

Systems with Image Intensifiers (MCPs)

Our CCD- linescan cameras can be combined with several image intensifiers. Particularly for the spectroscopy the combination of the sensors of Hamamatsu suits best. These sensors can be delivered with a special fiber plate window, which is directly mounted to the output window of the intensifier. With this solution up to 70% of the light is transferred to the sensor.

Because the sensors has pixel sizes up to 2,5mm, it can collect most of the screen light.



Intensifiers with double or single MCP's (MCP: microchannel plate) are available: They are delivered from different manufacturers (DEP or Proxitronic) with 18 or 25 mm screen diameter.

The 18 mm type fits best to the sensors S3924-512 or S3921-256 while the 25mm type fits best to the S3924-1024 or S3921-512. A high voltage supply is included. The amplification is adjustable.

For gated applications a pulse unit is available. The standard version has a minimum pulse width of 100ns. Aka for optional pulse width of 10 ns.



The image intensifiers fiber output is directly mounted to the fiber plate window of the sensor. The connection can be bonded with a special adhesive.

Because of the limited lifetime of the intensifiers, we suggest to mount these parts mechanically together. On this way a damaged intensifier could be easily replaced and the expensive sensor could be used furthermore.

Dramatically reduction of lifetime occur when the cathode in high amplification mode is coupled incidentally to daylight.

The linescan cameras can be intensified up to 100.000 times when coupled to an image intensifier (with Double-MCPs). Hereby you have to decide between these following features:

* spectral response <-> dark emission

4 photocathode materials are recommended:

	spectral response [nm]	dark emission [el/cm ² /sec]	sensitivity [μA/lm]
S25-Pk	165 - 850	1000	350 standard
S20-Pk	165 - 750	100	200
Bialkali-Pk	165 - 550	10	60
RbTe-Pk	165 - 300	3	uv

* efficiency <-> afterglow time

The repetition rate for the pulsed mode is limited by the phosphor screen material.

With a resolution of 7 bit $\approx 1/100 = 1\%$ the maximum repetition rate f_{\max} of a periodical signal measurement is listed below.

maximum [nm]	efficiency(600nm) [W/W]	screen decay 90% to 10% [ms]	screen decay 10% to 1% [ms]	f_{\max} [Hz]
P20 517	$7 \cdot 10^{-4}$	4	55	17
P46 513	$4 \cdot 10^{-5}$	0,3	0,09	3000

* resolution <-> amplification

The resolution (MTF=modulation transfer function) with double -MCP's is worse:

i.e. when is	modulation at 20 lp/mm	max. amplification [lm/lm]	max. amplification [el/el]
single-MCP	30%	$3 \cdot 10^5$	$5 \cdot 10^3$
double-MCP	20%	10^7	$3 \cdot 10^5$