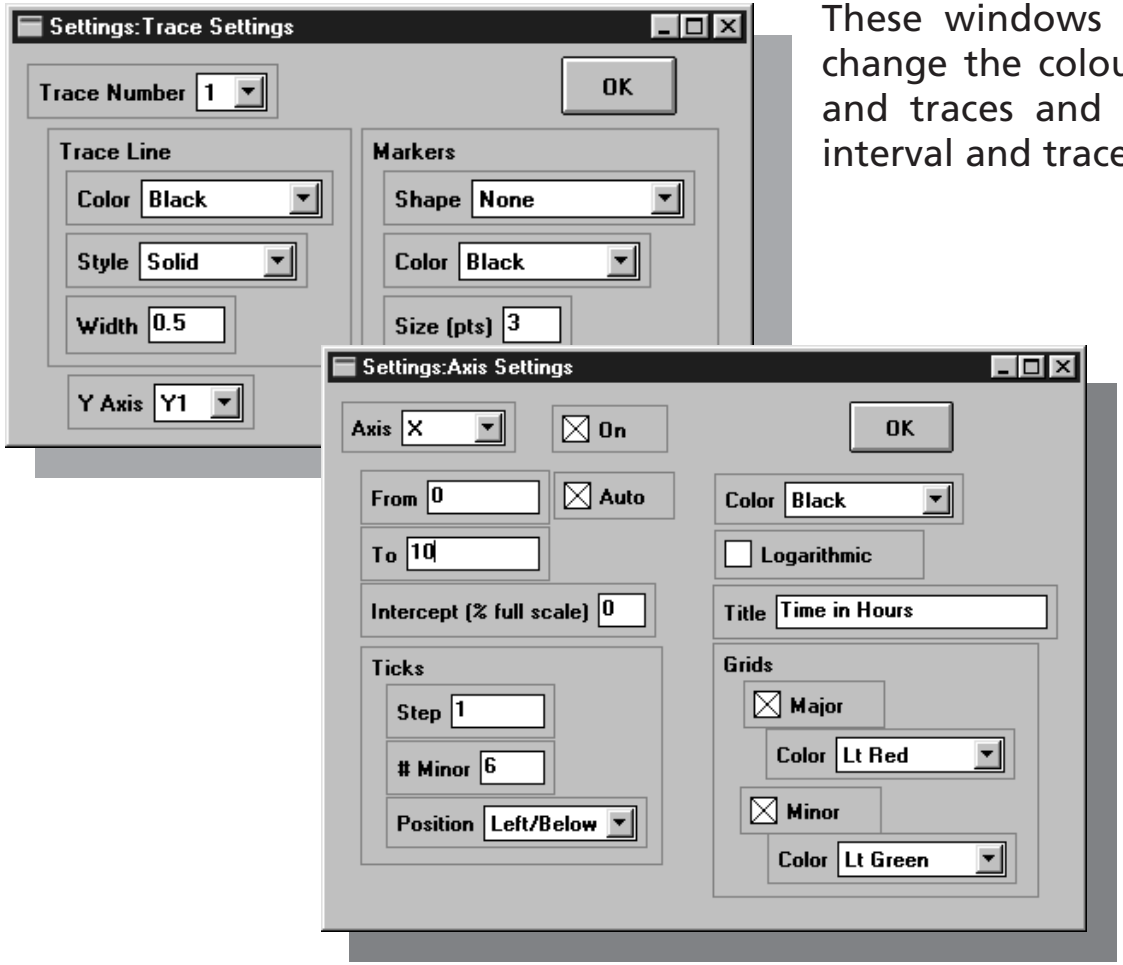


4.82 Display Mode

By clicking twice on Graphic you can change various display parameters:



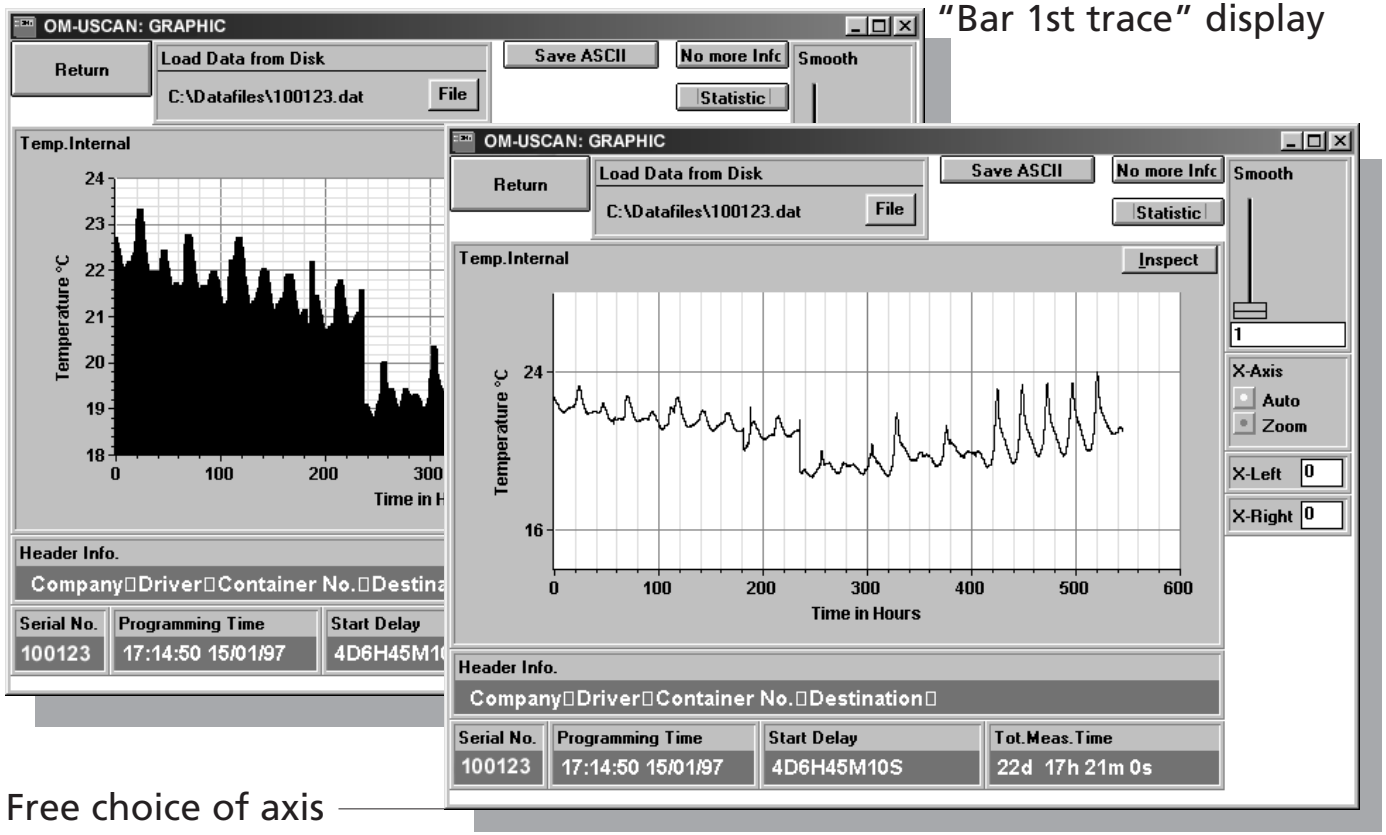
4.821 Trace Settings



These windows allow you to change the colour of the axes and traces and also the grid interval and trace section.

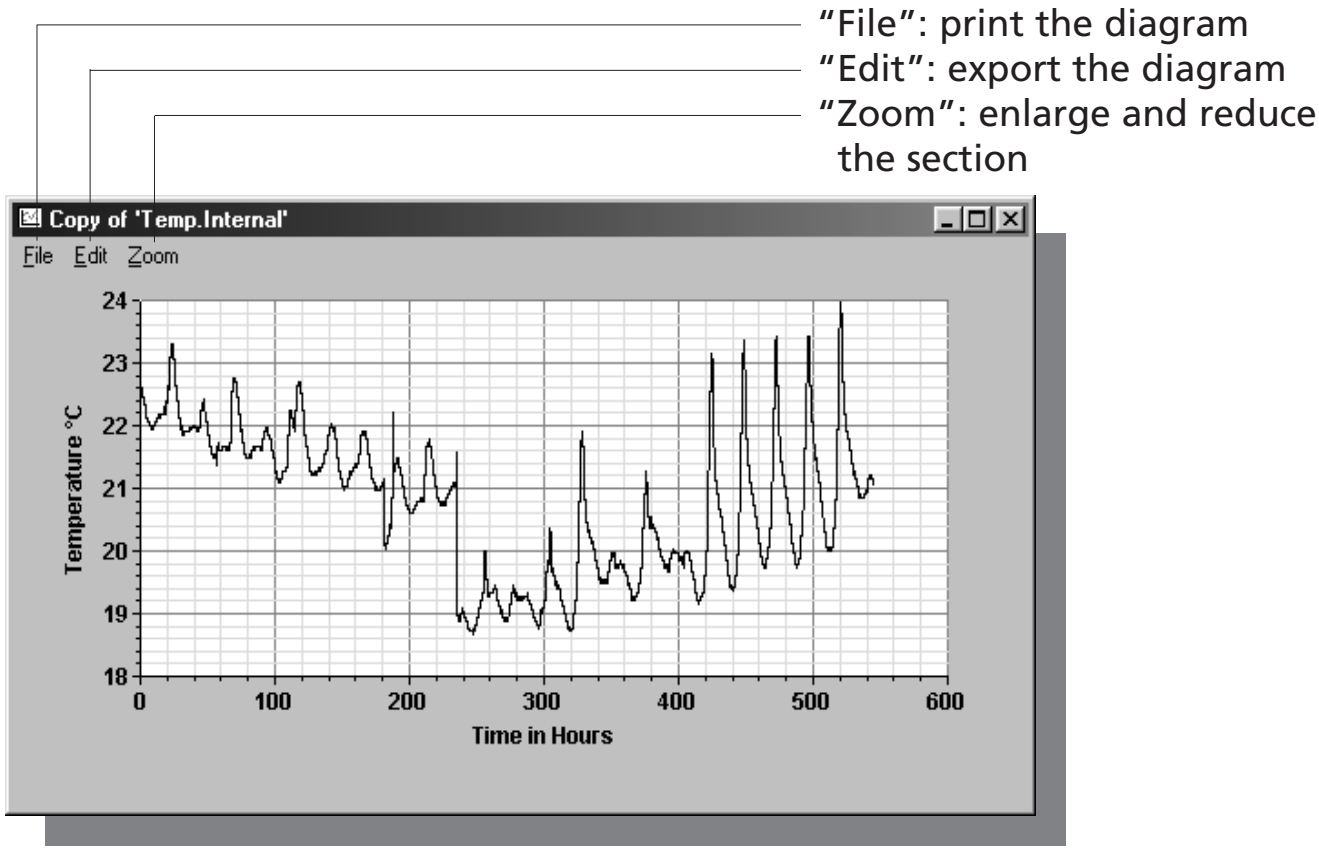
4.822 Axis Settings

4.823 Examples



4.83 “Inspect”

The “Inspect” window allows you to enlarge and reduce sections.



4.84 "Save ASCII"

This function linearizes the raw data and stores them in ASCII, allowing these data to be further processed by any programs. The first few lines look like this:

Single-channel

X	Y
0.05	5.038
0.053	5.199
0.056	5.362
0.058	5.519
0.061	5.626
0.064	5.764
0.067	5.88
0.069	5.961
0.072	6.035
0.075	6.138
0.078	6.197
0.081	6.243
0.083	6.303
0.086	6.34
0.089	6.37
0.092	6.416
0.094	6.446
0.097	6.469
0.1	6.521

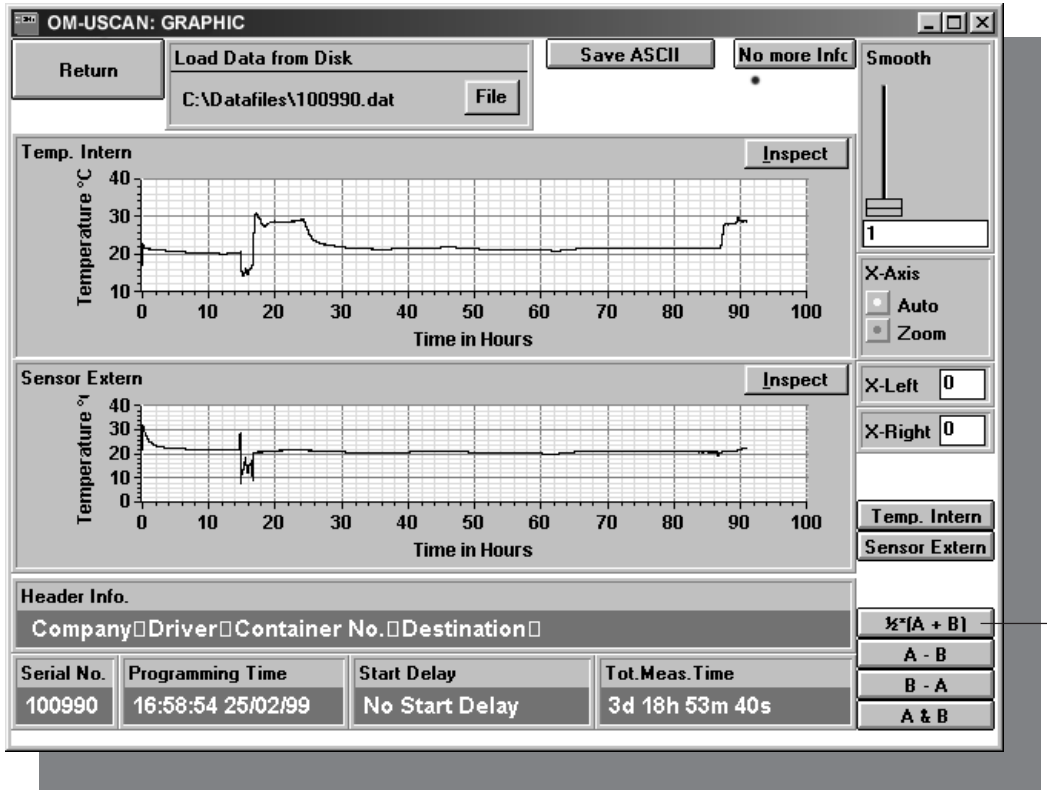
X = time axis in hours
Y = ordinate in °C

Twin-channel

X	Y1	Y2
0.003	26.234	25.368
0.006	26.396	25.375
0.008	26.485	25.375
0.011	26.567	25.375
0.014	26.567	25.298
0.017	26.485	25.298
0.019	26.485	25.222
0.022	26.485	68.745
0.025	26.508	70.381
0.028	26.59	68.745
0.031	26.598	72.141
0.033	26.688	78.259
0.036	26.793	88.388
0.039	26.922	82.412
0.042	26.412	5.795
0.044	24.61	-4.578
0.047	22.803	-9.084
0.05	20.825	-11.265
0.053	18.91	-12.442

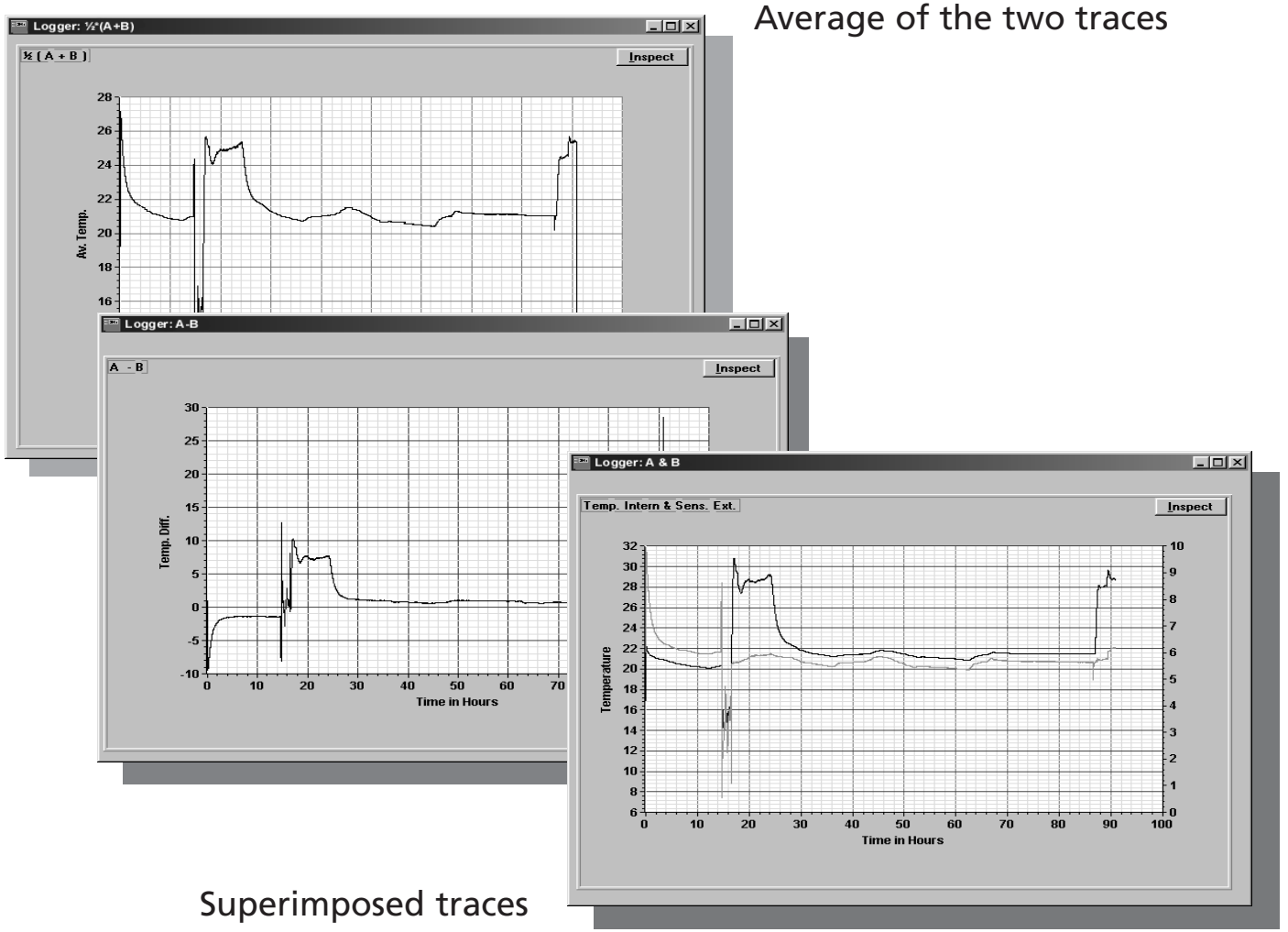
4.9 Twin-Channel "Graphic"

If you have recorded data with both, the internal and the external sensor, Graphic will automatically display them in two separate diagrams. The operating features are different from those in the single-channel display and mathematical combinations for the two traces have been added to allow connections to be made visible.



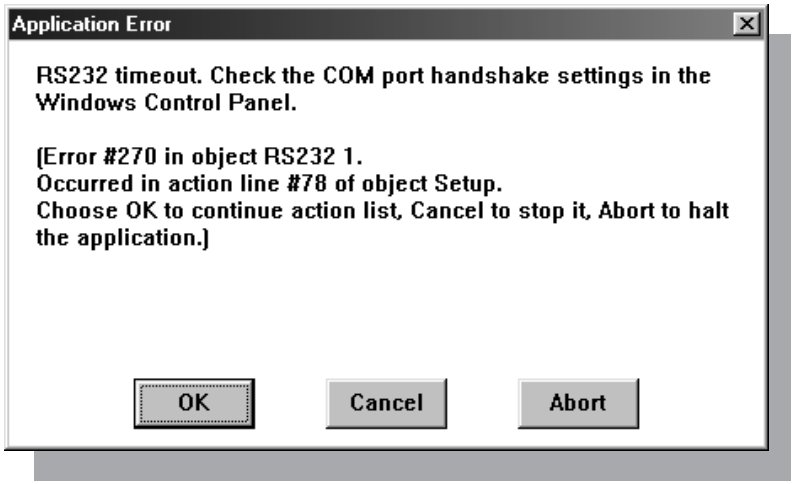
Operation for mathematical combinations.

4.91 Mathematical Combinations



5. Troubleshooting

Wrong Com Port.
Time Out Delay: 10 seconds



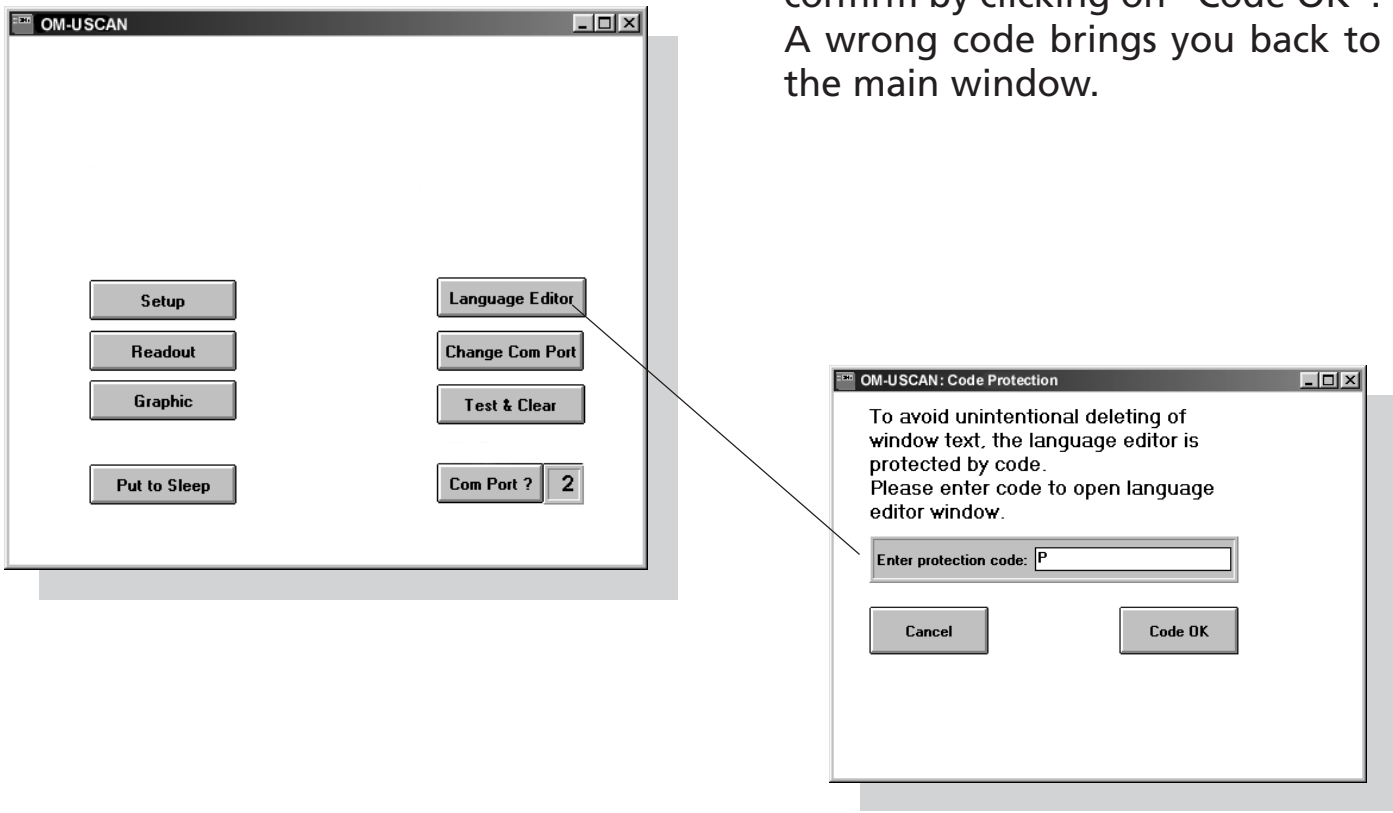
This message appears if the PC cannot communicate with the ***datalogger***.
The reasons may be the following:

- Wrong COM Port selected:
  => check the COM Port
  => check the RS232 cable

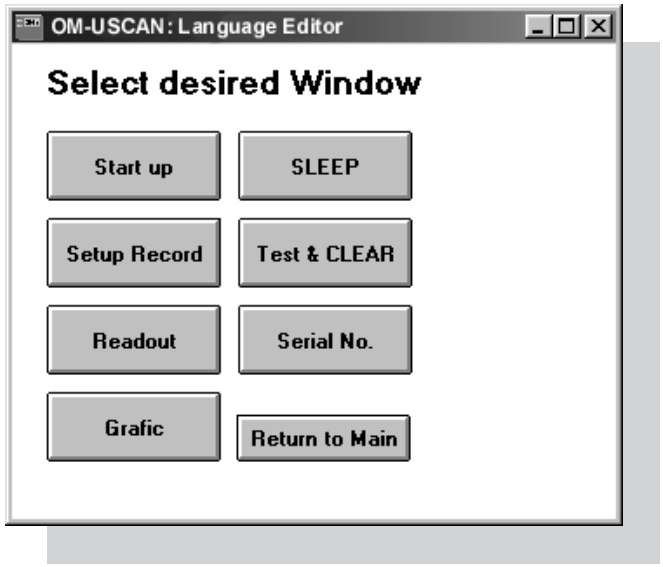
- The ***datalogger*** is not in communication mode:
  => check if the interface is switched on and reconnect the ***datalogger*** to the interface for resetting.
  => check the 9 Volt Battery of the interface.

6. Language Editor

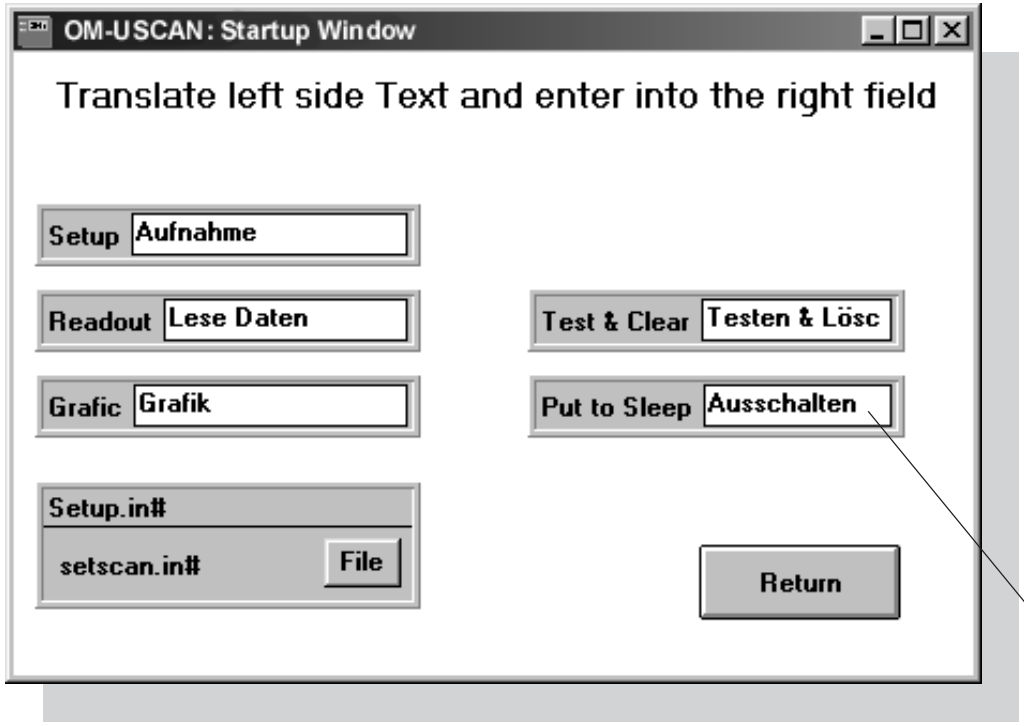
The ***OM-USCAN*** Software give you the possibility to change the key words in any window. So you can adapt the program exactly to your needs. The language editor can only be opened by a protection code in order to prevent any unauthorized and unintentional manipulation of existing key words. Open the language editor by the appropriate key word and confirm by clicking on "Code OK". A wrong code brings you back to the main window.



The right code opens a new window where you can select the window you like to modify.



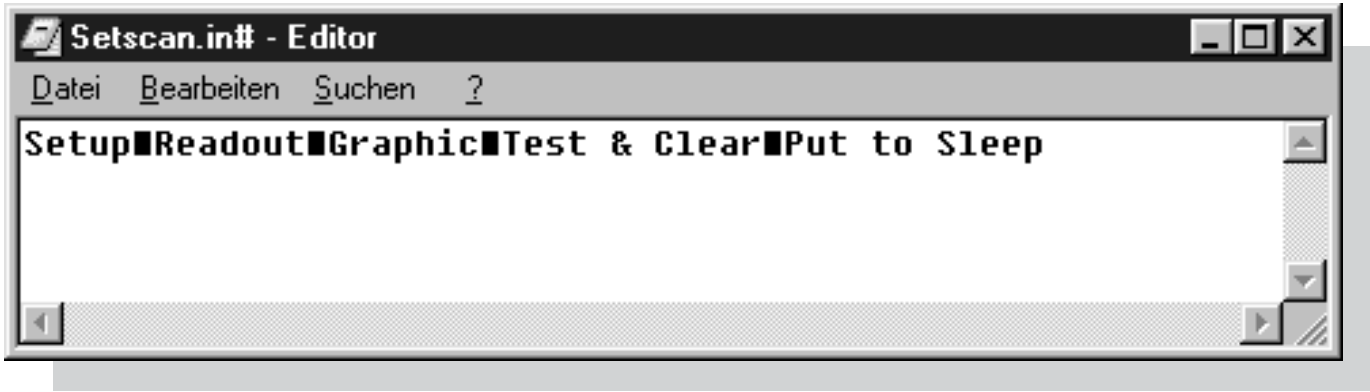
When you open for example the Startup window you can see several blank fields right of the English key words. In this field you can enter now your desired key words. Do not terminate your entry by a carriage return, change only with the mouse to the next field. Blank fields will be displayed in the window as blank. If you only like to make correction on some fields, please use an ordinary text editor. After all fields have been labeled, move the mouse cursor to "File".



The data will be saved under "setscan.in#". Do not change the file name.
Now you can test the setup window by clicking with the mouse on the "Return" key in order to go back to the main window.

Any text and language can be entered into these fields.

If you find now any error in the text it is unnecessary to go back to the language editor and fill out all fields again. A simpler way is to use the editor from Windows. Change to the Program-Manager and click twice on the "Editor" icon. Open the directory, where you have installed the ***OM-USCAN*** software. Open the file "setscan.in#".



Now you can modify and correct all text between the "■". Do not clear the"■" control characters. After correction please save the data under same file. Then go back to the ***OM-USCAN*** software and test the changes.

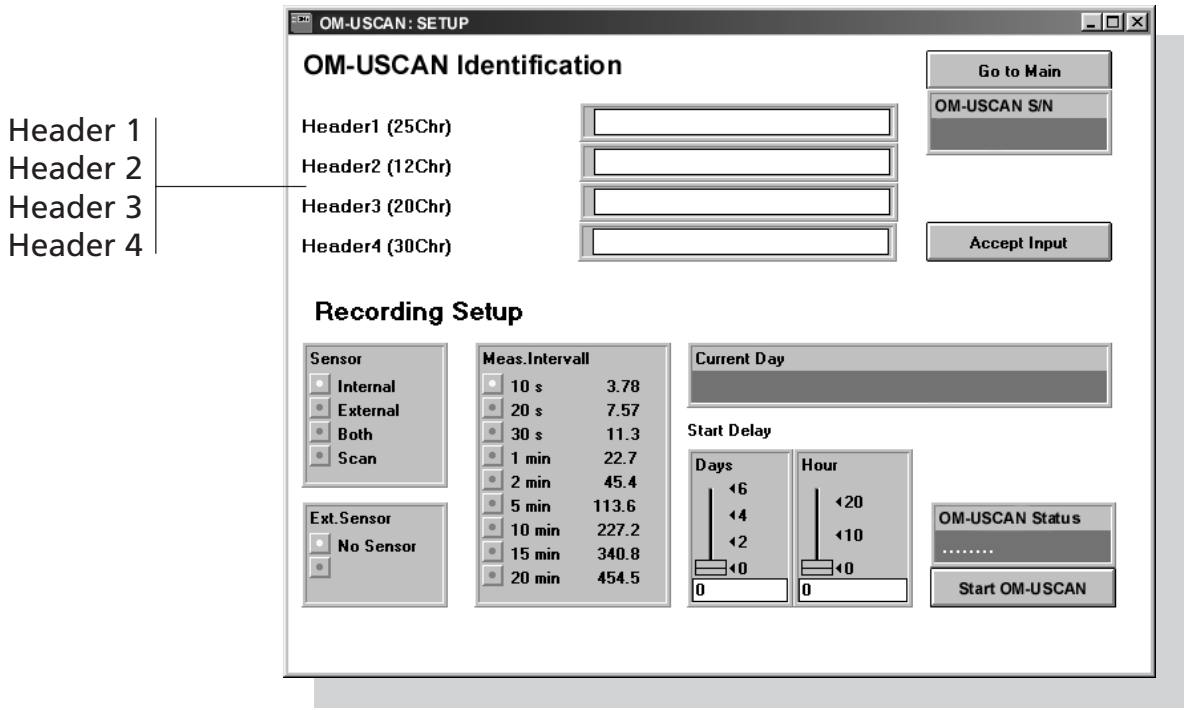
The language editor is subdivided into the following windows:

	Window	**Use**
-	Start up	Main-Window
-	Setup Record	Setup the ***datalogger*** for data recording
-	Readout	Readout the recorded data fom ***datalogger***
-	Graphic	Show the recorded data in a graphic
-	Sleep	Put ***datalogger*** into sleep mode to save power
-	Test & Clear	Test ***datalogger*** communication and function

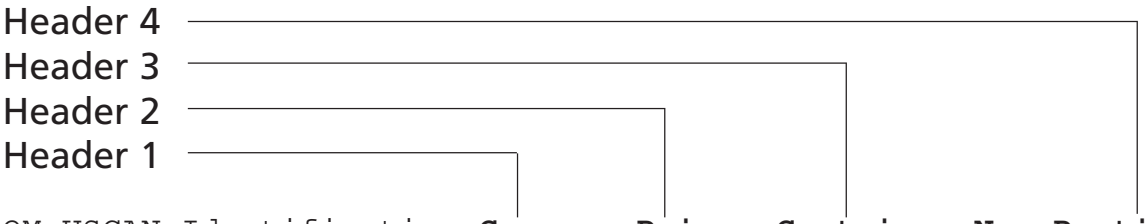
For each window a separated data file exists. This enables simpler handling of language data. The relation between the different windows and data files is as follows:

	Window	**File**
-	Start up	setscan.in#
-	Setup Record	record.in#
-	Readout	readout.in#
-	Graphic	grafic.in#
-	Sleep	sleep.in#
-	Test & Clear	t&c.in#

As you have seen you can modify and correct any ***OM-USCAN*** window and translate to the destination language. The most important window is the setup window where you can adapt your needs for header. Four lines are available for the header. If you use the language editor all lines must be filled in. But if you only like to modify "Header 1" to "Header 4", it´s simpler to use the Windows Editor to change the four lines.



To modify the four header lines, please open the "record.in#" file.
In this file you see, where the header information is placed:




```
OM-USCAN Identification■Company■Driver■Container No.■Destination■
OM-USCAN Setup Condition■Sensor■Interval,External,Both,Scan Mode■
Ext. Sensor■No Sensor, ;Temperature,Humidity;Ext.only, ;■Return■
OM-USCAN Serial No.■Actual Date/Time■Start Delay■Days■Start Hour■
No Delay■OM-USCAN Status■Waiting■Measuring■Input O.K.■Set Start Delay■
Sampl.Interval■
```

Now change with the editor the header info, for example:

```
OM-USCAN Identification■User Name■Street■City■Country■
OM-USCAN Setup Condition■Sensor■Interval,External,Both,Scan Mode■
Ext. Sensor■No Sensor, ;Temperature,Humidity;Ext.only, ;■Return■
OM-USCAN Serial No.■Actual Date/Time■Start Delay■Days■Start Hour■
No Delay■OM-USCAN Status■Waiting■Measuring■Input O.K.■Set Start Delay■
Sampl.Interval■
```

Do not touch any " , ; ■ " . They are used as controlling characters.
Finally save the file and restart the software.

Index of Key words

U

W

Z

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