

MaNima Pollux Industrial Nova

Highlights

- High-power PWM driver — up to 48V / 40A across 8 channels
- Redundant fail-safe design — 2×4 channels on separate supplies, automatic switch-over with fault signalling
- Per-channel hardware overcurrent protection
- Voltage, current and temperature monitoring with configurable error levels
- Up to 8 PADIO channels — each pin as analog input (NTC), digital input or output
- Dedicated PWM output for temperature-controlled fan/pump cooling
- 2 digital inputs + 2 potential-free outputs for scene control, alarms and redundancy
- 4 PNP high-side outputs to switch a user-supplied voltage (relays, indicators, PLC)
- 8 high-speed pulse-trigger inputs, one per output channel
- Dual Ethernet with custom API and MaNima Cloud monitoring

• Applications

- UV curing and drying of inks, coatings and adhesives
- UV-C disinfection and sterilization of food, water, air and surfaces
- Machine vision and high-speed inspection lighting (VIS / NIR / SWIR)
- Horticulture and controlled-environment agriculture lighting
- Scientific and analytical light sources (fluorescence, spectroscopy, solar simulation)
- High-power, redundant lighting for harsh or unattended industrial environments

Description

The MaNima Pollux Industrial Nova is a high-power PWM LED driver for demanding industrial lighting processes in harsh environments. It drives eight independent channels up to 48V and 40A, with a configurable PWM frequency from 100 to 2000 Hz and an efficiency of up to 91%, across an extended operating temperature range up to 80°C. Its low channel resistance of around 20 mΩ keeps losses — and therefore heat generation — to a minimum, even at full load.

Each channel has its own hardware short-circuit and overcurrent protection that limits the current within 10 μs, independent of the firmware — predictable even in the event of a software fault. The channels can be configured as two banks of four on separate power supplies; if one fails, the other bank keeps running while an output signals the fault.

The Pollux Industrial Nova measures each output current individually and up to eight NTC temperatures in real time. Using configurable thresholds it intervenes — dimming, alarming or shutting down — before a fixture is damaged, while a dedicated PWM output steplessly regulates a fan or pump in a closed loop based on the measured temperature.

Integration is hardware-based and deterministic. Eight configurable PADIO pins (analog or digital, input or output), four PNP high-side outputs that switch a supplied voltage, and two potential-free outputs plus two digital inputs connect directly to PLC signals; configuration and readout run over an extensive API. Eight high-speed trigger inputs — one per channel — generate overdrive pulses directly from a hardware signal, without software in the critical timing loop, so the lighting tracks the process or camera exposure deterministically.

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Revision history

Revision	Change	Author	Reviewer	Date
1.0	Initial release	NOo	MvdH	August 2026

Electrical specifications

Absolute maximum ratings

Absolute maximum rating @ 25°C	Min	Max	Unit
Power supply input	9	50	V
Maximum output current per side (single channel)		10	A
Maximum output current per side (channels combined)		20	A
Digital input voltage levels ¹		VDD	
Digital output voltage level		400	VDC
Digital output current		50	mA
Cable length NTC sensors ²		30	m
Cable length power supply		3	m
Cable length LED outputs		30	m

¹VDD is the power supply voltage

²NTC sensors cable length can be extended using MaNima Extensa device

PADIO characteristics	Min	Typ	Max	Unit	Condition
Input high level (Vih)	2.0			V	
Input low level (Vil)			1.22	V	
Input current ²			1.4	mA	24V
Maximum input voltage			24	V	
Default NTC resistance (R ₂₅) ¹		5000		Ω	configurable
Default NTC Beta value ¹		3950			configurable
Measurable temperature range ¹	0		120	°C	default NTC
PNP Output mode ³				V	VCC_IO
Source Current ³			50	mA	

Each of the 8 pins is configurable as analog input (NTC), digital input, or PNP high-side output.

¹ Values apply to the default 5 kΩ / 3950 NTC; NTC resistance and Beta are configurable. Usable range depends on the NTC used.

² Input current specified at the maximum input voltage (24 V).

³ In output mode the pins are PNP high-side outputs, identical to the OD_OUT outputs, switching a user-supplied VCC_IO.

PNP outputs & VCC_IO input	Min	Max	Unit
VCC_IO input voltage		24	V
Output voltage (high)		VCC_IO	V
Source current per output		50	mA

Four PNP high-side outputs (OD_OUT_2...5) switch the user-supplied VCC_IO; electrically identical to the PADIO output mode.

Pump/fan control	Min	Max	Unit
Supply voltage		12	V
Supply current		500	mA
PWM control frequency		25	kHz
PWM control level		3.3	V

4-wire fan/pump header (GND, 12 V, TACH, PWM); up to 500 mA (6 W at 12 V). TACH is an open-drain signal with an internal 4.7 kΩ pull-up to 3.3 V.

Specification	Min	Typ	Max	Unit	Condition
Power supply	12		48	V	
Idle supply input current ¹		0.12		A	24V
		0.07		A	48V
Idle power consumption ¹		2.9		W	24V
		3.3		W	48V
Efficiency at full load ²		89		%	24V
		91		%	48V
Operating temperature	0		80	°C	
Humidity	20		80	%	
IP rating	IP52				
Weight		360		grams	
Default output PWM frequency ³	100	330	2000	Hz	
Output short circuit protection response time			10	µs	
Channel resistance (on board) ⁴		20	30	mΩ	

¹Idle means no outputs or inputs are driven, only power being supplied, with 1 ethernet port connected and all other connectors are open

²Full load meaning all 8 outputs driven at maximum capacity

³The frequency can be changed from 100-2000Hz using the configurator, however to comply with regulations, these cases should be measured and verified separately by the user

⁴Channel resistance is measured from GND connection to channel output on terminal block

The digital inputs are protected against voltages up to the power supply voltage

Specification	Min	Max	Unit	Condition
Digital input high level Vih	2.0		V	
Digital input low level Vil		1.22	V	
Digital input current		1.4	mA	48V input

Specification	Min	Max	Unit	Condition
Screw terminal wire sizes	0.05	3.31	mm ²	Solid wire
	30	12	AWG	Solid wire
	0.05	3.31	mm ²	Stranded wire
	30	12	AWG	Stranded wire
Screw terminal torque		0,5	Nm	
		4	Lb.In	
Wire strip length		6	mm	

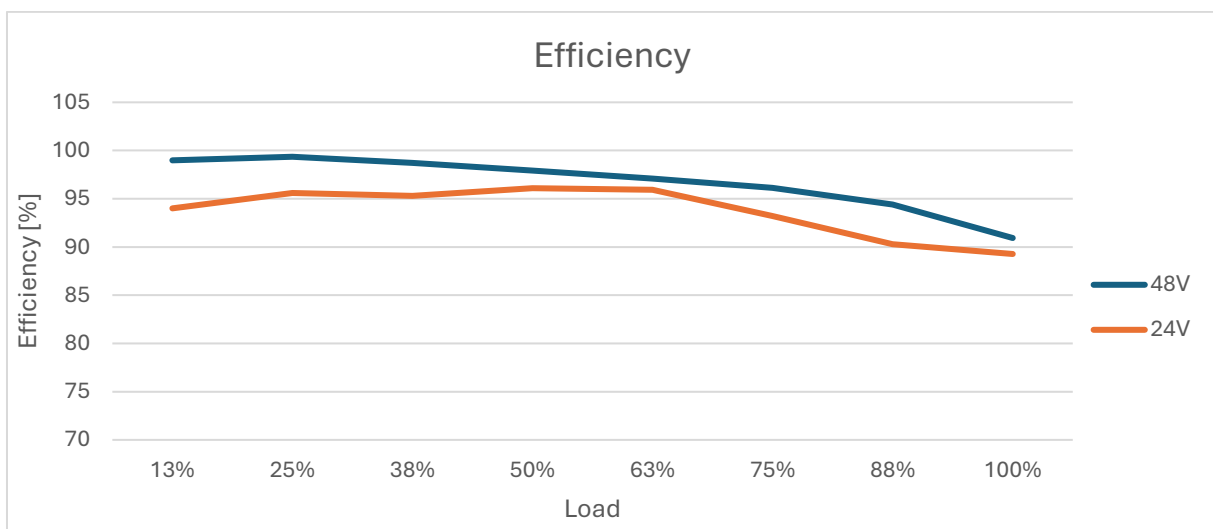
Efficiency

The MaNima Pollux efficiency is calculated by dividing the output power by the input power. Because output power differs per application, the maximum output power is used for efficiency calculation.

$$Eff = \frac{P_{out}}{P_{in}}$$

The graph below visualizes the efficiency of the Pollux, with load from 0 to maximum on the horizontal scale and the efficiency on the vertical scale.

This is based on using all 8 output channels 100% on, 1 ethernet port connected and all other ports disconnected.



100% load means 2000W of output power driven with 100% duty cycle.

Redundancy

The MaNima Pollux can be used as a redundancy device. In this case, the outputs will be setup as 2x4. Each side of the Pollux will be fed with a separate power supply. When one of these fails, the LEDs on that side will turn off but the Pollux itself and the other working side will keep functioning.

In such a failure, an output can be triggered to turn on an alarm light, notify a PLC or when the MaNima cloud is used, an email can be send.

The Pollux can also be set up to switch to another scene. Refer to the Use Cases for examples.

Features

The Pollux Industrial Nova is built to integrate. Every input and output is exposed at hardware level and individually configurable, so the driver adapts to the surrounding machine rather than the other way around.

Output

The Pollux Industrial Nova provides eight independent PWM output channels, arranged as two banks of four. Each bank is powered by its own supply input, while the grounds of both inputs are shared. The channels drive up to 48 V at 40 A total, with a configurable PWM frequency from 100 to 2000 Hz so the output can be matched to the LED load and to flicker or EMC requirements. The two-bank layout also enables redundant operation (see Redundancy).

PADIO interface

At the core of the driver's flexibility are eight PADIO pins (Programmable Analog/Digital I/O). Each pin is individually configurable as an analog input for NTC temperature sensing, a digital input, or a PNP high-side output — so the same connector adapts to the sensors and signals of the installation instead of forcing a fixed pinout. A pin in analog mode is automatically disabled as an output, keeping measurement and switching cleanly separated.

PNP high-side outputs & VCC_IO

Four dedicated PNP high-side outputs (OD_OUT) switch a user-supplied voltage on the VCC_IO rail. Because that switching voltage is provided externally, the outputs drive relays, indicator lamps or PLC inputs directly at the level the rest of the installation already uses — no extra interface hardware required.

Digital I/O

Two digital inputs allow local control, switching scenes or taking commands straight from PLC outputs, while two potential-free digital outputs report faults and errors or enable external redundancy circuits. Together with the PADIO pins, this gives the integrator a complete set of hardware handshakes to and from the surrounding machine.

Monitoring

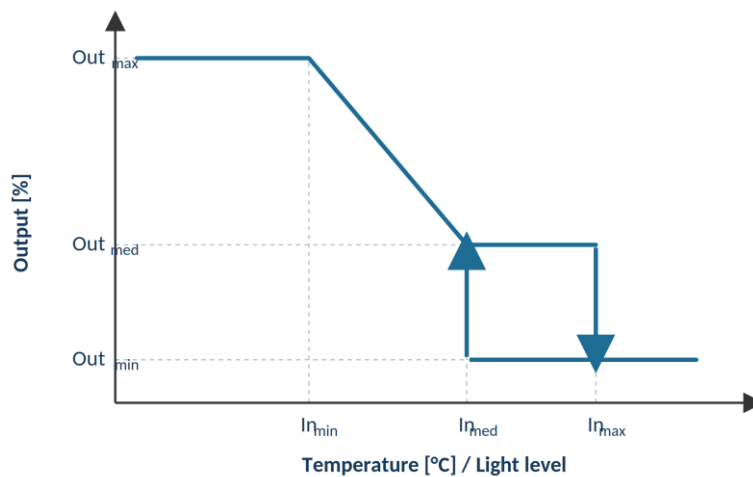
The Pollux Industrial Nova measures each output current individually and reads up to eight NTC temperatures in real time. Configurable thresholds turn these measurements into actions: an

output can be disabled, a scene switched or an alarm raised the moment a value leaves its safe window — locally, in hardware, without waiting on a supervisory system.

Thermal management & active cooling

Temperature is handled as a closed loop. When a fixture approaches its limit the driver dims the affected output to prevent overheating, and a dedicated PWM output steplessly drives a fan or pump so cooling scales with the measured temperature instead of running flat out, while a tachometer input reads back the actual RPM — closing the loop and flagging a stalled or failing fan before it can cause overheating. A small hysteresis on the lower threshold keeps the fixture from flickering at the switching point.

The dimming curve for the NTC measurement is shown below:



The values are configured in the MaNima Configurator. The lower end features a hysteresis, to make sure the LED fixture won't start blinking on this edge case.

Protection

Protection is layered and hardware-based: reverse-polarity protection on the supply inputs, input overvoltage protection that shuts the device down above ~51 V (withstanding up to 80 V), individual fast short-circuit protection that limits each output to 10 A within microseconds, and board-temperature monitoring that reduces the output duty cycle above 80 °C. None of these depend on firmware, so they stay effective even during a software fault.

Pulse mode

For the fastest processes, a pulse mode drives overdrive pulses to the outputs with tight timing control. Eight high-speed trigger inputs — one per channel — fire these pulses directly from a hardware signal, either periodically without an input or at a fixed delay after a digital trigger, so the lighting synchronises deterministically with a moving line or a camera exposure.

Control & configuration

The Pollux Industrial Nova is configured through the MaNima Cloud, or locally with the MaNima Configurator where no internet connection is available. An extensive API exposes control and

read-out to third-party systems, and the MaNima Cloud adds remote monitoring and email alerts — so the device fits a fully networked line and a stand-alone machine equally well.

Networking & daisy-chaining

The Pollux Industrial Nova carries two Ethernet ports with an onboard switch, so multiple units can be daisy-chained along a single network run instead of home-running every device back to a central switch. This keeps cabling short and simple in long production lines, while a controller or the MaNima Cloud still reaches every driver on the chain.

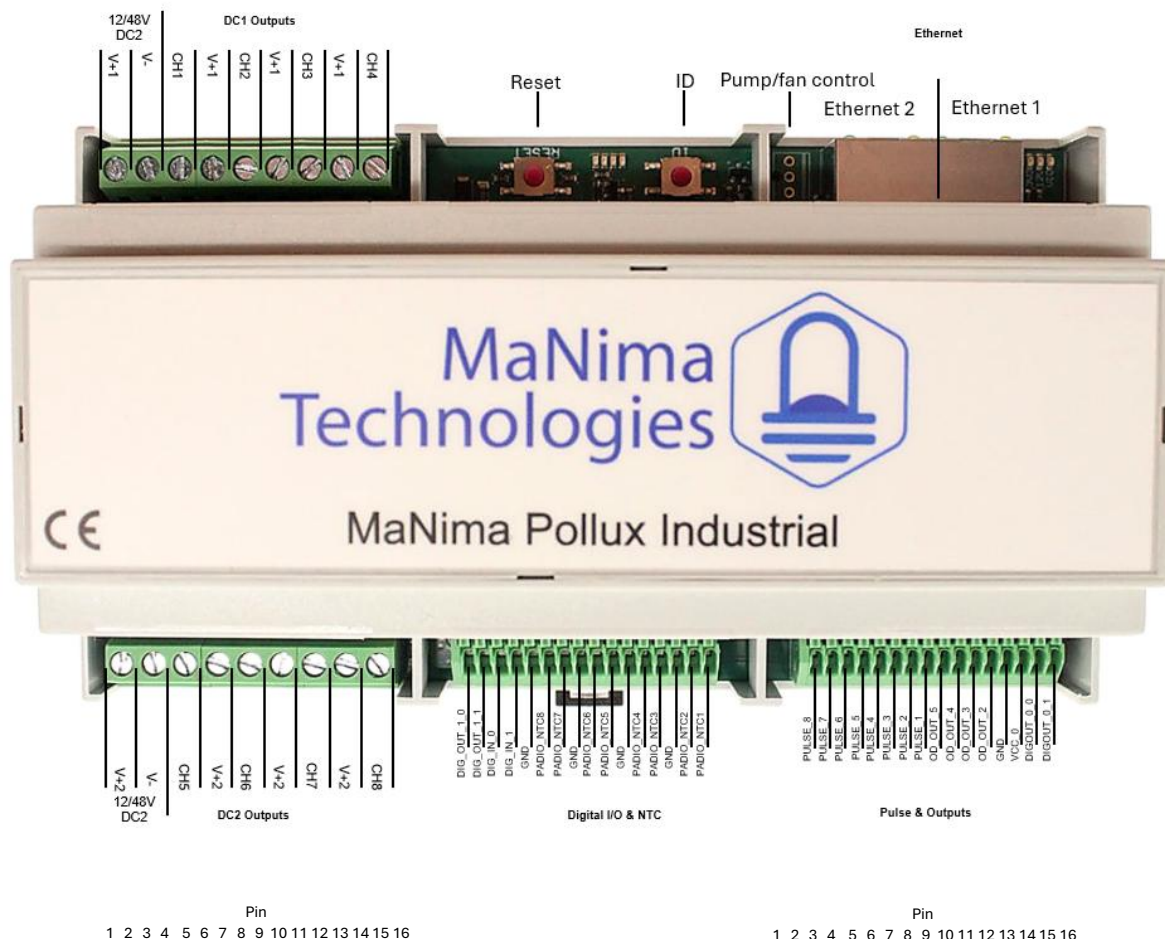
Dimming & PWM control

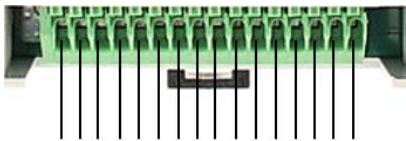
Each channel is driven by PWM at a frequency that is configurable from 100 to 2000 Hz, so the output can be tuned to the LED load, to flicker-free operation for camera-based processes, or to EMC constraints. Channels dim independently, allowing different fixtures on one driver to run at different levels simultaneously.

Scenes & standalone operation

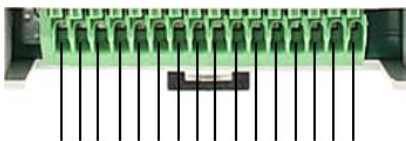
Beyond live control, the Pollux Industrial Nova can store scenes and run them autonomously, with time scheduling and scene switching triggered from its digital inputs — for example jumping to a safe scene on a fault. This lets the driver keep a machine running on its own, without a supervising PC or network connection.

Pinout



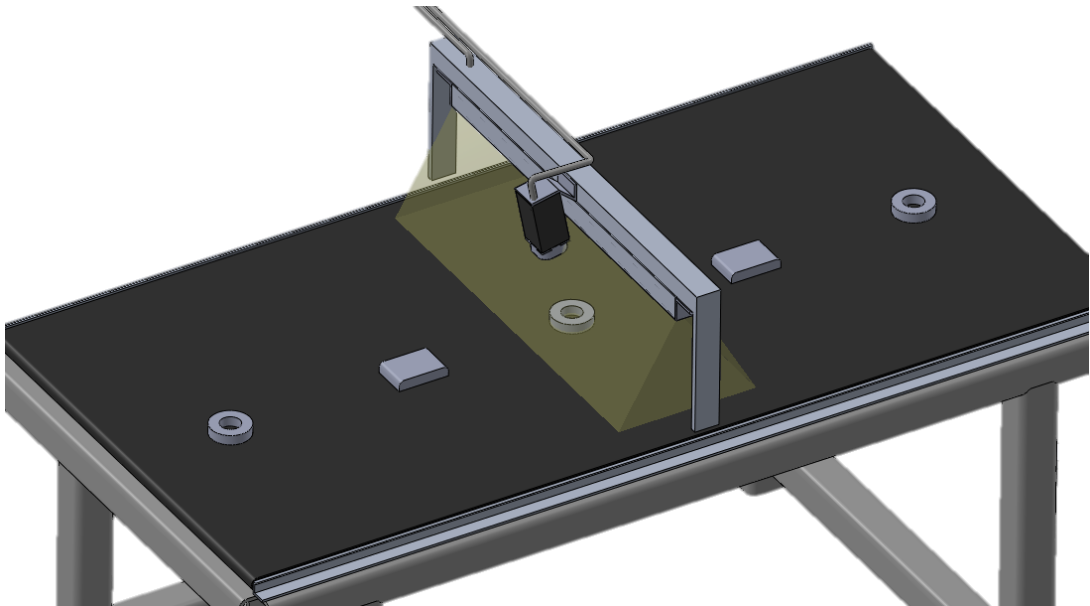


Connector	Digital I/O & NTC
Digital Input	DIG_OUT_1_0
	DIG_OUT_1_1
	DIG_IN_1
	DIG_IN_0
	GND
Analog, Digital IN and OUT	PADIO_NTC8
Analog, Digital IN and OUT	PADIO_NTC7
	GND
Analog, Digital IN and OUT	PADIO_NTC6
Analog, Digital IN and OUT	PADIO_NTC5
	GND
Analog, Digital IN and OUT	PADIO_NTC4
Analog, Digital IN and OUT	PADIO_NTC3
	GND
Analog, Digital IN and OUT	PADIO_NTC2
Analog, Digital IN and OUT	PADIO_NTC1

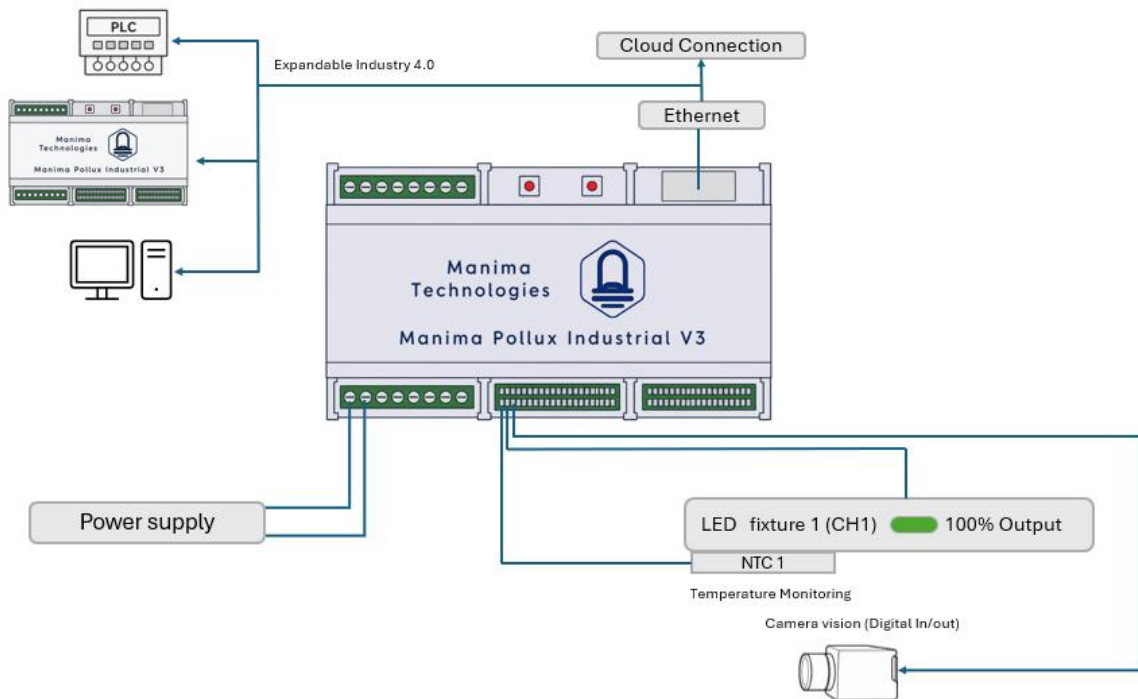


Connector	Pulse & Outputs
Pulse Mode	PULSE_8
	PULSE_7
	PULSE_6
	PULSE_5
	PULSE_4
	PULSE_3
	PULSE_2
	PULSE_1
PNP outputs	OD_OUT_5
	OD_OUT_4
	OD_OUT_3
	OD_OUT_2
	GND
Voltage Input	VCC_IO
Digital Out	DIGOUT_0_0
	DIGOUT_0_1
Pump/fan	GND
	12V
	TACH
	PWM

Use Case: NIR/SWIR machine vision inspection across variable working distances

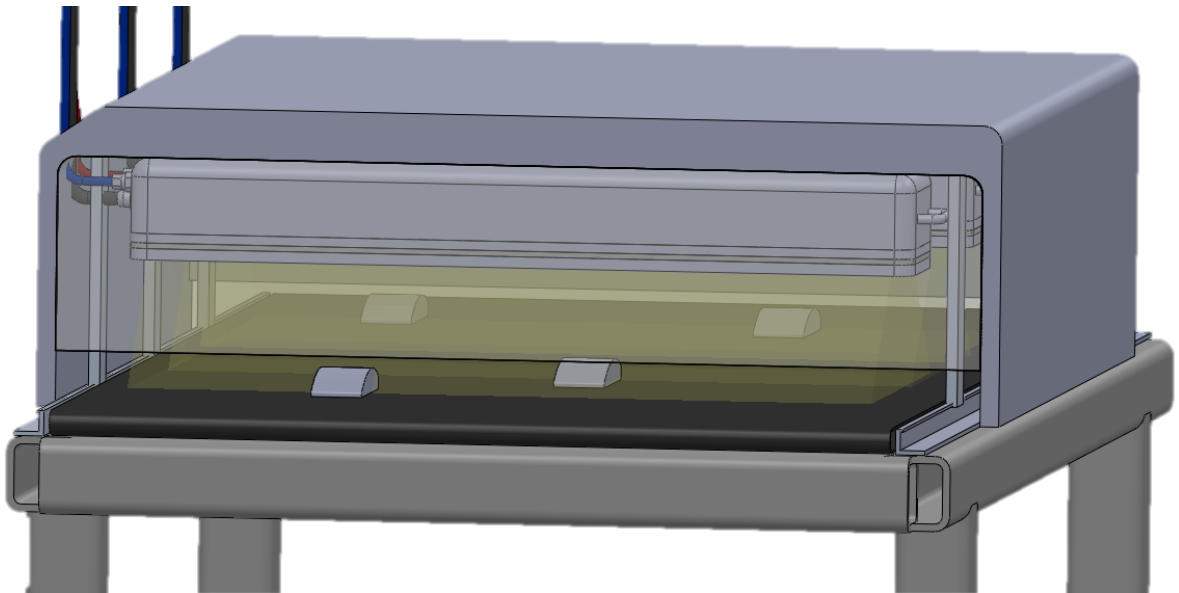


To eliminate motion blur and exposure drift caused by fluctuating belt speeds, the camera and the lighting fixture operate on a hardware-level feedback loop. When an object enters the inspection zone, the system sends a digital hardware signal to the Pollux Industrial Nova, which instantly triggers a sequence of actions.



Example system configuration showing integration between the LED fixture, SWIR camera, and MaNima Pollux Industrial Nova controller.

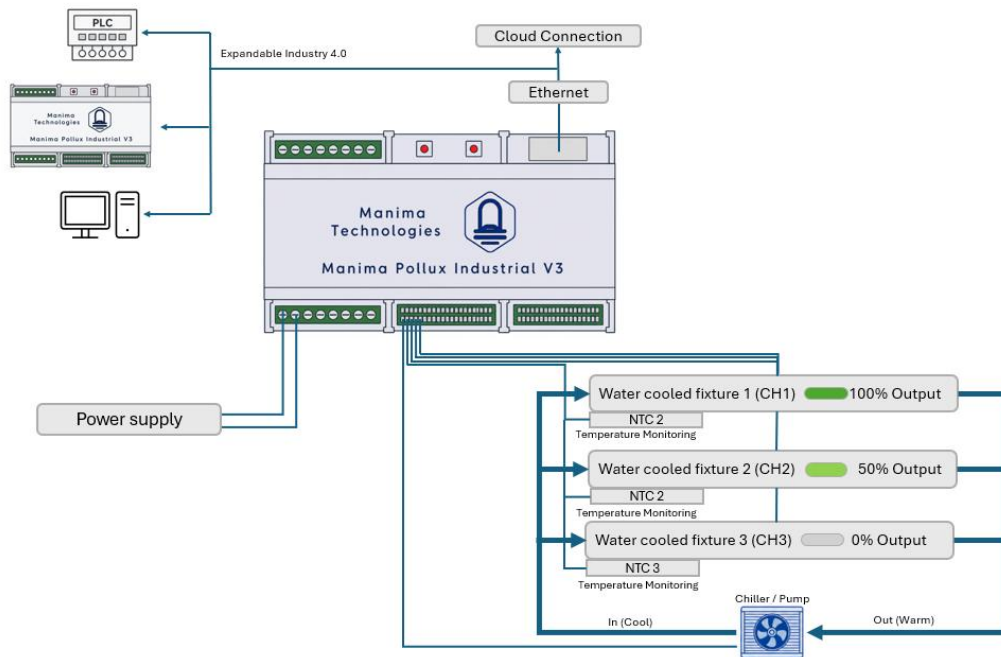
Use Case: 265 nm disinfection for food-processing



Modular stainless steel 316 fixture platform configurable for application-specific wavelengths, optics, and cooling requirements.

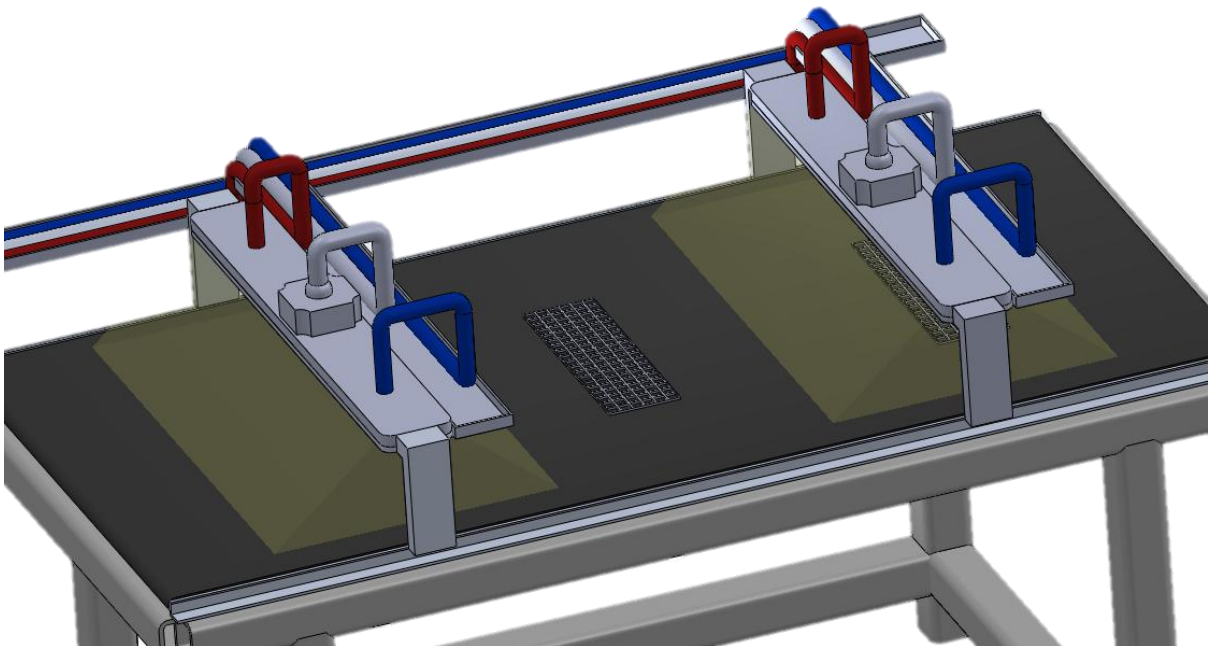
This industrial use case uses targeted 265 nm UV-C light to inactivate bacterial pathogens (such as *E. coli*) within hygienic, high-throughput food processing environments.

As food products pass through the exposure zone, a central PLC triggers high-speed strobe flashes, delivering high peak intensity during the brief exposure window while keeping heat buildup low. Built-in NTC sensors continuously monitor the temperature of the LED fixture.

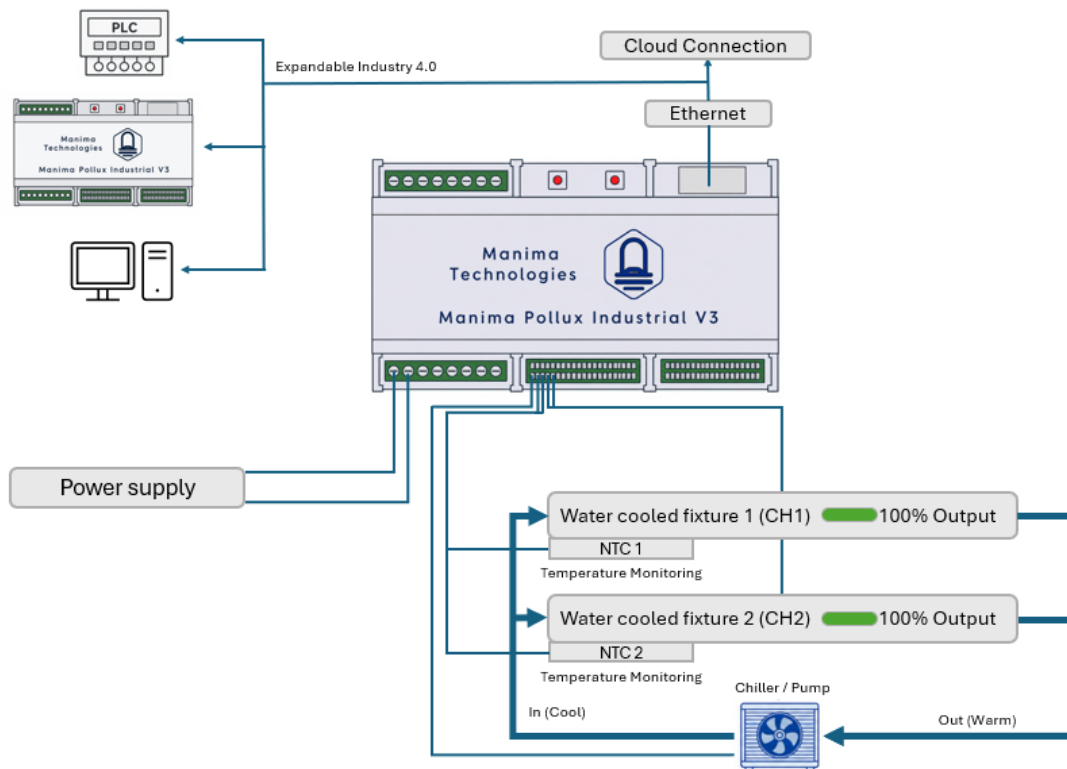


The MaNima Pollux Industrial Nova platform enables independent control of multiple LED fixtures through separate output channels. Fixtures can be individually pulsed, dimmed, or operated at full output depending on application requirements.

Use Case: High-irradiance UV-A curing and accelerated material aging



This high-irradiance use case automates industrial UV-A curing and accelerated material aging along a continuous conveyor line. A MaNima Pollux independently controls the output channels, executing precise pulsing, dimming, and full-output sequences tailored to specific material profiles.



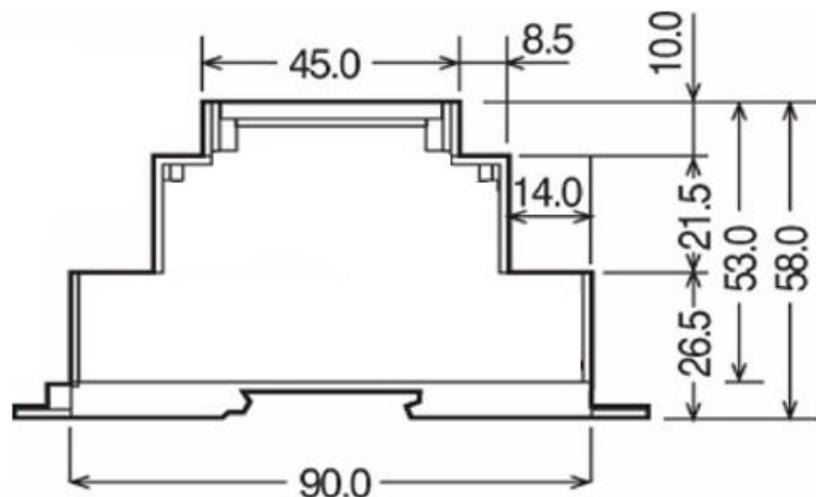
Integrated water-cooling and control system configuration for high irradiance UV-A applications.

Mechanical specifications

The Pollux and Pollux Industrial Nova are fitted inside an DIN rail enclosure.

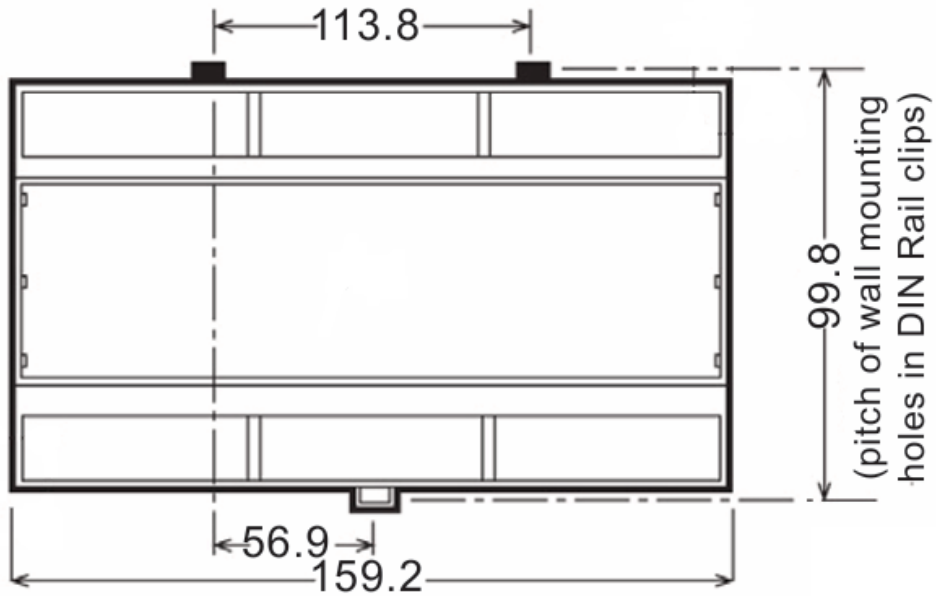
Dimensions are found in the image on the right. The width of the enclosure is found below.

- Design meet requirements of DIN 43880
- Fits 35mm DIN rail or screwed to flat surface
- Durable Light gray UL94-VO Flame retardant PC material
- 90mm long and 58mm high



Pollux

The enclosure of the Pollux is 3 units wide, or 159.2mm.



Ordering information

Order number	Type	Remark
POLIND	Pollux Industrial Nova	In DIN rail enclosure
NTCPCB	MaNima NTC sensor	Default NTC sensor

All products are carefully handled and packaged in ESD safe methods.

Disclaimer

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