

Meteo Plus 2004 Documentation

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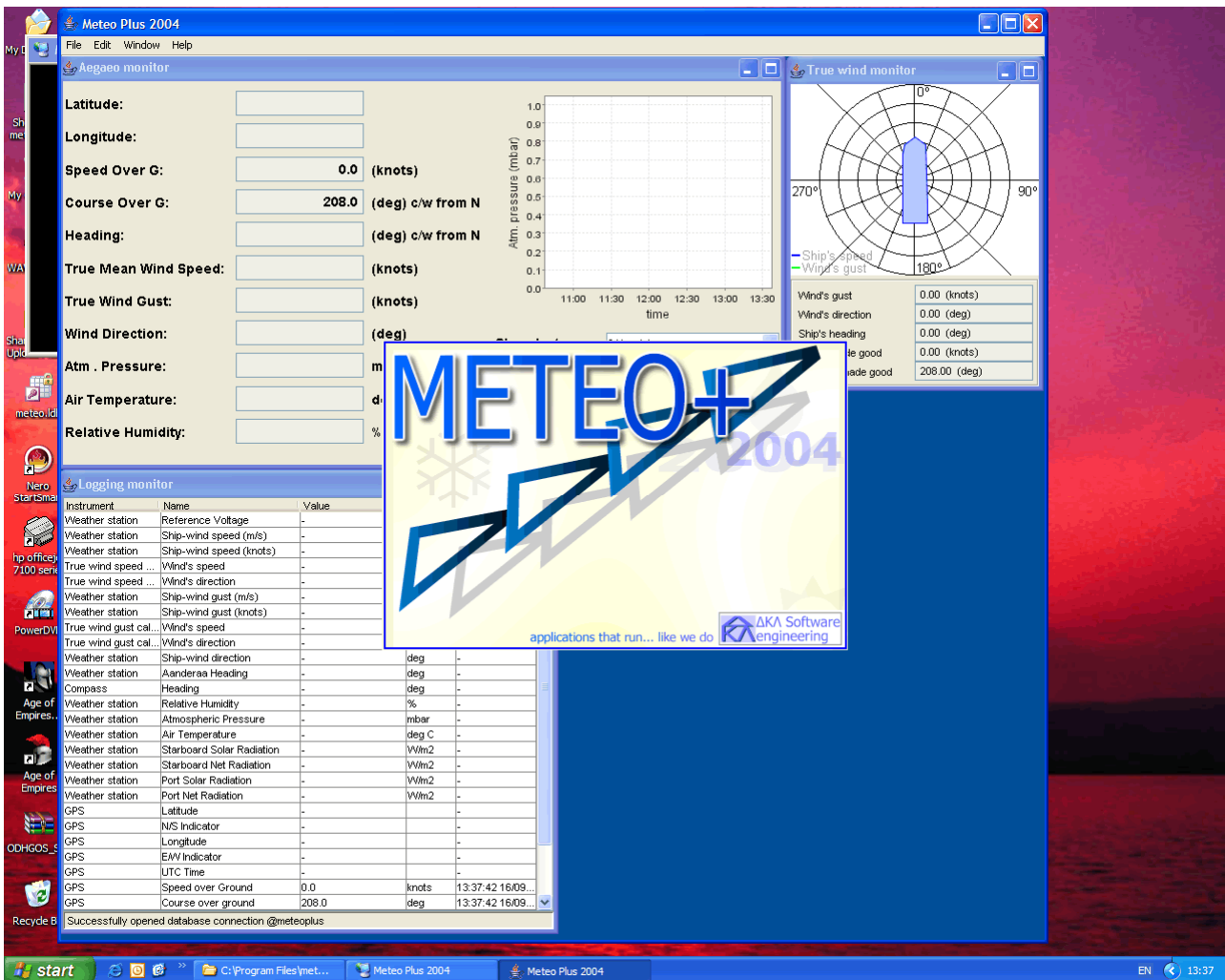
A User Manual

A.1 Meteo Plus operation via screenshots

The philosophy and usage of Meteo Plus are being presented via some screenshots.

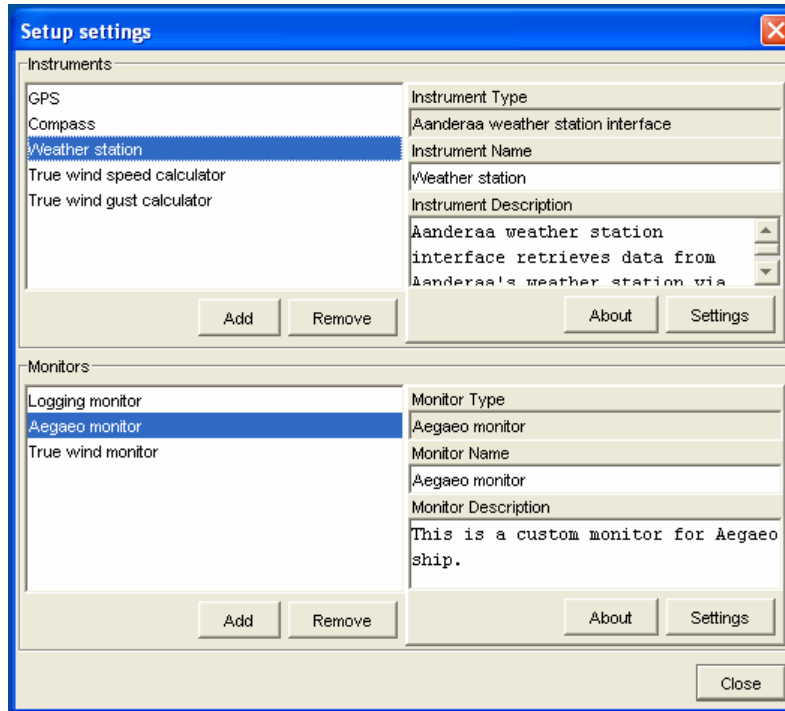
A.1.1 Main View

This is the main screen of Meteo Plus. One can see three active monitors: The Aegaeo monitor in the up left corner (see section 1.7), the Log (Logging) monitor bellow it (see section 1.6) and the Ship (True wind) monitor on the right (see section 1.8). The splash screen appears on start-up. These monitors and more that are not active at given setup can be used to present information from several data sources.



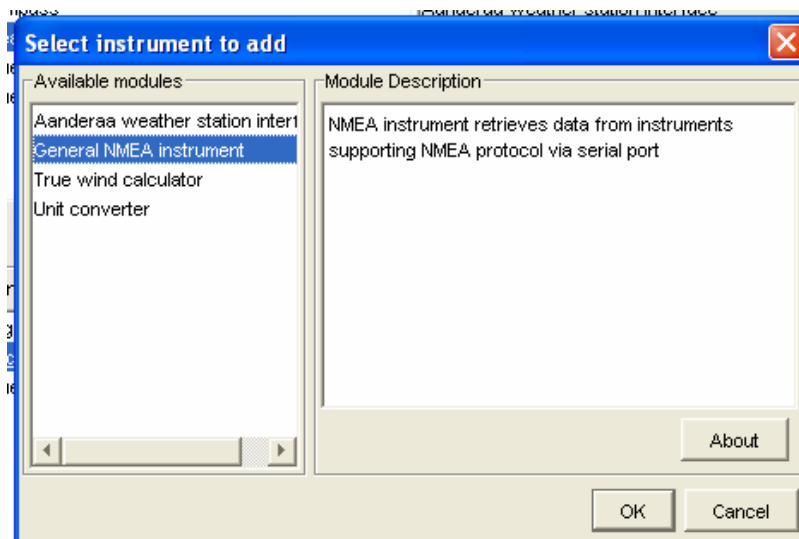
A.1.2 Setup screen

By pressing Edit > Settings in the main menu, the Setup settings dialog appears. You can see current setup including three monitors that we described before (on the bottom) and five data sources (instruments): GPS, Compass, Weather station, True wind speed calculator and True wind gust calculator. While the three first instruments represent true data sources, from external world, the last two are virtual data sources which just process data provided by the first three.



A.1.3 Add new instrument

By pressing the add button bellow the instrument list, new instruments can be added via the dialog bellow. Unlimited number of instruments of the same type can be added as long as they don't lock the same resources (e.g. don't use the same serial port).



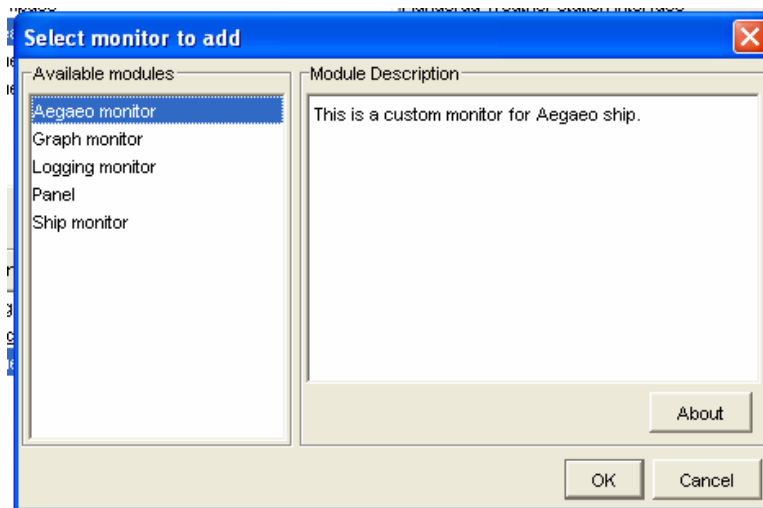
The list contains some default instruments, released with Meteo Plus. These are:

Instrument	Description
Aanderaa weather station interface	Aanderaa weather station interface retrieves data from Aanderaa's weather station via serial port
General NMEA instrument	NMEA instrument retrieves data from instruments supporting NMEA protocol via serial port
True wind calculator	True wind instrument calculates the made-good value of wind's gust from the apparent wind measured on board and ship's speed - heading
Unit converter	This is a generic multi-variable mathematic expression calculator that can be used for unit conversion and computation of complex expressions of measured quantities

Additional custom instruments that cover any need can be added easily by adding small .jar files in the classpath.

A.1.4 Add new monitor

By pressing the add button bellow the monitor list, new monitors can be added via the dialog bellow. Unlimited number of monitor of the same type can be added.



The list contains some default monitors, released with Meteo Plus. These are:

Monitor	Description
Aegaeo monitor	This is a custom monitor for Aegaeo ship.
Graph monitor	This is a graph monitor. It shows a chart of the selected channel
Logging monitor	This is a logging monitor with database connectivity
Panel	This is a panel that can show up to three channels, formatted with text
Ship monitor	This is a monitor that shows ship's speed and wind's direction

Additional custom monitors that cover any need can be added easily by adding small .jar files in the classpath.

A.1.5 NMEA instrument settings

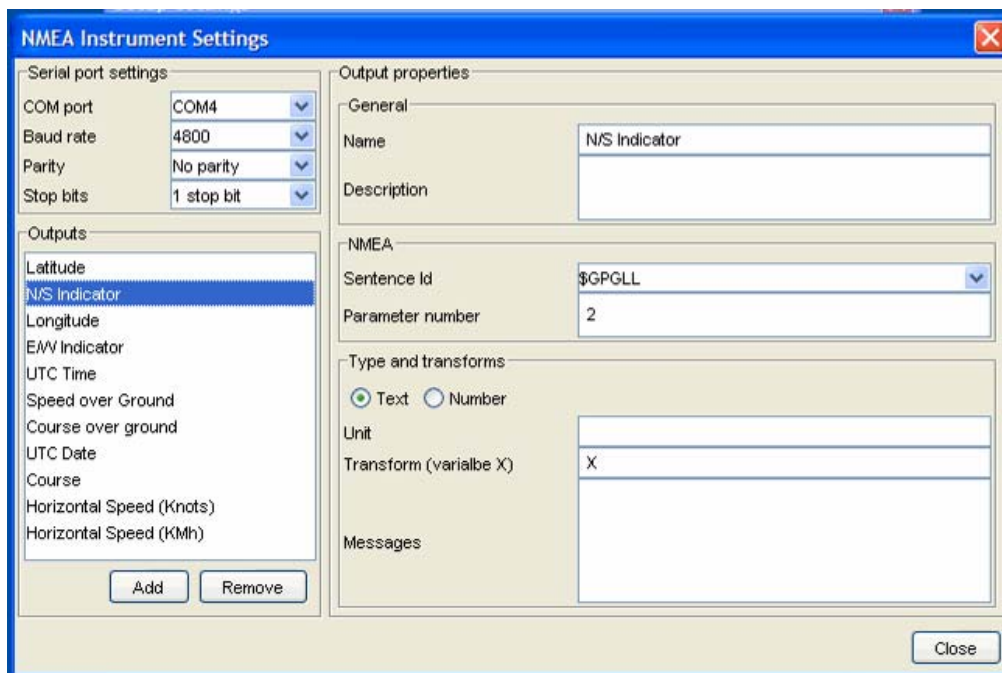
By double clicking an NMEA instrument in the instruments list, the NMEA Instrument Settings dialog appears. Via this dialog one can select the COM port that the instrument is connected, the Baud rate and other communication options. One can see the “Outputs” list below the Serial port settings. This is empty for a newly created NMEA instrument. By pressing add new output channels are being added. By the Output properties on the right, output channels can be customized:

1. General: Name and descriptions
2. NMEA: The parameter should the output channel listen to

For example, a common NMEA string is the following:

```
$GPRMC,085342,A,3757.570,N,02336.094,E,00.1,158,0605105,4,E*7D
```

The third parameter (3757.570) is the Latitude and the fifth (02336.094) is the Longitude. In order to make channels that watch these parameters, one should select as Sentence Id: \$GPRMC and set parameter number to 3 and 5 respectively. As one can see this instrument provides a lot



3. Type and transforms: Details about the output of a channel. Via these options, one can declare if the channel is expected to provide Textual or Numerical data. Unit explicitly declares the unit of the measured quantity. It's recommended to add units when available for the sake of clarity. The “Transform” field provides the ability to add custom formulas to transform numerical values. This can be useful for example if you want to have a channel for speed in miles/hour and another channel for the same speed in km/h. You add two channels that differ only in the formula field. If the formula contains an error, it's presented in the Messages box below. For more information about the mathematical expression builder, see in the section below.

A.1.6 The mathematical expression builder

The mathematical parser is used to perform arithmetic operations in variable values (usually X but in many cases can be more than one). Formulas may contain variable names, numbers, all basic operations (+ - * /), some more: COS, SIN, TAN, EXP, SQRT, ABS, ACOS, ASIN, ATAN, LOG,

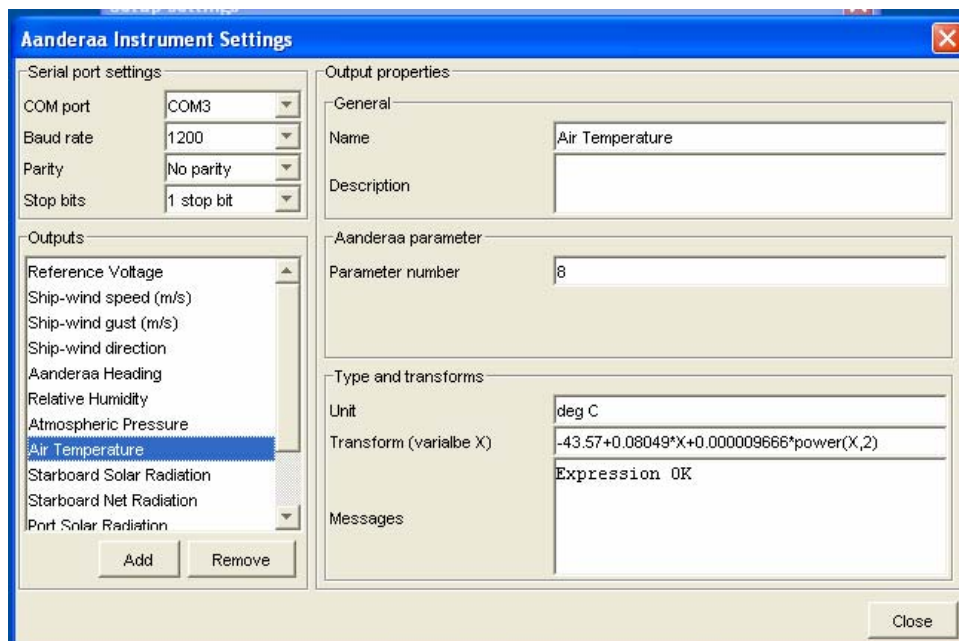
TODEGREES, TORADIANS, POWER, MAX, MIN and some constants: E(), PI() and RANDOM() (creates random numbers between 0 and 1 using JAVA's Math.random()). ACOS, ASIN, ATAN and LOG should be handled with care because of their "dangerous" mathematical properties. The decimal separator is the dot ('.'), engineering number format (e.g. 4.32e-15) is supported, parenthesis can be used and formulas are case insensitive.

A.1.7 Aanderaa instrument settings

The Aanderaa instrument looks pretty much like the NMEA instrument. The only difference is the major simplification on the "Aanderaa parameter" section on the right. Aanderaa's "Sensor Scanning Unit 3010" sends a string of twelve integer numbers from 0 to 1023 (10bit ADC) via the serial port (1200baud).

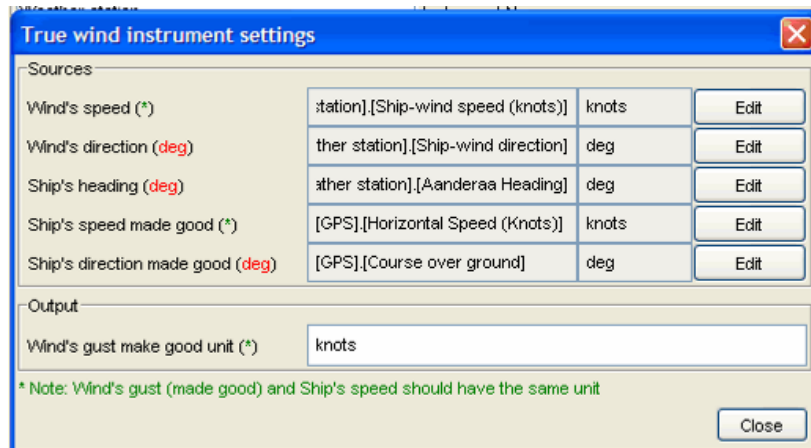


The first number is a reference voltage as measured by the ADC and should be 0262. Subsequent numbers correspond to the analogue voltages measured by the instrument. An example of a sequence is this one: 0262 0013 0020 0425 0874 1023 0523 0716 0585 0574 0586 0558. One can add output channels in the same way as the GPS instrument (press the Add button). Then the parameter number has to be defined. For example the parameter number for the reference voltage is 1. In most of cases, the number that is being received doesn't correspond directly to any physical quantity. It's therefore expected that complex transforms (formulas) are going to be used in order to evaluate physical quantities. This can be done with the mathematical expression parser (see section A.1.6).



A.1.8 True wind instrument settings

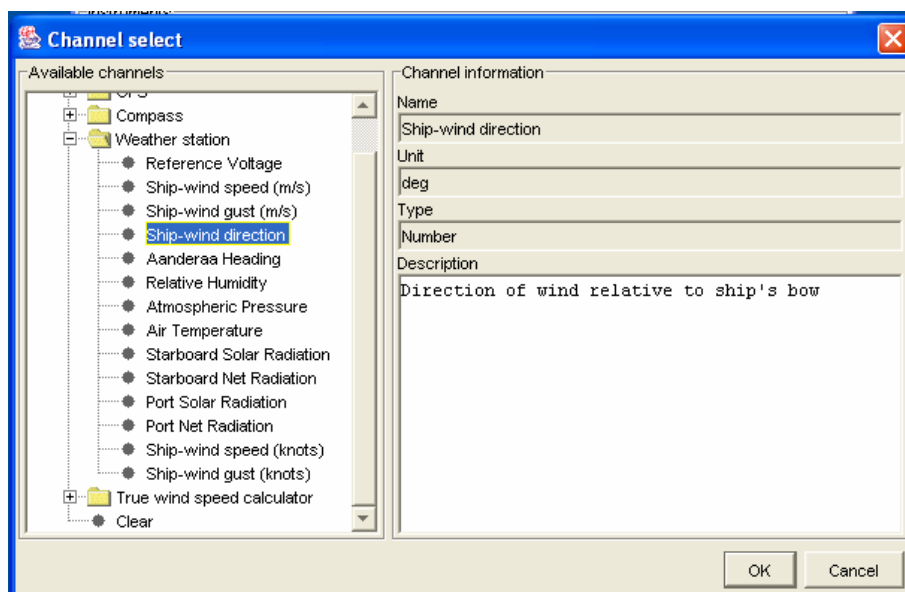
The true wind instrument calculates true wind's speed and direction given the apparent wind's speed (and direction), ship's speed (and direction) and ship's heading. This is a virtual instrument as it doesn't create data on its own rather than processes data from other source instruments. Units of quantities involved with true wind instrument should be compatible in order to obtain a meaningful result. This instrument is useful for the calculation of both wind's speed and wind's gust.



One can change the source of an input value by pressing the edit button. This way the channel select dialog will appear (see section A.1.8 below) and let him select the source channel for the given input.

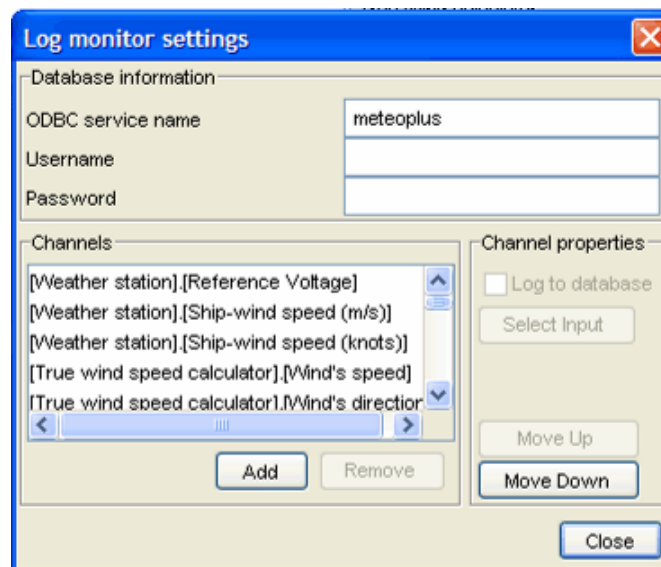
A.1.9 The channel select dialog

By using the channel select dialog, one can select sources for inputs of a module (instrument or monitor). As one can see, it provides useful information about instruments and their channels that are available. It should be noted that if a module has an input that expects numeric values, outputs that provide textual data will not be presented in the list. Additionally if an instrument invokes this dialog, its outputs are not presented in the list in order to prevent loop-connections that would stall the system. Unfortunately such loop-connections can be performed by cross connecting two instruments so SPECIAL ATTENTION should be paid. One can also see a "Clear" option on the bottom of the tree. This disconnects completely the given input.



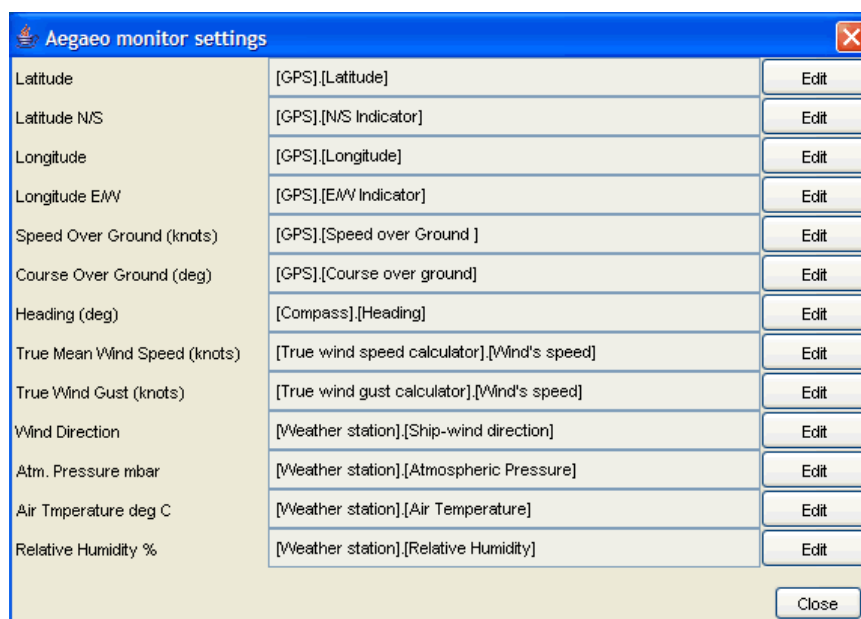
A.1.10 Log and database monitor settings

By double clicking the Logging monitor in the Setup Setting dialog, the Log monitor settings dialog appears. By using this monitor, data from various instrument can be presented in a table and be stored in an ODBC database using a predefined schema. Via these settings, the database ODBC service name is being stated and optional Username and Passwords. Unlimited number of inputs can be selected for viewing and logging by simply pressing the add button. Then the channel select dialog (see section A.1.8) appears and prompts the users to select desired input. If the “Log to database” check box on the right is unchecked for a channel, it only appears in the table but it doesn’t get logged to the database. Move Up and Move Down let the user order conveniently the channels in the table view.



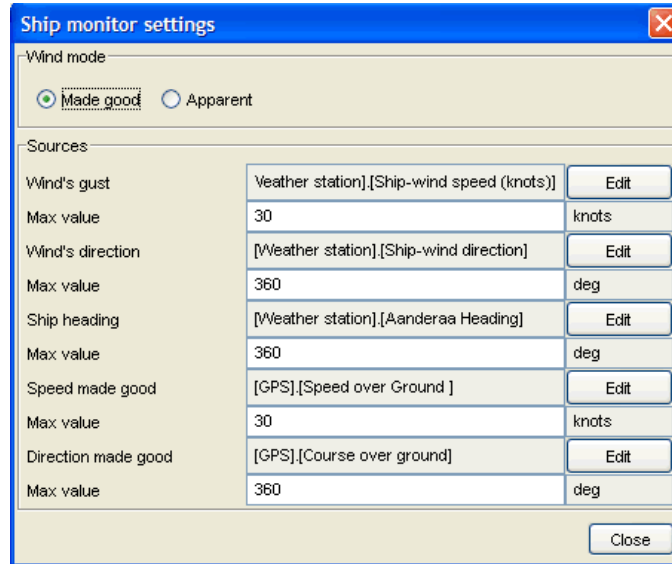
A.1.11 Aegaeo monitor settings

The Aegaeo monitor is a monitor that shows some predefined quantities that are useful for an Oceanographic ship like Hellenic Centre for Marine Research’s Aegaeo ship. It also graphs out the atmospheric pressure change on the last one to twelve hours in order to ease the weather reports.



A.1.12 Ship monitor settings

The ship monitor is presenting on a graph the ship and arrows showing the direction and magnitude of the ship's speed and wind's speed. The sources for various inputs can be selected by pressing the Edit button and a max value must be defined for each input in order to present correct (normalized) arrows. This monitor is being expected to be used in conjunction with the True wind instrument.



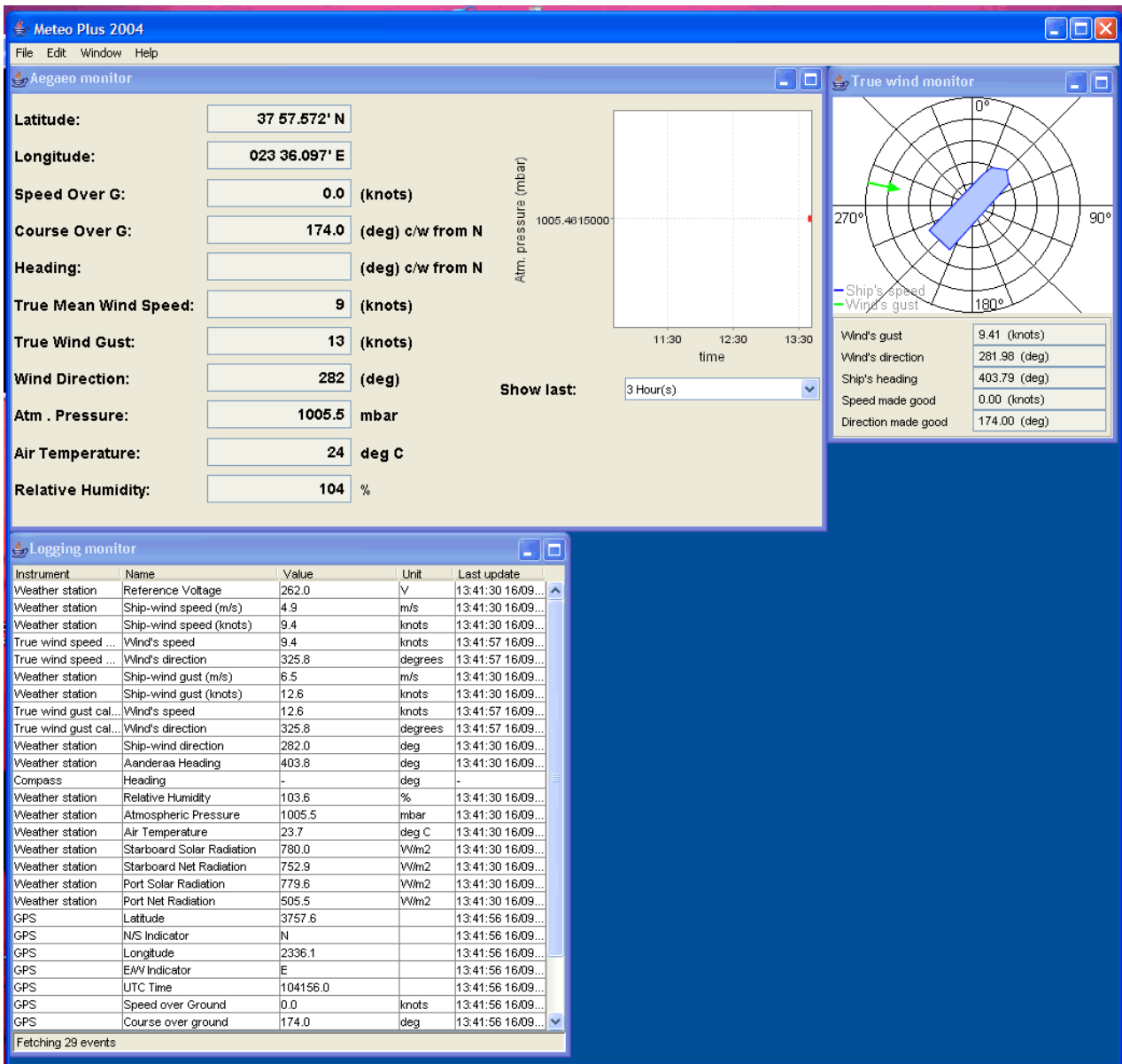
A.1.13 About dialog

About dialog (Help > About) presents a quick description of the Meteo Plus software, copyright information and contact information of the author.



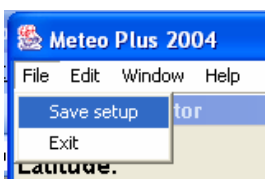
A.1.14 Actual screen view

When application loads or setting dialog closes operation of Meteo Plus begins. You may have to wait several seconds till data from slower sources (like Aanderaa instrument) get received and present. Information from faster sources like GPSs will be presented immediately.



A.1.15 Save setup

Correctly configuring the Meteo Plus requires some level of experience. In order to allow experimenting with different setups, the settings don't get saved until the Save setup (File > Save Setup) menu option gets pressed.

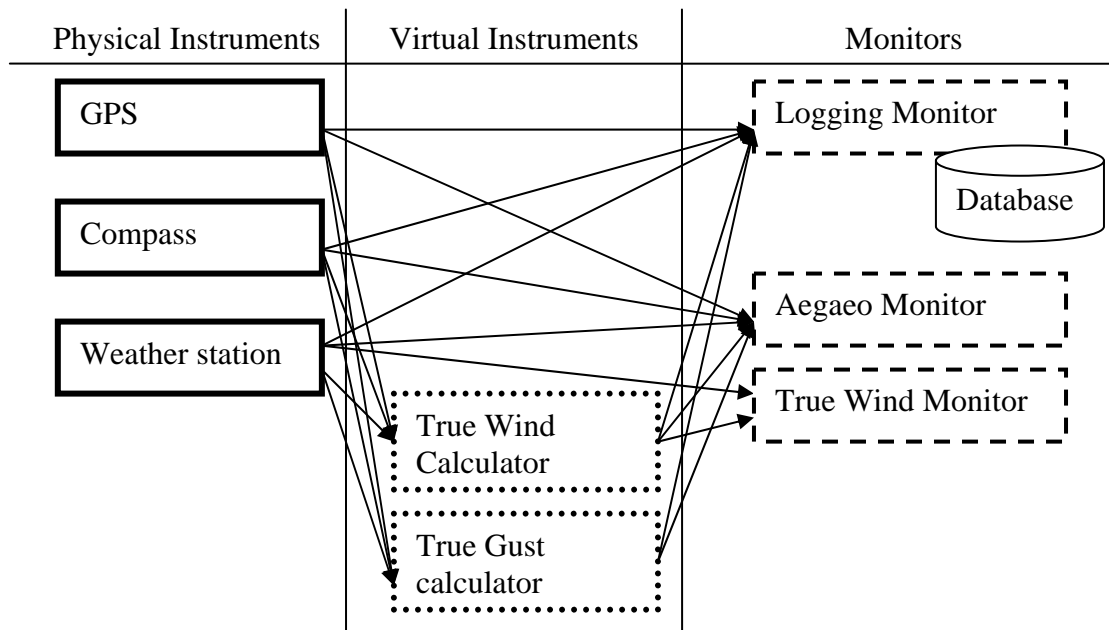


A.2 Application loading

One has just to run the meteoplus.bat file. Under linux, an equivalent shell script should be made.

```
@ "C:\Program Files\Java\j2re1.4.2_01\bin\java" -classpath "app.jar;comm.jar;jfreechart-0.9.11.jar;jcommon-0.8.6.jar" gr.doit4me.meteoplus.MeteoPlus
```

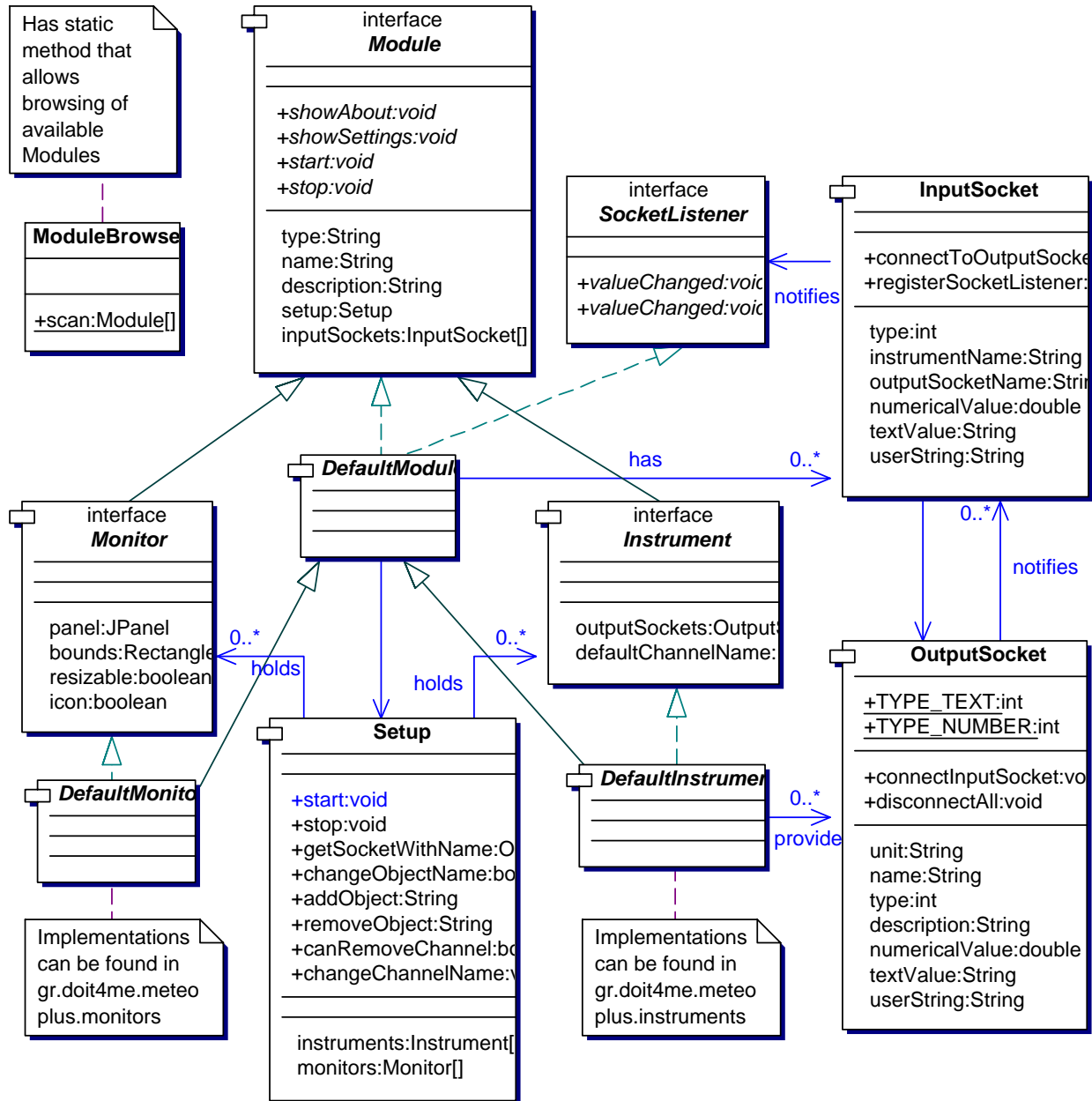
A.3 Setup Configuration for Aegaeo Ship



B Developer's Documentation

UML diagrams that may help a developer follow.

B.1 Core classes: *gr.doit4me.meteo.plus.core*



B.5 Propagating messages example: *TrueWindInstrument.calculateValues()*

