VISIOTRONIX

The neXt Electronics Vision

LED Illuminators
FD1 Series



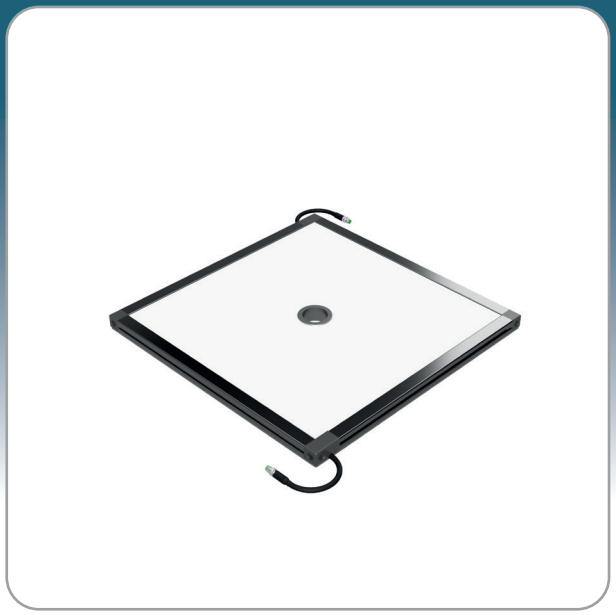
Revision EN2610

2026

www.visiotronix.com

FD1 SERIES

Modular Flat Dome LED Illuminators with Central Camera Aperture



Central Camera Aperture : Features an open center allowing direct camera and lens mounting for axial, shadow-free inspection setups..

Modular Architecture Design : Construction using 50x50 mm matrix tiles enables flexible configuration of varying shapes and dimensions for machinery.

Integrated Driver Technology : Internal MCCD electronics regulate individual LED currents, maintaining uniform output despite input voltage fluctuations.

Advanced Thermal Management : High Thermal Transmission Material ensures efficient heat dissipation, reducing component stress and protecting long-term chromatic stability..

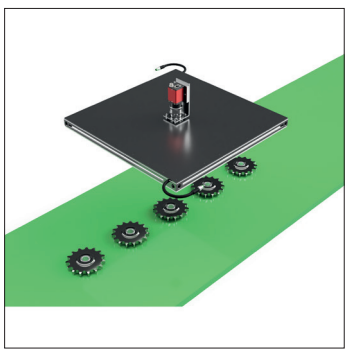
Secure Industrial Connection : M8 3-pin pigtail connector with a threaded locking ring provides absolute vibration immunity and space-saving integration.

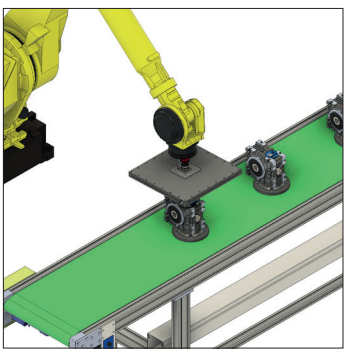
Applications

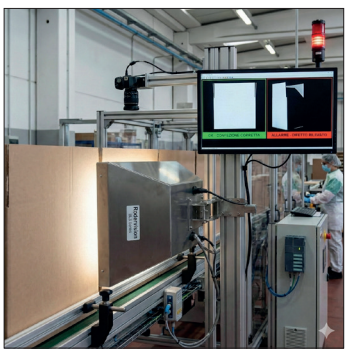
- Axial camera vision inspection.
- Automated robotic assembly guidance.
- Component orientation and verification.
- Packaging and label identification.
- High-density surface inspection tasks.
- Electronic PCB defect detection.
- Pharmaceutical container quality control.
- Precision dimensional measurement systems.
- High-speed industrial part sorting.
- Integrated OEM optical test benches.

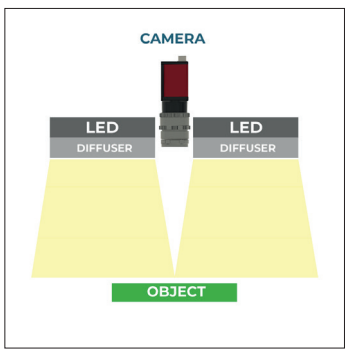
Key Features

- Central camera mounting aperture
- High-density LED ring matrix
- Modular 50mm tile system
- Integrated current-stabilizing electronics
- High-efficiency HTTM thermal management
- Transparent glass direct protection
- Vibration-immune M8 pigtail connection



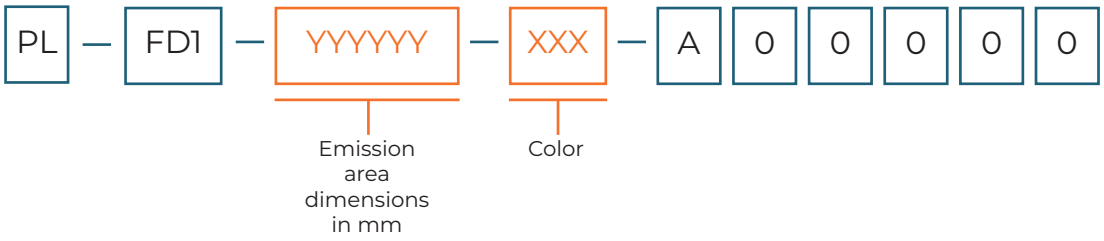






Composition of the product identification code

The code in orange are to be filled in according to the desired configuration



Emission area

Highlighted models are from normal production - Others are on request and may have longer production times

Length emissione area - mm (order code)		
150 x 150 (015015)		
250 x 250 (025025)	250 x 350 (025035)	250 x 450 (025045)
350 x 350 (035035)	350 x 450 (035045)	
450 x 450 (045045)	450 x 550 (045055)	
550 x 550 (055055)		

Color - LED type

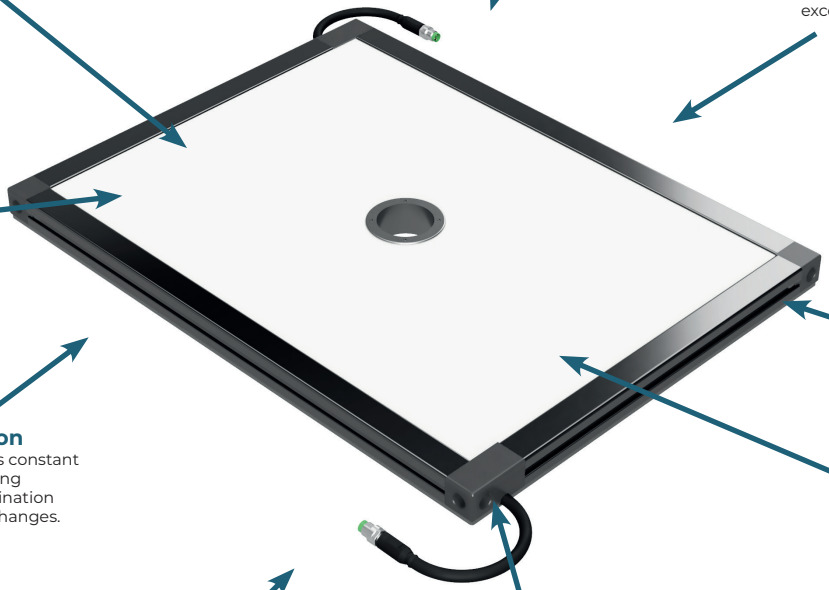
WHI : Neutral White 5000K
INF : Infrared 850 nm
BLU : Blue 470 nm (on request)
RED : Red 625 nm (on request)

Why choose a FD1 series illuminator ?

High density LED matrix
High density LED matrix with integrated lens for creating a direct and homogeneous light beam. The LED array is kept regular through a special fixturing mask that ensures its uniformity of LED mounting spacing.

Industrial connector
Connector with threaded fastening for easy assembly and quick disconnection in case of maintenance. The cable is fixed through a flexible grommet to ensure a small bending radius.

Aluminium enclosure
Black anodised aluminium enclosure. The use of aluminium ensures high heat dissipation from the LEDs and excellent mechanical robustness.



48H-Test certificate
Each illuminator undergoes a 48-hour test cycle and a test certificate is issued with the product. This procedure ensures high quality of the product delivered to the client.

Industrial design
The entire FD1 family is designed for industrial use on vision systems or optical test benches. The target customer for this product family is either the industrial machine manufacturer or the vision system integrator.

Uniform Light Emission
MCCD© technology maintains constant current across all LEDs, ensuring perfectly homogeneous illumination regardless of supply voltage changes.

Very high efficiency and high intensity LEDs
Use of the latest generation of high-brightness, low-power LEDs. The LEDs used in the FD1 series have a built-in lens, have state-of-the-art features, and are produced by the world's largest LED manufacturer.

Reverse polarity protection
The internal circuits are protected against reverse polarity of the supply voltage. Protection takes action in case of incorrect connection of power cables.

HTTM© Technology
Use of HTTM technology for high heat dissipation produced by LEDs. A special material layer is used inside the illuminator for contact between the LEDs and the housing.

Main features common to the FD1 family

Features	Value
Supply voltage	24 Vdc +/- 5%
IP rating / temperature	IP40; operating temperature 0 - 50 °C
Electrical connection	M8 3-pin connector with threaded ring nut; pig-tail cable approx. 100 mm
Control and driver	MCCD driver; ON/OFF or PWM control up to 100 kHz; reverse polarity protection
Mounting and structure	Side groove profile; AISI 316 brackets with screw kit; central camera hole
Certifications and testing	CE, RoHS; made by RODER in Italy (ISO 9001); 48-hour test with certificate

The VISIOTRONIX FD1 series represents an advanced family of flat dome LED illuminators designed for machine vision applications involving highly reflective or specular surfaces.

Derived from the DC6 ring series, the FD1 combines a modular matrix of 50x50 mm tiles with a specialized semi-transparent glass cover.

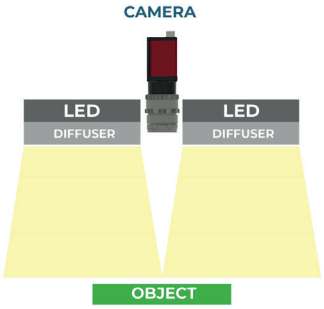
This optical design diffuses high-intensity light to create a uniform dome-like illumination effect while maintaining an ultra-slim, space-saving profile.

A central aperture enables the camera lens to be mounted axially, capturing shadow-free images directly through the diffused lighting field.

To ensure metrology-grade repeatability, internal MCCD drivers stabilize the current supplied to latest-generation LEDs, mitigating any fluctuations in the plant power grid.

Thermal integrity is preserved using High Thermal Transmission Material (HTTM) technology to dissipate heat effectively. Featuring an M8 pigtail connector, reverse polarity protection, and a T-slotted aluminum chassis, each unit undergoes 48-hour burn-in testing.

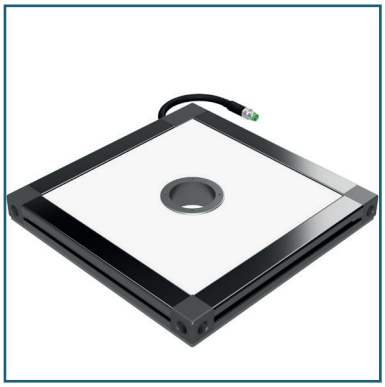
Typical configuration



Direct illumination

The FD1 series of illuminators can be used for direct illumination of the object to be inspected. The angle of incidence of the light can be chosen according to the characteristics of the object, the degree of detail to be highlighted or the type of inspection to be carried out.

Models and accessories



FD1 150 x 150

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-17-87	PL-FD1-015015-WHI-A00000	150 x 150	WHI	0.96A @24vdc	288	1
10-17-88	PL-FD1-015015-INF-A00000	150 x 150	INF	0.72A @24vdc	288	1

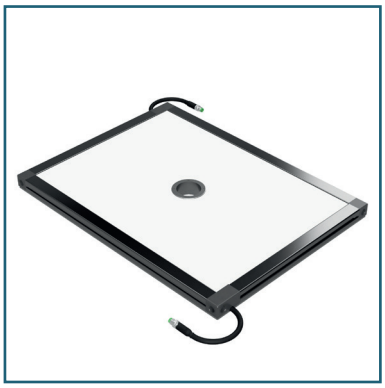
* Consumption data are nominal values obtained under test conditions according to internal testing procedures.



FD1 250 x 250

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-17-89	PL-FD1-025025-WHI-A00000	250 x 250	WHI	2.88A @24vdc	864	1
10-17-90	PL-FD1-025025-INF-A00000	250 x 250	INF	2.16A @24vdc	864	1

* Consumption data are nominal values obtained under test conditions according to internal testing procedures.



FD1 250 x 350

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-17-91	PL-FD1-025035-WHI-A00000	250 x 350	WHI	4.1A @24vdc	1224	2
10-17-92	PL-FD1-025035-INF-A00000	250 x 350	INF	3.1A @24vdc	1224	2

* Consumption data are nominal values obtained under test conditions according to internal testing procedures.

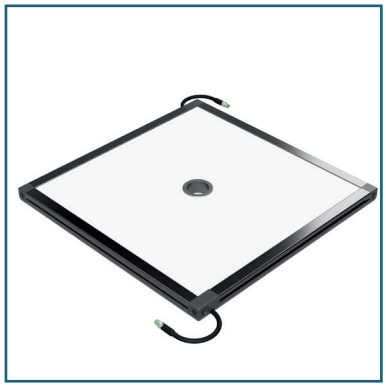


FD1 250 x 450

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-17-93	PL-FD1-025045-WHI-A00000	250 x 450	WHI	5.3A @24vdc	1584	2
10-17-94	PL-FD1-025045-INF-A00000	250 x 450	INF	3.96A @24vdc	1584	2

* Consumption data are nominal values obtained under test conditions according to internal testing procedures.

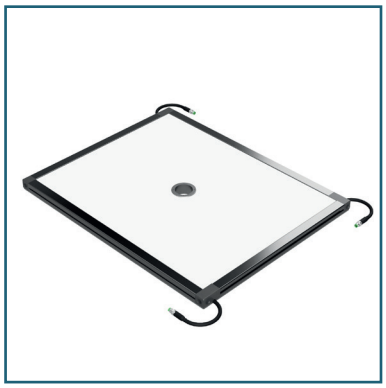
FD1 series - standard models



FD1 350 x 350

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-17-95	PL-FD1-035035-WHI-A00000	350 x 350	WHI	5.8A @24vdc	1728	2
10-17-96	PL-FD1-035035-INF-A00000	350 x 350	INF	4.4A @24vdc	1728	2

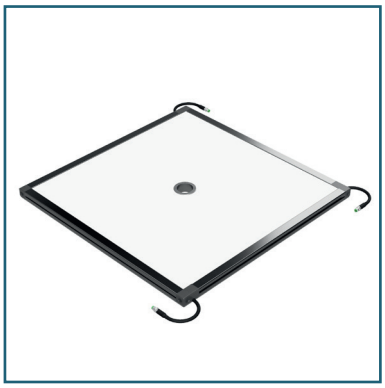
* Consumption data are nominal values obtained under test conditions according to internal testing procedures.



FD1 350 x 450

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-17-97	PL-FD1-035045-WHI-A00000	350 x 450	WHI	7.5A @24vdc	2232	3
10-17-98	PL-FD1-035045-INF-A00000	350 x 450	INF	5.6A @24vdc	2232	3

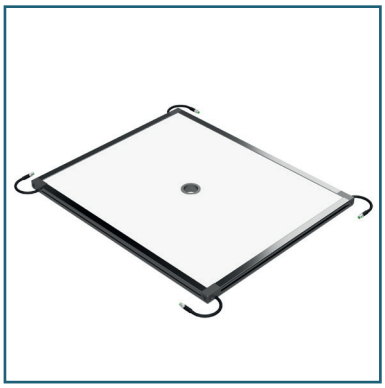
* Consumption data are nominal values obtained under test conditions according to internal testing procedures.



FD1 450 x 450

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-17-99	PL-FD1-045045-WHI-A00000	450 x 450	WHI	9.6A @24vdc	2880	3
10-18-00	PL-FD1-045045-INF-A00000	450 x 450	INF	7.2A @24vdc	2880	3

* Consumption data are nominal values obtained under test conditions according to internal testing procedures.

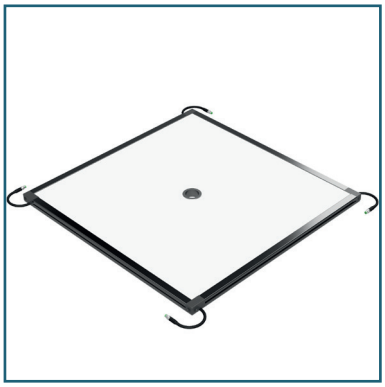


FD1 450 x 550

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-18-01	PL-FD1-045055-WHI-A00000	450 x 550	WHI	11.8A @24vdc	3528	4
10-18-02	PL-FD1-045055-INF-A00000	450 x 550	INF	8.8A @24vdc	3528	4

* Consumption data are nominal values obtained under test conditions according to internal testing procedures.

FD1 series - standard models

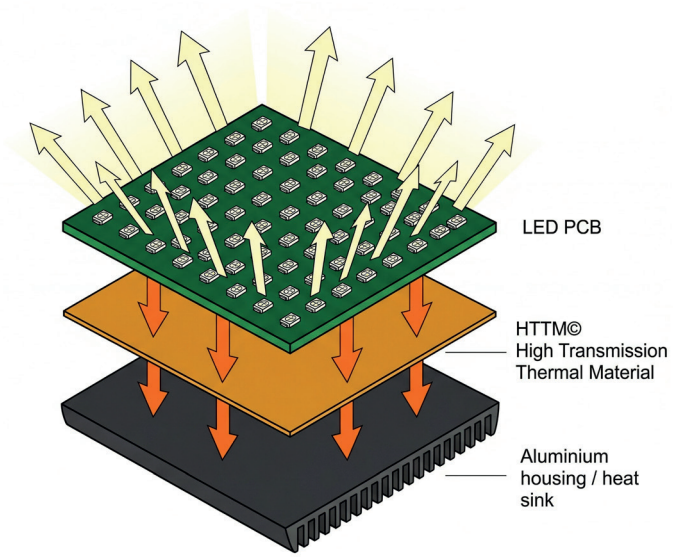


FD1 550 x 550

Item Code	Product Code	Light area	Color	Consumption*	LED	Cables
10-18-05	PL-FD1-055055-WHI-A00000	550 x 550	WHI	14.4A @24vdc	4320	4
10-18-06	PL-FD1-055055-INF-A00000	550 x 550	INF	10.8A @24vdc	4320	4

* Consumption data are nominal values obtained under test conditions according to internal testing procedures.

HTTM© Technology — High Transmission Thermal Material circuit configurations



HTTM© Technology — High Transmission Thermal Material

Thermal management is one of the most critical factors determining the long-term performance of an LED illuminator.

Excessive or uneven junction temperature is the primary cause of luminous flux degradation, chromatic shift, and reduced LED service life in industrial lighting systems.

RODER addresses this challenge with HTTM© technology, a purpose-engineered thermal interface solution integrated into every next-generation illuminator.

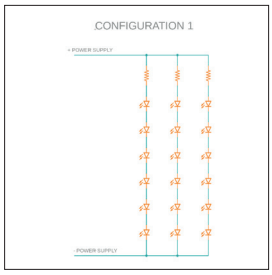
A layer of electrically insulating, high-thermal-conductivity material is precisely interposed between the LED printed circuit board and the aluminium housing.

This material acts as a highly efficient thermal bridge: it prevents any electrical contact between the PCB and the enclosure while channelling the heat generated by both the LED array and the driver electronics directly and uniformly into the aluminium frame, which acts as the primary heat sink.

Compared to conventional air-gap or standard thermal pad solutions, HTTM© achieves a substantially lower and more uniform steady-state LED junction temperature.

The direct consequences are: extended LED service life, stable luminous flux output over tens of thousands of operating hours, and consistent chromatic coordinates throughout the product lifetime — all critical requirements for reliable, long-term photometric calibration in machine vision systems.

Traditional circuit configurations

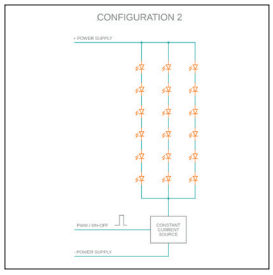


Configuration 1

This basic configuration powers LED columns through current-limiting resistors without active control.

Disadvantages:
- Variations in forward voltage cause visible luminance non-uniformity.
- Lack of thermal compensation leads to temperature-dependent brightness.
- Parasitic capacitance slows switching dynamics.
- No dedicated PWM input; requires external supply modulation.

Machine vision: Low uniformity , current instability and lack of active control prevent reproducible photometric measurements.

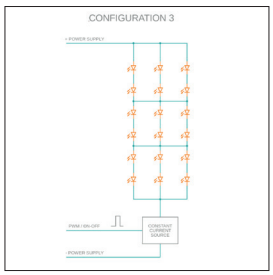


Configuration 2

A single constant current source powers columns in parallel, enabling PWM digital modulation.

Disadvantages:
- Vf variations cause uneven current distribution and lateral luminance gradients.
- Differential aging amplifies Vf mismatch, worsening uniformity over time.
- Lack of per-column balancing limits spatial consistency.

Machine vision: Acceptable for non-critical tasks. Better than Configuration 1 due to PWM and thermal stability, but lacks precision due to non-uniformity.



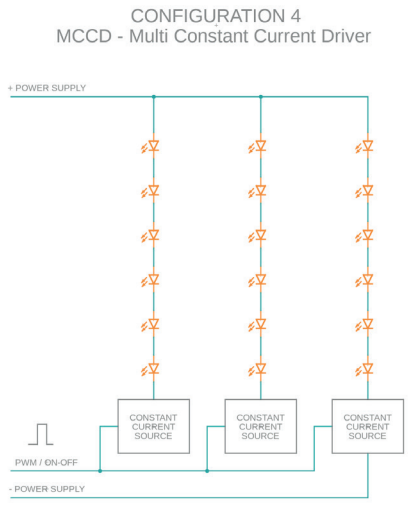
Configuration 3

Configuration 3 is architecturally identical to Configuration 2: a single constant current driver with PWM input feeds the entire matrix with the columns connected in parallel. The same technical considerations apply in their entirety.

In some implementations this variant differs in the number of LEDs per string or the supply voltage, without however resolving the fundamental problem of unbalanced current distribution between columns.

Machine vision assessment: Identical to Configuration 2. Same strengths and same intrinsic limitations of the single-driver architecture.

MCCD - Multi Contant Current Driver by RODER SRL



This is the MCCD architecture implemented by RODER.

Each column of the LED matrix is powered by its own dedicated, independent constant current source. The three sources share a single PWM/ON-OFF input that guarantees simultaneous switching of all columns.

Advantages

- **Independent Column Balancing**: Each driver delivers nominal current regardless of LEDs, eliminating lateral luminance gradients at the source.
- **Spatial Uniformity:** Consistent luminance across the matrix, independent of Vf variability between batches, devices, or over time.
- **Thermal Compensation:** Drivers autonomously offset thermal drift per string, maintaining stable current even under non-uniform heat gradients.
- **Strobe Synchronization:** Shared PWM ensures simultaneous switching, eliminating inter-column jitter—critical for global shutter cameras.
- **Lifetime Stability:** Column-specific compensation for differential LED ageing preserves photometric uniformity throughout the product's life.
- **Calibration Repeatability:** Fixed luminance over temperature and time ensures vision system calibration remains valid without periodic adjustments.

Parameter	Configuration 1 - Resistors	Configuration 2 - Single CC	Configuration 3 -Single CC	Configuration 4 - MCCD RODER
Constant current	No	Yes — global	Yes — global	Yes — per column
Current uniformity	Poor	Moderate	Moderate	Excellent
Spatial uniformity	Low	Good	Good	Excellent
PWM / strobe dynamics	Slow	Excellent	Excellent	Outstanding
Thermal stability	None	Yes — global	Yes — global	Per column
Machine vision suitability	Not suitable	Acceptable	Acceptable	Optimal
Global efficiency	♦ ♢ ♢ ♢ ♢	♦ ♦ ♦ ♢ ♢	♦ ♦ ♦ ♢ ♢	♦ ♦ ♦ ♦ ♦



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