

UV Visible Spectrophotometer

SP-UV1000 SCI-UV1000
SP-V1000 SCI-V1000
SP-V1100 SCI-V1100
SP-UV1100 SCI-UV1100
SP-UV3101 SCI-3101UV
SP-UV2102 SCI-2102UV
SP-UV3102 SCI-3102UV
SP-UV2101 SCI-2101UV
SP-XUV5102 SCI-5102XUV
SP-XUV5101 SCI-5101XUV

User Manual

Table of Contents

Introduction	3
I. Safety	3
II. About the device.....	3
III. Description of related symbols	3
Chapter 1. Overview	2
I. Instrument rationale and structure	2
II. Key technical indicators	3
III. Key functions	3
Chapter 2. Instrument Installation	4
I. Environmental requirements.....	4
II. Check supply voltage	5
III. Installation.....	5
Chapter 3. Instrument Description.....	6
I. Instrument description	6
II. Operating panel	7
III. Key description	7
Chapter 4. Instrument Use	7
I. Software system.....	7
II. Basic operations	8
1. Measurement mode selection	8
2. Wavelength Setting	8
3. Parameter Setting	8
4. Delete the measurement results and stored data.....	9
5. Calibrating 100% T/0Abs	9
6. Measuring samples	9
7. Measurement results printing	9
III. Preparations before measurement	10
1. Power-ON self-test	10
2. Preheating	10
3. Confirm colorimeter cell	11
IV. Measurement.....	11
1. Photometric measurement	11
2. Quantitative measurement	13
V. System Setting.....	18
1. Measurement mode	19
2. Turn ON and OFF the deuterium lamp.....	19
3. Turn ON and OFF the tungsten lamp	19
4. Dark Current Calibration	20
5. Wavelength calibration.....	20
6. Version information.....	21
7. Export data to USB.....	21
8. Date and Time Setting	21

Introduction

I. Safety

The instrument design complies with the safety specifications set forth by the National Standard of the People's Republic of China GB4793.1-2007/IEC61010-1:2001 (i.e., Safety Requirements for Measuring, Control and Lab Electrical Equipment: Part 1) and the National Standard of the People's Republic of China GB9706.1-2007/IEC60601-1:21988) (i.e., Medical Electrical Equipment: Part 1).

II. About the device

SP-UV1000/SP-V1000 serial model visible spectrophotometer is an electronic laboratory testing equipment.

- ☐ Instrument use mode:
Intermittent use
- ☐ Presence or absence of overvoltage (current): No
- ☐ Class of pollution:
2

III. Description of related symbols



General Warning, danger



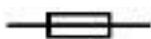
Warning, electricity hazard



Warning, hot surface



Mandatory, Connect an earth terminal to the ground



Fuse



Crossed out recycle bin, this device is to be recycled by the designated electronic equipment disposal department or vendor after use.

Chapter 1. Overview

SP-UV1000/SP-V1000 visible spectrophotometer is characterized by wide wavelength range, high sensitivity, powerful functions, ease of use, simple structure and acceptable appearance, especially the application of large-screen LCD, high-precision A/D converter and nonvolatile memory, which makes the instrument uniquely advantageous among the products of the same grade and widely applicable chemical, pharmaceutical, biochemical, metallurgical, light industry, textile, materials, environmental protection, medical assay and education industries, as one of the important quality control instruments in the analytical testing industries and an essential instrument in conventional labs.

I. Instrument rationale and structure

The rationale of spectrophotometric analysis involves using the selective absorption of light of different wavelengths by samples to perform qualitative and quantitative analysis of the samples and judging the structure and chemical composition of substances through analysis of absorption spectrum.

This instrument works on the principle of relative measurement, i.e., selecting a certain solvent (distilled water, air or test sample) as the reference solution and setting its transmittance (i.e., transmission rate T) as 100%, while the transmittance of the testing sample is derived with reference solution as reference standard. The changes in transmittance (transmission rate T) will have a certain functional relation with the concentration of the test sample and it complies with the Lambert-Beer's Law within a certain range.

$$T=I/I_0$$

$$A=KCL=-\log I/I_0$$

Wherein T transmittance (transmission rate)

C solution concentration

K absorption coefficient of solution

L length of liquid layer in light path

I intensity of light irradiated on the photoelectric converter through tested sample

I_0 intensity of light irradiated on the photoelectric converter through reference test sample.

SP-UV1000/SP-V1000 ultraviolet/visible spectrophotometer is a domestically leading new-generation UV-VIS spectrophotometer. These are developed based on this rationale, in conjunction with the modern precision optics, the latest microelectronics and other high-end new technologies.

II. Key technical indicators

SP-UV1000/SP-V1000 serial model key technical indicators are as follows:

Item	UV Visible Spectrophotometer
Wavelength range	325~1000nm
Photometric range	-0.3~3Abs
Spectrum bandwidth	4nm (2nm alternative)
Wavelength accuracy	$\pm 1\text{nm}$
Wavelength repeatability	$\leq 0.2\text{nm}$
Photometric accuracy	$\pm 0.5\%T(0\sim 100\%T)$
Photometric repeatability	$\leq 0.2\%T(0\sim 100\%T)$
Stray light	$\leq 0.2\%T@360\text{nm}$
Baseline drift	0.002A/h@500nm (preheated for 1hour)
Display	128×64 dot-matrix graphic LCD
Data output	USB, parallel port
Overall dimensions	490mm×360mm×210mm
Weight	12kg

III. Key functions

SP-UV1000/SP-V1000 serial model visible spectrophotometer has three major functions.

■ Photometric measurement

The measurement modes are switchable (absorbance, transmission rate and energy) and the measurement results (up to 200 groups) can be saved in the instrument's memory and printed.

■ **Quantitative measurement**

Standard curve can be established using either coefficient method or standard sample calibration method, and the regression equation (up to 200 groups) and measurement results (up to 200 groups) can be saved in the instrument's memory or printed.

■ **System application**

Turn ON and OFF deuterium and tungsten lamps, calibrate dark current, calibrate wavelength, export data and select measurement mode and restore factory settings.

Chapter 2. Instrument Installation

I. Environmental requirements

SP-UV1000/SP-V1000 serial model visible spectrophotometer is designed in response to the effects of environmental factors on the instrument. To ensure normal operation of the instrument and achieve an extended service life, check installation environment condition before installation.

The environmental requirements that ensure normal operation of the instrument are as follows:

■ **Avoid high-temperature and high-humidity environments**

The instrument shall be installed away from high-temperature and high-humidity environments. The instrument shall be used at 16~35℃ and 45-80% RH.

■ **Keep the instrument away from outside magnetic field interferences**

Ensure to place the instrument away from magnetic/ electric field and high-frequency waves emitting electronic devices as much as possible.

■ **Keep the instrument away from corrosive gases**

Please don't install the instrument in the presence of corrosive gases such as chlorine, hydrochloric acid gas, hydrogen sulfide gas and sulfurous acid gas in air significantly exceeds the applicable standards.

■ **Instrument must be placed on a steady surface**

Place the instrument on a steady and vibration free surface. The instrument's fan should be sufficient to allow it vent smoothly.

■ **Supply voltage**

The power supply for normal operation of the instrument is AC 220±22V@50±1Hz or 110±11V@60±1 Hz.

■ **Power supply must be well grounded**

The instrument should preferably use a standalone power socket and the power supply should be well grounded in order to prevent abnormal operation of the instrument.

■ **Regulated power supply**

When the local voltage is unstable, please equip the instrument with regulated power supply.

■ **Instrument should be protected from direct sunlight.**

■ **Maintain dust-free environment.**

II. Check supply voltage



Ensure to check the supply voltage before installation, in order to avoid damages to the instrument.

Supply voltage varies greatly from one country to another. The input power supply to any devices sold by DLAB in mainland China is 220V/50Hz.

III. Installation

The installation of SP-UV1000/SP-V1000 serial model visible spectrophotometer is very simple. Please follow the following steps:

Step 1. Check the contents of package

Open the package and carefully examine its contents against the packing list. Please contact us or our dealer immediately if any item inside the package is found missing or damaged.

Step 2. Place the instrument

Take out the instrument and gently place it on a steady surface.

Step 3. Install the printer (an optional accessory)

Check and ensure that the power switch on the printer is OFF and connect the data cable of the printer in the printer port of the instrument.

Step 4. Install the power cable

Ensure to switch power OFF the instrument. Insert one end of the power cable into the power port and the other end into the power socket of the instrument.

Step 5. Connect the power supply

Ensure whether all connecting points are well-connected and switch power ON the instrument. The instrument is now ready for normal use after self-test.

Chapter 3. Instrument Description

I. Instrument description



① Sample chamber cover

③ Operating panel

⑤ Cooling fan

⑦ Printer port

software

⑨ USB interface

⑪ Power switch



② Sample rack

④ Pull rod

⑥ Louver cover

⑧ USB(B) for

⑩ Power socket

II. Operating panel

The operating panel of UV-1000/V-1000 serial model visible spectrophotometers is shown as follows:



① LCD display

② Keypad

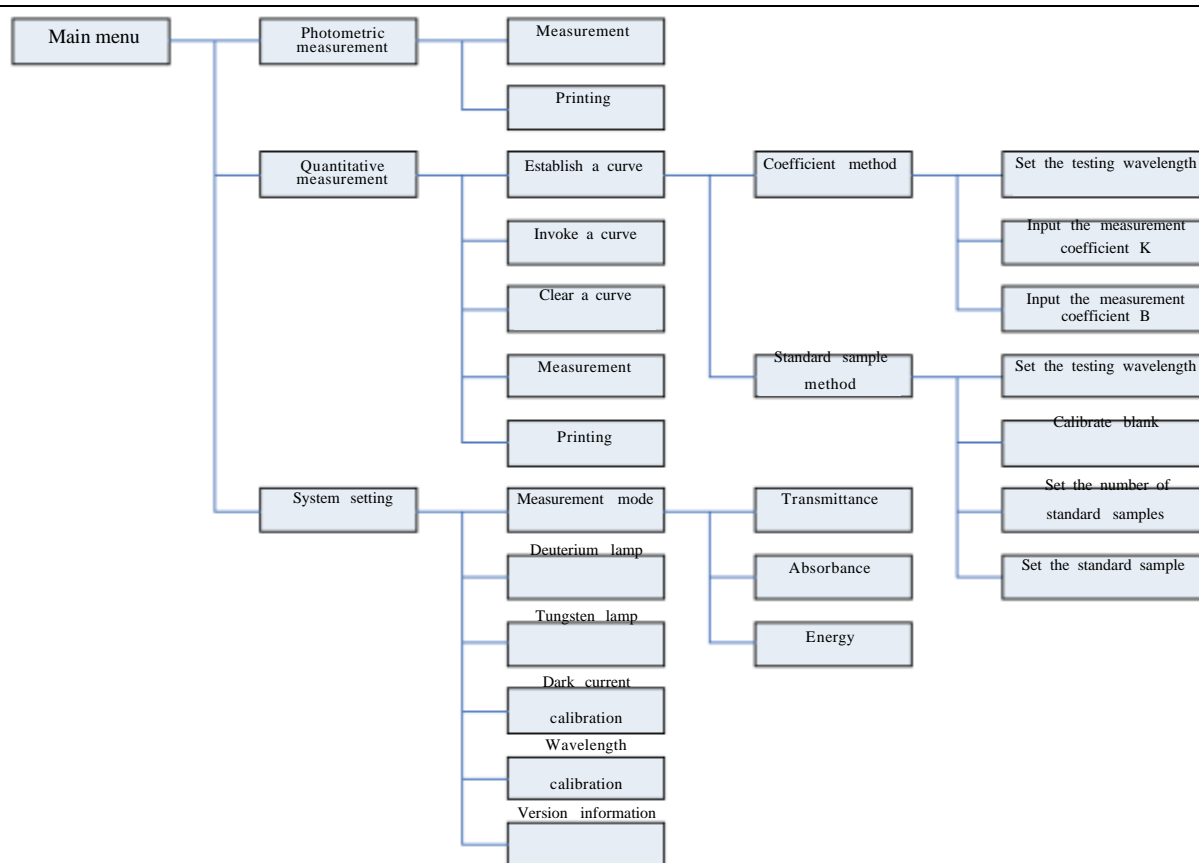
III. Key description

SET	Set the parameters
GOTO λ	Set the wavelength
ZERO	Calibrate 100% T/0Abs
PRINT	Print the data
—	Function key, promoting functions according to display screen
⬇	Roll down the menu options or turn datasheet pages
⬆	Roll up the menu options or turn datasheet pages

Chapter 4. Instrument Use


I. Software system

The instrument's software system is shown as follows:







II. Basic operations

1. Measurement mode selection

On the main interface, press the corresponding function key  to enter the corresponding measurement mode.

2. Wavelength Setting

On the key pad, press  to enter the wavelength setting interface, press  or  to change the entered wavelength value and press  (left) to proceed to the set wavelength value and automatically calibrate 100% T/0Abs.

3. Parameter Setting

Press **SET** key to enter the parameter setting interface, press **↶** or **↷** to select the settings or input parameters and press **—** (left) to confirm.

4. Delete the measurement results and stored data

If the local memory is full and you want to clear all saved data, you can long press the button **PRINT** to delete all data in the interface of date view.

5. Calibrating 100%T/0Abs

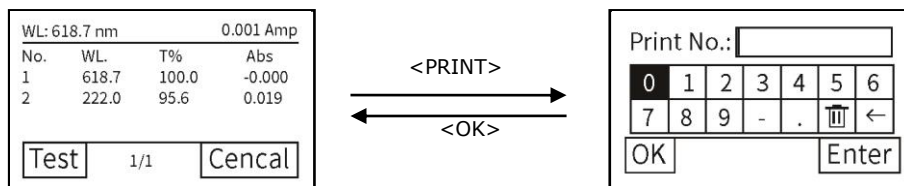
Place the reference into the light path and press **ZERO** key to calibrate 100%T/0Abs.

6. Measuring samples

Place the sample into the light path and press **—** (left) to measure the sample.

7. Measurement results printing

On the measurement interface, short press **PRINT** to enter print setting, input the data number you want to print, press **—** (left) to print the corresponding test results.



Instrument host and Bluetooth printer online tutorial:

- 1) Turn on the printer switch, the green light continues to flash;
- 2) Open the instrument host, after the instrument self-test is completed, it can automatically connect with the Bluetooth printer.
- 3) If the connection is successful, the green indicator light of the printer will be long bright.
- 4) The operating instrument can be printed!

The specific operation process of the Bluetooth printer can be viewed in its user manual!!

III. Preparations before measurement

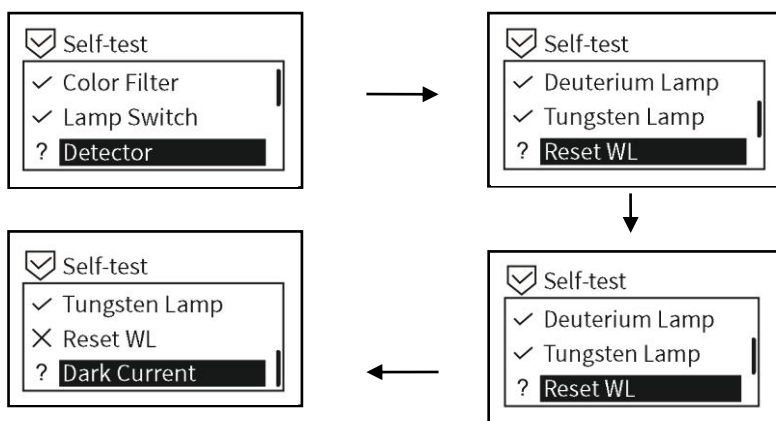
1. Power-ON self-test

Ensure that the light path is clear and close the sample chamber cover. Turn ON the power switch on the instrument to start self-test. The start window is like this:



Self-test

It can self-check the following items: color filter, lamp switch, detector, deuterium lamp, tungsten lamp, wavelength calibration and dark current calibration.

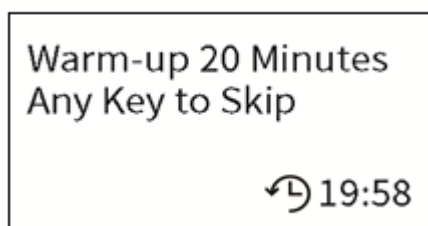


Self-test error

If any item has error during self-checking, it will beep and show the error item. You can press any key to continue the process. After the self-test is done, you can go to the system application for further inspections and calibrations. If errors continue, please contact the service team.

2. Preheating

After self-test, the instrument enters into the preheating state. **For accurate measurement, preheating time needs to be 20-30 minutes.**



3. Confirm colorimeter cell

Before moving the sample into the colorimeter cell, confirm the cell is clean and free of residues. **If the wavelength to be tested is less than 400nm, please use quartz cell.**

IV. Measurement

1. Photometric measurement

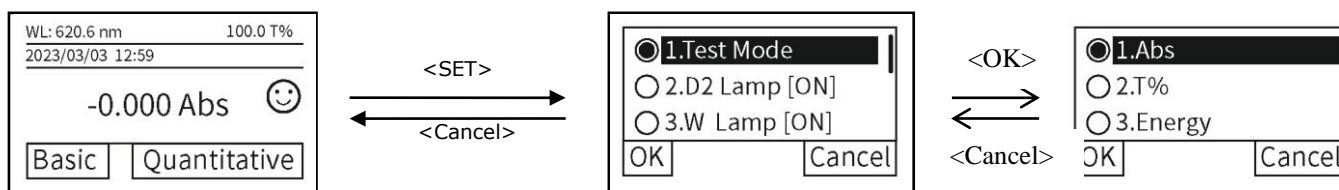
Photometric measurement is used to test the absorbance or transmittance at a fixed wavelength.

Step 1. Enter the photometric measurement interface

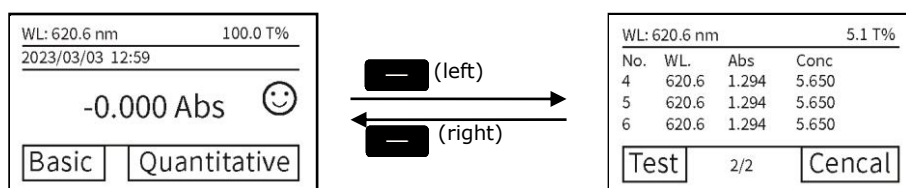
After the self-checking and preheating, the device will go to the main interface of photometric measurement automatically as follows.

WL: 620.6 nm	100.0 T%
2023/03/03 12:59	
-0.000 Abs ☺	
Basic	Quantitative

You can select the working mode by pressing **SET** key and **←** (left) to enter the working mode interface. Then press **↶** or **↷** to choose working mode, like absorbance, transmittance or energy. Then confirm and press **→** (right) to back to main interface.

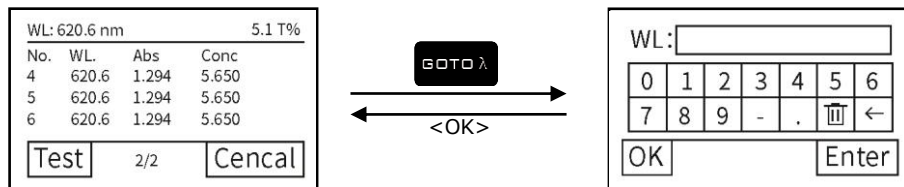


On the “main interface”, press **←** (left) to select “Basic”



Step 2. Set the wavelength to be tested

Press **GOTO λ** to enter the wavelength setting interface and **↶** or **↷** to input the wavelength value, and press **—** (left) to proceed to the set wavelength value.



The valid WL range is 200-1000nm, if invalid number is entered, it will beep three times and go back to the main interface of photometric measurement.

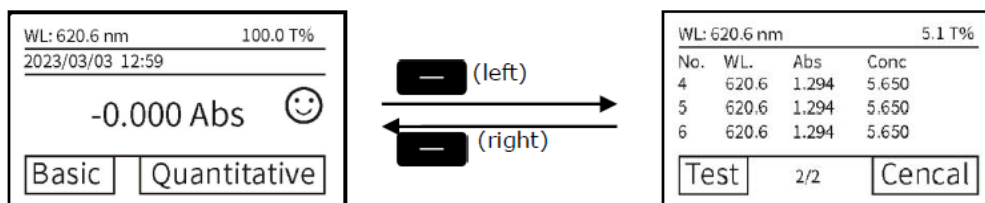
Step 3. Calibrate 100%T/0Abs

Place the reference into the light path and wait until the stability indicator ☺ shows up, then press **ZERO** to calibrate 100%T/0Abs.

Note: remember to put in the reference sample before doing blanking, otherwise the test results will not be accurate.

Step 4. Measure the samples

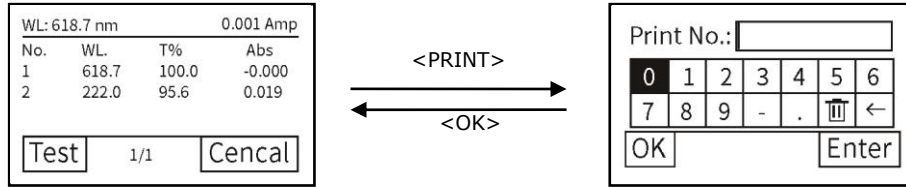
Place the sample into the light path, wait until the stability indicator ☺ shows up, and press **—** (left) to enter measurement interface, then press **—** (test) again to have the test results, and the readings will be displayed in the data list. Repeat this operation to complete the sample measurements



Each page can show three data and you can see other pages via pressing **↶** or **↷**. In the measurement interface, you can set the wavelength too, but need to do the zero again, otherwise the results will not be accurate.

Step 5. Print the data

On the measurement interface, short press **PRINT** to enter print setting, input the data number you want to print, press **—** (left) to print the corresponding test results.



Step 6. Delete the data

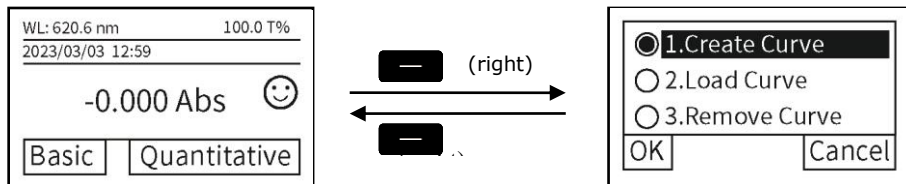
If the local memory is full and you want to clear all saved data, you can long press the button **PRINT** to delete all data in the interface of date view.

2. Quantitative measurement

You can create the curve via standard samples with known concentration and use this curve to do quantitative measurement for similar samples. If the K and B are known in advance, you can also set up the curve via coefficient method.

Step 1. Enter the quantitative measurement interface

On the “main interface”, press **—** (right) to select “quantitative measurement”.

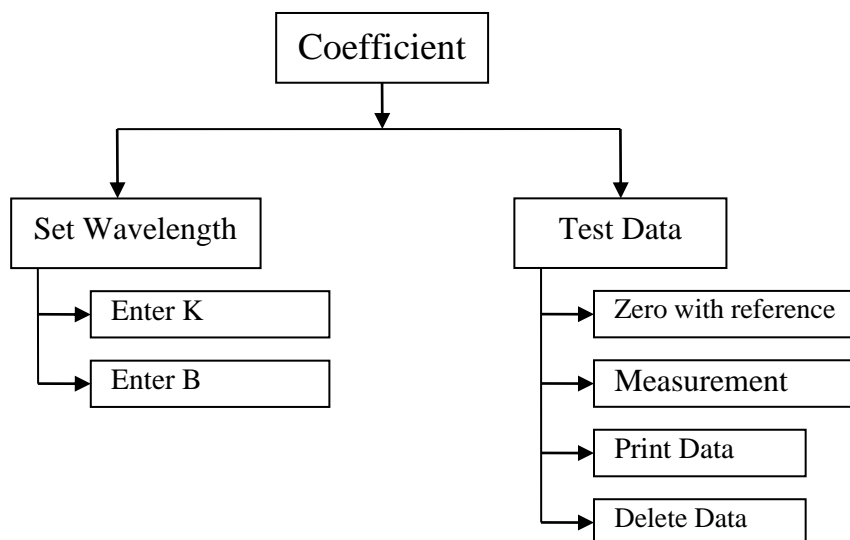


Step 2. Establish the standard curve or load the stored standard curve

There are two ways to establish standard curve available for users to choose, depending upon the actual situation.

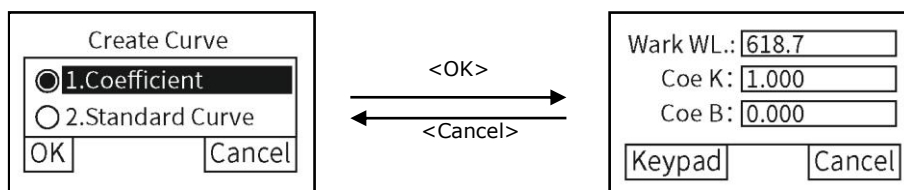
Coefficient method:

This method is a simple way of quantitative measurement, it is realized by a formula with the absorbance value tested by the spectrophotometer.



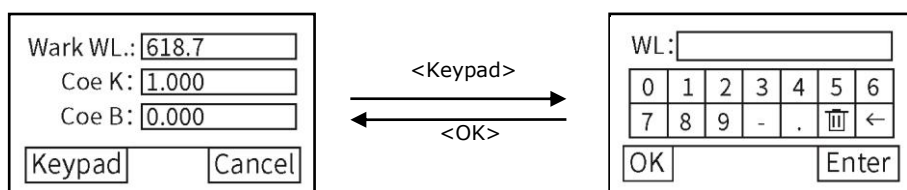
1) Select the coefficient method.

Press or to select “create curve” and press or to select “coefficient method”.



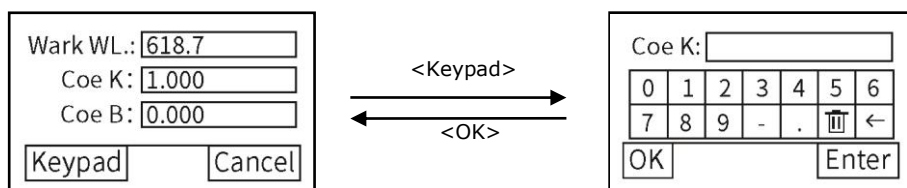
2) Set the wavelength to be measured.

Press or to enter the measured wavelength value and press (left) to confirm and back to previous interface.






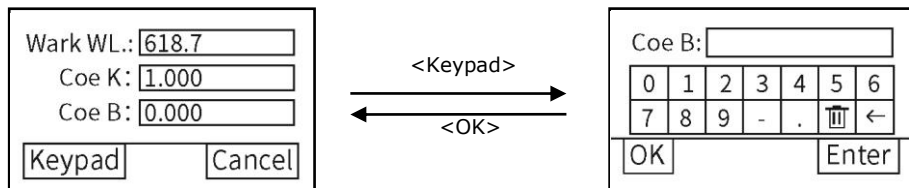
3) Set the measurement coefficient K.




Press or to enter the K value and press (left) to confirm and back to previous interface.

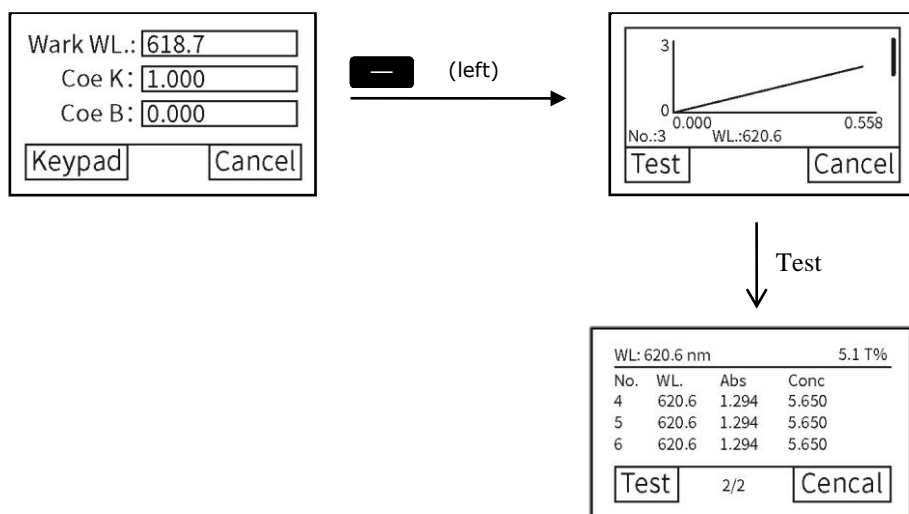


4) Set the measurement coefficient B.

Press  or  to enter the B value and press  (left) to confirm and back to previous interface.

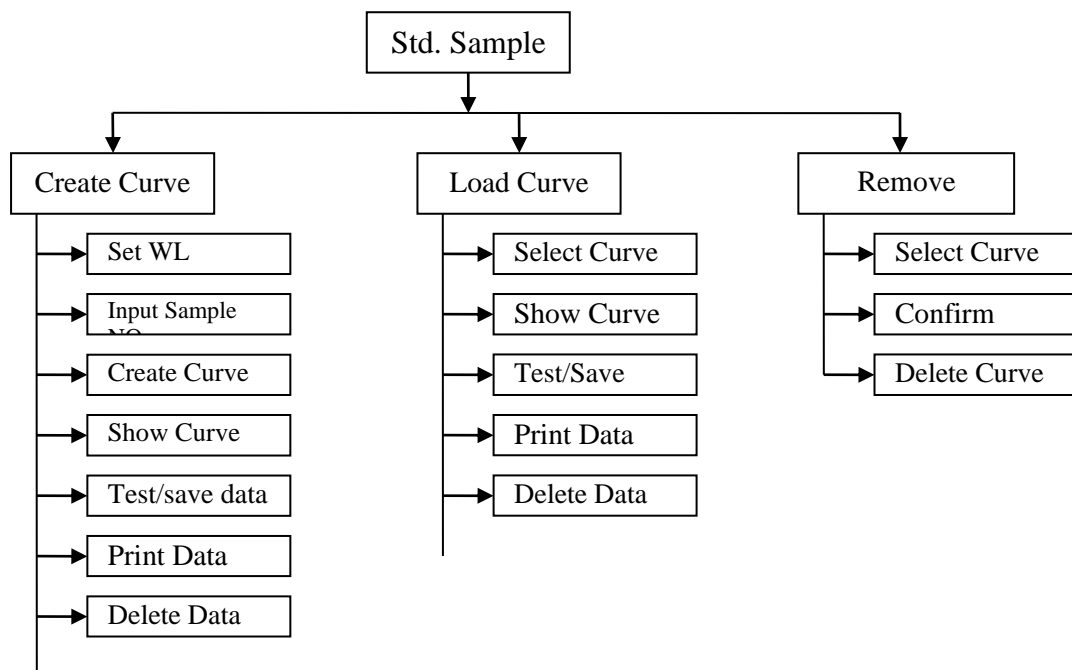


Continue to press  or  until Keypad become OK, press  (left) to confirm and complete the coefficient method setting. Now instrument displays the newly established curve. Then you can do the measurements.








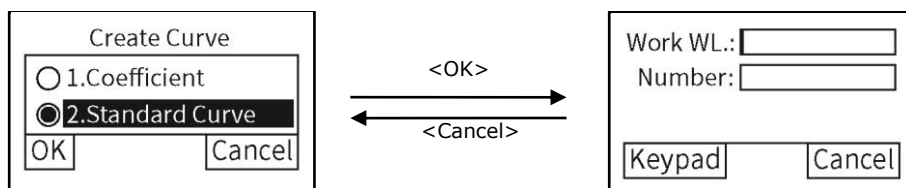
Note: before do the tests, make sure do the blanking with your reference sample first, otherwise the results will not be accurate.

Standard Sample Method








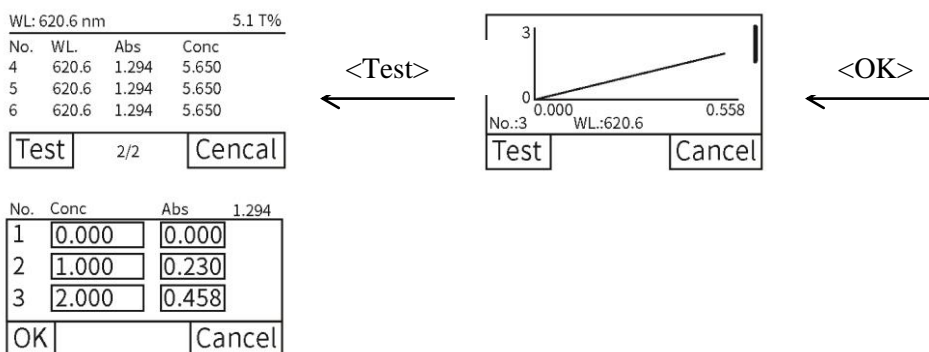
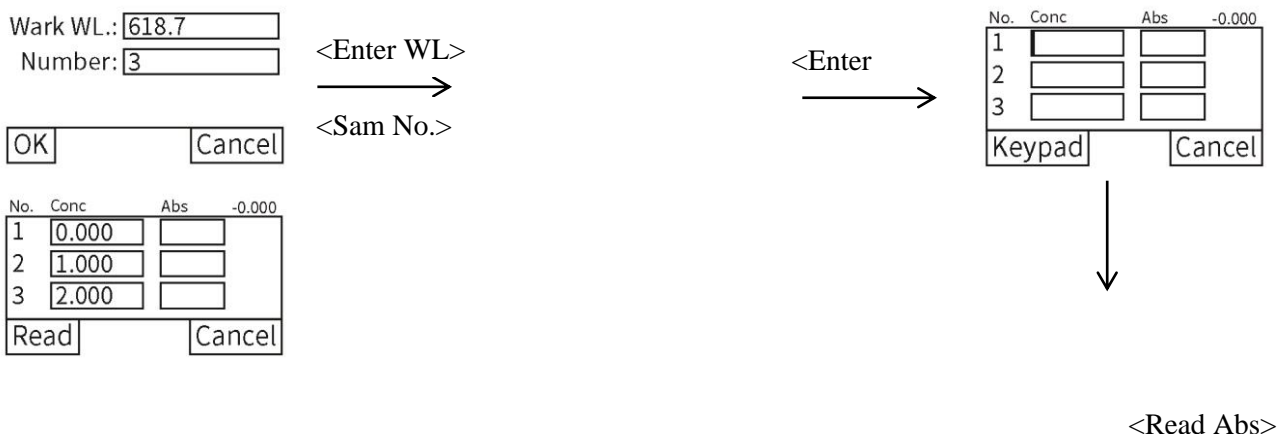
1) Select the standard sample method.

Press  or  to select "create curve", press  or  to select "standard Curve" and press  (left) to enter standard sample method.



2) Build new standard curve.

Enter the wavelength and number of samples (up to 9), press  (left) to confirm and enter the next interface. Press  or  to input the concentration of each sample via keypad. Then press  to do blanking, after that, press  (left) read the absorbance value of each sample. The details are as follows.








The standard curves established after successive completion of calibration of all standard samples will be automatically saved in the instrument's memory.

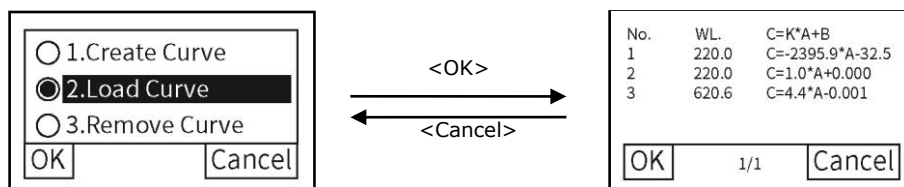
Note: the number range of the samples is 1-9. If invalid number is entered, it will beep three times and back to setting interface.

Invoke the stored standard curve:

The newly built curves will be saved to the local memory automatically and users can invoke them directly. It can save up to 50 curves and the latest curve is at the end of the list.

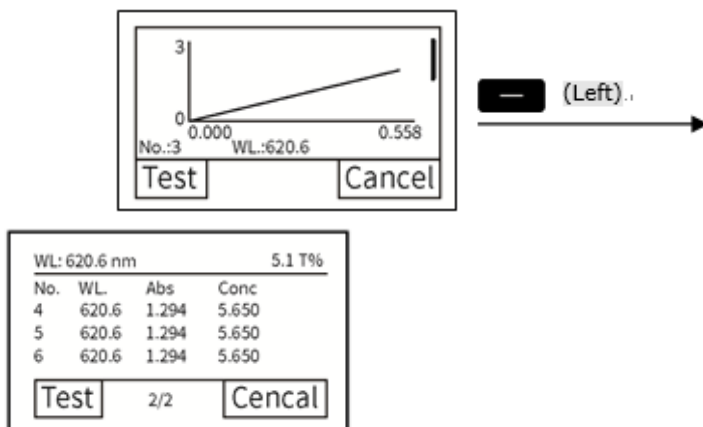
1) Select the saved curve.

Press  or  to select "Load Curve", press  or  to select the corresponding curve equation and then press  (left) to confirm.




2) Enter the sample measurement interface


Press  (left) to enter the measurement interface after invoking a curve.



3) Calibrate 100%T/0Abs.

Place the reference into the light path and press  to calibrate 100%T/0Abs.

4) Measure the sample using the standard curve.

Place the sample into the light path and press  (left) to measure it. The results will be displayed in the data list. Repeat this operation to complete measurement of all samples.

5) Print the data

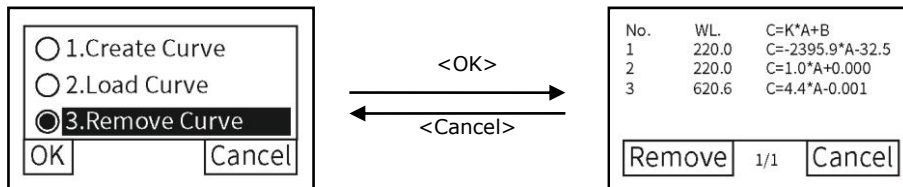
On the measurement interface, short press **PRINT** to enter print setting, input the data number you want to print, press **—** (left) to print the corresponding test results.

6) Delete the data

If the local memory is full and you want to clear all saved data, you can long press the button **PRINT** to delete all data in the interface of date view.

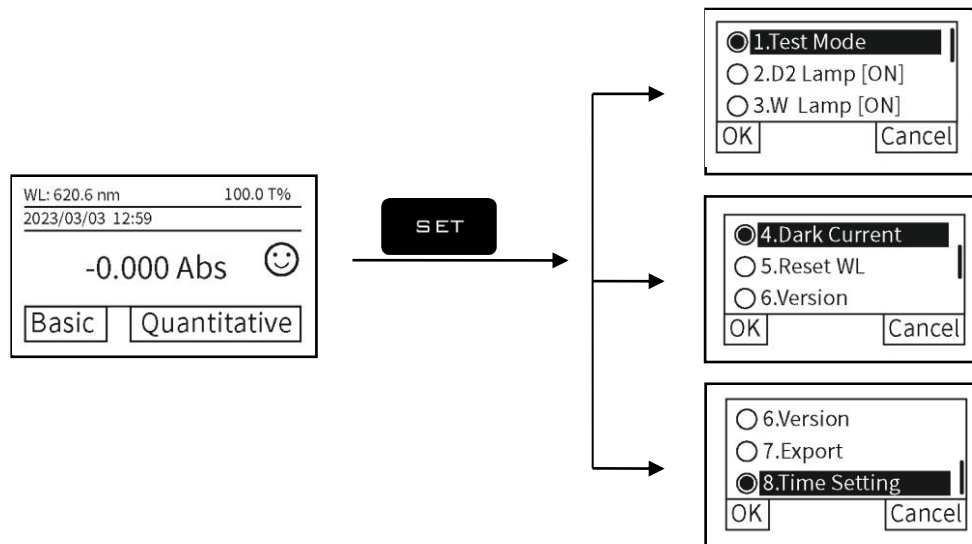
Remove curve:

This is used to delete the saved curves. You can go to this menu and select the curve needs to be removed, and press **—** (left) to delete the curves.



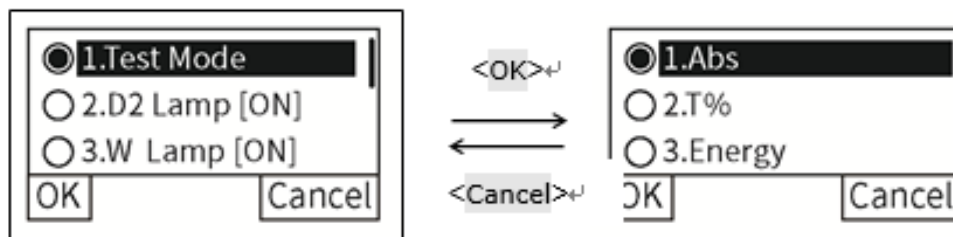
V. System Setting

Users may set the system configuration of the instrument in the “system application” depending upon actual use. On the “main interface”, press **SET** key to enter the setting parameter interface.



1. Measurement mode

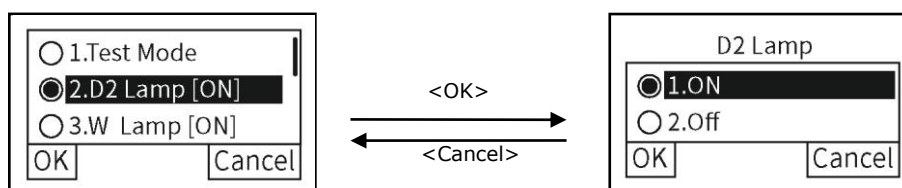
Press or to select “Test Mode”, press (left) to enter, press or to select “absorbance”, “transmittance” or “energy” and then press (left) to confirm.



2. Turn ON and OFF the deuterium lamp







When measuring with testing wavelength within the range of 340-1000nm, users can turn OFF the deuterium lamp to extend the service life of deuterium lamp.

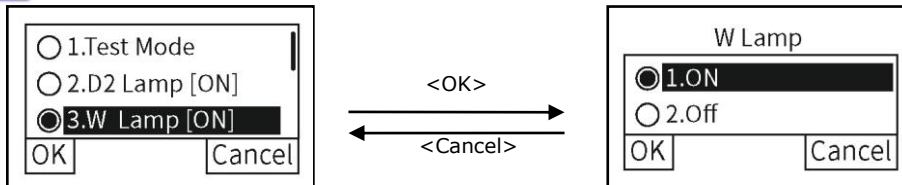
Press or to select “D2 Lamp”, press (left) to enter, press or to select “ON” or “Off” and then press (left) to confirm.



3. Turn ON and OFF the tungsten lamp




When measuring with testing wavelength within the range of 200-339nm, users can turn OFF the tungsten lamp to extend the service life of tungsten lamp.

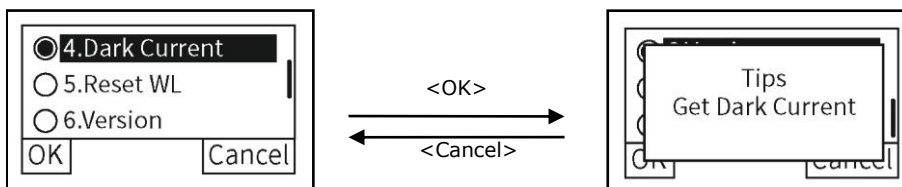
Press  or  to select “D2 Lamp”, press  (left) to enter, press  or  to select “ON” or “Off” and then press  (left) to confirm.



4. Dark Current Calibration




When the working environment of the instrument changes, users may recalibrate the dark current after the instrument preheating and before sample measurement.

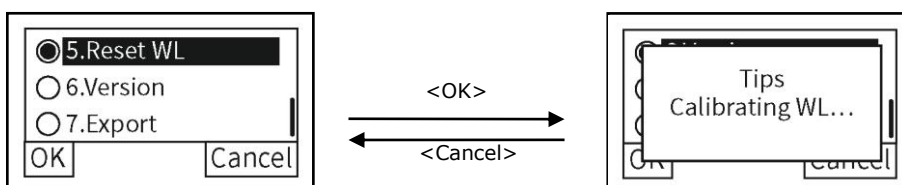
Press  or  to select “Dark Current”, press  (left) to calibrate. The sample chamber cover must be closed throughout the entire calibration process. Return after completion.






5. Wavelength calibration

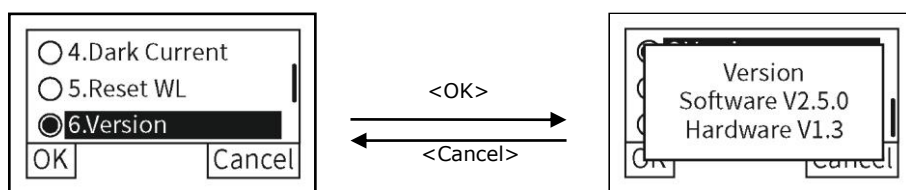
Sudden power failures while the instrument is in use, abnormal power OFF and attenuation of light source energy will all result in wavelength deviation and deviation of measurement results, where wavelength recalibration is required.

Make sure that the light path is clear and the sample chamber cover is closed. Press  or  to select “Reset WL” and press  (left) to calibrate. The sample chamber cover may not be opened throughout the calibration process. Return after completion.






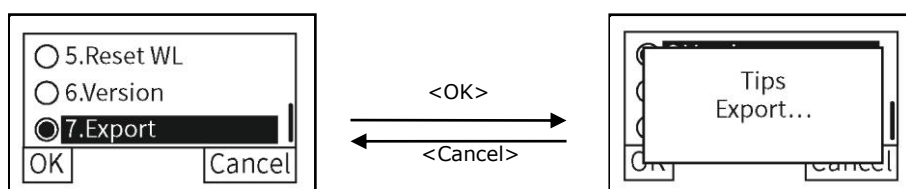
6. Version information

Press  or  to select “version”, press  (left) to view the version information interface and then press any key to return.



7. Export data to USB




You can transfer the saved data on the spectrophotometer to the USB. Press  or  to select “Export”, press  (left) to transfer data.

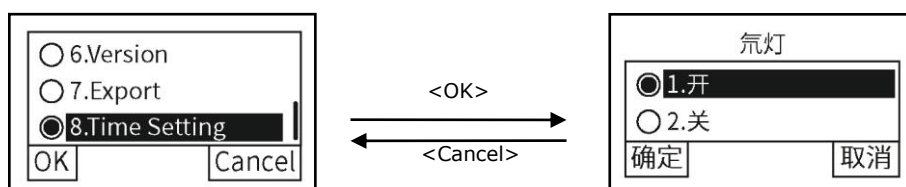


Before export the data, you must insert the USB to the USB port on the back of the device, otherwise it will give error information.



8. Date and Time Setting

Press  or  to select “Time Setting”, press  (left) to enter the menu and set the correct date and time.



FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

ISED Statement

- English: This device complies with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

The digital apparatus complies with Canadian CAN ICES-3 (B)/NMB-3(B).

- French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Radiation Exposure Statement

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.