

KOWOSPOT/ X

Pin Hole Camera

according to EN 12543-2, ASTM E1165

KOWOSPOT

for X-ray film and Imaging Plates (CR)



KOWOSPOT X

with digital CMOS detector (DDA) and software

KOWOSPOT / X Pin hole camera - Elements and combinations

The analogue version KOWOSPOT for X-ray film/ Imaging Plates and the digital version KOWOSPOT X (DDA) are designed consequently in a modular system (module length 150 mm) allowing measurements of focal spots sizes from 5 mm down to 50 μm compliant with actual standards.

The modular design allows to build any required combination or even a later upgrading with these elements:

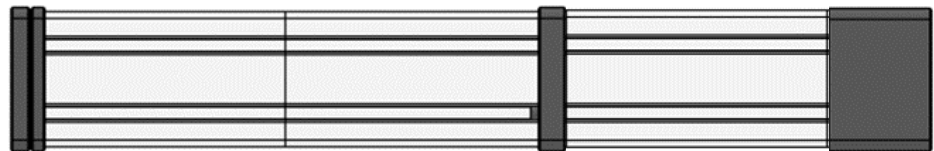
Main Elements:

11 01032	B100 Element, Pin Hole Diaphragm, 100 μm
11 01033	B30 Element, Pin Hole Diaphragm, 30 μm
11 01034	B10 Element, Pin Hole Diaphragm, 10 μm
11 01035	V1 Element, Extension, 150 mm
11 01036	V2 Element, Extension, 300 mm
11 01037	EF Element, X-Ray Film/ Imaging Plate
11 01039	ED Element, DDA - CMOS Detector with Software, USB extension 5 m

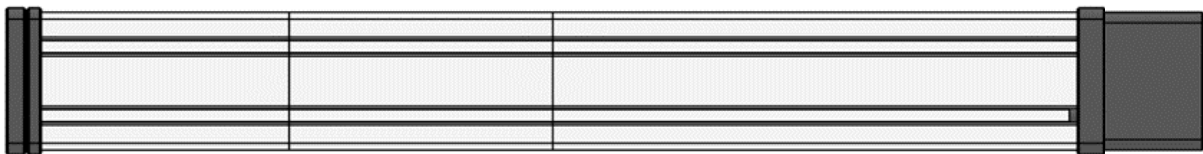
Options and Spare Parts:

11 010...	A... Adapter for X-Ray Tube Head large variety available
11 01047	USB extension cable - spare 5 m long
11 01048	CMOS area image sensor - spare 20 μm , 20x30 mm, cable 1.5 m
11 01049	KowoSpot Software - separate on USB flash drive

Example: KOWOSPOT 1:1, 100 μm - 1x EF, 2x V1, 1x B100, A... elements



Example: KOWOSPOT 4:1, 10 μm - 1x EF, 1x V1, 1x V2, 1x B10, A... elements



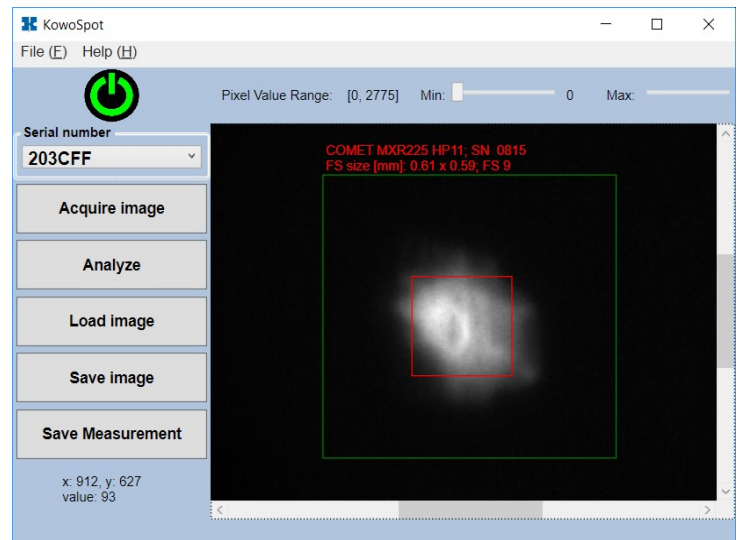
Focal Spot Class	Focal Spot Size ψ [μm]	Pinhole \varnothing P [μm]	FPD minimal m [mm]	PDD minimal n [mm]	Magnification minimal n / m	EF / ED Element Film or Detector 150 mm	V1 Element Extension 150 mm	V2 Element Extension 300 mm	B.. Element Pin hole	A... Adapter X-ray tube 150 mm
FS 0	5000	100	300	300	1 : 1	EF or ED	2	0	B100	opt.
FS 1	4000	100	300	300	1 : 1	EF or ED	2	0	B100	opt.
FS 2	3200	100	300	300	1 : 1	EF or ED	2	0	B100	opt.
FS 3	2500	100	150	450	3 : 1	EF or ED	0	1	B100	opt.
FS 4	2000	100	150	450	3 : 1	EF or ED	0	1	B100	opt.
FS 5	1600	100	150	450	3 : 1	EF or ED	0	1	B100	opt.
FS 6	1270	30	150	450	3 : 1	EF or ED	0	1	B30	opt.
FS 7	1000	30	150	450	3 : 1	EF or ED	0	1	B30	opt.
FS 8	800	30	150	450	3 : 1	EF or ED	0	1	B30	opt.
FS 9	630	30	150	450	3 : 1	EF or ED	0	1	B30	opt.
FS 10	500	30	150	450	3 : 1	EF or ED	0	1	B30	opt.
FS 11	400	10	150	450	3 : 1	EF or ED	0	1	B10	opt.
FS 12	320	10	150	450	3 : 1	EF or ED	0	1	B10	opt.
FS 13	250	10	150	600	4 : 1	EF or ED	1	1	B10	opt.
FS 14	200	10	150	750	5 : 1	EF or ED	0	2	B10	opt.
FS 15	160	10	150	900	6 : 1	EF or ED	1	2	B10	opt.
FS 16	127	10	150	900	6 : 1	EF or ED	1	2	B10	opt.
FS 17	100	10	150	1050	7 : 1	EF or ED	0	3	B10	opt.
FS 18	80	10	150	1200	8 : 1	EF or ED	1	3	B10	opt.
FS 19	63	10	150	1200	8 : 1	EF or ED	1	3	B10	opt.
FS 20	50	10	150	1350	9 : 1	EF or ED	0	4	B10	opt.

KOWOSPOT X fully digital measurement of focal spot size with results within a minute

The digital version KOWOSPOT X consists of the analogue version KOWOSPOT plus a CMOS detector (DDA) and the complete easy to use software package KowoSpot.

Benefits:

- Measurement (ASTM E1165-20 or EN12543-2) within a few seconds
- Supports ILP method (according to actual standards) and 10% threshold method (according to old standard)
- Complete solution supplied - only PC with MS WINDOWS® is required
- Storing images (.tif) and results (.cvs) repeated measurements stored in same cvs file
- focal spot evaluation over live time of X-Ray tube
- CMOS detector design for about 6000 focal spot measurements; DDA can be replaced easily
- DDA with 20 µm pixel size and special scintillator offer high resolution and efficiency
- Software with auto exposure function and easy to use evaluation (no expert required)
- Modular concept - fits for focal spot sizes from 100 µm up to >4mm (FS 0 to FS 17)
Smaller focal spot sizes to 50 µm (FS 20) can be measured with restrictions in precision due to pin hole size
- Different adapters for most of available X-Ray tubes (special adaption upon request)



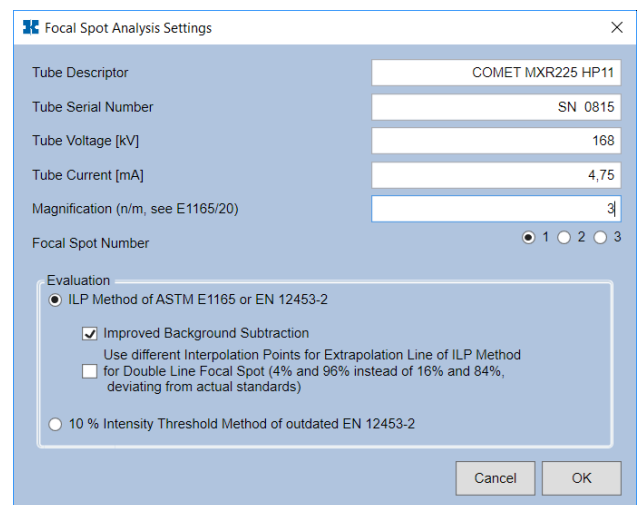
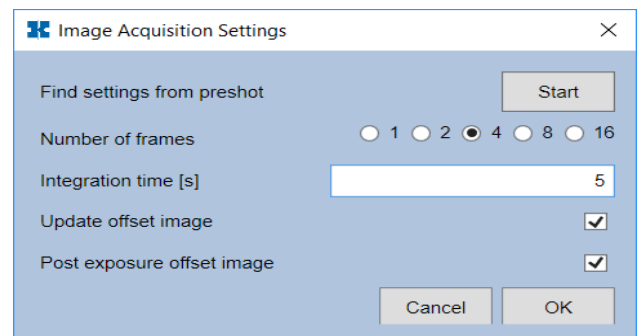
Software features:

- automatic detector (DDA) calibration when plugged in
- automatic evaluation of exposure time (1 s ..16 s)
- image integration for high SNR possible
- automatic calculation of system pixel size
- free style tube descriptor and Serial Number
- scatter reduction with improved background subtraction
- results are stored in images and sheet
- already captured images can be re-evaluated
- image size (Zoom) and gray value scaling adjustable



DDA Specification:

- CMOS sensor protected with fiber glass shielding
- 20 µm pixel size (25 µm SRb detector) with structured scintillator
- active area 1500 x 1000 pixel
- USB connection - cable length up to 6.5 m possible



KOWOSPOT/ X Pin hole camera

Example for KOWOSPOT/ X with magnification 4:1

EF Element 11 01037

Carrier for X-ray film/ Imaging plate (IP)
Cover with Pb-/ Cu shielding

ED Element 11 01039

with DDA for evaluation with
KowoSpot software

V1 Element 11 01035

with anti-scatter shielding

V2 Element 11 01036

with anti-scatter shielding

B Element

B100 Element 11 01032

B30 Element 11 01033

B10 Element 11 01034

with collimator

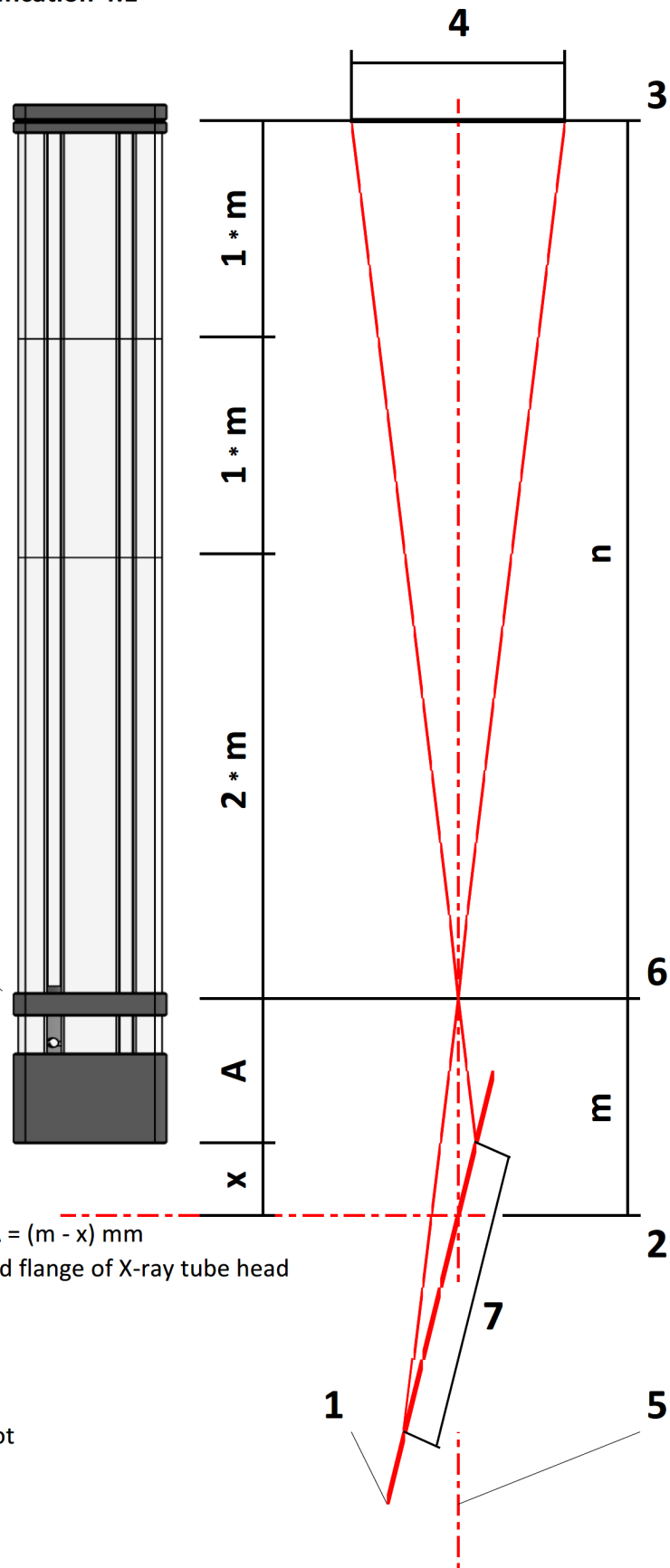
A... Adapter 11 010...

Adapter for X-ray tube head

x distance between reference plane (2) and flange of X-ray tube head

$$A = (m - x) \text{ mm}$$

- 1 plane of anode
 - 2 reference plane
 - 3 radiographic image detector
 - 4 magnified length of effective focal spot
 - 5 beam direction (X-ray beam)
 - 6 incident face of the diaphragma
 - 7 physical length of the actual focal spot
- magnification = $n : m$



KOWOSPOT/ X has to be used with an adapter (A_ Element) for X-ray tube head or X-ray unit. Dimensions of flange and x (distance between reference plane 2 and flange of X-ray tube head) have to be given by customer - type of X-ray tube is sufficient in many cases.