



General Description

The PULNiX series of analog line scan cameras provides variable speeds as well as excellent linearity and dynamic range at a very cost effective price. Due to their extremely compact size, these rugged units can easily be ganged or grouped in close proximity for multi-head installations.

Two resolutions are offered, 2048 pixels ("SP" and "EP" models) and 5000 pixels ("SF" model). The external communication format is switch-selectable between TTL or RS-422. The lens mount is standard Nikon-F type; the Pentax K type lens is available as an option. The PL-2048EP has elongated pixels for 14 times the sensitivity of standard pixel configuration.

PL-2048SP Standard

The PL-2048SP is the basic model, offering 2048, 14µm square pixels and a clock rate up to 10MHz. BNC connectors are provided for video and sync I/O. Switches on the rear panel allow selection of internal/external sync and internal/external clock. All functions as well as power are accessed through a 12-pin connector on the rear of the camera. The PULNiX I/O cable model #12P-02 mates with the 12-pin connector. This 2-meter cable has a connector on one end and leads on the other. Other cable lengths are available from PULNiX. The cable length must be limited to 15m or less when using the cable for clock I/O. For camera mounting, a mounting rail is on the underside of the camera. Securing holes are located at the top and on both sides of the camera.

PL-2048EP

Similar to the standard PL-2048SP, the PL-2048EP also features 14 x 200µm pixels for greater sensitivity. 14 times longer than a typical pixel, the added pixel area permits increased light-gathering capability for low illumination application environments, providing results similar to a TDI sensor.

PL-5000SF

The PL-5000SF is the basic 5000 pixel high resolution model. The higher resolution allows greater accuracy and larger field of view. The clock rate is up to 12MHz for faster scanning.

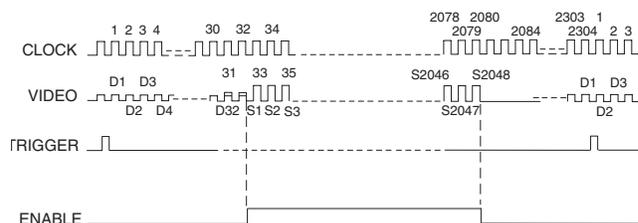
Product Features

- High speed scanning (from 100µsec.)
- Small, compact design
- Analog video output
- Internal/External clock, sync input/output selectable
- Uses standard Nikon F-mount lenses
- Downsized packaging allows multi-head installations
- Vibration and shock resistant
- High sensitivity PL-2048EP scans from 300µsec.
- High resolution PL-5000SF has a 5000 bit CCD imager

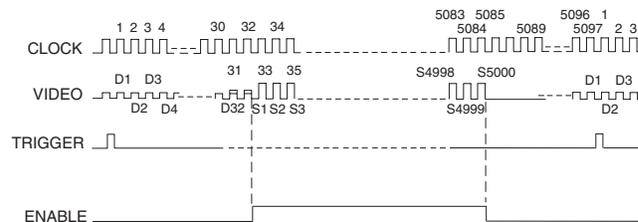
Applications

PULNiX line scan cameras offer high resolution scanning at a scanning rate of up to thousands of frames per second. Advantages of line scan cameras include less noise, greater light sensitivity and greater reliability at predetermined distances. Applications include sheet material measurement, product diameter and length measurement, positioning, edge control, pinhole detection, punch hole diameter measurement, defect detection and loop control.

Timing Charts



PL-2048SP, PL-2048EP



PL-5000SF

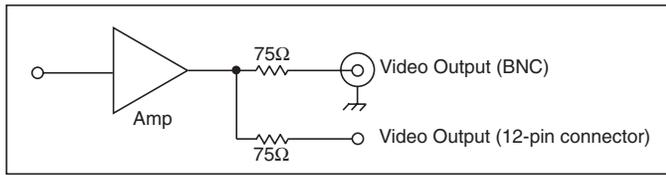
Preliminary Data Sheet

Please note: Due to ongoing product improvements, specifications and information presented in this preliminary data sheet are subject to change.

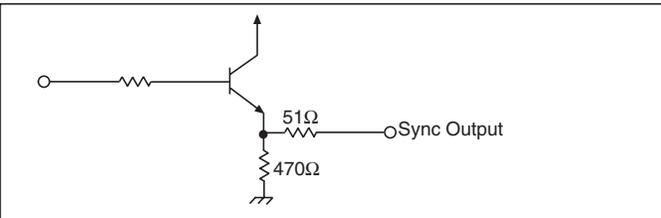
Input/Output Circuits

Output Circuits

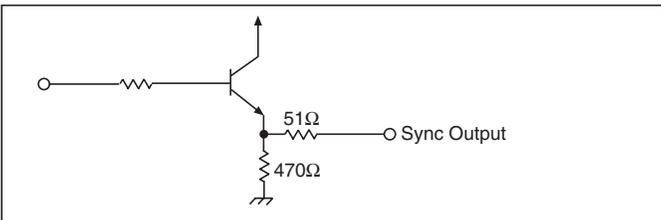
Video Output Circuit



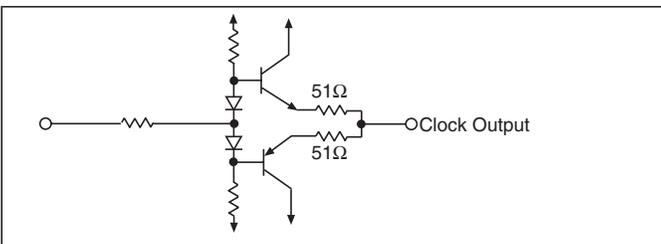
Line Transfer Pulse Output Circuit



Enable Output Circuit

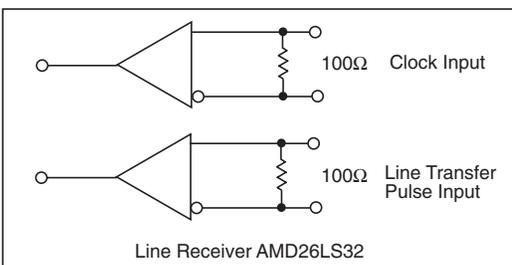


Clock Output Circuit

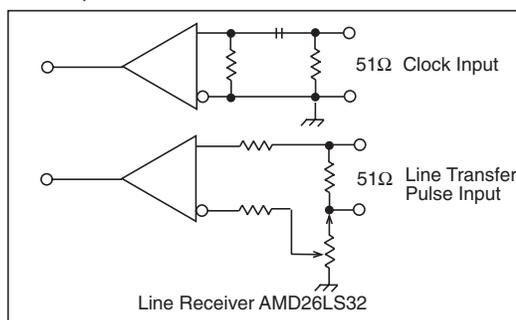


Input Circuits

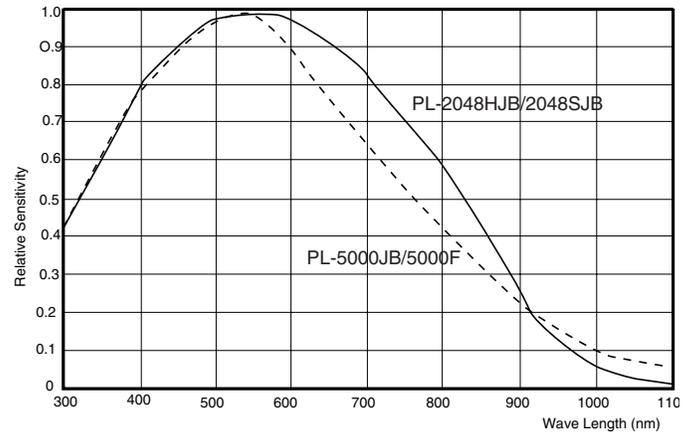
RS-422 Input Circuit



TTL Input Circuit

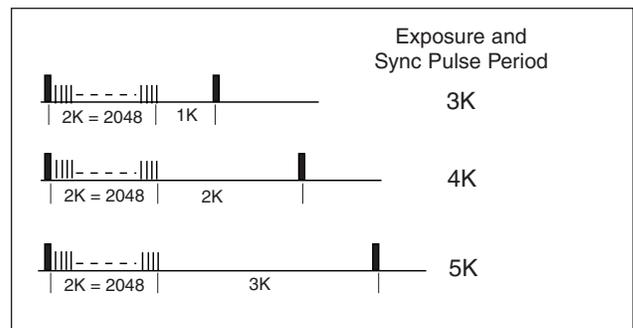


Spectral Response



Internal Sync Selection

The internal sync selection provides various exposure options. The clock speed is selectable between 6MHz and 12MHz, and is consistent regardless of scan frequency. The sync is reset trigger period for each scan. The CCD scanning ends at the same period but the imager is exposed until the next sync pulse is generated. If the camera is the 2048-bit sensor type, CCD scanning is 2K-bit (2048 clock pulses). If the sync reset is selected to be 3K-bit, 2K is the CCD scan and 1K is the idle period; the total exposure is the 3K period.



Cable Information

PULNiX video cable 12P-02 (2m) is standard for the PL Series line scan cameras. Custom lengths are available by request. The maximum length for using clock input and output is 15m.

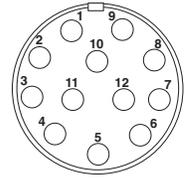
12-Pin Configuration

TTL Input Mode

Pin#	TTL Level I/O	Color
1	GND	vinyl (gray)
2	+12VDC	vinyl (yellow)
3	GND (Video Out)	coaxial net wire (red)
4	Video Out	coaxial core (red/white)
5	GND (Sync.)	shielded net wire (orange)
6	Sync	shielded core (orange/yellow)
7	Enable Out	shielded core (white/yellow)
8	GND (Clock)	coaxial net wire (black)
9	Clock	coaxial core (black/white)
10	GND	vinyl (brown)
11	+12VDC (input)	vinyl (blue)
12	GND (Enable Out)	shielded net wire (white)

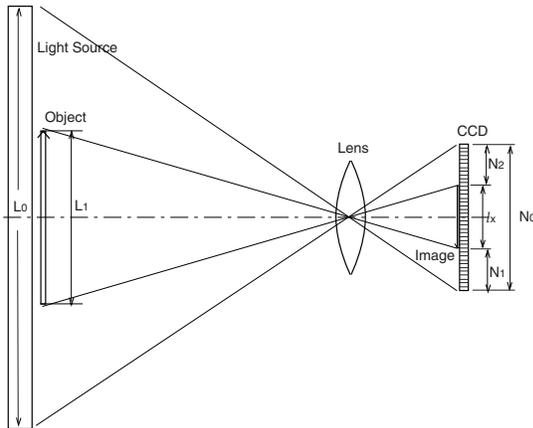
RS-422 Input Mode

Pin#	RS-422 Input
1	GND
2	+12VDC
3	GND (Video Out)
4	Video Out
5	Sync - Input
6	Sync + Input
7	Enable Out
8	Clock - Input
9	Clock + Input
10	GND
11	+12VDC
12	GND (Enable Out)



12-Pin Connector

Operation and Mode Selection

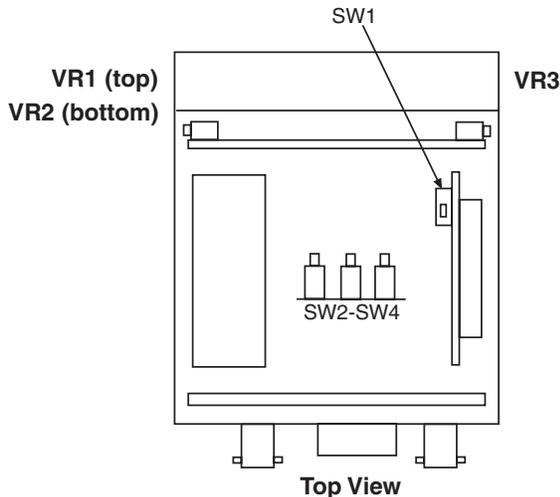


Resolution (D):
 $d = L_0 / N_0$ (mm)

Measurement of object length (Lx):
 $Lx = \{N_0 - (N_1 + N_2)\} \times L_0 / N_0$

N_0 : Total pixel number

N_1, N_2 : High video level pixel number



SW1: Internal Clock Selection

12MHz position switch on the rear panel side
 6MHz position switch on the mount side

SW2~4: TTL/RS-422 Selection

All switches UP: TTL Level Input
 All switches DOWN: RS-422 Input

SW5: Internal Sync Frequency Selection

Positions 1-7 change the frequency (see table)

SW#	Clock No.
1	0.5K
2	1K
3	2K
4	4K
5	8K
6	16K
7	32K

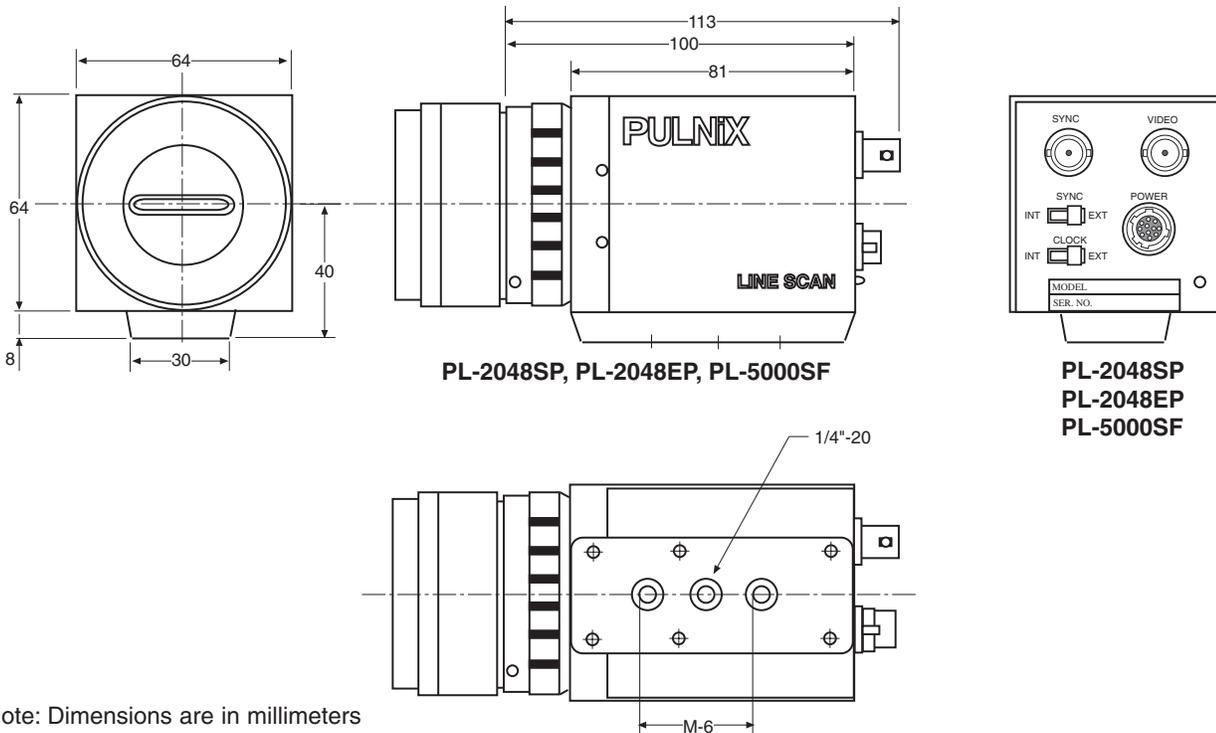
Positions 8-0 select camera model type

Model	SW8	SW9	SW10
PL-2048S	ON	OFF	OFF
PL-2048H	OFF	ON	OFF
PL-5000	ON	ON	OFF

Specifications

MODEL	PL-2048SP	PL-2048EP	PL-5000SF
Pixel number	2048	2048	5000
Pixel pitch & aperture	14x14µm	14x200µm	7x7µm
CCD chip size	28.67mm	28.67mm	35mm
Scan/sec. rate	100~4550 scans/sec. 10~0.22 msec.	100~4550 scans/sec. 10~0.22 msec.	100~2352 scans/sec. 10~0.22 msec.
Clock freq. vs. video freq.	1:1	1:1	1:1
Clock freq. Internal	1~10 MHz	1~10 MHz	1~12 MHz
Clock freq. External	1~10 MHz	1~10 MHz	1~12 MHz
Output Video	0~2Vpp at 75Ω load		
Output Sync	TTL level at 51Ω		
Output Clock	TTL level at 51Ω		
Input Ext. sync	10~0.22 msec.	10~0.22 msec.	10~0.425 msec.
Input Ext. clock	TTL level at 51Ω or RS-422 at 100Ω		
Sensitivity	8 V / lux.:sec	50 V / lux.:sec	8.5 V / lux.:sec
Saturated exp. vol.	0.25 V / lux.:sec	0.04 V / lux.:sec	0.23 V / lux.:sec
Dynamic range	1500	160	3000
Output non-uniformity	10% (max.)		
Power requirement	12 V 500mA		12 V 350mA
Temperature	Operating temperature: 0~40°C, 85% Storage temperature: -10~65°C		
Dimensions	64mm x 64mm x 113mm		
Weight	426 grams		
Lens mount	Nikon F-mount (Pentax K mount optional)		

Physical Dimensions



Note: Dimensions are in millimeters

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LINE SCAN CAMERAS

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