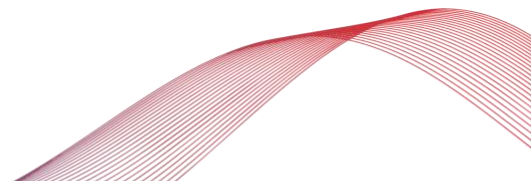




PCU-200

Polarization Control Unit

User Manual



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1

COMPLIANCE

FDA-CDRH Compliance

Under the US Food and Drug Administration (FDA) Center for Devices and Radiological Health (CDRH), the unit complies with the Code of Federal Regulations (CFR), Title 21, Subchapter J, which pertains to laser safety and labeling. See following link for more information:

- <http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?CFRPartFrom=1000&CFRPartTo=1050>

CSA / IEC Compliance

The unit complies with certain standards of the Canadian Standards Association (CSA) and the International Electrotechnical Commission (IEC).

The unit falls in the Installation Category (Overvoltage Category) II under IEC 664. IEC 664 relates to impulse voltage levels and insulation coordination. The category is defined as: local level, appliances, portable equipment, etc., with smaller transient overvoltages than Installation Category (Overvoltage Category) III.

The unit falls in the Pollution Degree 2 category under IEC 1010-1 and CAN/CSA-C22.2 No. 1010.1. The IEC standard on Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use relates to insulation coordination. The CSA standard is on Safety Requirements for Electrical Equipment for Measurement Control, and Laboratory Use, Part I: General Requirements. The Pollution Degree 2 category is defined as follows: "Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected."

CE Compliance

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

2

GENERAL INFORMATION

Overview

The PCU-200 is a polarization controller featuring a wide wavelength range from 1260 to 1650 nm. Ideally suited for polarization dependent loss (PDL) measurements with either fixed or tunable sources.



Figure 1: PCU-200 Polarization Control Unit

Principle of Operation

The PCU-200 is an optomechanical polarization controller designed to generate an arbitrary state of polarization (SOP) at the output of a single-mode fiber. The input is provided through a polarization-maintaining fiber and passes through a fixed linear polarizer followed by two independently rotating achromatic waveplates: a quarter-wave plate and a half-wave plate. The fixed polarizer establishes a known reference polarization, while the rotation of the waveplates produces the desired SOP at the output.

Unlike electro-optic (EO) crystal-based polarization controllers, the PCU-200 relies entirely on passive optical components and mechanical rotation. The use of achromatic waveplates provides nearly wavelength-independent retardance over the operating wavelength range, enabling broadband polarization control without the wavelength dependence typically associated with EO crystal devices. This architecture provides deterministic, repeatable polarization control over the full Poincaré sphere as well as the full wavelength operating bandwidth.

Applications

- PDL measurements
- SM source coupling into devices with high PDL
- CPO and PIC characterization
- Passive and active component testing
- QA and R&D

Key Features

- Wideband functionality (1260 to 1650nm)
- Seamless integration with Santec's swept test system
- SCPI commands via USB or Ethernet

Included Accessories

- USB A to USB B cable (1.8m)
- Ethernet cable (1.8m)
- AC power cord (2m)

Optional Accessories

- Rackmount kit

3

SAFETY INFORMATION

To avoid situations that could result in serious injuries or death, always observe the following precautions.

The safety instructions must be observed whenever the unit is operated, serviced, or repaired. Failure to comply with any of these instructions or with any precaution or warning contained in the user manual is in direct violation of the standards of design, manufacturing, and intended use of the unit. Santec assumes no liability for the customer's failure to comply with any of these safety requirements.

Safety Markings on the Unit

See Table 1 for symbols and messages that can be marked on the unit. Observe all safety instructions that are associated with a symbol.

Table 1: Safety symbols

	Laser radiation may be present. Refer to the user manual for instructions on handling and operating the unit safely. Avoid looking into any ports near which this symbol appears.
	Frame or chassis terminal for electrical grounding within the unit.
	Protective conductor terminal for electrical grounding to the earth.
WARNING	Procedure can result in serious injury or loss of life if not carried out in proper compliance with all safety instructions. Ensure that all conditions necessary for safe handling and operation are met before proceeding.
CAUTION	Procedure can result in serious damage to or destruction of the unit if not carried out in compliance with all instructions for proper use. Ensure that all conditions necessary for safe handling and operation are met before proceeding.

Classification

The PCU-200 consists of an exposed metal chassis that is connected directly to earth via a power cord and is therefore classified as a Class 1 instrument.

Important Safety Information

Laser Hazards

Warning



- Never look directly into the end of an optical cable connected to an optical output device that is operating. Laser radiation is invisible and direct exposure can severely injure the human eye.

Electrical Hazards

Warning



- Some of the circuits are powered whenever the unit is connected to the AC power source (line power). To ensure that all circuits are powered off, disconnect the power cord from either the power inlet on the unit's rear panel or from the AC line-power source (receptacle). The power cord must always be accessible from one of these points. If the unit is installed in a cabinet, the operator must be able to disconnect the unit from the line power by the system's line-power switch.
- Use only the type of power cord supplied with the unit. If you need to replace a lost or damaged cord, make sure to replace with a power cord of the same type.
- Connect the power cord only to a power outlet equipped with a protective earth contact. Never connect to an extension cord or any receptacle that is not equipped with this feature.
- If using a voltage-reducing autotransformer to power the unit, ensure that the common terminal connects to the earthed pole of the power source.
- Do not interrupt the protective earth grounding. Such action can lead to a potential shock hazard that can result in serious personal injury. Do not operate the unit if an interruption to the protective grounding is suspected.
- Do not operate the unit when its cover or panels have been removed.
- To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.
- Do not use the unit outdoor.
- Operating the unit in the presence of flammable gases or fumes is extremely hazardous.

- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Only technicians authorized by Santec should carry out repairs. In addition to voiding the warranty, opening the unit (even when unplugged) can expose you to potential shock hazards.
- Some of the unit's capacitors can be charged even when the unit is not connected to the power source.
- Do not perform any operating or maintenance procedure that is not described in the user manual.

4

GETTING STARTED

Caution



- To avoid injury or death, always observe the precautions listed in SAFETY INFORMATION on page 4.

This manual contains complete operating instructions for safe and effective operation of the PCU-200 Polarization Control Unit. It is recommended that users of the PCU-200 familiarize themselves with contents of this manual before using the instrument.

The inspection report and a description of any customer-requested information may be found in the calibration document envelope included with the instrument.

Initial Inspection

Warning



- To avoid electrical shock, do not initialize or operate the unit if it bears any sign of damage. Ensure that the unit and any devices or cords connected to it are properly grounded.

- ✓ Inspect the package and contents for signs of damage.
- ✓ Ensure all contents are included.
- ✓ Read the user manual thoroughly and become familiar with all safety symbols and instructions to ensure that the unit is operated and maintained safely.
- ✓ If the initial inspection reveals any damage or missing components, immediately notify Santec Inc. and if necessary, the carrier.

Operational Requirements

For the unit to meet the warranted specifications, the operating environment must meet the conditions outlined in Table 2.

Table 2: Environmental requirements

Parameter	Specification
Altitude	Up to 2000m
Temperature	10 to 35°C
Humidity	Up to 95% RH (10 to 35°C)
Voltage	Main supply voltage fluctuations must not exceed $\pm 10\%$ of the nominal voltage

Product Overview

PCU-200 Front Panel

A front view of the PCU-200 is shown in Figure 2. It features a touchscreen which displays information such as current state of polarization, switch active channel and unit information.


Figure 2: Front view of a PCU-200

PCU-200 Rear Panel

A rear view of the PCU-200 meter is shown in Figure 3. See Table 3 for a detailed description.

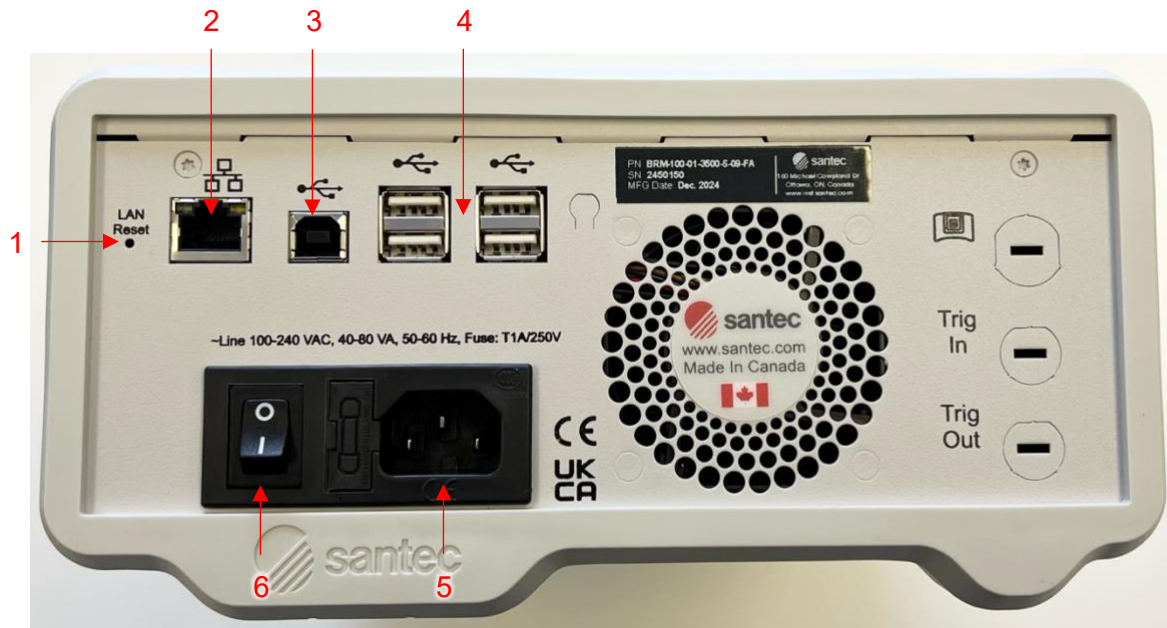


Figure 3: Rear view of a PCU-200

Table 3: Detailed description of the PCU-200 rear panel components (see Figure 3)

Item #	Description
1	LAN/Reset Press once: reset network settings
2	Ethernet port Connection to LAN
3	USB B port Connection to PC
4	USB A ports Connections to peripherals for future functionality (no current usage)
5	Power input Contains user-replaceable fuse
6	IO switch On/off toggle

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OPERATION

Powering Up the Instrument

To power up the meter:

1. Verify that the power switch is set to the “off” position (O). Connect the PCU-200 to an AC power supply using the power cord provided.
2. Toggle the power switch to the “on” position (I). The Santec logo will flash on the screen during the unit’s initialization.

Device Information and Settings

Swipe left to access the *Setup* page (Figure 4). This page will display information about the unit and its connectivity status. See Table 4 for a detailed description.



Figure 4: PCU-200 Setup page

Table 4: Detailed description of the PCU-200 Setup page (Figure 4)

Parameter	Description
SN:	• The unit serial number (“1234567”) as stored on the unit.
Firmware:	• The unit’s firmware version (“v03.00.01”).

IP address	- When connected to a network via Ethernet, the unit's IP address ("192.168.12.91") will be displayed in the bottom right corner with a green LAN icon. Use this IP address to access the PCU-200 webpage or to connect to it via software. - If not connected to a network, the LAN icon will display as red.
------------	---

Changing the State of Polarization via the Touch Screen

Swipe right to access the *Polarization Controller* page.

In Figure 5:

- tap in the top left corner to select a module (applicable for PCU-200 with built-in 1x4 PM switch only). See Figure 6.
- tap on one of the 6 preset positions to change to that state of polarization
 - linear 0° (horizontal)
 - linear 90° (vertical)
 - linear +45°
 - linear -45°
 - right hand circular
 - left hand circular



Figure 5: PCU-200 touch screen preset states of polarization

Controlling the 1x4 PM Switch (Wideband Option Only)

From the Module Select Page (Figure 6), tap on:

- POL to go to the *Polarization Controller* page (Figure 5)
- OPTx to go to the *Optical Switch* page



Figure 6: PCU-200 touch screen *Module Select* page

On the Optical Switch page (Figure 7), tap on:

1. The arrows to increment up or down by 1 channel
2. The desired input to switch to that channel

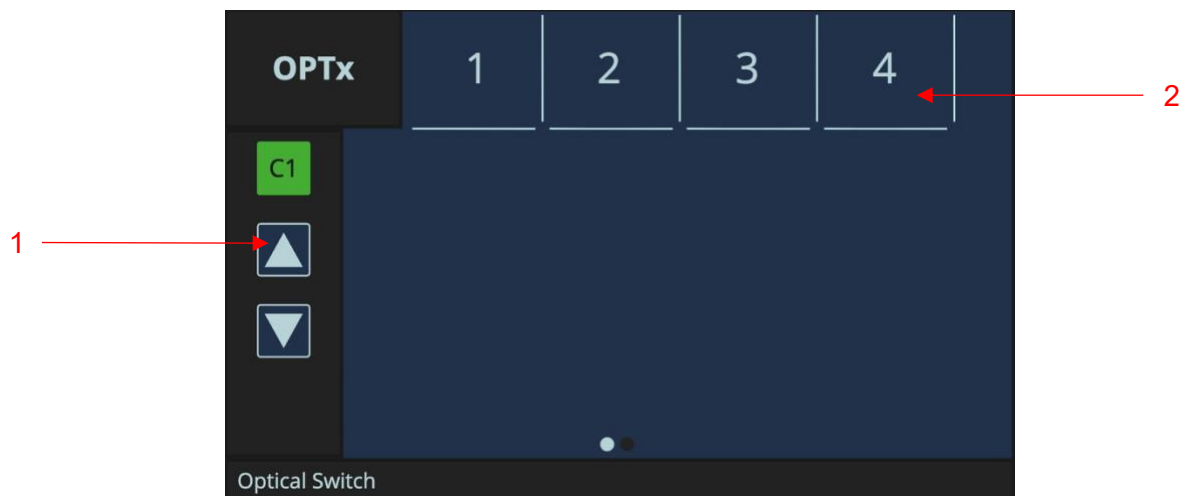


Figure 7: PCU-200 touch screen *Optical Switch* page

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PCU-200 WEBPAGE

To access the PCU-200 webpage, connect the unit to a network and on any computer or tablet on the same network, open a web browser (recommended: *Google Chrome* or *Firefox*) and enter the PCU-200's IP address (see Device Information and Settings on page 10) in the URL bar.

Dashboard

The *Dashboard* tab shows the last calibration date of the meter (Figure 8).

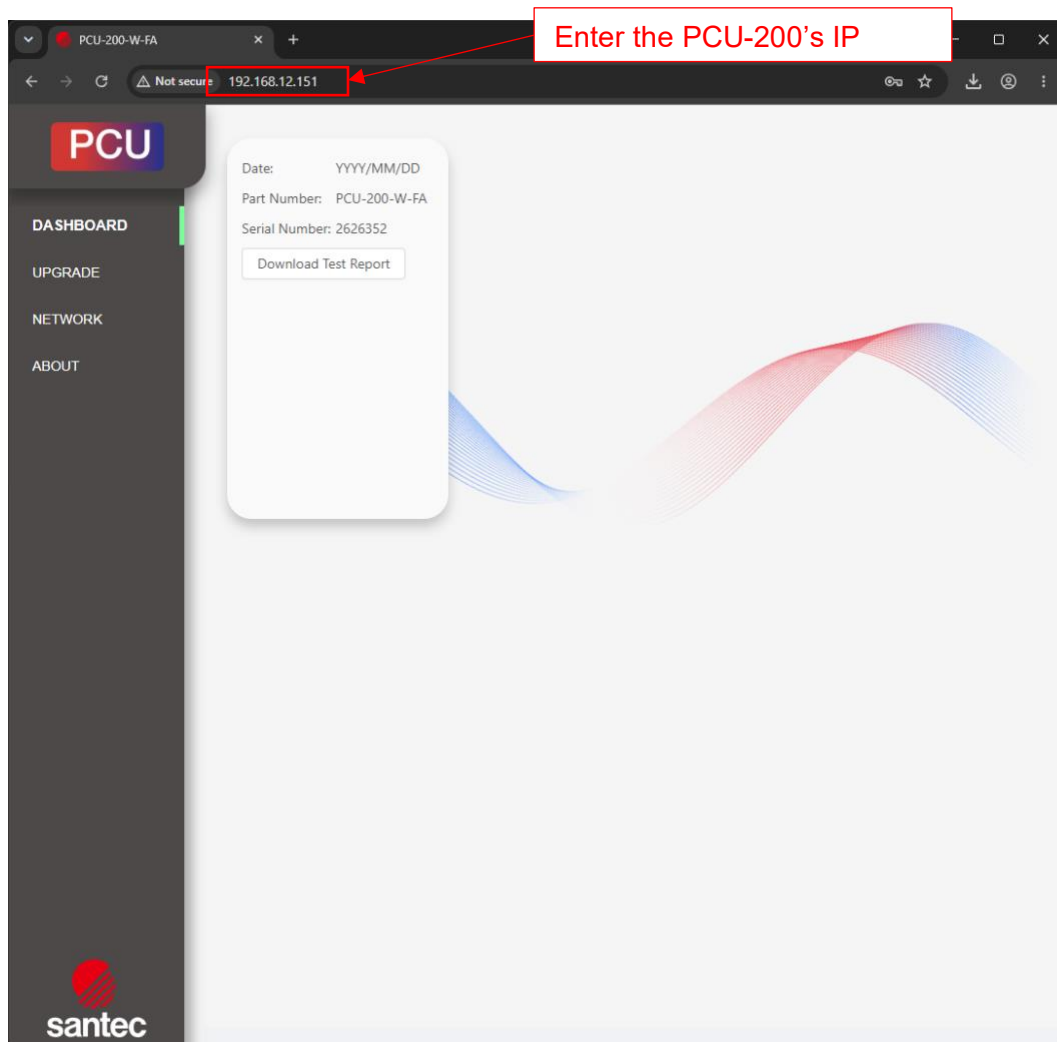


Figure 8: PCU-200 webpage – *Dashboard* tab

Upgrade

Go to *Upgrade* to view the version of, upgrade or re-install the firmware of the BRM-100 (Figure 9). Please contact support.inst@santec.com before performing a firmware upgrade for additional instructions.

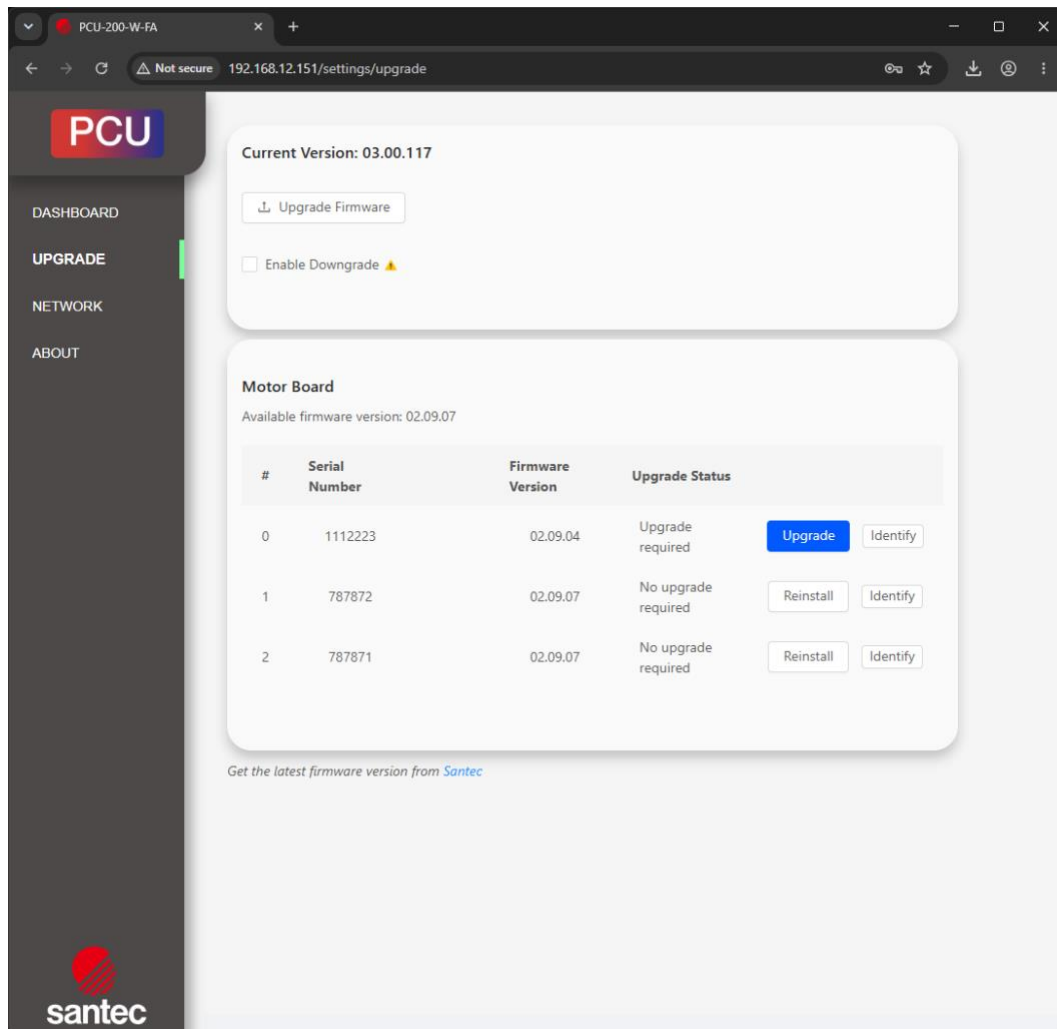
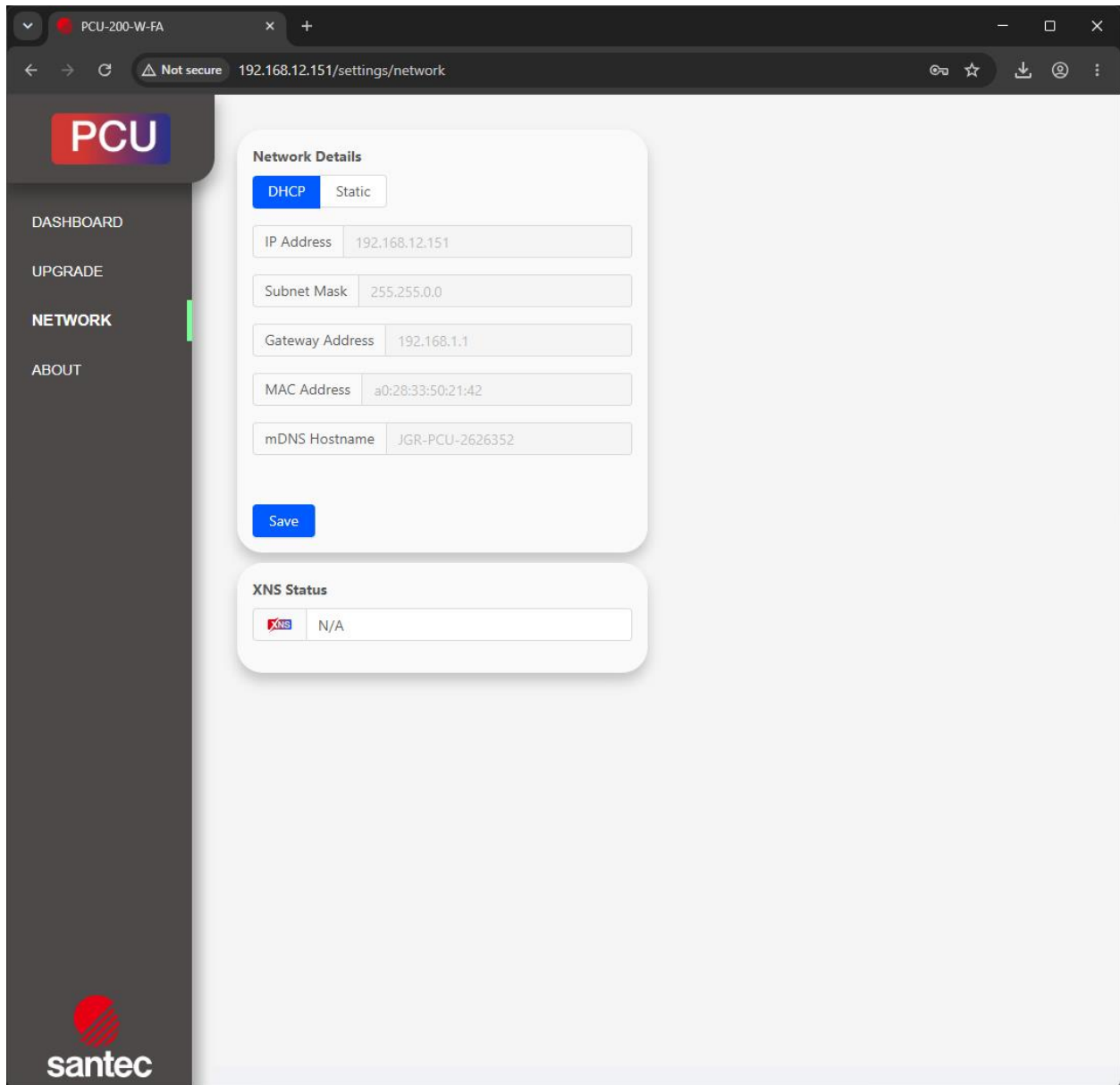


Figure 9: PCU-200 webpage – *Upgrade* tab

Network

You can view, edit or reset the network settings of the PCU-200 from the *Network* tab (Figure 10).



The screenshot shows a web browser window with the address bar displaying "192.168.12.151/settings/network". The page has a dark sidebar on the left with the "PCU" logo and navigation links: DASHBOARD, UPGRADE, NETWORK (highlighted with a green bar), and ABOUT. The main content area is titled "Network Details" and features two tabs: "DHCP" (selected) and "Static". Below the tabs are input fields for "IP Address" (192.168.12.151), "Subnet Mask" (255.255.0.0), "Gateway Address" (192.168.1.1), "MAC Address" (a0:28:33:50:21:42), and "mDNS Hostname" (JGR-PCU-2626352). A blue "Save" button is positioned below these fields. Below the "Network Details" section is an "XNS Status" section with a small "XNS" icon and the text "N/A". The Santec logo is visible in the bottom left corner of the sidebar.

Figure 10: PCU-200 webpage – *Network* tab

About

The *About* tab (Figure 11) displays the unit's firmware version, model and serial number. Error logs can be downloaded from this page for troubleshooting. *Advanced* mode is reserved for Santec technicians and Santec-approved service centers.

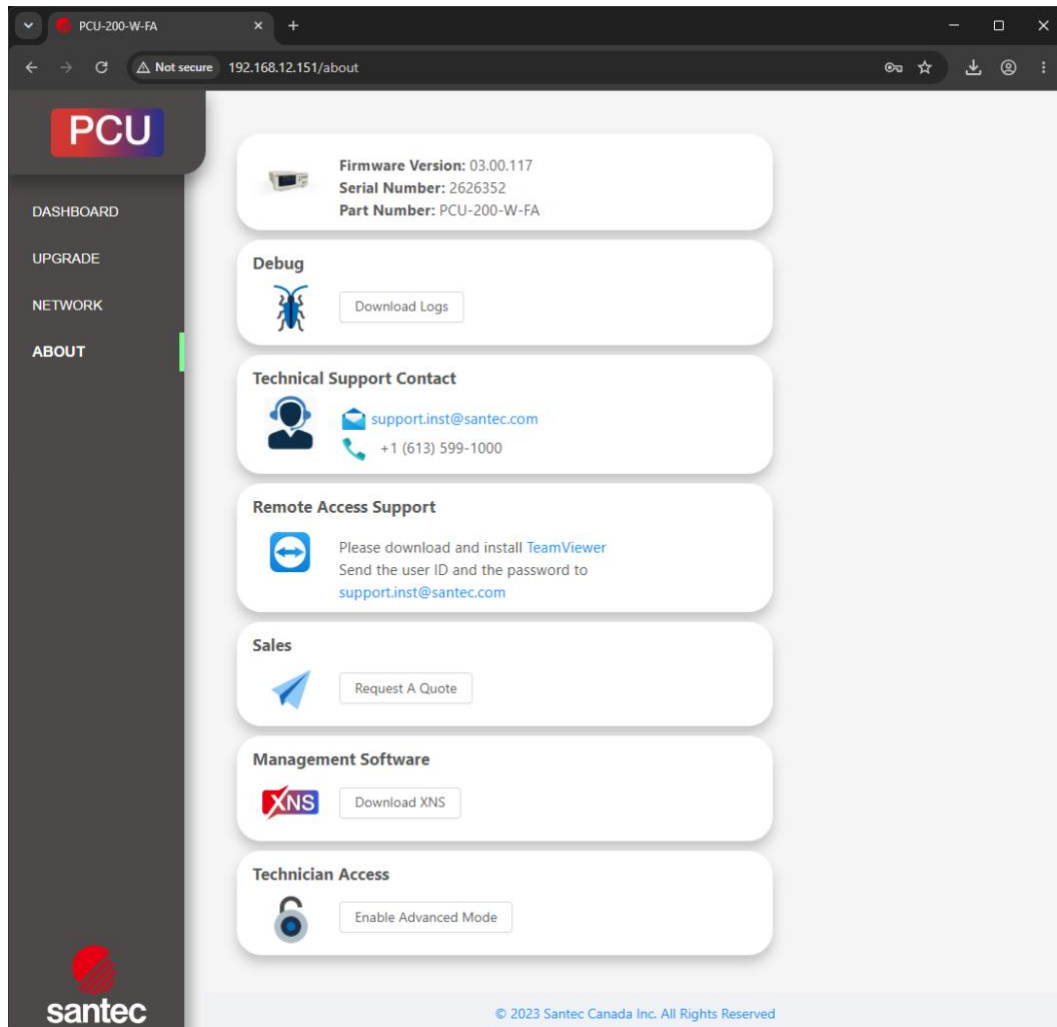


Figure 11: PCU-200 webpage – About tab

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PROGRAMMING GUIDE

Establishing Communication

The PCU-200 follows the *SCPI* (Standard Commands for Programmable Instruments) message-based programming standard. It conforms to the *USBTMC* (USB Test and Measurement) standard.

USB

VISA drivers are required for USB communication.

- Recommended: *Rohde and Schwarz*
 - https://www.rohde-schwarz.com/gr/applications/r-s-visa-application-note_56280-148812.html
- Alternatives: *National Instruments*, *Keysight*, etc.

Ethernet

Each PCU-200 is factory pre-set to use DHCP. To connect the PCU-200:

- Connect the PCU-200 to the network via an Ethernet cable
- Swipe on the front panel touchscreen to the *Setup* page to view the PCU-200's IP address

The TCP/IP libraries provided by most operating systems are sufficient.

Note: any VISA implementation can control the PCU-200 via TCP/IP on port 5025.

Step-by-step Guide Python

This section provides a step-by-step programming guide in a **Python** programming environment using the **PyVISA** library.

1. Install a VISA backend on the development system.
2. Install Python 3.8+ and the PyVISA package:

```
pip install pyvisa
```

3. Connect the PCU-200 via its USB B port to the development system (or ensure it is reachable on the network for a TCP/IP connection).
4. Create a `pyvisa.ResourceManager`, list the connected VISA resources to find the PCU-200's address, and open a session to it.

```
import pyvisa as vs
```

```
rm = vs.ResourceManager()
instruments = rm.list_resources()
print(instruments)
#see if any Santec USB instruments are present
if(any(s.startswith('USB0::0x2428') for s in instruments)):
    r = [s for s in instruments if s.startswith('USB0::0x2428')]
    if(len(r)>0):
        print("USB device found. Connecting to",r[0])
        instrument = rm.open_resource(r[0], open_timeout=5000)
else:
    #if no USB instrumnts, ask for IP address
    ip=input("Enter IP Address: ")
    TCP_INST="TCPIP::"+ip+":5025::SOCKET"
    instrument = rm.open_resource(TCP_INST, open_timeout=5000)
```

5. Use `instrument.write()` to send write only SCPI commands and `instrument.query()` for any commands which are expected to return data.

```
response=instrument.query("*IDN?")
print(response)
```

Notes

1. Some commands can take several seconds to return. Increase the timeout to at least 5000 ms, either when opening the resource (`open_timeout=5000`, as shown above) or afterward via `instrument.timeout = 5000` (milliseconds).
2. PyVISA's `.write()` method appends a termination sequence to every command automatically (the default `write_termination` is `\r\n`).
3. The PCU-200 runs SCPI commands asynchronously. To check whether an operation is complete, poll the status bit via the query `STAT:OPER:COND?`. If the returned value is 0, the PCU-200 has completed its operation.

```
import time

def WaitOperationComplete(device, log=None):
    status = 4
    while status > 0:
        try:
            time.sleep(0.05)
            device.write("STAT:OPER:COND?")
            status = int(device.read_raw())
            time.sleep(0.05)
        except Exception as e:
            if log is not None:
                log.error(e)
            return False
    return True
```

Example usage:

```
instrument.write("POL:STATE 0")
if not WaitOperationComplete(instrument):
    raise TimeoutError("PCU-200 did not complete its operation")
```

Complete Example

Putting the steps above together into one runnable script:

```
import pyvisa as vs
import time

def WaitOperationComplete(device, log=None):
    status = 4
    while status > 0:
        try:
            time.sleep(0.05)
            device.write("STAT:OPER:COND?")
            status = int(device.read_raw())
            time.sleep(0.05)
        except Exception as e:
            if log is not None:
                log.error(e)
            return False
    return True

rm = vs.ResourceManager()
instruments = rm.list_resources()
print(instruments)
#see if any Santec USB instruments are present
if(any(s.startswith('USB0::0x2428') for s in instruments)):
    r = [s for s in instruments if s.startswith('USB0::0x2428')]
    if(len(r)>0):
        print("USB device found. Connecting to",r[0])
        instrument = rm.open_resource(r[0], open_timeout=5000)
else:
    #if no USB instruments, ask for IP address
    ip=input("Enter IP Address: ")
    if(len(ip)<1): ip = "192.168.12.66"
    TCP_INST="TCPIP::"+ip+":5025::SOCKET"
    instrument = rm.open_resource(TCP_INST, open_timeout=5000)

print(instrument.query("*IDN?"))

instrument.write("POL:STATE 0")
if not WaitOperationComplete(instrument):
    raise TimeoutError("PCU-200 did not complete its operation")
```

Step-by-step Guide .NET

This section will provide a step-by-step programming guide in a .NET programming environment such as C# or VB.NET.

1. Install VISA drivers on the development system

2. Connect the PCU-200 via its USB B port to the development system
3. Add a reference to *Ivi.Visa.dll* in your project:

C:\Program Files (x86)\IVI Foundation\VISA\Microsoft.NET\Framework32\v2.0.50727\VISA.NET Shared Components 5.11.0\Ivi.Visa.dll

4. Use the *IVI.Visa.GlobalResourceManager* to find all USB instruments on your system:

```
Public Overrides Function GetAllAddresses() As String()
    Try
        Dim nameList As New List(Of String)
        nameList = GlobalResourceManager.Find("USB?*INSTR")
        Return nameList.ToArray()
    Catch ex As Exception
        Return Nothing
    End Try
End Function
```

5. Open an *IMessageBasedSession* to the desired device using an address from the *nameList* in the previous step:

```
Private visa As IMessageBasedSession

visa = GlobalResourceManager.Open(addr)
```

6. Use the *Write* method to send SCPI commands and the *Read* method to retrieve results:

```
Public Overrides Function Read(ByVal readableOnly As Boolean) As String
    Dim response As String = String.Empty
    response = visa.RawIO.ReadString()
    If response = String.Empty Then
        Throw New Exception("Read from device failed")
    End If
    Return response
End Function

Public Overrides Sub Write(ByVal strCommand As String)
    visa.RawIO.Write(strCommand)
End Sub
```

Write commands require termination with the linefeed character *\n*.

Notes

1. Some commands can take several seconds to return. The *Read* timeout should be increased to at least 5000ms using *visa.TimeoutMilliseconds*
2. The PCU-200 runs SCPI commands asynchronously. To check if an operation is complete, it is required to poll the status bit via the query "*STAT:OPER:COND?*". If the return value is 0, the PCU-200 has completed its operation.

```

Try
    Write("POL:STATE 0" + vbCrLf)

    While (iResponse <> 0)
        strSwitchResponse = Query(":STAT:OPER:COND?" + vbCrLf)

        If Not Integer.TryParse(strSwitchResponse, iResponse) Then
            iResponse = -1
        End if

        System.Threading.Thread.Sleep(10)

        iCycles += 1

        If iCycles > 300 Then
            Throw New System.TimeoutException("PCU-200 did not complete its
operation")
        End If
    End While
Catch ex As Exception
    MsgBox(ex.Message)
End Try

```

Commands Lists

See Table 5 and Table 6 for SCPI required commands and PCU-200 commands respectively.

Table 5: SCPI required commands list

Command	Description
*CLS	Clears the status byte.
*ESE #	Sets the <value> of the Standard Event Status Enable Register.
*ESE?	Returns the value of the Standard Event Status Enable Register.
*ESR?	Returns the value of the Standard Event Status Register.
*IDN?	Returns the instrument's identification (model, serial number, firmware version).
*OPC	Sets bit 0 in the Standard Event Status Register when all pending operations have finished.
*OPC?	Returns the ASCII character 1 when all operations have finished.
*OPT?	Returns a comma-separated list of all of the instrument options.
*RCL "filename"	Recalls a configuration from <filename>.
*RST	Resets most functions to factory-defined conditions.
*SAV "filename"	Saves configuration to <filename>.
*SRE #	Sets the <value> of the Service Request Enable Register.
*SRE?	Returns the value of the Service Request Enable Register.
*STB?	Returns the value of the status byte including the MSS.
*TST?	Initiates the internal self-test and returns the results: 0 if all tests passed and 1 if at least one failed.

*WAI	Causes instrument to wait until all commands are completed.
------	---

Table 6: PCU-200 commands list

Command	Description
:MODUle#:INFO?	Return details about module <#>. This info will be more detailed, equivalent to the data shown in the module selection grid. First module is Module 0.
:MODUle:NUMber?	Return total number of modules present
:MODUle:SElect	Select next module
:MODUle:SElect #	Select module <#>
:MODUle:SElect?	Return current selected instrument
MODUle:TYPE?	Return type of currently selected module
POLarization#:STATE?	Return current state (0-5) for module <#>. Nominal states are respectively V, H, +45, -45, LHC, RHC
POLarization# ₁ :STATE # ₂	On module <# ₁ >, change to state <# ₂ > (0-5). If no parameter change to next state.
POLarization# ₁ :WP# ₂ # ₃	On module <# ₁ >, set waveplate <# ₂ > (0: QWP or 1: HWP) to desired position <# ₃ > in degrees (0-360)
POLarization# ₁ :WP# ₂ ?	Return module <# ₁ >'s position in degrees of waveplate <# ₂ >
ROUTe#:CHANnel #	If switch module present, change channel to #
ROUTe#:CHANnel:NUMber?	Return number of outputs on this module

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MAINTENANCE

Cleaning the Unit

1. Unplug the unit from the line power.
2. Clean the enclosure with a damp cloth.
3. Do not plug the unit back in until it is completely dry.

Cleaning the Outputs

Warning



- Connecting contaminated or damaged connectors to the PCU-200 can damage the unit and affect its performance.
- Damaging the output fiber during maintenance can affect the performance of the unit.

Always inspect the unit's bulkheads with an inspection probe microscope before each connection. "Push style" port cleaners can be used to clean the outputs as necessary.

Cleaning Jumper Connectors

Figure 12 shows a dirty connector requiring cleaning. Figure 13 shows a clean connector ready to be mated.

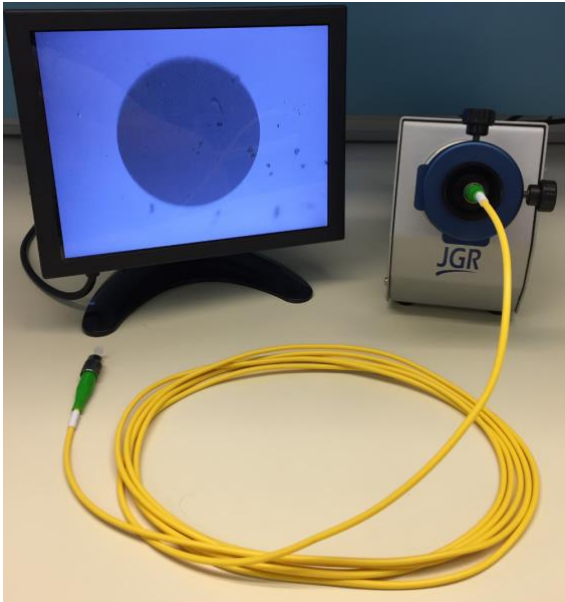


Figure 12: Dirty connector end-face inspection using Santec's EFI-100

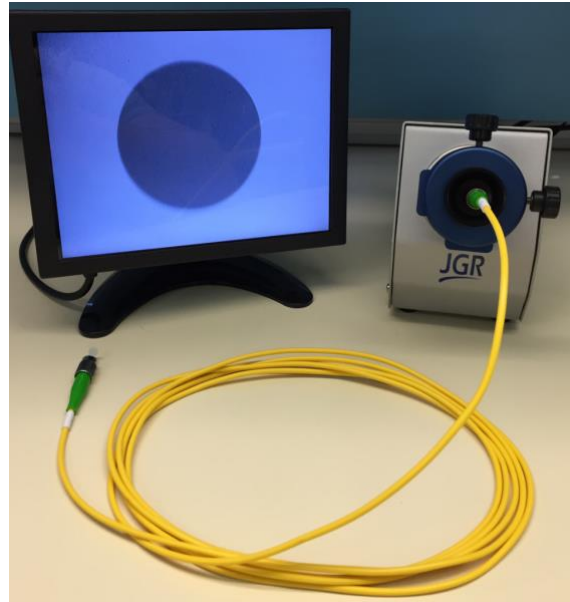


Figure 13: Clean connector end-face inspection using Santec's EFI-100

Warning



- Using contaminated or damaged jumpers can affect the performance of the unit.
- Never force an optical connector mating. Some connectors have a ceramic ferrule that can be easily broken.

Optical cable ends need to be inspected before each mating to ensure they are free of contamination or damage. An inspection scope such as Santec's EFI-100 is required.

If they are contaminated, they must be cleaned. The following items are required.

- Filtered compressed air or dusting gas
- Lint-free swabs and lint-free wipes
- Optical grade isopropyl alcohol (IPA) or optical grade 200° ethanol (**do not use rubbing alcohol** which can contain up to 30% water)

To clean the connectors:

1. Blow the sleeve with compressed air.
2. Apply the alcohol to a small area of the lint-free wipe and rub the end of the ferrule over the wet area.
3. Wipe the ferrule on a dry area of the lint-free wipe.
4. Blow the end of the ferrule with compressed air.
5. Apply the alcohol to a lint-free swab to clean the remaining parts of the connector.

6. With the other end of the swab, dry the areas cleaned.
7. Blow the areas cleaned with compressed air.

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STORAGE AND SHIPPING

Damage can occur from improper handling. Make sure to maintain the unit within the specified temperature range during storage or shipping. Please follow the recommendations below to minimize the possibility of damage:

- If possible, pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations that could generate condensation within the unit.
- Avoid unnecessary shocks and vibrations.

Returning Instruments to Santec

As indicated above, please ship the returned material in the original shipping box and packing material. If these are not available, follow the guidelines below:

1. Contact Santec to obtain an RMA number.
2. Cover the front panel with foam to prevent damage.
3. Wrap the unit in anti-static packaging. Use anti-static connector covers.
4. Pack the unit in a strong enough shipping box considering the unit's weight.
5. Use enough shock-absorbing material (10 to 15 cm) to cushion the unit and prevent it from moving inside the box. Pink poly anti-static foam is recommended.
6. Seal the shipping box securely.
7. Clearly mark FRAGILE on at least 3 of the 4 sides of the box.
8. Always provide the model and serial number of the unit and, if applicable, the RMA number on any accompanying documentation. If possible, indicate the RMA number on the box itself to facilitate identification.

Contact Information

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SPECIFICATIONS

Table 7: PCU-200 optical and electrical specifications sheet

Parameter	Specification
Input Fiber	Panda PM
Output Fiber	9/125
Wavelength Range (nm)	1260 to 1650
Insertion Loss (dB) ^{1,2}	2
Wavelength Dependent Loss (dB)	0.75
State of Polarization Relative Accuracy (°) ³	± 5
State of Polarization Repeatability (°)	± 0.5
State of Polarization Switching Speed (ms)	125
Maximum Safe Input Power (dBm)	23
Return Loss (dB) ¹	50
Remote Interface	USB or Ethernet
Display	5" touch screen
Input Voltage	100 - 240 V AC, 50 - 60 Hz
Power Consumption (VA)	60 maximum

Notes:

¹ excluding connectors

² add 1.0 dB for wideband option (integrated 1x4 PM switch)

³ at 1310 and 1550nm

Table 8: PCU-200 mechanical and environmental specifications sheet

Parameter	Specification
Unit Dimensions W x H x D (cm) ¹	22.5 x 9 x 32.5
Shipping Box Dimensions W x H x D (cm)	36.5 x 39 x 53
Unit Weight (kg)	8
Volumetric Weight (kg) ²	15
Operating Temperature (°C)	10 to 35
Storage Temperature (°C)	-40 to 70
Humidity (Non-condensing)	Max 95% RH from 10 to 35°C

Notes:

¹ excluding removable rubber bezels. Add 1.5cm to W and 3.5cm to H with the removable rubber bezels

² $W \times H \times D / 5000$



In the event of any trouble with this product, turn the unit off in accordance with the procedures to shut off the power described in this operation manual, disconnect the power source cord, make sure the product name and serial number described on the name plate of the product, and then contact our dealer at your place or directly contact us at Santec Photonics Laboratories. Our telephone number and facsimile number are shown below. However, we are not responsible for any trouble arising from your own repair or modification on this product.

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