

JASCO FP-4020/4025

Clarity Control Module

ENG

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To facilitate the orientation in the **Jasco FP-4020/4025** manual and **Clarity** chromatography station, different fonts are used throughout the manual. Meanings of these fonts are:

Instrument (blue text) marks the name of the window to which the text refers.

Open File (italics) describes the commands and names of fields in **Clarity**, parameters that can be entered into them or a window or dialog name (when you already are in the topic describing the window).

WORK1 (capitals) indicates the name of the file and/or directory.

ACTIVE (capital italics) marks the state of the station or its part.

The bold text is sometimes also used for important parts of the text and the name of the **Clarity** station. Moreover, some sections are written in format other than normal text. These sections are formatted as follows:

Note: Notifies the reader of relevant information.

Caution: Warns the user of possibly dangerous or very important information.

■ Marks the problem statement or trouble question.

Description: Presents more detailed information on the problem, describes its causes, etc.

Solution: Marks the response to the question, presents a procedure how to remove it.

1 Jasco FP-4020/4025 Control Module

This manual describes the setting of the **Jasco FP-4020/4025** Fluorescence detector. The control module enable direct control of the instrument over RS-232 connection.



Fig 1: Jasco FP-4020/4025 detector

Direct control means that the detector can be completely controlled from the **Clarity** environment, including the digital data acquisition. That way, no A/D converter is needed. Instrument method controlling the analysis conditions will be saved in the measured chromatograms.

2 Requirements

- **Clarity** Installation USB with appropriate control license allowed - LC Control (p/n A24).
- Optional RS-232 interface (Jasco Product Item: 6890-H445A, RS232C 9P CABLE WITH ADAPTER)
- Free COM port in the PC.
- Serial DB9M-DB9M cross cable (p/n SK01)
- Minimal firmware version 1.02.04

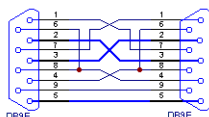
Note: Modern computers usually have only one (if any) serial (COM) port installed. To use more devices requiring the RS-232 port, the MultiCOM adapter (p/n MC01) is available.

Note: Cables are not part of **Clarity** Control Module. It is strongly recommended that you order the required cables together with the Control Module.

3 Installation Procedure

3.1 Jasco FP-4020/4025 detector communication

The **Jasco FP-4020/4025** is controlled by serial (RS-232) communication. It uses a standard serial DB9F-DB9F cross cable (p/n SK01) described in the picture below..



Caution: RS-232 communication interface for the Jasco FP-4020/4025 is optional (Jasco Product Item: 6890- H445A, RS232C 9P CABLE WITH ADAPTER). Make sure you have it installed or contact your local instrument distributor

It is necessary to set a proper type of RS232 Mode on the Jasco FP-4020/4025 detector:

- Use the Menu button on device
- Select TOOL
- Select RS232C Mode
- Set LC-2000

Use the RESET/RUN inputs on the rear panel of the detector to connect start wires from an autosampler for instance or any device that provides the start signal to the detector:



Fig 2: Jasco FP-4020/4025 rear panel: Input/Output Terminals

3.2 Clarity Configuration

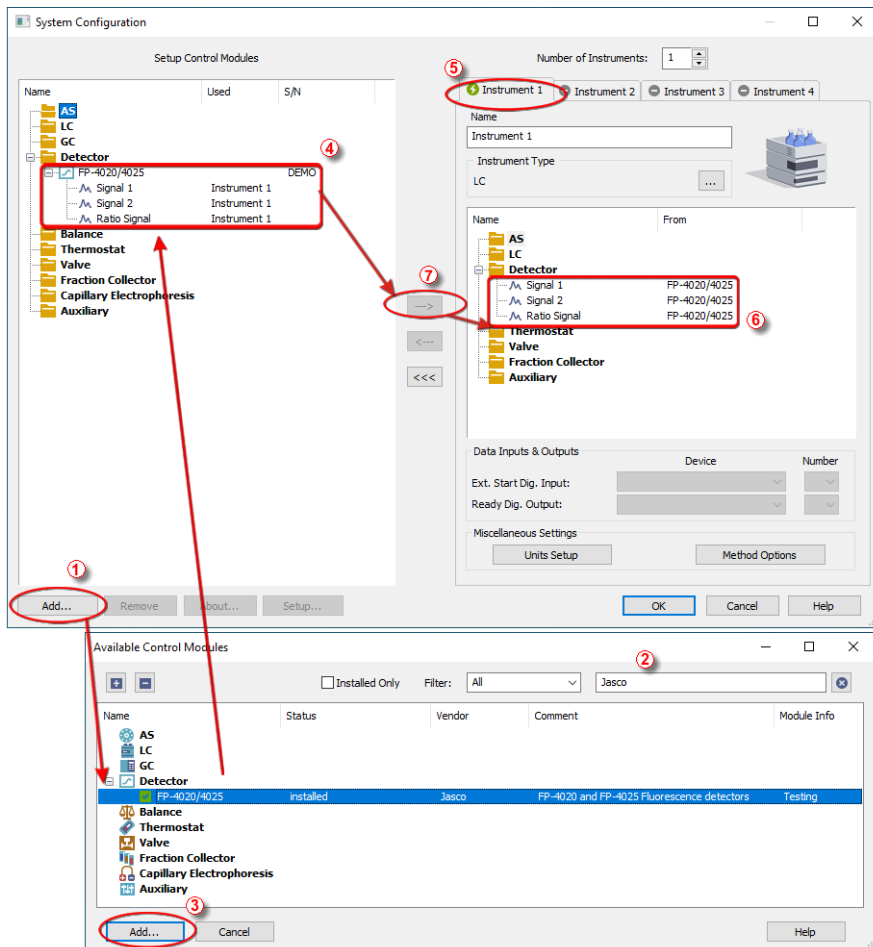



Fig 3: How to Add Jasco FP-4020/4025 module



- Start the **Clarity** station by clicking on the  icon on the desktop.
- Invoke the **System Configuration** dialog accessible from the **Clarity** window using the **System - Configuration...** command.
- Press the **Add** button (1) on **Fig 3** on pg 4.) to invoke the **Available Control Modules** dialog.
- You can specify the search filter (2) to simplify the finding of the driver.

- Select the correct item and press the **Add** (③ on Fig 3 on pg 4.) button.
- The **Jasco FP-4020/4025 Setup** dialog will appear.

Jasco FP-4020/4025 Setup

Port: COM1

Serial Number: DEMO

Model Type: FP-4020

Firmware Version: Demo Version

AutoDetect

Configuration Parameters

A/Z and Mark In Input: Off

Wavelength Range [nm]: EM>EX+10

Flow Cell ID Reading: Inactive

Additional Detector Information

OK Cancel Help

- Set the correct communication *Port* and click on the *Autodetect* button to establish communication with the device.
- The **Jasco FP-4020/4025** item (④) will appear in the *Setup Control Modules* list of the **System Configuration** dialog.
- Drag the appropriate item from the *Setup Control Modules* list on the left side to the desired *Instrument* tab (⑤) on the right side (⑥), or click on the **...** button (⑦).

4 Using the control module

After adding and setting up the detector a new [Acquisition](#) tab will appear in the [Method Setup](#) dialog. A new **Jasco FP-4020/4025** detector section enabling the monitoring of the current detector state will be also created in the [Device Monitor](#) window.

4.1 Jasco FP-4020/4025 Setup

Jasco FP-4020/4025 Setup

Port: COM1
Serial Number: DEMO
Model Type: FP-4020
Firmware Version: Demo Version

AutoDetect

Configuration Parameters

A/Z and Mark In Input: Off
Wavelength Range [nm]: EM>EX+10
Flow Cell ID Reading: Inactive

Additional Detector Information

OK Cancel Help

Fig 4: Jasco FP-4020/4025 Setup

Port

Select the communication port the instrument is connected to.

AutoDetect

Test the connection to the detector using the set COM port. Upload the configuration from the instrument: serial number, model type, firmware version, A/Z and mark in input, wavelength range, and flow cell ID reading settings.

Serial Number

Shows the autodetected serial number of the Jasco FP-4020/4025 detector.

Model Type

Shows the autodetected model of the detector: FP-4020 or FP-4025.

Firmware Version

Shows the autodetected model of the detector: FP-4020 or FP-4025

A/Z and Mark In Input

Shows whether to execute an autozero when a marker signal is input to the MARK IN terminals on the rear panel on the detector. Normally select On for analytical measurements, and Off for fractionation in preparative HPLC.

Wavelength Range

Shows the settable excitation and emission wavelength range. You can choose between EM>EX+10 or Not Restricted.

Use Not Restricted very carefully. With this option, both the excitation wavelength and emission wavelength can be set in the 0 to 900 nm range. Setting the emission and excitation wavelengths to the same value

for a long period (5 minutes or more) may damage the photomultiplier tube.

Note: Refer to the FP-4020/4025 Fluorescence Detector Operator's Manual for details.

Flow Cell ID Reading

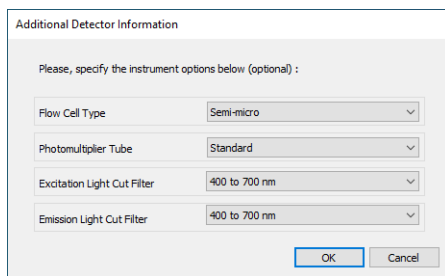
Shows whether the flow cell information data is read or not. Note that the flow cell temperature is not controlled if Inactive is set (FP-4020 model). When the detector model is FP-4025, the temperature control function is not applicable and set to Inactive automatically.

You can modify the A/Z and Mark In Input, Wavelength Range, and/or Flow Cell ID Reading settings directly from the Detector Setup window. The configuration settings will be sent when you send the method to the instrument.

Additional Detector Information

Click this button to set additional instrument options, for information only. This step is not mandatory.

By default, the following instrument options are not specified in the Additional Detector Information window.



Additional Detector Information	
Please, specify the instrument options below (optional) :	
Flow Cell Type	Semi-micro
Photomultiplier Tube	Standard
Excitation Light Cut Filter	400 to 700 nm
Emission Light Cut Filter	400 to 700 nm
OK Cancel	

Fig 5: Additional Detector Information

Flow Cell Type

Specify the flow cell type installed (for analytical measurements or rapid-separation HPLC).

Photomultiplier Tube

Specify whether the photomultiplier tube used is a standard one or an optional photomultiplier tube for expanding the emission wavelength range.

Excitation Light Cut Filter

Specify whether a higher-order excitation light cut filter is installed.

Emission Light Cut Filter

Specify whether a higher-order emission light cut filter is installed.

4.2 Method Setup - Acquisition

The **Method Setup - Acquisition** tab serves for setting the common parameters of the **Jasco FP-4020/4025** detector. If more than one detector is available, it is possible to select between them by using the *Select Detector* combobox on the top of the dialog.

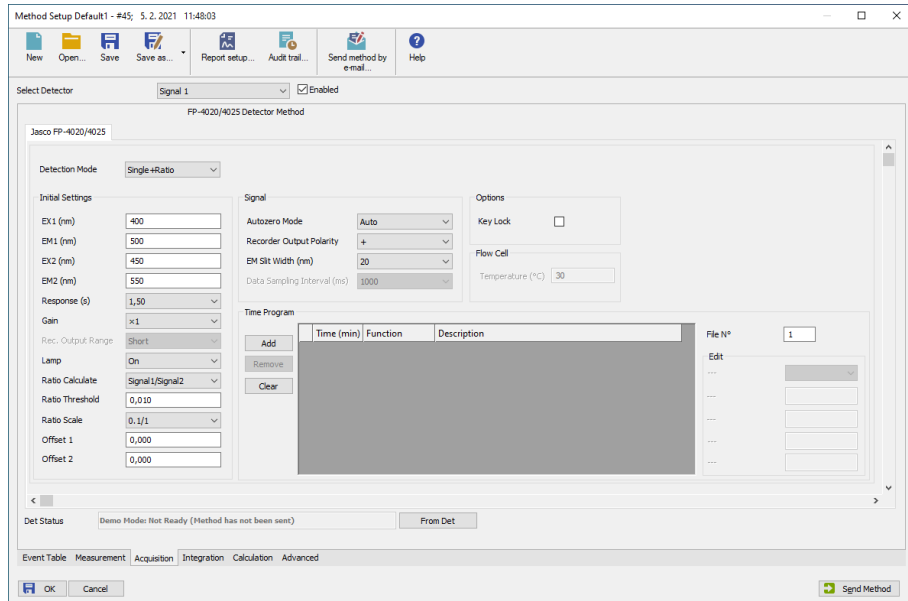


Fig 6: Method Setup - Acquisition

Detection Mode

Three detection modes are available:

Single

Means "single wavelength detection". The fluorescent intensity is measured at a pair of excitation and emission wavelengths.

Dual

Means "simultaneous dual wavelength detection". The fluorescent intensity is measured at two pairs of excitation and emission wavelengths (Signal 1 and Signal 2 respectively).

Single + Ratio

Means "ratio detection". Each fluorescent intensity is measured at each of two pairs of excitation and emission wavelengths. The ratio of both signals (Signal1/Signal2 or Signal2/Signal1, depending on the *Ratio Calculate* value set in the method) is also calculated.

EX1, EM1

Sets the first pair of excitation and emission wavelengths (nm) in the dual detection mode or ratio detection mode. When the detection mode is Single, the excitation and emission wavelengths (nm) can also be set in these fields. The setting range depends on the *Wavelength Range* defined in [Jasco FP-4020/4025Setup](#) window.

EX2, EM2

Second pair of excitation and emission wavelengths (nm) in the dual detection mode or ratio detection mode. The setting range depends on the *Wavelength Range* defined in [Jasco FP-4020/4025Setup](#) window.

Whatever the detection mode, the light set at the excitation wavelength is radiated to the flow cell and the light set at the emission wavelength is detected.

Response

Sets the response time (in seconds).

Gain

Sets the application voltage to the photomultiplier tube (PMT) of the fluorescence detector. Normally, the response of the sample increases by incrementing the PMT gain.

In quantitative analysis, calibration curve making and the following quantitative analyses should be done under the same gain and response settings.

Rec. Output Range

Sets the range of recorder output in single wavelength detection.

Lamp

Sets the lamp *On* and *Off*.

Ratio Calculate

Sets the numerator and denominator assignment of Signal 1 and Signal 2 in ratio calculation (ratio detection mode only). You can choose between *Signal 1/Signal 2* and *Signal 2/Signal 1*.

Ratio Threshold

Sets the threshold value used in ratio calculation in the ratio detection mode.

Ratio calculation is output when the denominator value exceeds the threshold value. Zero is output if the result does not exceed this value.

Ratio Scale

Set the relationship between the ratio calculation value and the REC/INT2 OUT output of the detector. (refer to the Operator's manual for details on the Input / Output terminals).

Offset 1, Offset 2

This setting applies to the ratio detection mode only.

Offset values of Signal 1 and Signal 2 can be set in advance to suppress generation of negative values due to baseline drift in the ratio calculation.

Autozero Mode

Sets the autozero execution conditions. You can choose one of the following mode:

Auto

Autozero is executed automatically when the wavelength or gain is changed. This is the default mode.

Manual

Autozero is not executed automatically when the wavelength or gain is changed. This mode is used for checking the absolute fluorescent intensity.

Hold

Autozero is executed automatically when the wavelength or gain is changed. However, the signal level is kept to just before the level at when the autozero is executed. Even if the baseline has been drifted and the baseline level is not zero, it is free from large level differences.

Recorder Output Polarity

Sets the polarity of recorder output. When "+" is selected, signals are output to the + side when the fluorescent intensity signals increase. Conversely, signals are output to the - side when "-" is selected.

EM Slit Width

Sets the emission slit width for the emission side monochromator: *20 nm* and *40 nm* are selectable.

In general, if the difference between the excitation wavelength and emission wavelength is less than *100 nm*, *20 nm* selection enables high-sensitive analysis. If the difference is more than *100 nm*, *40 nm* should be selected.

Data Sampling Interval

Sets the sampling interval for the detector acquiring the fluorescent signal data. The default value is *100 ms*. This setting is ignored in the dual detection mode or ratio detection mode and *1000 ms* are automatically used as sampling interval.

Note: When you login to the Jasco FP-4020/4025 detector, *1000 ms* is used as default data sampling interval. The value set in the method is applied when the method is sent to the instrument.

Flow Cell Temperature

Sets the temperature of the flow cell. The flow cell temperature is not controlled if Inactive is set in the detector configuration for the *Flow Cell ID Reading* parameter in [Jasco FP-4020/4025Setup](#) window or if the instrument model is FP-4025.

Note: There is no stabilization time setting, the instrument will be ready when the flow cell temperature setpoint +/- 1°C is reached.

Key Lock

When this setting is enabled, key operation is disabled on the instrument.

Time Program

The time table is used to perform changes on the detector during run.

First, set the program file number (*File N°*) that will be used on the instrument: 10 types of time programs can be stored on the detector.

Then, set the *Time* (min) when the selected [Function](#) is executed and define the function values. The list of functions can vary according to the detection mode.

Only one function can be changed per step. A maximum of 64 steps can be set.

Note: The steps of the time program after the Run Time value defined in the Measurement tab are ignored during an analysis. If needed, modify the Run Time value in the method.

Loading / Sending the Method

Click *Send Method* to download the method to the instrument.

Note: By default, three signals (Signal 1, Signal 2 and Ratio Signal) are loaded from the [System Configuration](#) when opening the instrument in Clarity. Thus they are visible in the [Data Acquisition](#) window until the method is sent to the instrument.

Click *From Det* to load the method stored in the detector.

Spectrum Measurement

This detector feature is not supported.

4.3 Time Program: Functions

The following table summarizes the settings that can be changed during the run according to the detection mode.

Select first the detection mode, then add some steps in the time program table:

- Click *Add* to add a line at the end of the time program table.
- Click *Remove* to delete the selected line.
- Click *Clear* to clear the whole time program table.

Function	Detection Mode		
	Single	Dual	Ratio
Wavelength (nm)	A	A	A
Response (s)	A	A	A
Gain	A	A	A
Recorder Output Range	A	-	-
Autozero	A	A	A
Threshold	-	-	A

A: means the function can be set.


The time program steps are automatically sorted by chronological order when the method is saved.

Note that a marker signal (MARK OUT) is automatically output when a run starts (Refer to the FP-4020/4025 Fluorescence Detector Operator's Manual for details on this setting).

The steps of the time program after the *Run Time* value set in the Measurement tab are ignored during an analysis.

Note: The following functions available on the detector are not supported in the Time Program table: Lamp (On/Off), Signal Calculate, Ratio Scale, Offset 1 and Offset 2.

4.4 Device Monitor

The window with the detector status can be invoked by the *Monitor - Device Monitor* command from the **Instrument** window or using the  *Device Monitor* icon. It displays the detector global status and some actual detector settings.

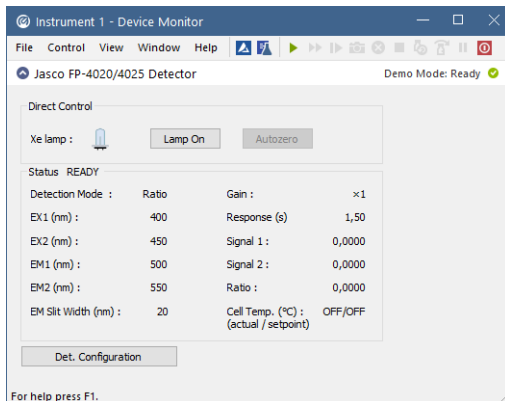


Fig 7: Device Monitor - Detector

Detector Status

The Jasco FP-4020/4025 detector status is shown:

READY: the time program of the acquisition method is executable.

EQUILIBRATING: the flow cell temperature is equilibrating to reach method setpoint. This information is not displayed when the flow cell temperature is not controlled or *Flow Cell ID Reading parameter* is set to *Active*.

BUSY: the hardware is busy.

PRERUN: the initial conditions of the acquisition method are running.

RUNNING: the time program of the acquisition method is running.

TROUBLE: the detector experienced a problem during operation.

Detection Mode

Displays the actual set detection mode.

EX1

Displays the first actual set excitation wavelength (*Dual* or *Ratio* detection mode) in nm. When the detection mode is *Single*, the set excitation wavelength is also displayed in that field.

EM1

Displays the first actual set emission wavelength (*Dual* or *Ratio* detection mode) in nm. When the detection mode is *Single*, the set emission wavelength is also displayed in that field.

EX2

Displays the second actual set excitation wavelength (*Dual* or *Ratio* detection mode) in nm.

EM2

Displays the second actual set emission wavelength (*Dual* or *Ratio* detection mode) in nm.

EM Slit Width

Displays the actual set emission slit width (in nm) for the emission side of the monochromator.

Gain

Displays the actual set gain.

Response

Displays the actual set response in seconds.

Signal 1

Displays the actual measured signal for the first pair of excitation and emission wavelengths. When the detection mode is *Single*, the corresponding measured signal is also displayed in that field.

Signal 2

Displays the actual measured signal for the second pair of excitation and emission wavelengths.

Ratio

Displays the actual measured ratio (Signal 1/Signal 2 or Signal2 / Signal 1 depending on the set ratio calculation method) when the detection mode is *Ratio*.

Cell Temp.

Displays both the actual measured and set flow cell temperatures. Flow cell temperature is read when the *Flow Cell ID Reading* parameter is set to *Active*, else *OFF* is displayed.

The flow cell temperature is controlled with model FP-4020 only.

Det. Configuration

Click this button to display the [Hardware Configuration](#) dialog. If the serial connection is working successfully, then the COM port to which the detector is connected, the serial number, the model type, and the firmware version of the detector will be displayed.

Direct Control

The detector can be partially controlled from the [Device Monitor](#) window.

Click *Autozero* to perform the autozero operation.

Click *Lamp On/Off* to turn the lamp ON or OFF.

Note that direct control actions are disabled when the detector status is running.

Click Shut down or select Control / Shut Down to put the detector in safe mode and switch the lamp off even if an analysis is running.

5 Troubleshooting

When the solution to a problem cannot be found easily, a recording of the communication between **Clarity** and the detector will significantly help **DataApex** support.

The data recording can be enabled by adding or amending the COMMDRV.INI file in the **Clarity** installation directory (C:\CLARITY\CFG by default). The file can be edited in any text editor (e.g. Notepad). The following section should be edited or added:

```
[COM1]
echo=on
textmode=on
filename=CommJascoFP402025_%D.txt
reset=off
```

Note: Instead of COM1 type the correct serial port used to communicate with the **Jasco FP-4020/4025** detector. This address is displayed when the *Det Configuration* button in the [Device monitor](#) window.

Note: %D (or %d) in the filename parameter means that the log will be created separately for each day. The *reset=off* parameter disables deleting the content of the log each time the station is started during the same day.

The created *.TXT files will be of great help in the diagnosis of not documented errors and communication issues.

5.1 Error Messages during Operation

Some items are automatically checked during operation. If an error is found, a message will be displayed in Clarity. Stop current operation in Clarity, close all windows and logout from the instrument.

On the Jasco FP-4020/4025, press the *Clear* key to cancel temporarily the error.

The following lists the possible errors and their countermeasure. Contact your local instrument distributor for assistance.

An error message “Leak from flow cell”.

Solution: This error is displayed when liquid leaks from the flow cell. Turn off power on the instrument. Detach the flow cell and try to find the leak position. Refer to the Operator's manual for details.

An error message “EX grating drive error”.

Solution: The excitation grating drive function is not carried out properly. Turn off the power, wait at least 10 seconds then turn on the detector again. Contact your local instrument distributor if the same error is still reported.

An error message “EM grating drive error”.

Solution: The emission grating drive function is not carried out properly. Turn off the power, wait at least 10 seconds then turn on the detector again. Contact your local instrument distributor if the same error is still reported.

An error message “Hg drive error”.

Solution: The mercury lamp drive function is not carried out properly. Turn off the power, wait at least 10 seconds then turn on the detector again. Contact your local instrument distributor if the same error is still reported.

An error message “Trouble lamp off, Lamp over temp, L. house not set”.

Solution: This message is displayed when the lamp goes out automatically for one of the following reasons:

- The lamp was ON with the lamp housing cover not attached over 10 minutes. Turn off the power, wait at least 10 seconds then turn on the detector again.
- The lamp housing is not set properly. Turn off the power, check installation of the lamp housing, then turn on the detector.
- The lamp housing temperature has exceeded the specified value. Turn off the power and check whether foreign matter is caught by the fan on the rear panel. Turn on the detector again.

An error message “Lamp temperature error”.

Solution: This is displayed when an error is detected in the measured temperature of the lamp housing. Turn off the power, wait at least 10 seconds then turn on the detector again. Contact your local instrument distributor if the same error is still reported.

An error message “Peltier temperature error”.

Solution: This is displayed when an error is detected in the measured temperature of the flow cell temperature controller (FP-4020 only). Turn off the power, wait at least 10 seconds then turn on the detector again. Contact your local instrument distributor if the same error is still reported.

An error message “Cell temperature error”.

Solution: This is displayed when an error is detected in the measured temperature of the flow cell. Turn off the power, wait at least 10 seconds then turn on the detector again. Contact your local instrument distributor if the same error is still reported.

An error message “PMT temperature error”.

Solution: This is displayed when an error is detected in the measured temperature of the photomultiplier tube. Turn off the power, wait at least 10 seconds then turn on the detector again. Contact your local instrument distributor if the same error is still reported.

An error message “Lamp fan error” or “Chassis fan error” or “Peltier fan error”.

Solution: This is displayed when an error is detected in the rotation of the fan that cools the inside of the instrument. Turn off the power and check whether foreign matter is caught by the fan on the rear panel. Turn on the detector again.

An error message “Lamp maintenance time error”.

Solution: This error is displayed when the lamp operation time exceeds the set threshold value. Replace the lamp immediately if the lamp operation time exceeds the warranted life time of the lamp. Otherwise, the lamp may break.