DynaSpect Series

DynaSpect is the name for a series of spectrophotometer devices.

Multi-channel Analyzer

PMA-50

【Scientific applications】

- UV to visible spectroscopy
- Fluorescence spectroscopy
- Raman scattering
- Chemiluminescence analysis
- Liquid chromatography
- Gas chromatography
- ICP emission analysis
- Discharge spectrum analysis
- Combustion analysis
- Micro spectroscopy

【Industrial applications】

- Water quality testing
- Evaluation of light emitting devices and light sources
- Impurities testing
- Film thickness measurements
- UV radiation measurements
- Plasma monitors
- Fruit testers
- Combustion monitoring
- Color filter evaluation

HAMAMATSU

PHOTON IS OUR BUSINESS

PMA
Photonic Multichannel Analyzer

Simultaneous multi-wavelength measurement !

Measures emission, absorption and reflection spectra in a split second.

The PMA-50 is a multi-channel spectrophotometer consisting of a polychrometer, multi-channel photodetector, controller, and data analyzer. The PMA-50 simultaneously measures a wide range of wavelengths without running a wavelength scan, and so can measure emission, absorption and reflection spectra all at one time. Photodetectors are selectable according to measurement wavelengths and light intensity, so you can configure an optimal system that best matches your application.

FEATURES

Simultaneous multi-wavelength measurement

Using a self-scanning image sensor enables simultaneous multi-wavelength measurement without wavelength scanning. Even spectra with weak light emission can be rapidly measured.

High-precision spectrum measurement

Ideal for making high-precision spectrum measurements since the axis of the measured spectrum wavelength and photodetector spectral response characteristics can be calibrated.

Choice of optimal photodetectors to match application

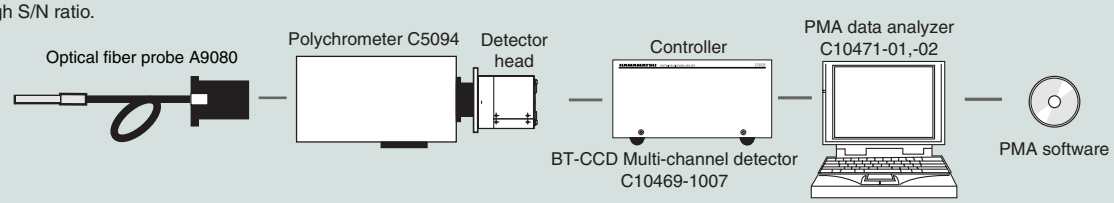
A wide variety of image sensors are available as photodetectors. Selecting a photodetector that best matches the measurement wavelength range and light intensity makes the PMA-50 the ideal tool for use in a broad range of applications.

Up to 3 gratings can be installed at the same time

Different types of gratings are available and up to 3 gratings can be installed at the same time. Even just one polychromator allows you to make simultaneous spectrum observations over a wide range of wavelengths as well as optical measurement with high spectral resolution.

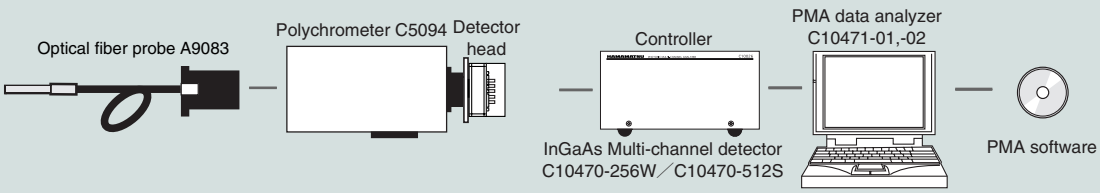
Ultra-high sensitivity model BT-CCD system

The BT-CCD system is a multi-channel photodetector using a back-thinned CCD sensor with enhanced sensitivity that makes it ideal for low-light-level measurement. Air-cooled thermoelectric cooling greatly reduces dark current noise so that even weak light can be measured at a high S/N ratio.



Near infrared model InGaAs system

These models have an internal InGaAs linear image sensor to allow measuring reflection and absorption spectra in the near infrared region with a wide dynamic range. Two models are available: C10470-256W (256 channels, spectral range 1200 nm to 2600 nm) and C10470-512S (512 channels, spectral range 900 nm to 1700 nm).



MEASUREMENT MODES

Standard measurements

This is the most basic measurement mode.

Applications: emission spectra for light sources, fluorescence, plasma and the like.

Reflective measurements

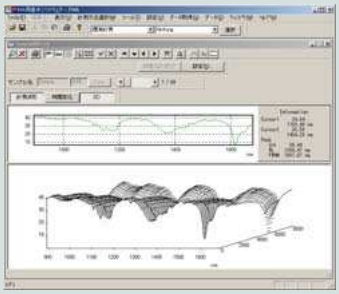
This is the measurement mode for finding spectral reflectance.

Applications: reflectance measurements for optical filters, coatings and the like.

Transmittance and absorption measurements

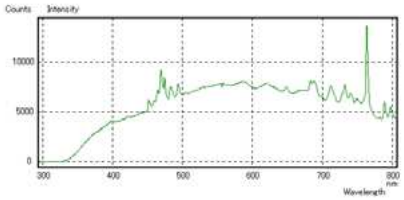
This is the measurement mode for finding spectral transmittance and absorption.

Applications: measurements of transmittance and absorption in optical filters, films, solutions and the like.

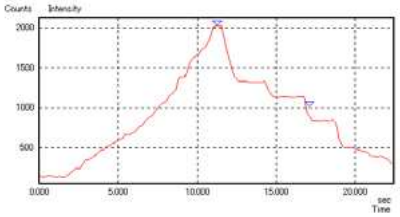


DISPLAY MODES

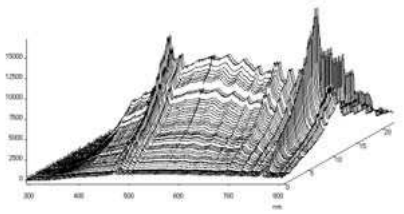
Spectrum display



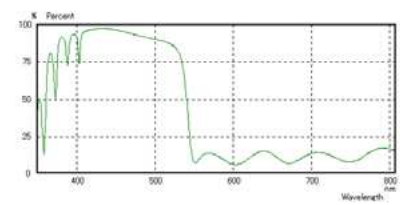
Display of changes over time



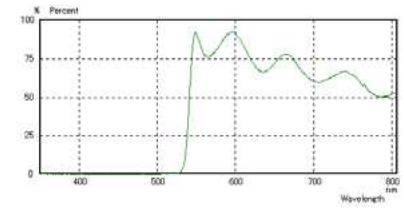
3-D display



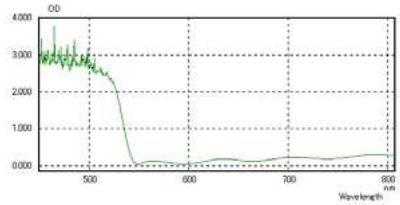
Reflectivity display



Transmittance display



Absorbance display (OD)



Grating list A6751

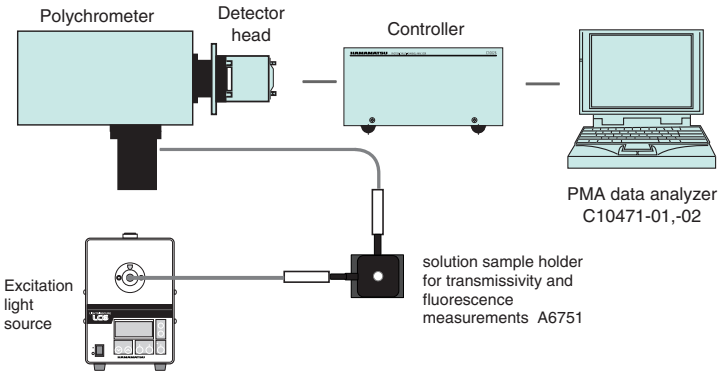
No. of grooves (gr/mm)	Blaze wavelength	Spectral range (nm)	Product No.	BT-CCD C10469-1007 (200 nm~1100 nm)				InGaAs C10470-512S (900 nm~1700 nm)				InGaAs C10470-256W (1200 nm~2600 nm)			
				C5094		C5095		C5094		C5095		C5094		C5095	
				Spectral width (nm)	Resolution (nm)	Spectral width (nm)	Resolution (nm)	Spectral width (nm)	Resolution (nm)	Spectral width (nm)	Resolution (nm)	Spectral width (nm)	Resolution (nm)	Spectral width (nm)	Resolution (nm)
50	600 nm	450~1200	40050600	—	—	944	3.2	768	3.9	492	2.5	768	6.0	492	3.84
100	450 nm	250~900	40100450	737	2.5	472	1.6	384	2.0	246	1.2	384	3.0	246	1.92
	780 nm	500~2000	40100780												
150	300 nm	250~800	40150300	492	1.7	315	1.1	256	1.3	164	0.83	256	2.0	164	1.28
	500 nm	300~1800	40150500												
	1250 nm	750~2500	40151250												
300	300 nm	250~1000	40300300	246	0.84	157	0.54	128	0.65	82	0.42	128	1.0	82	0.64
	500 nm	300~1000	40300500												
	750 nm	450~2000	40300750												
	1 μm	650~2400	40301000												
	1.7 μm	1000~2600	40301700												
600	300 nm	250~600	40600300	123	0.42	79	0.27	64	0.33	41	0.21	64	0.5	41	0.32
	500 nm	350~1600	40600500												
	500 nm	360~1250	45060501												
	1000 nm	600~2200	40601000												
	1500 nm	800~2200	40601500												
830	1200 nm	650~1600	40831200	89	0.30	57	0.19	46	0.23	30	0.15	46	0.36	30	0.23
1200	250 nm	200~550	45120251	61	0.21	39	0.13	—	—	—	—	—	—	—	—
	500 nm	350~800	45120501												
	190 nm~700 nm	190~700	45120190												
	1200 nm	600~1100	41201200												
	400 nm~1100 nm	400~1100	45120400												

★this Spectral range is reference values.

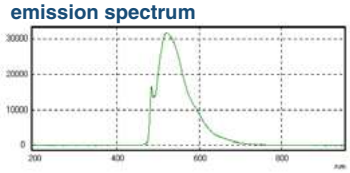
SYSTEM EXAMPLES

Emission spectrum measurements

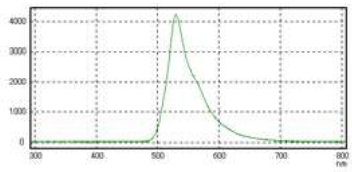
For fluorescent samples such as fluorescent lamps and EL devices



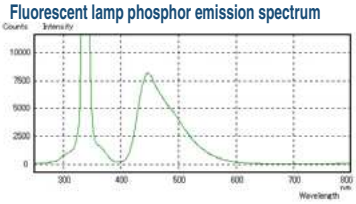
Fluorescence indicator (Fluorescein) emission spectrum



Chemiluminescence emission spectrum



Fluorescent lamp phosphor emission spectrum



<Configuration>

- Standard PMA-50 configuration

Options

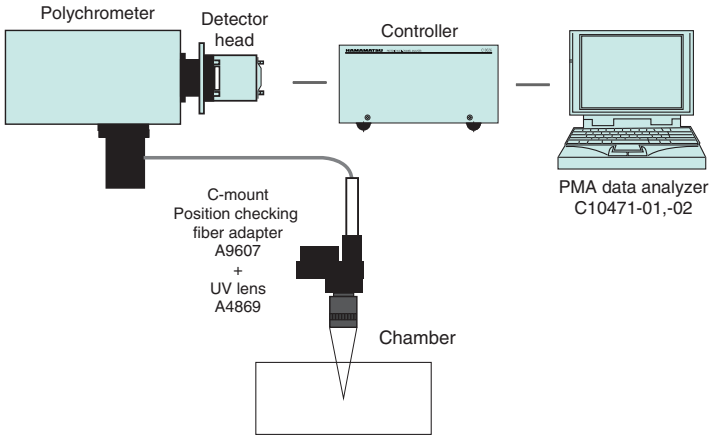
- C10471-01,-02 PMA data analyzer
- Excitation light source: laser, xenon lamp, etc.
- A6751 solution sample holder for transmissivity and florescence measurements

<Applications>

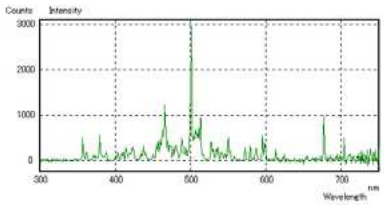
- Fluorescence spectroscopy
- Monitoring chemical light emissions

Emission spectrum measurements

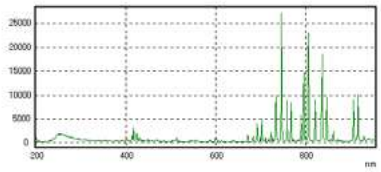
Emission spectrum measurements for plasma, electric discharge, ablation and the like



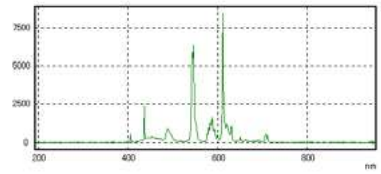
Electric discharge emission spectrum



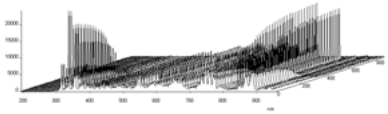
Emission spectrum during oxide film etching



Emission spectrum during nitride film etching



Temporal ch es in plasma emission spectra



<Configuration>

- Standard PMA-50 configuration

Options

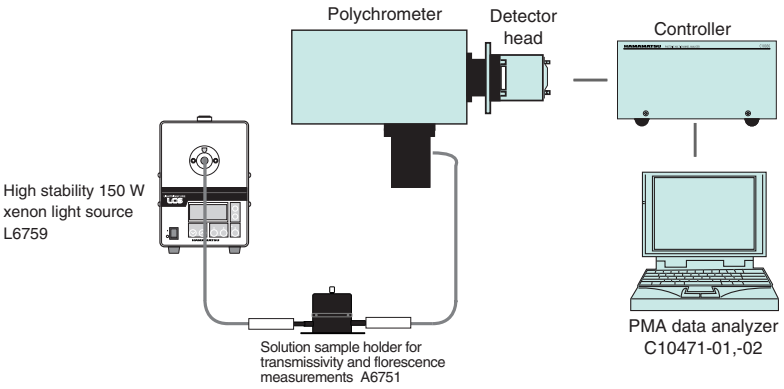
- C10471 PMA data analyzer
- A9607 C-mount position checking fiber adapter
- A4869 UV lens

<Applications>

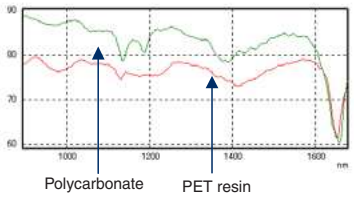
- Plasma component analysis
- Analysis of various emission phenomena

Absorption spectrum measurements

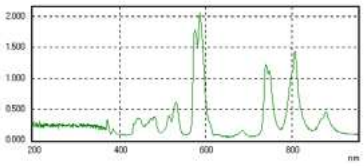
Spectral transmittance and absorption measurements in optical filters, films, solutions and the like



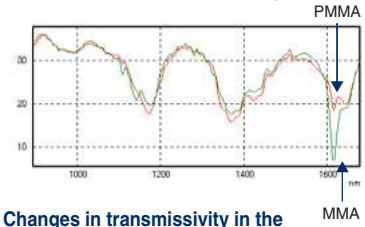
Component analysis of plastics using transmission spectra (polycarbonate and PET resins)



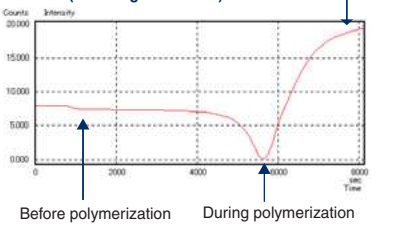
Didymium film absorption spectrum



MMA and PMMA transmission spectra



Changes in transmissivity in the polymerization from MMA to PMMA (wavelength: 1615 nm)



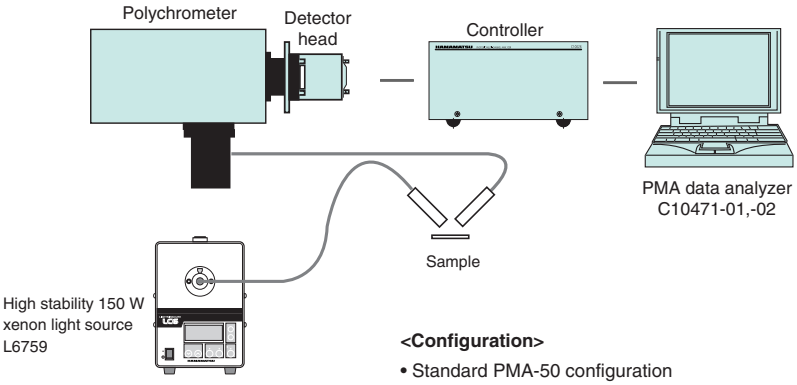
<Configuration>
- Standard PMA-50 configuration

Options
- C10471 PMA data analyzer
- L6759 high stability 150 W xenon light source
- A6751 solution sample holder for transmissivity and florescence measurements

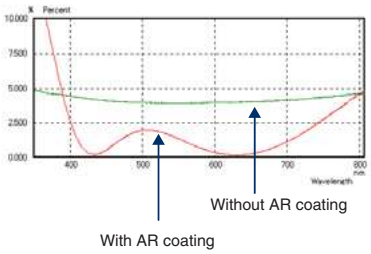
<Applications>
- Absorption spectrum evaluations for solutions and films
- Component analysis for samples
- Monitoring chemical changes

Reflective spectrum measurements

Measurement of spectral reflectance in optical filters, anti-reflective films (AR coatings) and the like



AR coating reflection spectrum



<Configuration>
- Standard PMA-50 configuration

Options
- C10471 PMA data analyzer
- L6759 high stability 150 W xenon light source

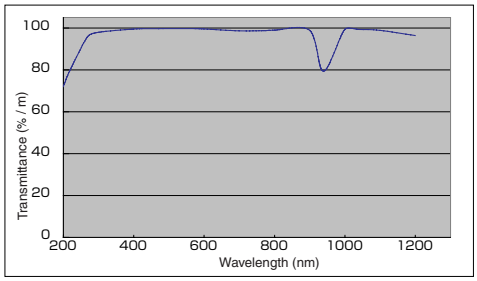
<Applications>
- Inspection of coatings
- Monitoring thin film growth

INPUT OPTICS

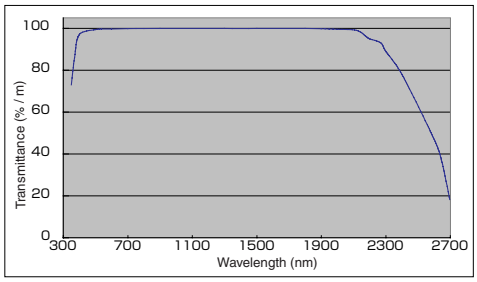
● Optical probes　① A9080（BT-CCD）　② A9083（InGaAs）

Optical probes A9080 and A9083 are optical fibers for guiding light to the polychromator. These optical probes make optical measurement easy because there is no need to set up an optical system. The A9080 and A9083 optical probes are each used with a fiber light condenser A5761-01.

① Spectral transmittance of A9080



② Spectral transmittance of A9083



● Fiber light condenser A5761-01

The A5761-01 is a fiber light condenser designed to easily attach to the C5094 and C5095 polychrometers. The A5761-01 efficiently inputs measurement light from the optical fiber probe into the polychrometer.

▲ A5761-01 connected to an optical fiber probe

POLYCHROMETERS / POLYCHROMETER ADAPTERS

● Polychromators C5094、C5095

▲C5094

The C5094 and C5095 are Czerny-Turner type polychrometers. A variety of gratings are available for each of them and up to 3 gratings can be simultaneously installed. Even one polychrometer allows you to make simultaneous spectrum observations over a wide range of wavelengths as well as optical measurement with high spectral resolution.
Since both polychrometers include a GP-IB interface, you can use your PC to switch the gratings, set observation wavelengths, and adjust the entrance slit width.

* Polychrometers already available at your company can also be used. Please consult our sales office for more information.
* Choose a polychrometer adapter that matches the detector to be used.

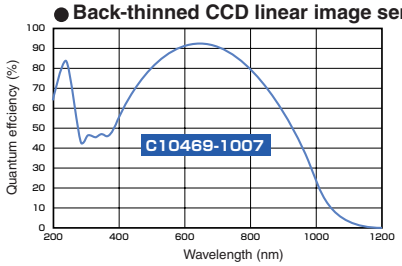
PHOTODETECTORS

● BT-CCD Multi-Channel detectors C10469-1007

The C10469-1007 is a multi-channel photodetector with a back-thinned CCD sensor that makes it ideal for low-light-level measurement. The C10469-1007 consists of a detector head and a controller. The CCD sensor in the detector head has a high quantum efficiency of 90% or more at a peak wavelength (approximately 650 nm). Even in the UV region (200 nm to 400 nm), the quantum efficiency is as high as 40% or more. What's more, air-cooled thermoelectric cooling greatly reduces dark current noise for making low-light-level measurements at a high S/N ratio.

Model	C10469-1007
Wavelength	200 nm to 1100 nm
Number of photosensitivedevice channels	1024 ch
Device cooling temperature	−15 ℃
Read-out noise	10 electrons
Dark current	75 electrons/scan (−15 ℃:20 ms)

● Back-thinned CCD linear image sensor

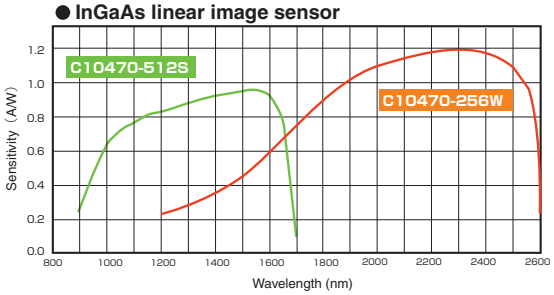


● InGaAs Multi-Channel detectors C10470-512S
● InGaAs Multi-Channel detectors C10470-256W

The C10470-512S and C10470-256W are high sensitivity multi-channel detectors specifically developed for spectrophotometry in the infrared region. These multi-channel detectors contain an InGaAs image sensor device integrating an InGaAs photodiode array and CMOS signal processing circuit into one package. The C10470-512S uses a single-stage Peltier cooler for thermoelectric cooling and covers a spectral range from 900 nm to 1700 nm.
The C10470-256W, on the other hand, uses a two-stage Peltier cooler and its spectral response ranges from 1200 nm up to 2600 nm.

Model	C10470-512S	C10470-256W
Wavelength	900 nm to 1700 nm	1200 nm to 2600 nm
Number of photosensitivedevice channels	512 ch	256 ch
Device cooling temperature	−10 ˚C	−20 ˚C
Read-out noise	12 500 electrons	12 500 electrons
Dark current	6750 electrons/scan (−10 ˚C:5 ms)	6.25×10^6 electrons/scan (−20 ˚C:5 ms)

● InGaAs linear image sensor



OPTIONS

● PMA controller

The PMA controller drives the C10469-1007, C10470-512S and C10470-256W multi-channel detectors, converts output signals from the sensor into digital signals, and transfers the data to a PC via the USB interface. Measurement conditions are controllable by U6039 PMA basic software that comes with the PMA-50.

● **Control section**
- Interface---------- USB 2.0 interface

● **AD converter**
- AD conversion---------- 16 bits

● **Functions**
- Data transfer---------- Transfers data stored in memory to a PC
- Exposure time setting--------- Sets from 5 ms to 64 seconds (depending on detector head)
- Trigger mode setting---------- Sets internal sync and external sync
- Trigger polarity setting--------- Sets trigger polarity during external sync
- Shutter open/close---------- Opens and closes shutter
- Amp gain setting---------- Sets data amp gain to 1, 2, or 5 times
- Pixel clock setting---------- Sets sensor readout speed

DATA ANALYZER

This is an IBM PC compatible computer used for data analysis.

PMA data analyzer

- Notebook PC C10471-01
- Desktop PC C10471-02

PMA SOFTWARE U6039-01

- Measurement functions ····· Monitoring measurement
Data measurement
- Temporal resolution measurement functions ··· Temporal fluctuation of spectra
Temporal fluctuation in reflectivity and transmissivity
- Data acquisition condition settings ····· Exposure time settings
Memory integration count assignment
- Calibration/correction ····· Wavelength axis calibration
Dark current correction
- Display functions ····· Spectrum display
Display temporal waveform fluctuations
- Wavelength axis display ····· Wavelength, wave number, Raman shift, energy (eV)
- Brightness axis display ····· Linear, logarithm
- Cursor analysis functions ····· Wavelength (wave number, etc.) vs. intensity
Peak detection
FWHM measurement
Integrated intensity
- Other analytical functions ····· Smoothing
Differential waveform

OPTIONS

Solution sample holder for transmissivity and fluorescence measurements A6751

This is a dedicated holder with an integrated condensing lens for the use with vials.

Reflection measurement optics A9665

These are optics making it possible to illuminate the sample at 45° from the light source and measure the reflected light.

C-mount fiber adapter A6399

This is an adapter for securing the fiber input optics to the C-mount of a microscope or the like.

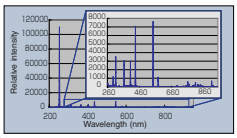
C-mount position checking fiber adapter A9607

In addition to the function of the C-mount fiber adapter, the measurement position can be checked. Measurements in the UV.

UV lens A4869

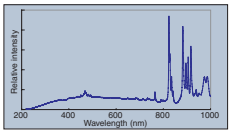
Condensing lens for UV.
f=50 mm, F3.5
(A6399, A8482 required)

Light source L5351 for wavelength calibration



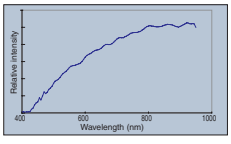
High stability 150 W xenon light source L6759

This is a high stability xenon light source with output wavelengths from 250 nm to 1000 nm for excitation and absorption measurements.



Halogen light source L6758

This is a halogen light source with output wavelengths from 400 nm to 1000 nm for excitation and absorption measurements.



SPECIFICATIONS

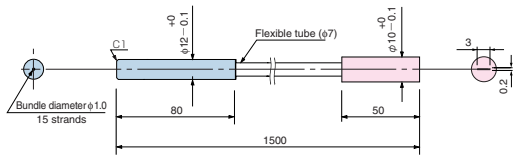
	PMA-50/BT-CCD system	PMA-50/InGaAs system	
Model	Ultra-high sensitivity	Near infrared model	
Photo-detector	BT- CCD linear image sensor C10469-1007	InGaAs linear image sensor C10470-512S	InGaAs linear image sensor C10470-256W
Wavelength	200 nm to 1100 nm	900 nm to 1700 nm	1200 nm to 2600 nm
Number of photosensitive device channels	1024 ch	512 ch	256 ch
Device cooling temperature	−15 ˚C	−10 ˚C	−20 ˚C
Read-out noise	10 electrons	12 500 electrons	12 500 electrons
Dark current	75 electrons/scan (−15 ˚C : 20 ms)	6750 electrons/scan (−10 ˚C : 5 ms)	6.25×106 electrons/scan (−20 ˚C : 5 ms)
AD resolution	16 bit		

● **Polychrometers**

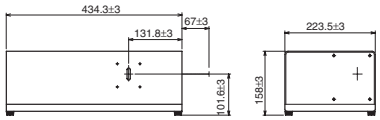
Model	C5094	C5095
Optical layout	Czerny-Turner type (comes with aberration-corrected toroidal mirror)	
Focal length	250 mm	500 mm
F value	4	8
Entrance slit width	Variable from 10 µm to 2000 µm	
Grating	Up to 3 gratings can be installed at the same time.	
Reciprocal linear dispersion	2.5 nm/mm (at 1200 gr/mm)	1.6 nm/mm (at 1200 gr/mm)

DIMENSIONAL OUTLINES (Unit :mm)

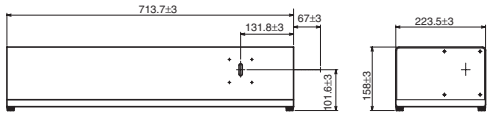
● **Fiber input optics** (approx.100 g)



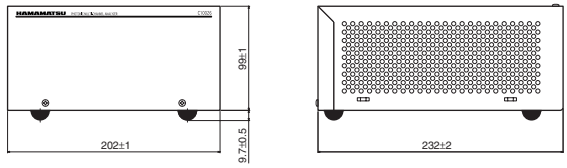
● **Polychrometers C5094** (approx.13.5 kg)



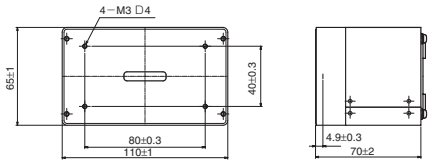
● **Polychrometers C5095** (approx.16 kg)



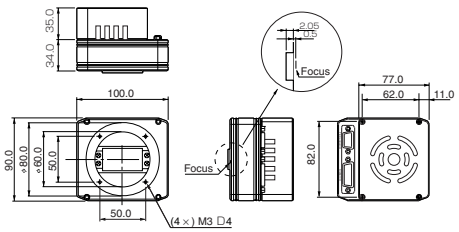
● **Controller** (approx.3 kg)



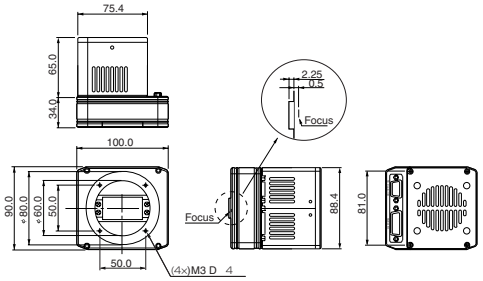
● **Detector C10469-1007** (approx. 520 g)



● **Detector C10470-512S** (approx. 940 g)



● **Detector C10470-256W** (approx. 870 g)



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