



**KIPP &
ZONEN**
SINCE 1830



Instruction Manual

PGS-100 • Sun Photometer

Important User Information

Dear customer, thank you for purchasing a Kipp & Zonen instrument. It is essential that you read this manual completely for a full understanding of the proper and safe installation, use, maintenance and operation of your new PGS-100 Sun Photometer.

We understand that no instruction manual is perfect, so should you have any comments regarding this manual we will be pleased to receive them at:

Kipp & Zonen B.V.

Delftechpark 36, 2628 XH Delft, - or
P.O. Box 507, 2600 AM Delft,
The Netherlands

T: +31 (0) 15 2755 210
F: +31 (0) 15 2620 351
support@kippzonen.com
www.kippzonen.com

Warranty and liability

Kipp & Zonen guarantees that the product delivered has been thoroughly tested to ensure that it meets its published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used according to the instructions supplied by Kipp & Zonen.

Kipp & Zonen shall in no event be liable for incidental or consequential damages, including without limitation, lost profits, loss of income, loss of business opportunities, loss of use and other related exposures, however incurred, rising from the faulty and incorrect use of the product.

Modifications made by the user may affect the instrument performance, void the warranty, or affect the validity of the CE declaration or other approvals and compliances to applicable International Standards.

Copyright © 2012 Kipp & Zonen B.V.

All rights are reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, without authorisation by Kipp & Zonen.

Kipp & Zonen reserves the right to make changes to this manual, brochures, specifications and other product documentation without prior notice.

Manual document number: V1201

Publication date: 24th January 2012

Table of Contents

Important User Information	3
Table of Contents	5
1 Introduction	7
1.1 Product overview	7
1.2 Manufacturer	7
1.3 Key parts of the PGS-100 Sun Photometer	8
1.3.1 The radiometer	8
1.3.2 The control unit	8
2 Installation	9
2.1 Included with the product	9
2.1.1 The radiometer	9
2.1.2 The control unit	10
2.1.3 Connection cables	10
2.1.4 CD-ROM	11
2.1.5 Mounting rings	11
2.2 Tools required	12
2.3 Location and support base	12
2.4 Mounting	12
2.4.1 Mounting rings	12
2.4.2 PGS-100 mounting kit	12
2.4.3 Fitting the PGS-100 radiometer	13
2.4.4 Alignment of the PGS-100 radiometer	14
2.5 Electrical connections	14
2.5.1 Connecting the radiometer to the control unit	15
2.5.2 Connecting the control unit to power	15
2.5.3 Connecting the control unit to the operating computer	15
2.5.4 Computer requirements	15
3 Accessories	17
3.1 Low temperature option	17
3.2 High temperature option	17
4 Software Installation and Configuration	19
4.1 Installing the software	19
4.2 Configuring the software	21

5	Operation and Measurement	25
5.1	Starting measurement	25
5.2	Averaging and exposure time	26
5.3	Measurement time and period	28
5.4	Waveband selection	29
5.5	Log and data files	30
5.5.1	Log file	30
5.5.2	Measurement data files	30
5.5.3	Calibration data file	32
6	Maintenance and Re-calibration	33
6.1	Weekly maintenance	33
6.2	Monthly maintenance	33
6.3	Yearly maintenance	33
6.4	Calibration	33
7	Specifications	35
7.1	Optical and electrical	35
7.2	Dimensions and weight	35
8	Trouble shooting	37
9	Customer Support	39



Using this table

Click on any item in the table of contents to be taken directly to the relevant page.

Click on the Kipp & Zonen logo at the bottom of any page to be taken back to the table of contents.

1. Introduction

Throughout this manual the following symbols are used to indicate to the user important information.



Danger electricity; warns of high voltage which can cause physical injury and/or damage to the equipment.



General warning about conditions, other than those caused by high voltage electricity, which may result in physical injury and/or damage to the equipment or cause the equipment to not operate correctly.

Note

Useful information for the user

1.1 Product overview

The PGS-100 Sun Photometer uses a solid state spectrometer with a CCD detector array to measure the direct solar radiation in the wavelength range from 350 nm (nanometers, 10^{-6} m) to 1050 nm.

The instrument consists of a radiometer, a control unit and connecting cables. Operating software is supplied on CD-ROM and must be running on a suitable computer in order for the instrument to make measurements and to store the spectral data. A computer is not part of the PGS-100 delivery.

The radiometer must be mounted on an automatic sun tracker in order to make measurements. A mounting kit is available for fitting the PGS-100 radiometer to a Kipp & Zonen sun tracker.

This manual provides information related to the installation, operation, maintenance, calibration, product specifications and applications of the sun photometer.

If any questions should remain, please contact your local Kipp & Zonen representative or e-mail the Kipp & Zonen customer and product support department at: support@kippzonen.com

Please go to www.kippzonen.com for information about other Kipp & Zonen products, or to check for any updates to this manual or software.

1.2 Manufacturer

The PGS-100 is sold and marketed by Kipp & Zonen and is manufactured by:

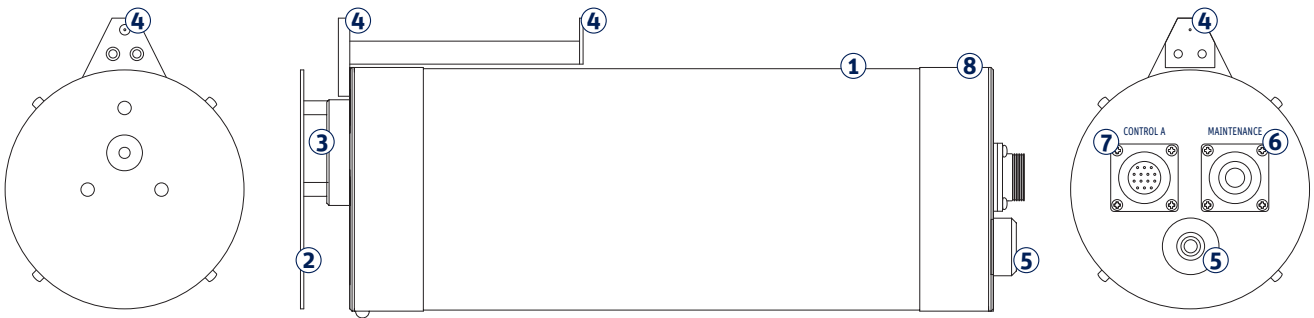
Prede Co. Ltd.
Sasamoto Building,
26-8-1 Kamidaira,
Fussa-shi,
Tokyo 197-0012
Japan
www.prede.com

1.3 Key parts of the PGS-100 Sun Photometer

1.3.1 The radiometer

The drawing below shows the key parts of the radiometer:

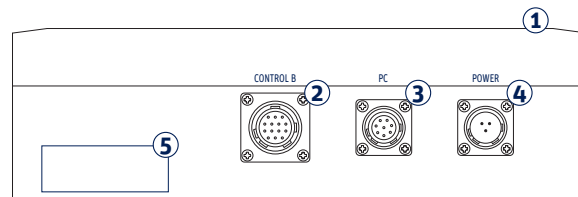
- ① Radiometer housing
- ② Sun shield
- ③ Optical input window
- ④ Alignment aid
- ⑤ Drying cartridge
- ⑥ 'MAINTENANCE' diagnostic socket (for factory service use only)
- ⑦ 'CONTROL A' socket for connection to the control unit
- ⑧ Serial number label



1.3.2 The control unit

The drawing below shows the key parts of the control unit:

- ① Control unit enclosure
- ② 'CONTROL B' socket for connection to the radiometer
- ③ 'PC' socket for connection to the operating computer
- ④ 'POWER' socket for connection to AC mains power
- ⑤ Serial number label



2. Installation

Please follow the instructions in this section carefully for the mechanical and electrical installation of the PGS-100 Sun Photometer.



Do not turn on power to the instrument until instructed to do so.

Note Do not connect the instrument to a computer until instructed to do so.

Note Do not turn on power to the operating computer until instructed to do so.

2.1 Included with the product

Check the contents of the shipment for completeness (see below) and note whether any damage has occurred during transport. If there is damage, a claim should be filed with the carrier immediately. In the case of damage and/or the contents are incomplete, contact your local Kipp & Zonen representative or e-mail the Kipp & Zonen customer and product support department at: support@kippzonen.com

The following items are included with the PGS-100 Sun Photometer:

- ① The radiometer
- ② The control unit
- ③ Connection cables
- ④ CD-ROM
- ⑤ Mounting rings

2.1.1 The radiometer

The radiometer contains the optical input system, solid state spectrometer with a CCD detector array, associated electronics and temperature stabilisation components. It has a white heat shield to reduce heating by direct solar radiation, an alignment aid for pointing the radiometer at the sun, and sockets for factory maintenance and the cable connection to the control unit. A drying cartridge is fitted to absorb internal moisture and to prevent internal condensation that would damage the spectrometer and optical system.

The radiometer is powered by low voltage supplied from the control unit.



2.1.2 The control unit

The control unit is contained in a weatherproof enclosure. It contains power supplies, control circuits for the radiometer temperature stabilization, interfaces to the radiometer and communication circuitry for a computer to operate the instrument.



2.1.3 Connection cables

Three cables are supplied with the PGS-100.

One is for connection between the radiometer and the control unit.

The second is for the supply of mains AC power to the control unit.

The third is for communication between the control unit and the operating computer.



2.1.4 CD-ROM

The CD-ROM disk contains the operating software for the PGS-100 and necessary setup files.



2.1.5 Mounting rings

The radiometer is normally supplied with two mounting rings that are used for fitting it to a Prede sun tracker. These are not required for fitting to a Kipp & Zonen sun tracker, with the PGS-100 Mounting Kit, and can be discarded.



Note A computer is not part of the PGS-100 delivery.

2.2 Tools required

The tools required to fit the PGS-100 radiometer to a Kipp & Zonen sun tracker are supplied with the PGS-100 Mounting Kit.

2.3 Location and support base

The location requirements are the same as for any instrument designed to be mounted on an automatic sun tracker for the measurement of direct solar radiation. The radiometer should have an unobstructed view of the sun throughout the complete solar arc at all times of the year.

The base support for the sun tracker must be rigid and stable and the alignment must be unaffected by weather and environmental effects. If this is not possible, the sun tracker must be fitted with an active tracking sun sensor to compensate for movements of the base support.

The field of view and slope angle of the PGS-100 radiometer input optics require that it must be aligned on the axis of the sun with a pointing accuracy of 0.2 ° or better.

The ambient operating temperature range of the PGS-100 is from -10 °C to +45 °C. For operation over the range from -30 °C to +45 °C the Low Temperature Option is required. For operation over the range from -10 °C to +60 °C the High Temperature Option is required. Please note that both options cannot be fitted at the same time.

2.4 Mounting

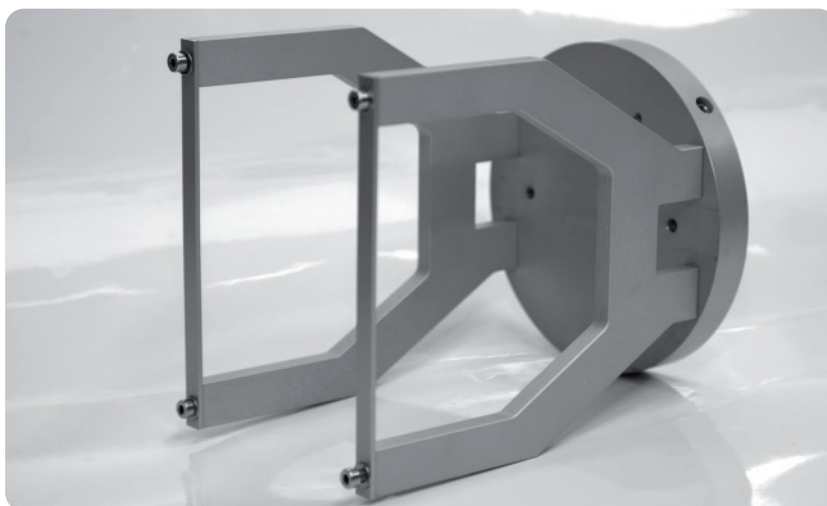
It is assumed that the PGS-100 radiometer is to be fitted to a Kipp & Zonen automatic sun tracker using the optional PGS-100 Mounting Kit.

2.4.1 Mounting rings

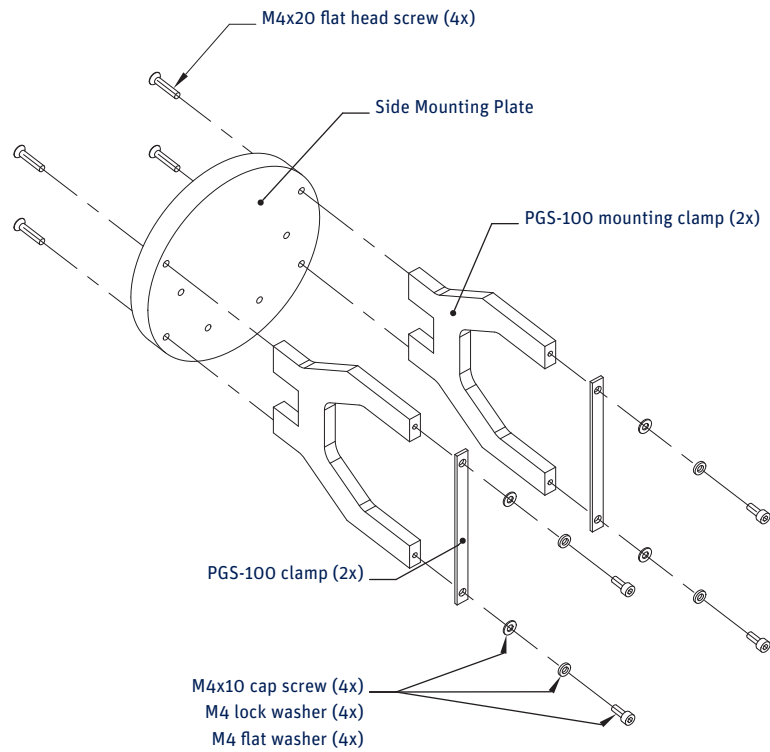
The radiometer is normally supplied with two mounting rings (shown in 2.1.5) that are used for fitting it to a Prede sun tracker. These are not required for fitting to a Kipp & Zonen sun tracker, with the PGS-100 Mounting Kit, and can be discarded.

2.4.2 PGS-100 mounting kit

The mounting kit comprises two brackets, clamps, and fixings; to be fitted to a side mounting plate of a Kipp & Zonen sun tracker. Depending upon the sun tracker configuration, a side mounting plate may also be required.



The components of the mounting kit are shown below (the side mounting plate is not included).



2.4.3 Fitting the PGS-100 radiometer

Fit the PGS-100 radiometer into the two mounting kit brackets with the connectors at the back and the alignment aid at the top. Secure the radiometer firmly with the two clamps such that it is centralised in the brackets, as shown below for a SOLYS 2 sun tracker (the side mounting plate is not included in the kit).



2.4.4 Alignment of the PGS-100 radiometer

Follow the sun tracker instructions for correct installation and setup.

Adjust the sun tracker and/or PGS-100 radiometer alignment such that sunlight will penetrate the first alignment hole and create a small spot of light around the second alignment hole.

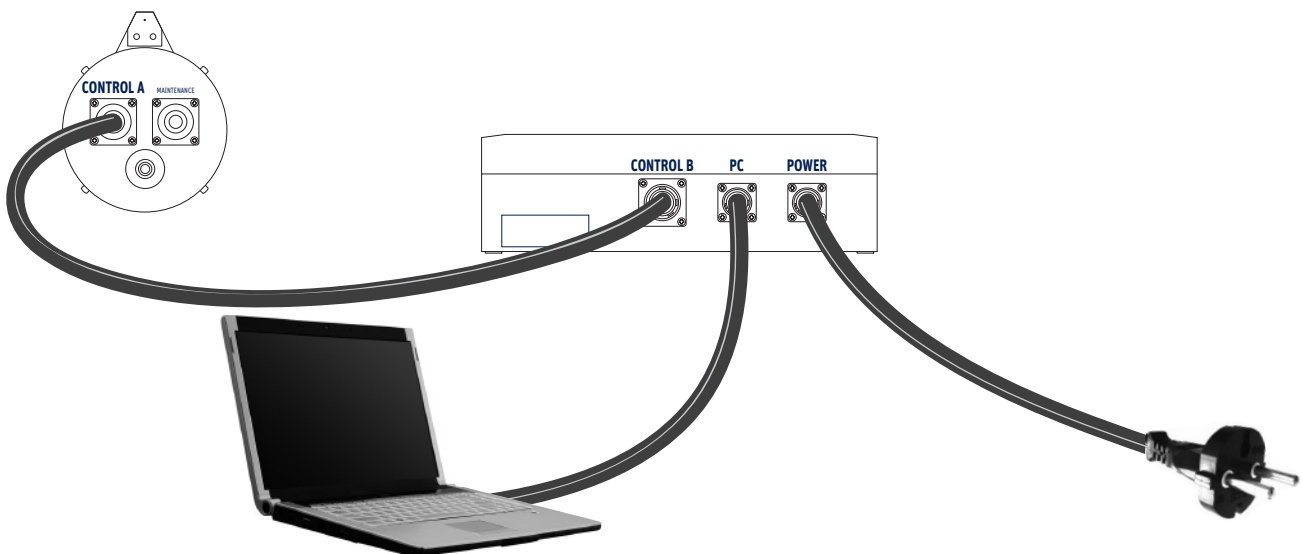
When the spot of light is fully covering the second alignment hole, the PGS-100 is correctly aligned.



2.5 Electrical connections

The plugs and sockets used in the PGS-100 are military-type circular locking connectors. Insert the plugs (they only fit in one orientation) and screw the locking rings finger-tight. Do not over-tighten the locking rings, this may damage the waterproof seals.

The electrical connection schematic drawing is shown below:



2.5.1 Connecting the radiometer to the control unit

Connect the cable with plugs labeled 'CONTROL A' and 'CONTROL B' to the radiometer socket 'CONTROL A' and the control unit socket 'CONTROL B'.

2.5.2 Connecting the control unit to power

Connect the cable labeled 'POWER' to the control unit socket 'POWER' and to the AC mains outlet.

The control unit can operate from 115 or 230 VAC, 50 Hz or 60 Hz, and has a maximum power consumption of 30 W.

If there is doubt about the quality or reliability of the AC mains power an Uninterruptable Power Supply (UPS) should be used for the computer and the PGS-100.



The PGS-100 power cable has a protective earth wire that must be connected to a secure ground point at the AC power outlet. This provides electrical safety, protection against lightning-induced damage (not direct strikes), and forms part of the EMC / RFI shielding.



Do not turn on power to the instrument at this point.

2.5.3 Connecting the control unit to the operating computer

Connect the cable labeled 'PC' to the control unit socket 'PC' and to the RS-232C serial port of the operating computer, or to a RS-232 to USB converter from a reputable manufacturer if a serial port is not available.

Note Ensure that any RS-232 to USB converter has the appropriate driver for the computer operating system installed, and is operating correctly.

2.5.4 Computer requirements

PGS-100 must be connected to a computer running the supplied operating software in order for the instrument to make measurements and to store the spectral data. A computer is not part of the PGS-100 delivery.

The operating software supplied with the PGS-100 has been developed to operate in a Windows™ 32-bit environment only. It will install in a 64-bit environment, but it will not communicate with the PGS-100. The software will operate correctly with Windows™ 2000, Windows™ XP and Windows™ 7, 32-bit versions. Use of any version of Windows™ Me or Windows™ Vista is unreliable and not recommended.

Normally the PGS-100 and its operating software are running continuously, 24 hours per day and 7 days per week. Therefore, it is recommended to use a desk-top computer designed for 24/7 operation, rather than a laptop computer.

The communication to and from the PGS-100 is by RS-232. Most desk-top computers have a 'legacy' serial port with screw-lock 9-pin connector and this is the preferred type of connection. If a RS-232 port is not available ensure that any RS-232 to USB converter has the appropriate driver for the computer operating system installed, and is operating correctly. Unbranded, generic, converters often exhibit communication problems.

The data files are not large, so processor speed and memory capacity of the computer are not important issues.

3. Accessories

There are two accessories available for the PGS-100 to extend the standard ambient operating, which is from -10 °C to +45 °C. Please note that both options cannot be fitted at the same time.

3.1 Low temperature option

For operation over the range from -30 °C to +45 °C the Low Temperature Option is required. This consists of an insulated cover for the radiometer. Fitting instructions are included with the option.

3.2 High temperature option

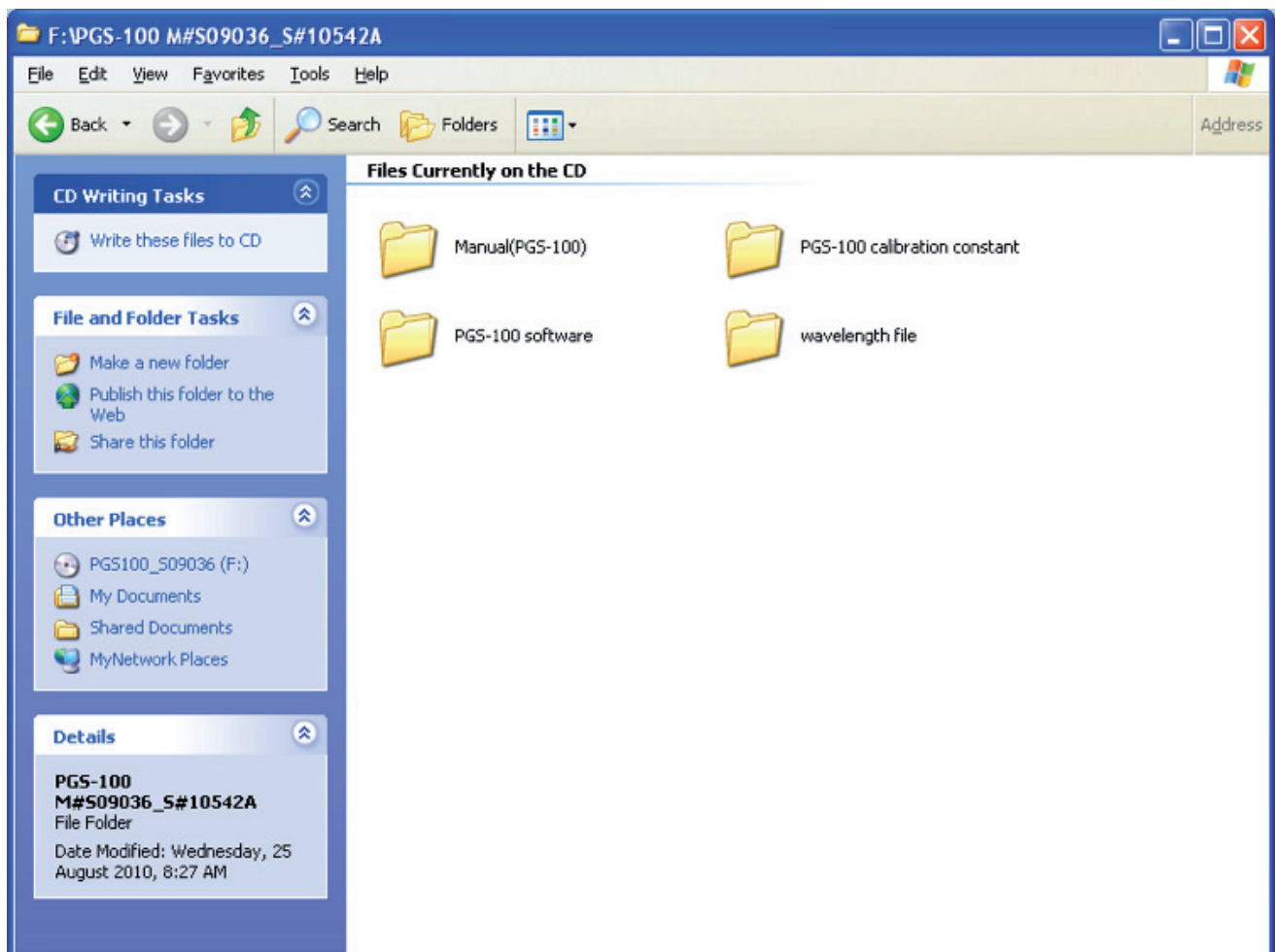
For operation over the range from -10 °C to +60 °C the High Temperature Option is required. This consists of reflective heat shields for the radiometer and a cooling ring which has liquid circulating through an AC mains powered chiller unit. Fitting and maintenance instructions are included with the option.

4. Software Installation and Configuration

The operating software for the PGS-100 Sun Photometer is supplied on a CD-ROM. The operating computer must be running on a 32-bit version of Windows™ XP or Windows™ 7.

4.1 Installing the software

1. Insert the supplied CD into the CD/DVD ROM drive of the operating computer. There will be a folder named 'PGS100' and with the serial number of the radiometer in the name.
2. Open this folder.



Note The manual in the folder is the original Prede version and not this Kipp & Zonen manual.

3. Open the PGS-100 software folder and browse through version, and setup_language folders until you reach the file 'setup.exe'.
4. Double click on 'setup.exe' to start installation of the software on your computer.
5. Press 'OK' at the first screen.
6. Press the large install button at the next screen. It is not recommended to change the installation directory to an external drive.
7. Press 'Continue' at the next screen. It is not recommended to change the Program Group.

A message will appear that the software was successfully installed.

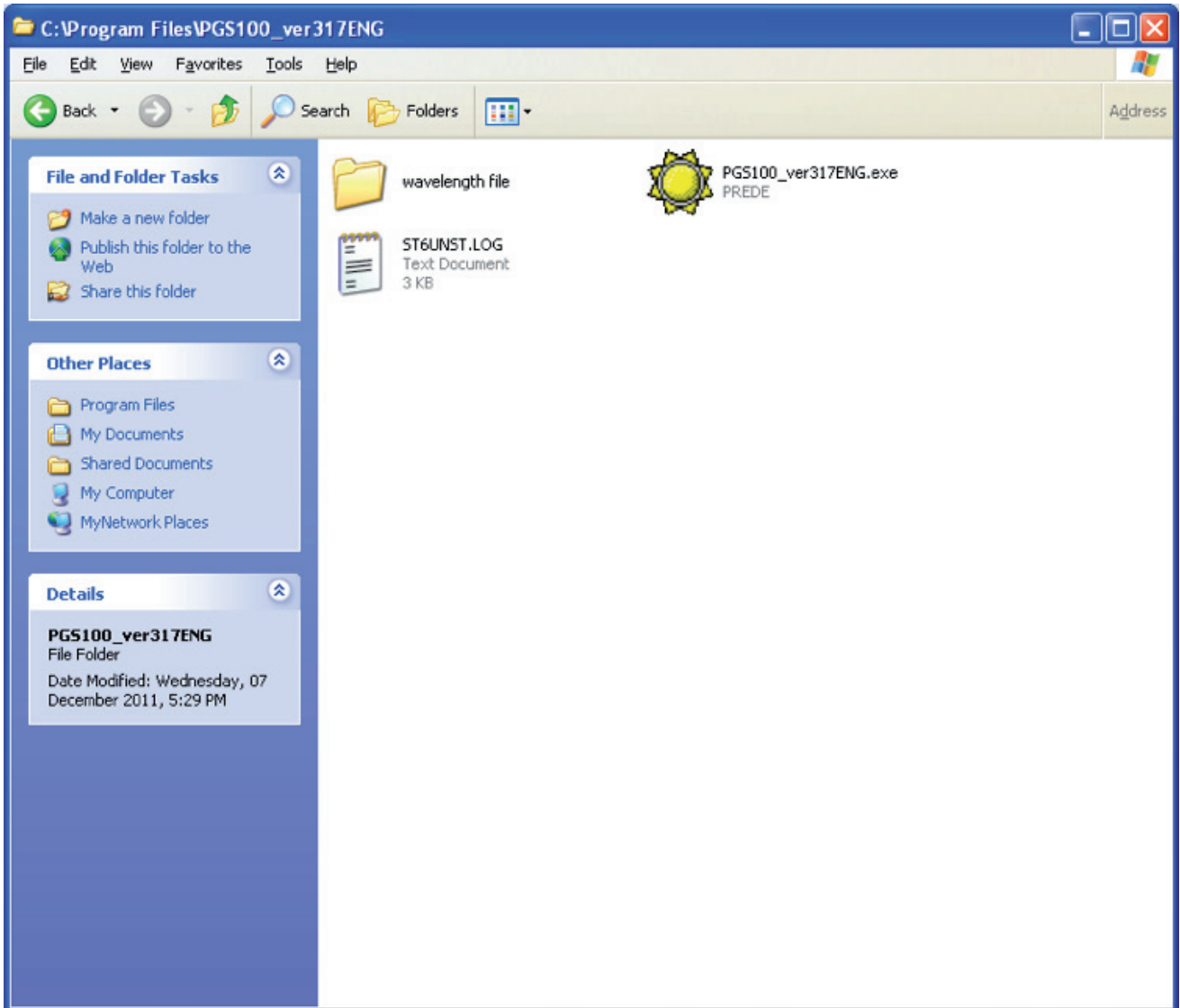
8. Press 'OK'.

Note Do not start the software yet.

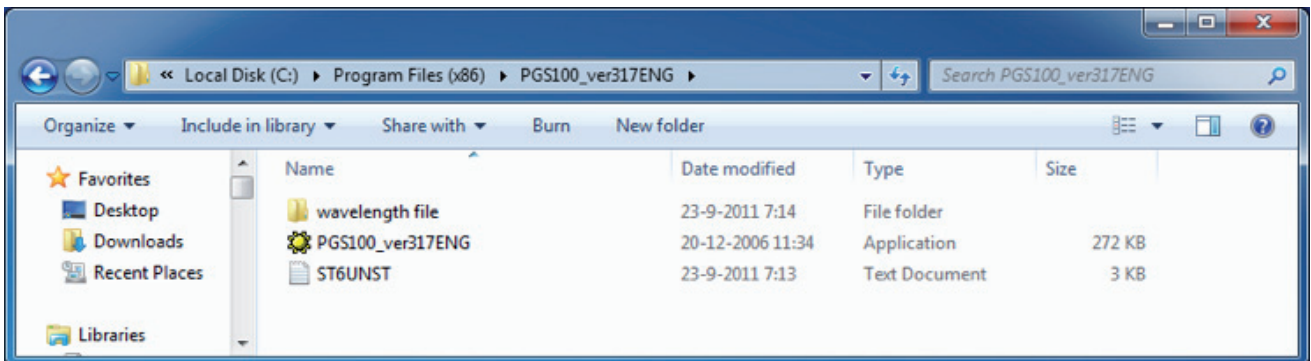
9. Browse the CD again and copy the folder 'wavelength file' into the installation directory.

The default location is c:\Program Files\PGS100_verxxxxxx

10. In Windows™ XP the folder should now look as below:



11. In Windows™ 7 the folder should now look as below:



12. Open the 'wavelength file' folder and check the name of the wavelength file. It should be a text file with no capital letters, for example '10542a.txt'

Note It is also recommended to copy the 'PGS-100 calibration constant' folder from the CD-ROM to this installation directory for future reference.

13. Remove the CD-ROM from the drive.

It is recommended to turn off the computer and then turn it on again to ensure that the software installation is complete.

14. Store the software CD-ROM in a safe place in case it is needed to reinstall the software, or use it on another computer, in the future.

4.2 Configuring the software

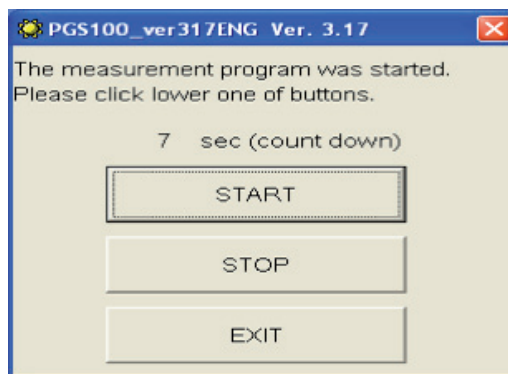
The operating software executable with the 'sun' symbol will now appear in the Start Menu in 'Programs'. This is 'PGS100_ver317ENG' in the example of 4.1 step 9. For ease of use it is recommended to make a shortcut to this application and place it on the desktop.

1. Double click on the executable and the program will start.

A message will pop up saying 'A wavelength file does not exist' - this is normal because the software is not configured yet.

2. Press 'OK'. The screen shown below will appear.

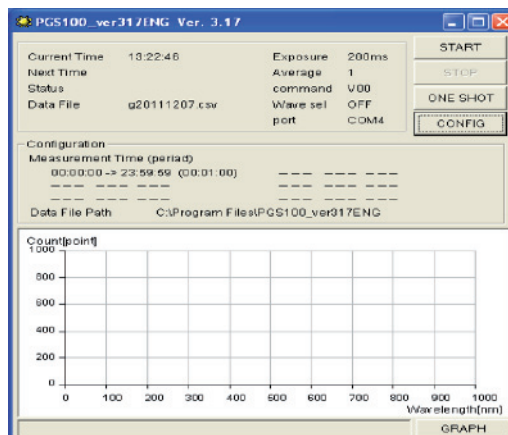
3. **Press the 'STOP' button before the count down reaches 0 seconds.**



Pressing the 'START' button or waiting for the countdown to time out will start measurement according to the configuration settings (not done yet). Pressing 'EXIT' will close the program.

A message will pop up saying 'Serial port COM1. It cannot open' - this is normal because the software is not configured yet.

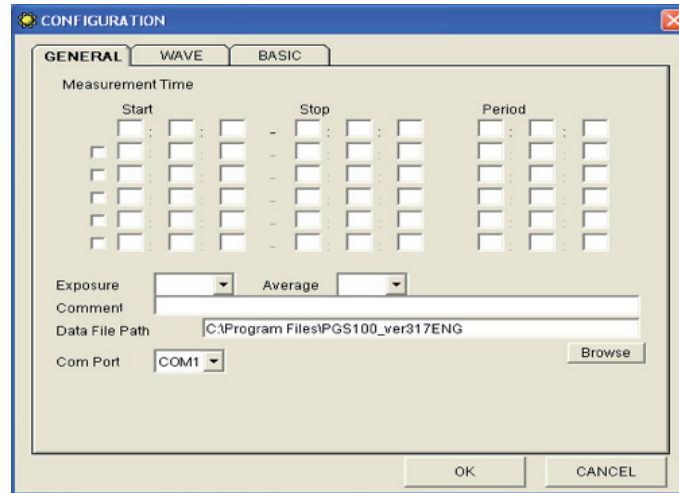
4. Press 'OK'. Now the main screen will appear.



On this screen you can see information of the time, status, and some other settings that are currently active. The 'START' button will activate timed measurements according to the predefined settings (not done yet), the 'STOP' button will only be active after the measurement has started. The 'ONE SHOT' button activate a single instantaneous measurement. The 'CONFIG' button opens the configuration screen of the software.

The lower half of the screen shows an overview of the measurement periods and the graphical display of the last measurement.

5. Press the 'CONFIG' button to open the screen below.



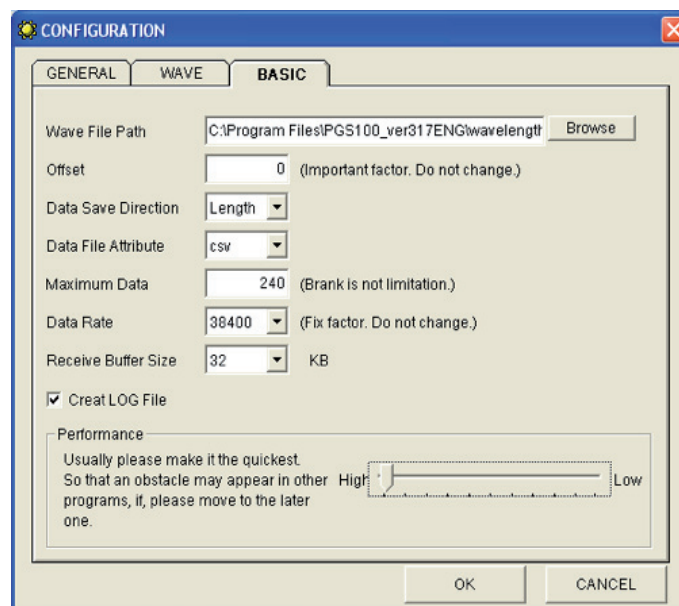
6. Set the Exposure time to 200 ms and the Average to 1, in order to get started.

A Comment can be added, for example the instrument location. Do not change the Data File Path at this time.

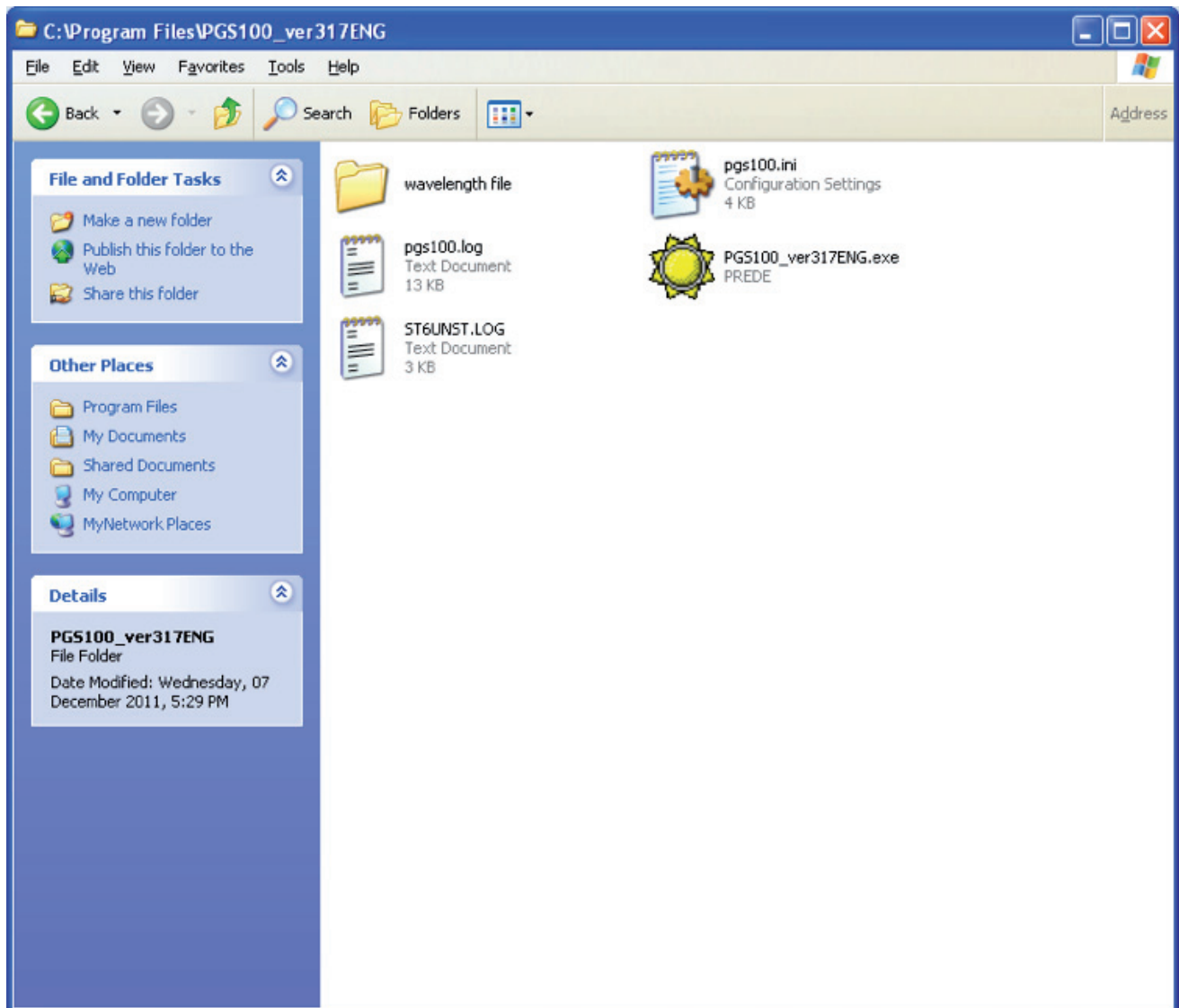
7. Select the appropriate COM Port number to suit the RS 232 or USB connection to the PGS-100.

8. Select the 'WAVE' tab. All the fields should be empty.

9. Select the 'BASIC' tab. And configure the settings as shown below.



10. For the Wave File Path, browse to the installation directory into which you copied the folder 'wavelength file'. The default location is c:\Program Files\PGS100_verxxxxx.



11. Select the 'wavelength file' folder, and click on 'Open'.

12. Select the 'txt' file, and click on 'Open'. The location will now appear as the Wave File Path.

13. For Offset the default value is '27'. This only applies to older PGS-100 radiometers. Change this to '0'.

14. Select 'Length', for the Data Save Direction. If 'Width' is used, some spreadsheets may run out of columns.

15. Select 'csv', for the Data File Attribute, to easily export the data to spreadsheets.

16. Enter '240', for Maximum Data.

When the number of measurements exceeds 240 a new file will be created. If the field is left empty (blank) the number of measurements is not limited and a new file will be created each day at midnight.

17. The default Data Rate is 19200 baud. However, for some of the faster modern computers this rate (and 9600 baud) is too slow for reliable communication. It is recommended to select 38400 baud.

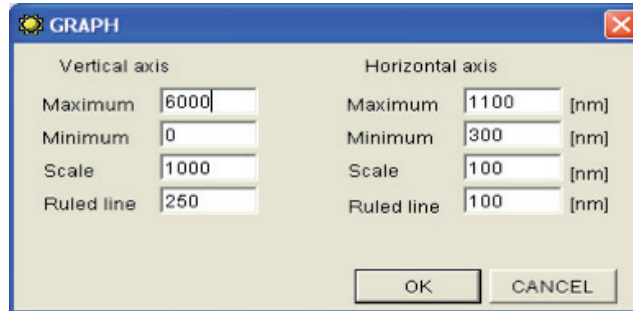
18. The Receive Buffer Size can remain at 32 KB.

19. Move the Performance slider to the highest setting. This is not a problem for modern computers.

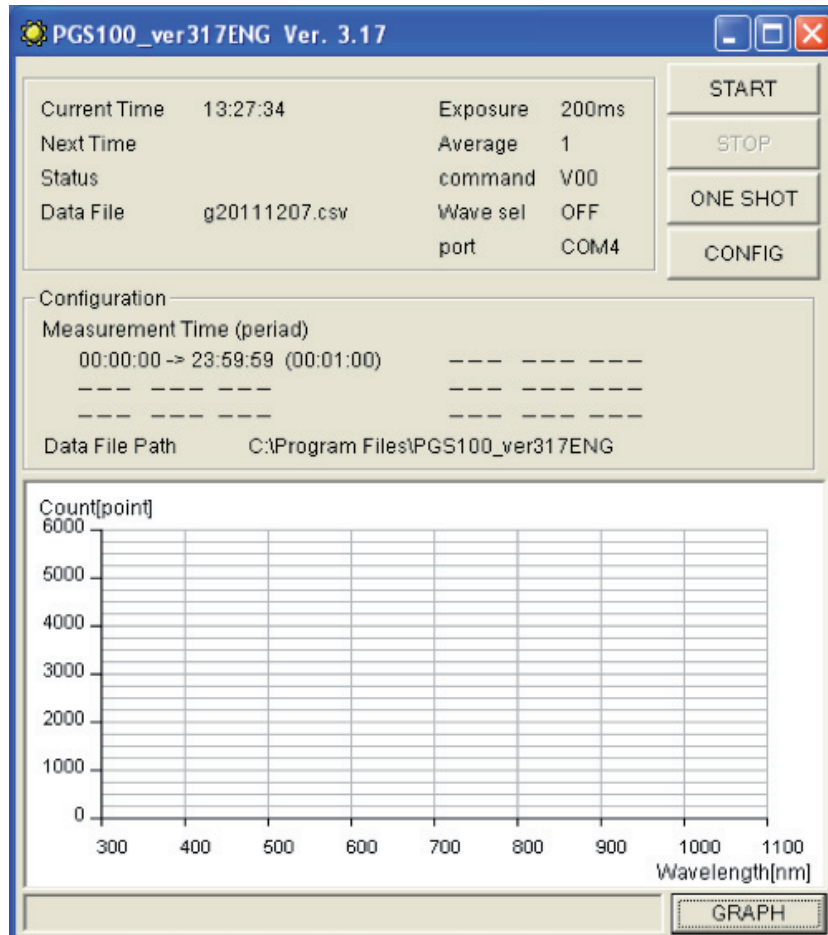
The screen should now look as in step 9.

20. Press the 'OK' button. The main screen will appear showing the modified settings.

21. Press the 'GRAPH' button and change the settings as below. These should be sufficient to start measurements with direct sunlight, the graph can be rescaled later, if necessary.



22. Press 'OK'. The main screen will appear as below.



The default Measurement Time will configure as from midnight to midnight each day and with a Measurement Period (interval) of 1 minute.

The software is now fully configured and the program should be closed.

5. Operation and Measurement

The radiometer of the PGS-100 is temperature controlled at $+35\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ to maintain the wavelength stability and the sensitivity of the detector in the spectrometer. Therefore, the PGS-100 should normally be continuously switched on to avoid a warm-up time before the control temperature is reached.

The operating software can be started and stopped with the PGS-100 switched on and connected to the computer. The software can be started first and then the PGS-100 switched on, but there may be a warm-up time before full accuracy is achieved, as mentioned above.

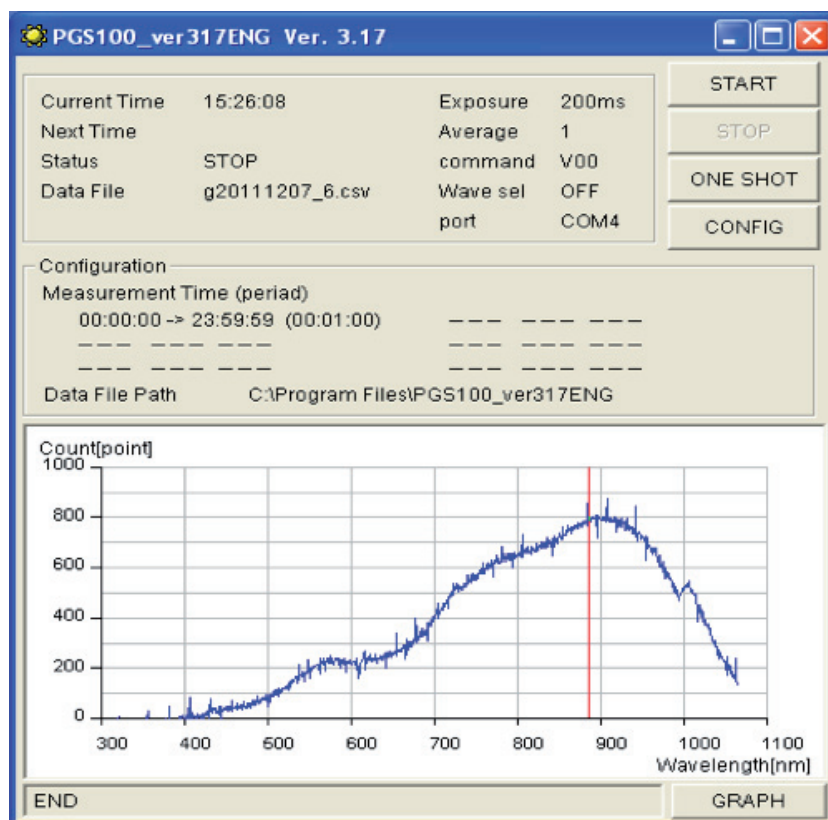
Note Turning the PGS-100 off, or disconnecting the 'PC' cable, whilst the software is running may cause the hardware and/or software communication drivers to hang up. In this case it will be necessary to restart the software and maybe also to restart the computer. Close the software before turning off the PGS-100 or disconnecting the 'PC' cable.

5.1 Starting measurement

As mentioned previously the PGS-100 should be already switched on and warmed up.

1. Start the software.
2. In the opening screen, either press the 'START' button or wait for the 10 second timer to count down to 0 seconds.

The main screen will appear showing the time to the next measurement. At that time the PGS-100 will make a measurement and the result will be displayed on the graph as shown below (the example spectrum is for a tungsten-halogen lamp) and stored to the computer disk. The intensity of the radiation received is given in 'Counts'. These are arbitrary units, the measured spectrum shows the relative intensity of the radiation received at different wavelengths.



A second, small, window opens after each measurement showing the main parameters, including the radiometer internal temperature and the current cursor position.

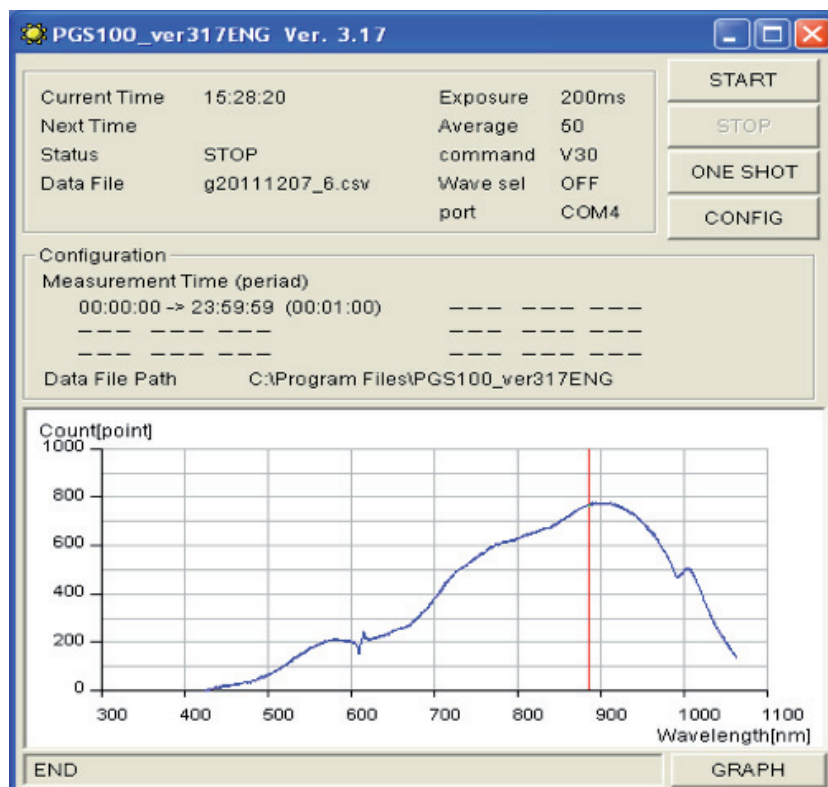
Data information CH 1	
DATE	2011/12/7
TIME	15:26:00
Exposure	200 ms
Average	1 time
temp	34 deg
wavelengt	884.9 nm
count	793 point

The graph can be rescaled to suit the current conditions without affecting the data that is stored. The graph only displays the last measurement. The red cursor line can be moved using the mouse pointer to any point on the x-axis and the corresponding wavelength and intensity can be read in the small window.

Each time the radiometer makes a measurement a 'click' can be heard. This is the exposure shutter operating, as in a camera.

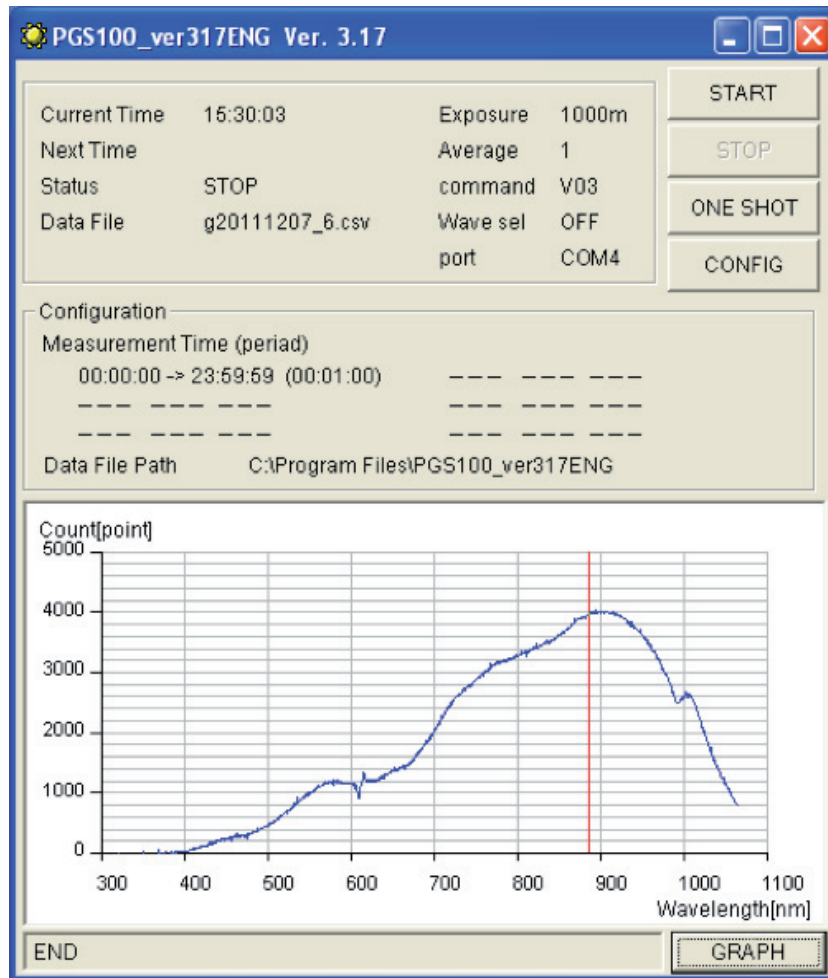
5.2 Averaging and exposure time

As can be seen in 5.1 step 2, when the light intensity is low and a short exposure time is used (200 ms) with a single measurement the result can be quite noisy. In the 'GENERAL' configuration window the number of 'shots' to be averaged can be selected. The screenshot below shows the effect of averaging 50 shots of 200 ms exposure.



The intensity is not affected, but the noise is significantly reduced. However, when measuring natural sunlight, if too many averages are made the atmospheric conditions may be changing during the process.

It is also possible to alter the exposure time. This will, of course allow more light into the spectrometer and increase the measured intensity and also reduce noise, as shown below.

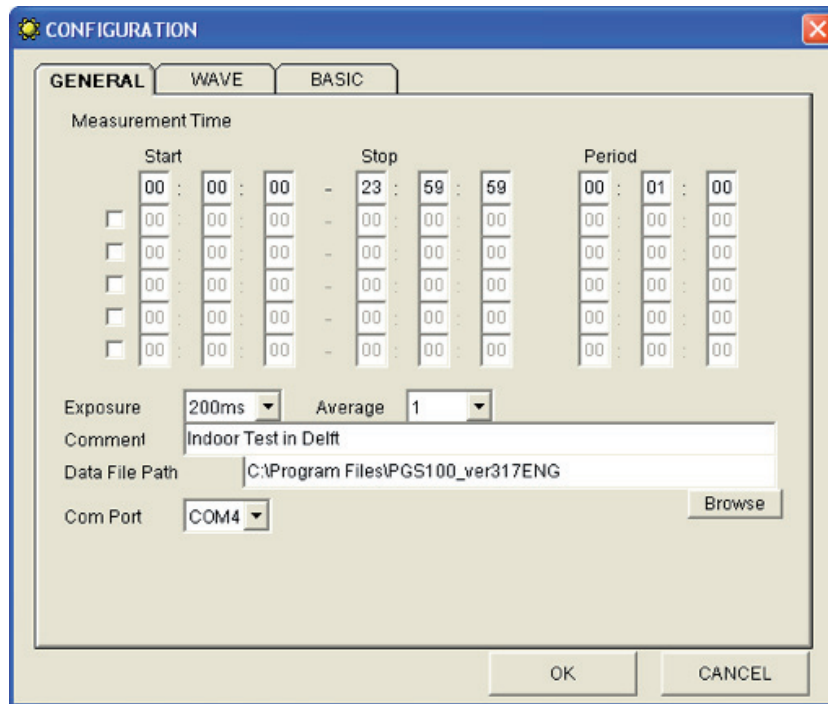


To stay within the linear range of the detector array, the number of counts should not exceed 10000.

5.3 Measurement time and period

The default Measurement Time will configure as from midnight to midnight each day and with a Measurement Period (interval) of 1 minute. However, this can be changed in the 'GENERAL' configuration window.

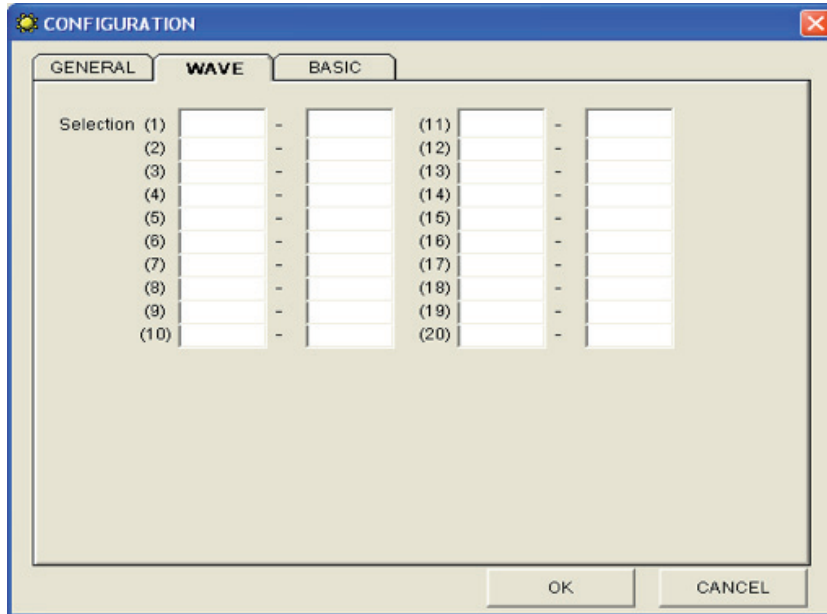
Up to six Measurement Times can be set with Start and Stop in hours, minutes and seconds. These must follow in chronological sequence and must not overlap (allow sufficient time for any averaging of the final measurements to be completed). Each of these Times can have its own Measurement Period in hours, minutes and seconds and each can be activated or deactivated by ticking or un-ticking the associated box to the left.



5.4 Waveband selection

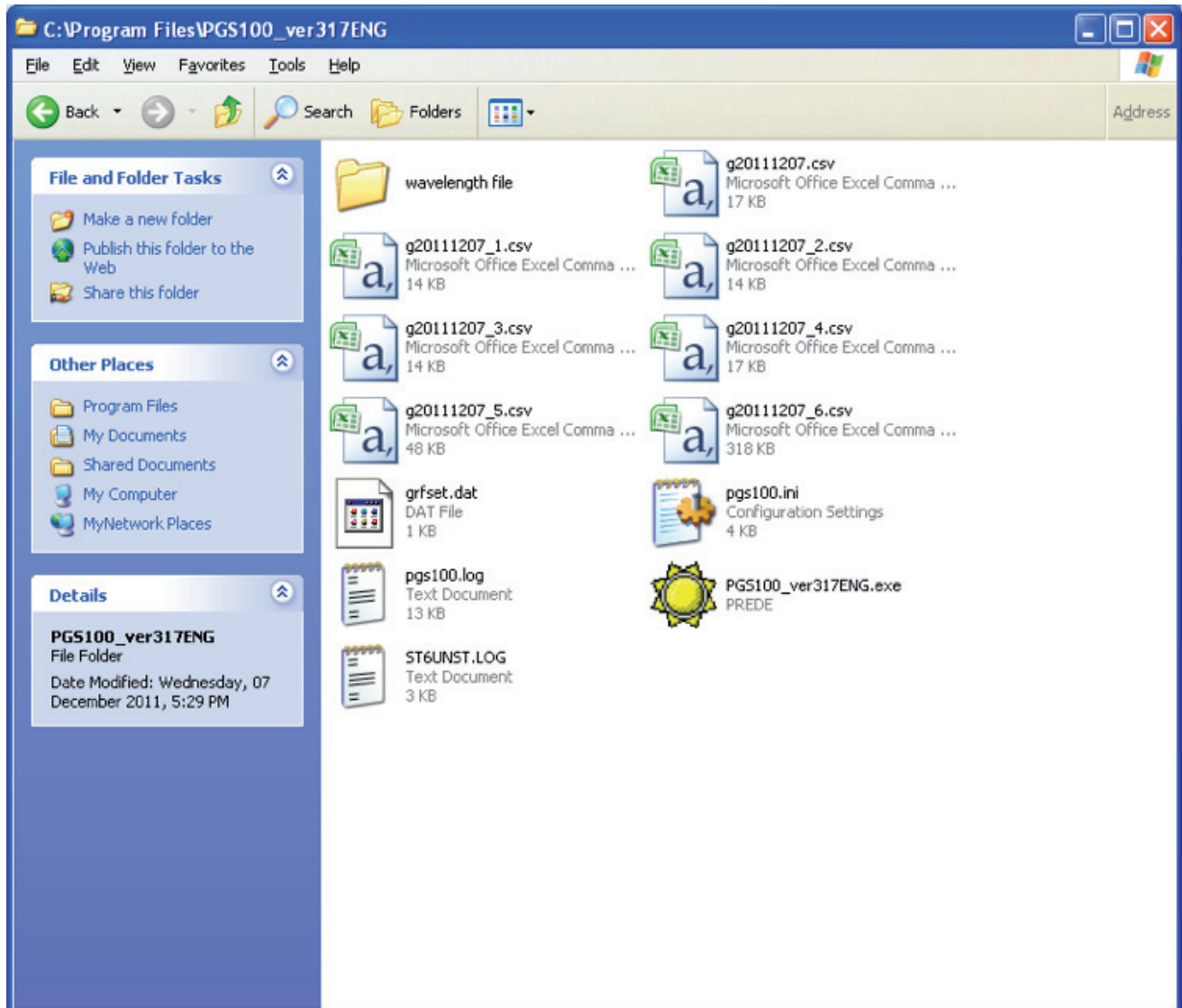
By default the 'WAVE' configuration window is left empty and the complete spectrum is saved for each measurement. As disk capacity is not a problem with modern computers it is usually best to use this default setting.

However, it is possible to select up to 20 wavebands and only the data within these bands will be stored. These wavebands must follow in sequence from short to long wavelengths and must not overlap.



5.5 Log and data files

The data and log files are stored in the installation directory, the default location is c:\Program Files\PGS100_verxxxxxx.



5.5.1 Log file

The pgs100.log file is in text format and lists when measurements were made and when the software was started and stopped.

5.5.2 Measurement data files

The files are identified by date (year, month, day) and format. When there is more than one file for a day there is an extension number '_n'.

It is recommended that these files are backed up regularly.

An example of a data file for a 'ONE SHOT' measurement is shown below, with 'comment' as the header, the main settings listed, and the intensity counts at each wavelength. During continuous operation an additional column is created for each measurement.

Indoor Test in Delft	
Date	07/12/2011
Time	14:19:36
Exposure time	200
Number of times of an average	1
Temperature	34
Wavelength	
318.193	4
318.949	-35
319.704	-9
320.460	-27
321.216	-17
...	...
...	...
...	...
912.602	823
913.310	889
914.018	801
914.726	829
915.433	813
916.141	804
916.849	812
917.556	805
918.264	815
918.971	805
919.678	799
920.385	819
921.092	805
...	...
...	...
...	...
1059.393	175
1060.075	165
1060.757	162
1061.439	156
1062.120	163
1062.802	164
1063.483	130
1064.165	162

5.5.3 Calibration data file

The CD-ROM contains a folder named 'PGS-100 calibration constant'. In this folder is an excel file containing the calibration information for the specific PGS-100 radiometer (the serial number is in the file name).

This 'Calibration Constant' file gives the sensitivity of the radiometer at each wavelength in the range from just below 350 nm to just beyond 1050 nm. The sensitivity is in units of $W/m^2/\mu m/Count$ and can be used to convert the 'counts' in the measured data file into the direct solar irradiance in $W/m^2/\mu m$.

Note There is no software for analysis of the data recorded from the PGS-100 Sun Photometer. It is for the user to perform data analysis to suit their particular application.

Because of the narrow field of view it is very difficult to calibrate instruments such as the PGS-100 Sun Photometer in a laboratory. They are best calibrated outdoors against a reference spectro-radiometer, at close to solar noon on a clear day with low aerosol content in the atmosphere.

A new PGS-100 is calibrated on the roof of the Prede Co. Ltd. Facility in Tokyo, by comparison to a reference PGS-100 which has been calibrated either at the NOAA Mauna Loa Observatory in Hawaii or at the National Renewable Energy Laboratory (NREL) in Golden, Colorado.

6. Maintenance and Re-calibration

The PGS-100 is simple to maintain and does not require any special tools or training. There are no service items requiring scheduled replacement.

6.1 Weekly maintenance

Clean the optical window at the front of the radiometer using pure alcohol or distilled water and a lint-free cloth. Ensure that no smears or deposits are left on the window.

Check the alignment of the radiometer to the sun, and adjust if necessary (refer the sun tracker manual).

6.2 Monthly maintenance

Check the desiccant in the drying cartridge on the rear of the radiometer. This is a self-indicating silica-gel. When it requires replacement the colour changes from blue to pink, or from orange to clear (depending upon the type used).

Note The blue type of silica gel contains Cobalt salts and it is not allowed to be used in the European Union under health and environmental legislation.

To replace the desiccant unscrew the cartridge from the radiometer housing, remove the cap in the end of the tube and safely dispose of the used silica-gel. Refill with fresh desiccant, replace the end cap in the tube. Make sure that the o-ring seal and its seat in the housing are clean. Screw in the drying cartridge hand-tight only to avoid distorting the o-ring seal.

6.3 Yearly maintenance

Check all the electrical connections. Unscrew the plugs, clean the contacts if necessary and then reconnect.

Check cables for damage caused by accident or by rodents.

Check the instrument mountings and any base supports are secure.

6.4 Calibration

The PGS-100 is a very stable instrument. However, a re-calibration is recommended every two years. The calibration method is outlined in section 5.5.3 and it is unlikely that the user has the necessary reference equipment to perform a calibration.

Therefore, it is usually necessary to return the PGS-100 to the Prede Co. Ltd. Factory in Tokyo for re-calibration, or to another facility with suitable reference equipment.

7. Specifications

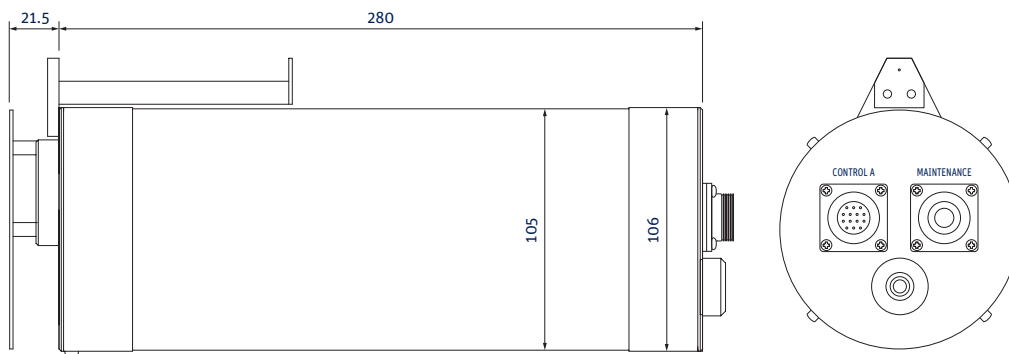
Kipp & Zonen and the manufacturer, Prede Co. Ltd., reserve the right to make changes to specifications and other product documentation without prior notice.

7.1 Optical and electrical

Detector	Silicon CCD array, 2048 elements
Minimum exposure time	200 ms
Nominal wavelength range	350 nm to 1050 nm
Slit width	100 μ m
Wavelength accuracy	\pm 0.5 nm
Half-power bandwidth	3.6 nm
Full opening view angle	2 °
Slope angle	0.5 °
Supply voltage:	115/230 VAC, 50/60 Hz
Maximum power consumption	30 W
Operating temperature range	- 10 °C to + 45 °C - 30 °C to + 45 °C with low temperature option - 10 °C to + 60 °C with high temperature option
Radiometer stabilization temperature	+ 35 °C \pm 2 °C
Communication	RS-232C serial

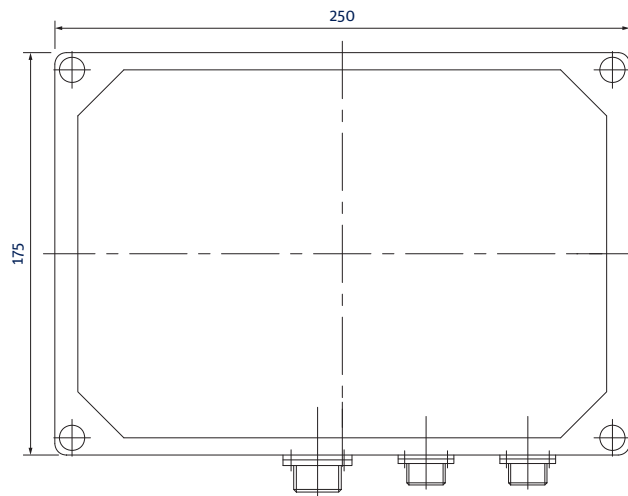
7.2 Dimensions and weight

Drawing of radiometer (in mm).

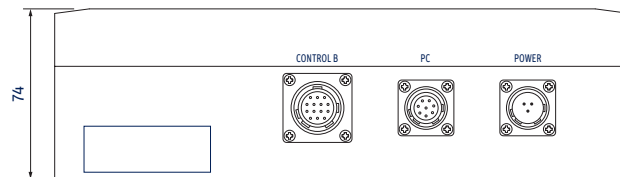


Weight: 2.5 kg

Drawing of control unit (in mm).



Weight: 1.5 kg



8. Trouble shooting



There are no user-serviceable parts within the radiometer and it must not be opened without the agreement and instruction of Kipp & Zonen or Prede Co. Ltd.



The control unit is AC mains powered and therefore contains a risk of shock if opened. The control unit must not be opened without the agreement and instruction of Kipp & Zonen or Prede Co. Ltd.

Most problems with the PGS-100 Sun Photometer after a successful installation are related to communication problems between the instrument and the computer, often due to power interruptions or disconnecting cables whilst the operating software is running.

If this occurs, check that the port number is still correct. Close the software and turn off the computer. Turn off the power to the PGS-100 and disconnect the 'PC' cable.

Reconnect the 'PC' cable and turn on the power to the PGS-100. Wait a few minutes and turn on the computer. Restart the operating software.

In an extreme, but unlikely, case it may be necessary to reinstall the operating software. Back up all the measurement data files before reinstallation.

If the measured radiation intensity appears to be low for the prevailing conditions check that the optical window is clean and check the alignment of the radiometer to the sun, and adjust if necessary.

If the measured radiation intensity is close to zero and radiation is available, check that the radiometer shutter is operating. The shutter should make a 'click' when it operates. For help regarding this, or other problems, please contact Kipp & Zonen customer support.

9. Customer Support

If you require any support for your Kipp & Zonen product please contact your local representative in the first instance. The information can be found in the 'Contact' section of our website at <http://www.kippzonen.com/?page/74152/Contact.aspx>

Alternatively, you can contact us directly at www.kippzonen.com/support

Please include the following information:

- Instrument model
- Instrument serial number
- Details of the fault or problem
- Examples of data and log files
- Latest valid calibration file
- Computer type and operating system
- Interfaces, power supplies and sun tracker used in the installation
- History of any previous repairs or modifications
- Pictures of the installation and site
- Overview of the local environment conditions

Kipp & Zonen guarantees that your information will not be shared with other organisations.



**KIPP &
ZONEN**
SINCE 1830

Our customer support remains at your disposal for any maintenance or repair, calibration, supplies and spares.

Für Servicearbeiten und Kalibrierung, Verbrauchsmaterial und Ersatzteile steht Ihnen unsere Customer Support Abteilung zur Verfügung.

Notre service 'Support Clientèle' reste à votre entière disposition pour tout problème de maintenance, réparation ou d'étalonnage ainsi que pour les accessoires et pièces de rechange.

Nuestro servicio de atención al cliente esta a su disposición para cualquier actuación de mantenimiento, reparación, calibración y suministro de repuestos.

HEAD OFFICE

Kipp & Zonen B.V.

Delftechpark 36, 2628 XH Delft
P.O. Box 507, 2600 AM Delft
The Netherlands

T: +31 (0) 15 2755 210
F: +31 (0) 15 2620 351
info@kippzonen.com

SALES OFFICES

Kipp & Zonen France S.A.R.L.

88 Avenue de l'Europe
77184 Emerainville
France

T: +33 (0) 1 64 02 50 28
F: +33 (0) 1 64 02 50 29
kipp.france@kippzonen.com

Kipp & Zonen Asia Pacific Pte. Ltd.

10 Ubi Crescent Lobby E
#02-93 Ubi Techpark
Singapore 408564

T: +65 (0) 6748 4700
F: +65 (0) 6748 6098
kipp.singapore@kippzonen.com

Kipp & Zonen USA Inc.

125 Wilbur Place
Bohemia
NY 11716
United States of America

T: +1 (0) 631 589 2065
F: +1 (0) 631 589 2068
kipp.usa@kippzonen.com

Go to www.kippzonen.com for your local distributor or contact your local sales office

Passion for Precision