

Manufacturer Information: PHI XPS Systems

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Physical Electronics, Inc.

The following information was supplied for PHI Models 5100, 5200, 5300, 5400, 5500, 5600, and 5700 XPS Systems including the 5000LS, 5500LS, 5600LS, and 5700LS.

The items appearing in bold italic capital letters are the required answers for the *Surface Science Spectra* Contributors Form. Items marked with an asterisk (*) are user-supplied or user-selected. Other information is provided to help users determine which answer best describes their system parameters.

Section C. Overall Instrument Description

Line 1. Spectrometer Manufacturer
PHYSICAL ELECTRONICS. INCORPORATED

Line 2. Manufacturer Model #
5100 single channel detector (SCD), four-element lens
5200 SCD, Omni Focus lens
5300 position sensitive detector (PSD), four-element lens
5400 PSD, Omni Focus lens
5500. 5600 or 5700 multi-channel detector (MCD), Omni Focus lens
5000LS SCD or PSD and either lens
5500LS. 5600LS or 5700LS MCD, Omni Focus lens

Line 3. Analyzer Type
SPHERICAL SECTION ANALYZER

Line 4. Non-standard Analyzer or Lens
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Line 5. Acceptance Angle from Analyzer Axis
0°

Line 6. Constant Pass Energy
CONSTANT PASS ENERGY 5100, 5200, 5300, 5400 and 5000LS, 5500, 5500LS
*(choice of **FAT** or **FRR**) 5600, 5600LS, 5700, and 5700LS

Line 7. Instrument Throughput Function
1/E Four-element lens
1/E Omni Focus I and IA (Large Area Mode)
1 (Small Area Mode)
1 Omni Focus II, III, IV and V: (FAT Mode, all area modes)
E (FRR Mode)

Line 8. Instrument Throughput Function Comment
*

Line 9. Excitation Source Label
*

Line 10. Excitation Source Window or Filter
2 μm AL for conventional X-ray sources
NO WINDOW for any model monochromator

Section C. Overall Instrument Description (continued)

Line 11. Detector Description

SINGLE CHANNELTRON 5100 and 5200
POSITION SENSITIVE 5300 and 5400
 * (has either *SCD* or *PSD*) 5000LS
MULTICHANNEL RESISTIVE PLATE 5500, 5600, 5700, 5500LS, 5600LS, and 5700LS

Line 12. Number of Detector Elements

1 5100 and 5200
64 5300 and 5400
 * (has either *SCD* or *PSD*) 5000LS
16 5500, 5600, 5700, 5500LS, 5600LS, and 5700LS

Line 13. Ion Gun Manufacturer and Model #

PHI MODEL 04-303 OR MODEL 04-303A 5 kV Ion Gun
PHI MODEL 04-300 4 kV Ion Gun

Line 14. Sputtering Current Measurement Method

*

Line 15. Ion Gun Operating Parameters

*

Line 16. Ion Gun Spot Size

Note: These are minimum spot sizes. Beam conditions required to achieve minimum size vary from component to component.

200 μm: 04-303 or 04-303A on 5100, 5200, 5300, 5400, or 5000LS
250 μm: 04-303 or 04-303A on 5500, 5600, 5700, 5500LS, 5600LS, or 5700LS
800 μm: 04-300

Line 17. Ion Gun Raster Parameters

*

Line 18. Sputtering Comments

*

Table 19. Angles

Note: Emission angle varies from 0° to 90°. These values assume 45° (sample is horizontal). The angles that change with different tilt are noted with a dagger (†).

Conventional X-Ray Source		Monochromator X-Ray Source	
Emission Angle	45°	Emission Angle	45°
Incident Angle †	9°	Incident Angle †	45°
Source-to-Analyzer Angle	53.8°	Source-to-Analyzer Angle	90°
Specimen Azimuthal Angle	0°		
Sputter Source Incident Angle	40°		
Sputter Source Polar Angle	45°		
Sputter Source Azimuthal Angle	111°		

Line 20. Angular Geometry Comments

*

Section E. Variable Instrument Parameters

Line 4. Source Beam Size

X Value (µm): **>25 mm** Conventional X-ray source (flood source)
 **2 mm** Model 10-400 monochromator
 **1 mm** 10-410 and 10-420 monochromator (point mode)
 **2 mm** 10-410 and 10-420 monochromator (area mode)
 Y Value (µm): **>25 mm** Conventional X-ray source (flood source)
 **2 mm** Model 10-400 monochromator
 **1.2 mm** 10-410 and 10-420 monochromator (point mode)
 **5 mm** 10-410 and 10-420 monochromator (area mode)

Line 5. Source Raster

NO

Line 6. Source Beam Size at Specimen Surface

* (Note: For all systems, beam size varies as the sine of the angle in X and is unchanged in Y from the values given in Line 4.)

Line 7. Raster Frame Rate

No Answer

Line 8. Analyzer Resolution

In % (constant retarding ratio): *

In eV (constant pass): 1% of the pass energy (SCD and MCD)
 1.5% of the pass energy (PSD)

Line 9. Analyzer Constants

*

Line 10. Analyzer Width

Energy Dependent: **NO**
 X and Y Values: **3x10 mm** Four-element len
 * (See tables below). Omni Focus lens
 At Energy: **ALL**

X and Y Values for the Omni Focus and Omni Focus II Lenses:

Aperture Number	Software Setting	
	Small-Area Mode	Large-Area Mode
1	200 µm	500 µm
2	600 µm	2 mm
3	1.1 mm	4 mm
4	1 x 3.5 mm	3 x 10 mm

Section E. Variable Instrument Parameters (continued)

X and Y Values for the Omni Focus III Lens:

Aperture Number	Software Setting		
	Minimum-Area Mode	Small-Area Mode	Large-Area Mode
1	75 μm	—	—
2	150 μm	200 μm	500 μm
3	400 μm	600 μm	2 mm
4	800 μm	1.1 mm	4 mm
5	0.8 x 2 mm	1 x 3.5 mm	3 x 10 mm

X and Y Values for the Omni Focus IV and V Lenses:

Aperture Number	Software Setting		
	Minimum-Area Mode	Small-Area Mode	Large-Area Mode
1	30 μm	—	—
2	120 μm	175 μm	400 μm
3	400 μm	600 μm	2 mm
4	800 μm	1.1 mm	4 mm
5	0.8 x 2 mm	1 x 3.5 mm	3 x 10 mm

Line 11. Analyzer Angular Acceptance Width

Constant with Energy: **NO**[@]
 X and Y Angles: **4**[°] Four-element lens
 *(See tables below) Omni Focus lens
 At Energy. **ALL**[@]

[@]Acceptance angles are constant at low retard ratios and decrease at high retard ratios. The acceptance angles noted in the following tables are the largest possible values and are most accurate in the regime where the acceptance angle is constant.

Omni Focus and Omni Focus II Lenses:

Solid Angle	Software Setting	
	Small-Area Mode	Large-Area Mode
	20°	6°

Section E. Variable Instrument Parameters (continued)

Omni Focus III, IV, and V Lenses:

	Software Setting		
	Minimum-Area Mode	Small-Area Mode	Large-Area Mode
Solid Angle	14°	10°	4°

Note: 75 μm analysis area has a solid angle of 10°.
30 μm analysis area has a solid angle of 8°.

Section F. Spectral Parameters

Line 16. Signal Mode

DIRECT ANALOG SCD
MULTICHANNEL PULSE PSD and MCD

Line 17. Detector Width

1% of the pass energy (SCD and MCD)
1.5% of the pass energy (PSD)

Line 20. Signal Intensity Correction

NO (Displayed raw data does not contain corrections. The user may specify additional corrections and these are noted in the original Y axis label.)

Line 21. Signal Modulation Method

NONE

Line 22. Lock-in Parameters

NONE