AquiSense Technologies

PearlAqua Deca 30C™

UV-C LED Water Disinfection System Residential Manual

Features

- Turn-Key solution for UV water disinfection
- Simple installation with included wall-mount
- Compatible with 3/8” NPT or BSPP connections
- Compatible with 12 and 24V systems
- Automatic UV On/Off controlled by water flow
- Dynamic Power Control delivers maximum UV at any flowrate
- Up to 120 psi operation pressure
- UV PulseCareTM protects against biofilm growth
- Visible indicator lights for system status feedback
- Mercury-free

Applications

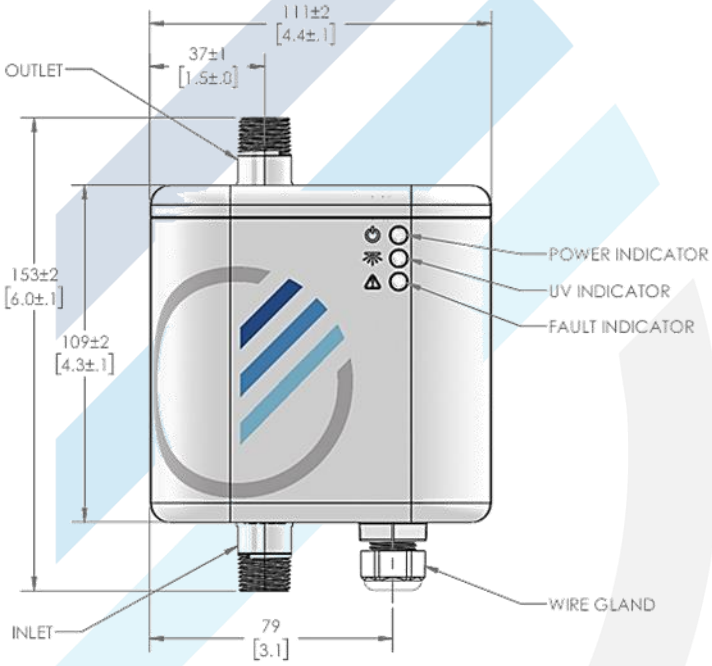
- Point-Of-Use applications with higher flow rates such as showers and soda machines
- Low flow-rate Point-Of-Entry water treatment including RVs, boats, and tiny houses
- Off-grid water treatment

Description

The PearlAqua Deca 30C is a UV-C LED water disinfection system designed for point of use applications with higher flow rates such as showers and soda machines, or smaller point of entry applications including RVs, boats, and tiny homes. This system provides disinfection without the use of harmful chemicals or materials.

Manual Release Date

October 23, 2024



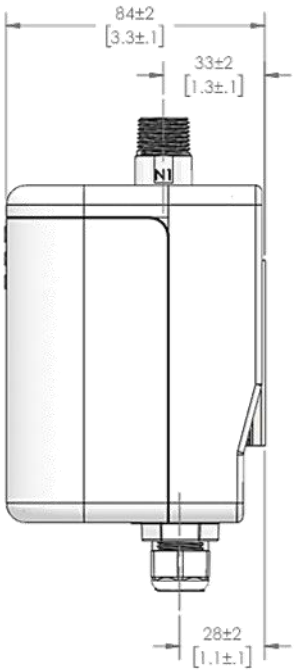


Table of Contents

1. Introduction

Safety Overview and Best Practices

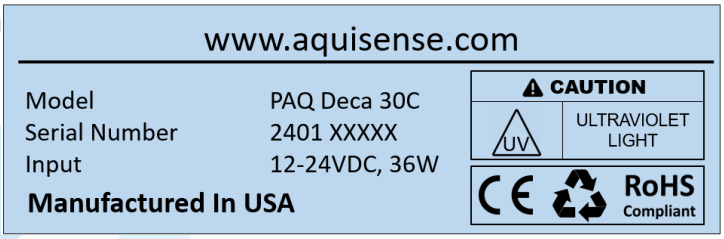
This device produces harmful ultraviolet (UV) radiation. Direct contact with UV radiation could damage the eyes and/or skin. Do not look directly into inlet or outlet ports without the use of UV resistant safety glasses.

UV Exposure Risk

- Always disconnect power from the unit before performing any Type of maintenance or servicing
- Do not operate product without first connecting water supply and allowing water to flow through product for at least 30 seconds
- Do not exceed pressure rating
- Do not use the unit if there is any sign of damage
- Do not install the unit in an area subject to full sunlight
- Keep children away from device
- Always comply with local plumbing and electrical codes

Safety Label

A safety label is affixed to each PearlAqua Deca 30C unit. The label identifies the model number, serial number, and electrical input. For more details on recommended operating specifications for your 30C unit, please see Section 3 Technical Specifications.



Cleaning and Maintenance

If there is suspected fouling occurring inside of the unit, the unit can be soaked and flushed with a mild cleaning agent such as 20% citric acid.

Part Numbering

The device part number will be printed onto a label wrapped around the PearlAqua Deca 30C cable that connects to the control board. The part number decoding key is shown below.

PAQ-30C-650-xx0-y000-zzzzz

Output Signal Options	
Choice 1*	Choice 2*

Power Supply (PS)	
PS	P
No PS	0

*Signal Letter Code	Meaning
F	Relay Fault
H	Status
L	Lifetime
S	UV Intensity
T	Temperature
U	Relay UV

Thread Type		Thread Size		Integrated Flow Switch		External Indicator		Special Build	
BSPP – Male	P	3/8"	1	Yes	F	Yes	1	Case Pulse Care	2
NPT - Male	N			No	0			Case No Pulse Care	3
								No Case Pulse Care	4
								No Case No Pulse Care	5

2. Technical Specifications

Recommended Operational Conditions

Parameter	Min	Max	Unit
Input Voltage	12	24	VDC
Operating Pressure	0	8.3 (120)	bar (psi)
Process Water Flow Rate (1)	6 (1.6) (2)	12 (3.2) (3)	lpm (gpm)
Process Water Temperature	0 (32)	35 (95)	°C (F)
Ambient Temperature	10 (50)	27 (80)	°C (F)
Relative Humidity		60%	-
UV Transmittance	90%		-
Suspended Particulate Size		10	Micron
Water Hardness		(7/120)	mg/L
Iron Concentration		0.3	ppm

(1) See Mechanical Specifications for all operating conditions.
(2) UV Dose = 40 mJ/cm^2 @ 98% UVT.
(3) UV Dose = 30 mJ/cm^2 @ 98% UVT.

Absolute Maximum Ratings

Absolute Maximum Ratings do not imply functional operation of the device at these or any other conditions beyond those listed under *Recommended Operating Conditions*. Operation outside the *Absolute Maximum Ratings* will cause permanent device damage.

Parameter	Min	Max	Unit
Input Voltage	-26.7	26.7	VDC
Operating Pressure	0	10 (145)	bar (psi)
Process Water Temperature	0 (32)	70 (158)	°C (F)
Ambient Temperature (Reactor filled)	0 (32)	70 (158)	°C (F)
Ambient Temperature (Reactor empty)	-25 (-13)	70 (158)	°C (F)
Storage Temperature (Reactor empty)	-25 (-13)	85 (185)	°C (F)

Electrical Specifications

Parameter	Conditions	Min	Typical	Max	Unit
Input Voltage		11		26	V
Power Consumption	UV On		30	36	W
Current Draw	UV Off		50	70	mA
Pulse withstand peak current	10/1000 µs waveform			5.14	A

Disinfection Specifications

Parameter	Conditions	Min	Typical	Max	Unit
UV Dose	@ 12 lpm, 98% UVT		30		mJ/cm^2
	@ 6 lpm, 98% UVT		40		
Operating Lifetime	To 70% radiant flux			10,000	Hours

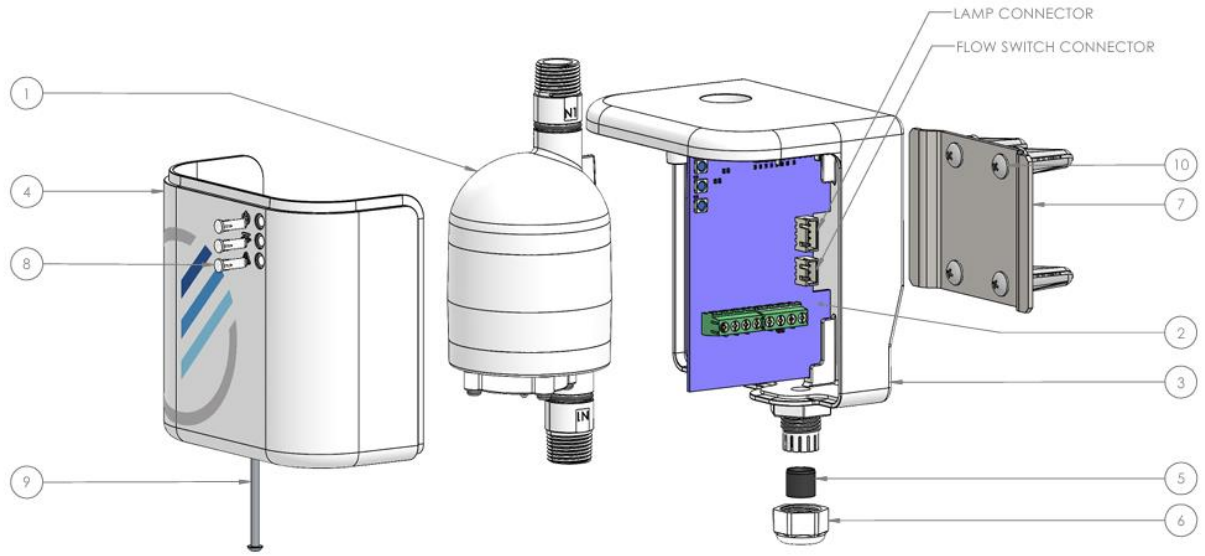
Mechanical Specifications

Parameter	Conditions	Min	Typical	Max	Unit
Operating Pressure		0		8.3 (120)	bar (psi)
Flow Rate		2 (0.5)		20 (5.3)	lpm (gpm)
Process Water Temperature(1)	@ 2 – 5 lpm	0		21 (70)	°C (F)
	@ 5+ lpm	0		35 (95)	°C (F)
Weight	w/ flow switch		545 (19.2)		g (oz)
	w/o flow switch		500 (17.6)		
Process Water Volume	w/ flow switch		80 (2.7)		cc (fl.oz)
	w/o flow switch		46 (1.6)		

(1) The product will function if your operating conditions are outside these conditions. Contact AquiSense Technologies for details.

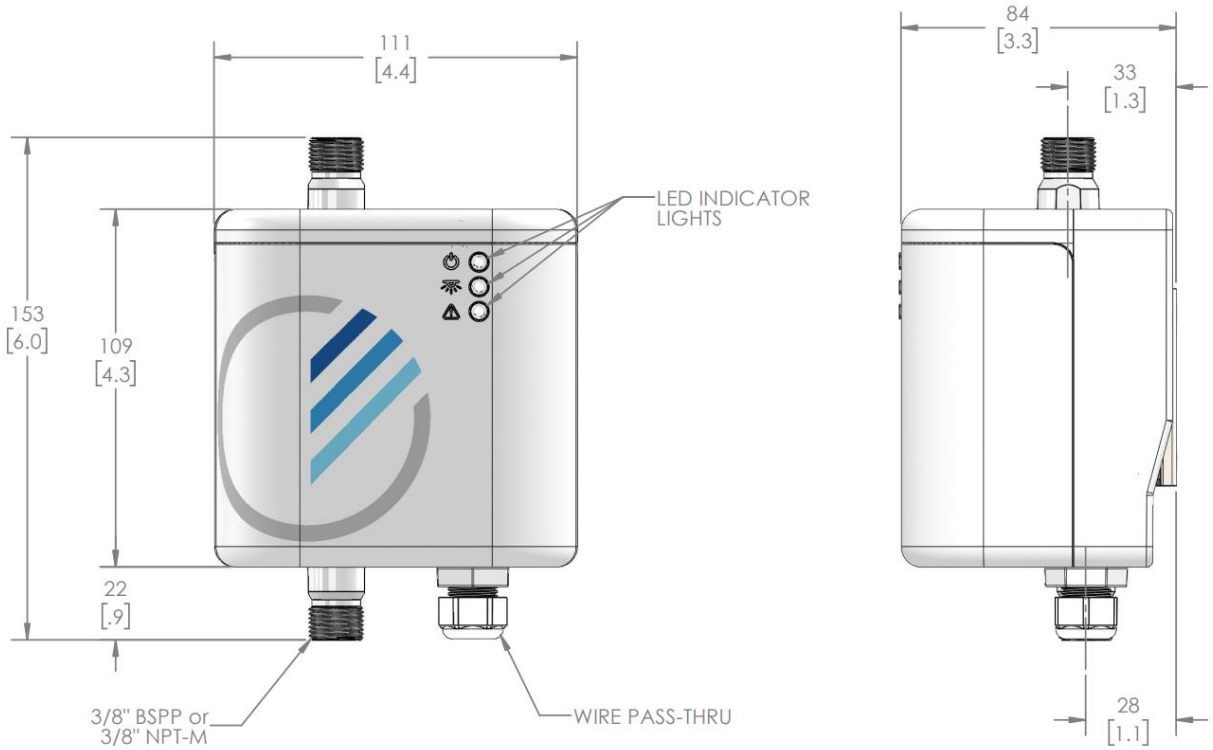
3. Components

General Assembly



ID	Name	Detail
1	Deca 30C flowcell	3/8” BSPP or 3/8” NPT Inlet/Outlet
2	Control board	
3	Housing	
4	Cover	
5	Wire gland grommet	
6	Wire gland nut	
7	Mounting bracket	
8	Indicator LEDs	See Section 6 for more information on LED indicator patterns
9	Cover locking screw	M3 x 25.0 Torx BHS
10	Wall mount hardware	Drywall anchor with No.10 screw

Dimensions


111
[4.4]
153
[6.0]
109
[4.3]
22
[.9]
LED INDICATOR
LIGHTS
3/8" BSPP or
3/8" NPT-M
WIRE PASS-THRU
84
[3.3]
33
[1.3]
28
[1.1]

4. Installation

NOTE: Review Section 3: Components for locations of water ports, mounting holes and electrical plugs.

General Practices

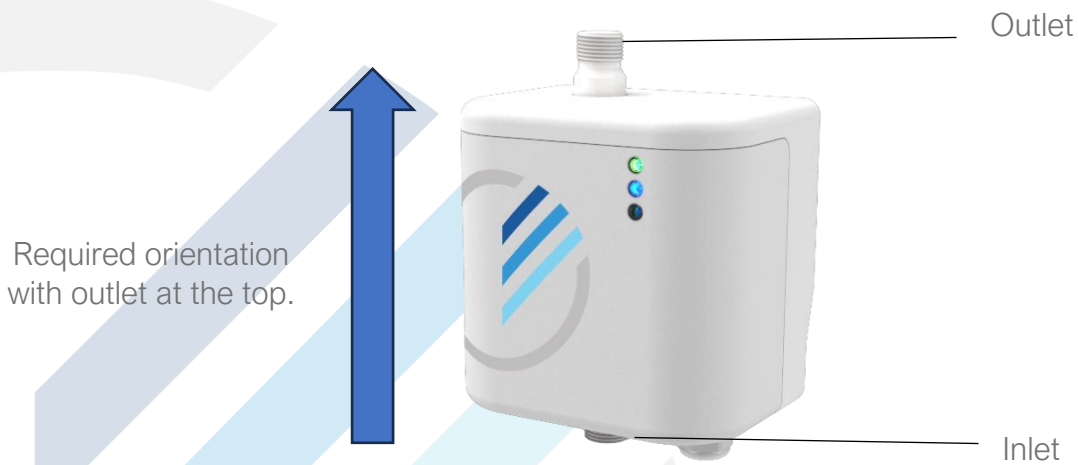
- Read all instructions before installation.
- Remove the PearlAqua Deca 30C from its packaging; ensure contents of the package are complete.
- When selecting the installation location, consider ease of access, maximum length and minimum bend radii of piping, electrical connections, and air circulation.
- Do a test fit of the unit before beginning any installation.
- Use appropriate connection fittings compatible with the plumbing pipework and Deca 30C water inlet and outlet ports.
- Deca 30C should only be installed vertically with the inlet (wire gland side) at the bottom and the outlet at the top.
- Installation by plumbing professional is recommended.

Detailed Installation

1) Do not attach the input power plug!
2) Connect water lines to the water inlet and water outlet. Use suitable connection fittings and tubing.

Exerting excessive torque on the inlet/outlet of the Deca 30C during installation may cause damage to internal parts. For this reason, a wrench/spanner should be used to brace the Deca 30C during installation to reduce torque.

3) Flush water through the unit for at least 30 seconds.
4) Close the tap, stopping water flow through the PearlAqua Deca 30C.
5) Connect the input power plug.
6) Verify unit works properly by viewing the indicator LEDs.
7) Green should illuminate shortly after power is applied.
8) If using an integrated flow switch, the blue light should illuminate when the tap is opened and turn off shortly afterwards.



5. Features

Indicator Lights

Power Indicator (1)	
On (green)	Unit is powered
Off	Unit is not receiving power
UV Indicator (2)	
On (blue)	Unit is receiving power; UVC disinfection is active; water is flowing
Off	UVC disinfection is not active
Pulsing (blue/dim)	Dynamic Power Control enabled
Blinking (blue/yellow)	Low UV Intensity
Fault Indicator (3)	
Blinking (yellow)	UV lamp has less than 10% lifetime remaining
On (yellow)	UV lamp have reached end-of-life
On (red)	System fault
Off	No faults

Dynamic Power Control

The maximum allowable UV output from the UV-LEDs is limited by the cooling available from the flow fluid. As the fluid decreases in flow rate or increases in temperature, the lamp will intelligently decrease UV output to maintain a safe operating temperature. Adjustments to output power are made in steps of 25% approximately every 1.5 seconds as needed.

This behavior ensures that the maximum possible UV performance is provided even in sub-optimal operating conditions. When Dynamic Power Control is active, the UV indicator (described above) will cycle between full brightness and a dimmed state.

UV Pulse Care

The UV Pulse Care feature helps to prevent biological growth within the PearlAqua Deca 30C during extended periods without use. This is done by briefly pulsing the UV lamp for 1 second every 30 minutes approximately.

Flow Switch

Units equipped with the built-in flow switch will automatically enable the UV lamp in response to fluid flow. When fluid flow ceases, the UV lamp will turn off within 5 seconds.

6. Trouble Shooting

UV indicator blinking blue and yellow

Issue: Low UV intensity

Solution: Flush with clean (high UVT) water, check UVT of process water, install pre-treatment as necessary. Possible lamp replacement needed.

Fault indicator blinking yellow

Issue: Lamps approaching end-of-life

Solution: Replace lamps soon

Fault indicator solid yellow

Issue: Lamps have reached end-of-life

Solution: Replace lamps

Fault indicator solid red

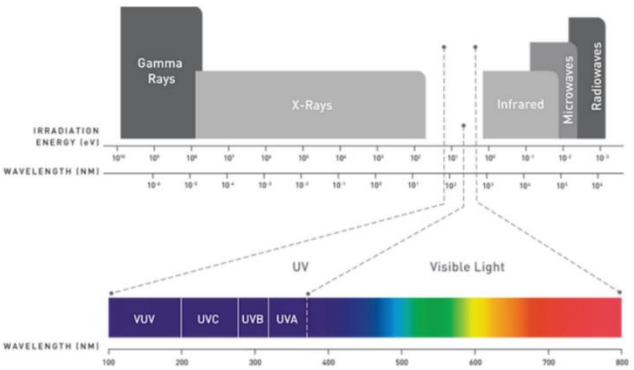
Issue: Lamp failure

Solution: Wait and allow lamp to cool. If waiting does not resolve the error, power cycle device, if issue persists, contact manufacturer.

7. Theory

UV-C Water Disinfection

Ultraviolet (UV) water disinfection technology has become an increasingly popular tool in water treatment over the past three decades, due in part to its ability to provide treatment without the use of harmful chemicals. UV represents wavelengths that fall between visible light and x-ray on the electromagnetic spectrum.



The UV range can be further divided into UV-A, UV-B, UV-C, and Vacuum-UV. The UV-C portion represents wavelengths from 200 nm - 280 nm, which is the wavelength range used in our LED disinfection products. UV-C photons penetrate cells and damage the nucleic acid, rendering them incapable of reproduction, or microbiologically inactive.

UV-C LEDs

A light-emitting diode (LED) is a semiconductor light source. It is a p–n junction diode, which emits light (or photons) when activated. The PearlAqua Micro utilizes small, state-of-the-art, UV-C LEDs, which emit photons in the UV range, to provide pathogen reduction without the use of harmful chemicals or heavy metals. Use of LEDs allows the PearlAqua Micro to achieve full intensity power upon start-up, withstand unlimited power cycles without impacting device life, and eliminate expensive disposal processes.

8. Warranty

General Statement of Warranty

The warranty period is 24 months from date of warranty registration, covering all failures due to material and product assembly. The owner must register the product at https://aquisense.com/registration for the warranty to be in place.

This warranty shall not apply to any failure or defect which results from the Equipment not being operated and maintained in strict accordance with instructions specified in the AquiSense Operations manual or defect which results from mishandling, misuse, neglect, improper storage, improper operation of the Equipment with other equipment furnished by the Owner or by other third parties or from defects in designs or specifications furnished by, or on behalf of, the Owner by a person other than AquiSense. In addition, this warranty shall not apply to Equipment that has been altered or repaired by anyone except AquiSense, their Authorized representative, or personnel acting under specific instructions from AquiSense.

The Owner must notify their dealer within 5 days of the date of any Equipment failure. This notification shall include a description of the problem, details of the product name (e.g. PearlAqua Micro), model number (e.g. 9C) and serial number - all found on the product label.

The Owner will fully cooperate with their dealer in attempting to diagnose and resolve the problem by way of telephone/web support. If the problem can be diagnosed by telephone/web support and a replacement unit is required, the dealer, in conjunction with AquiSense will either, at AquiSense expense, ship a repaired, reworked, or new part to the Owner. If the problem is not attributable to a breach of this warranty, the dealer or AquiSense reserves the right to invoice the Owner for this service.

This warranty is in lieu of all other warranties whether written, oral, implied, or statutory. Without limitation, no warranty of merchantability or fitness for a particular purpose shall apply to the Equipment.

Operating Hours

Unlike mercury vapor UV-C lamps, the lifetime of UV-C LEDs is not affected by on/off cycles. However, like all light sources, LEDs are subject to aging over time. AquiSense Technologies have engineered an integrated UV-C LED lamp module that contains: power regulation, temperature management, temperature monitoring, and intensity monitoring. When operated in accordance with AquiSense instructions, it is expected that the LED lamp module lifetime will be up to 10,000 hours depending on configuration.

Premature LED lamp module Failure

In the case of failure, the following refund/replacement applies:

- Up to 6 months use: Full Replacement
- Over 6 months use: Proportionate (Pro-rata) credit

Limitations of Warranty

This warranty:

- Relates only to faults in material and assembly. It does not cover any form of breakage from mishandling or mis-operation
- Applies where operating conditions are kept in accordance with AquiSense instructions
- Is limited to 24 months after the date of delivery
- Excludes transport costs for the return of parts
- AquiSense will not be responsible for any damages, consequential or otherwise

Return of Product

In all warranty cases, contact your dealer with details of the product name (e.g. PearlAqua Micro), model number (e.g. 9C) and serial number - all found on the product's cable. In case of difficulty, contact info@aquisense.com

Disposal of Product

As part of our commitment to the environment, all used or failed products returned to AquiSense facilities through your dealer will be properly recycled at no charge.

Manufacturer Contact Information

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9. Change Log

Version	Description of change	Release Date
0	Initial Release	October 23, 2024