

NOVA SMALL CLS UNIT



NOVA is the new Small CLS (Centralized Life Support) purposely designed for aquatics research labs, housing both fish and amphibian species. It is a semi-closed recirculating system that guarantees constant water quality by means of a multi-stage filtration design and UV disinfection to supply housing tanks with filtered and disinfected water. This unit also includes automatic monitoring and buffering systems to minimize water fluctuations by ensuring the fine adjustment of the main water quality parameters.

STANDARD TECHNICAL FEATURES

NOVA is a scalable filtration system that provides flexibility of use: racks can be connected in multiple configurations, at even **later stages**, from a **minimum of 2 up to a maximum of 8 racks** (up to 6 standard rows) depending on space availability and room constraints. By consistently circulating water through the supply and return lines, it maximizes water conservation and minimizes waste. On average, **around 10%** of the total system water volume is daily refreshed with **Reverse osmosis water to dilute Nitrate levels**. This water volume is subdivided into smaller amounts which are dumped every hour to maintain stable water parameters throughout the day. Reverse osmosis water is stored in a dedicated tank ready for use. The **housing of aquatic species** generates **suspended solids** and **dissolved organics** that must be **filtered**, as well as the presence of microorganisms that requires constant **disinfection**.

So firstly, water is **pre-filtered** and **biologically filtered** at **rack level** inside each blue sump tank and afterwards it is delivered to the CLS where the remaining filtration and disinfection steps are accomplished. **NOVA** includes a **bead filter for fine mechanical filtration with self-cleaning effect** to drastically reduce the need of consumables and maintenance needs. **Carbon filter** absorbs dissolved substances and also contributes to the clarity and odors absorption from water. **UV disinfection** generates a germicidal irradiation able to kill or disable the growth of micro-organisms like bacteria, viruses and other pathogens. **Standard probes** (temperature, pH, conductivity) and **optional probes** (TDG) constantly monitor quality and automatically trigger the **buffering system** to finely adjust the main water quality parameters.



BUILDING FRIENDLY DESIGN FOR EASY INSTALLATION

NOVA features a **space-saving compact design** and comes fully **preassembled** on a skid for easy installation. Its design allows for **modular** and **gradual increase** of racks at both sides according to layout and future needs, providing flexibility and a worthwhile investment. **NOVA** is also **fully compatible** with the previous product design (**WTU**) for a **one-to-one replacement**.



NOVA is compatible with **ZebTEC** and **XenopLus Multilinking racks** in different configurations and featuring a **blue sump tank** where **pre-filtration** and **biological filtration** are accomplished.

PRE-FILTRATION

It is performed either by means of a **disposable polyester pad** or a **reusable washable and autoclavable plastic pre-filter pad**. Both options provide a **first mechanical screen** in the range of **100µm** to retain largest particles like uneaten food and faeces. Underneath the pre-filter screen a **blue reusable sponge** of a similar size is also installed to mainly act as a **trickling** (additional) bio-filter.

BIOLOGICAL FILTRATION

Each sump tank includes a plastic perforated **cube box** dedicated to the housing of the plastic bio-media (**TP Bio-Fiche**) that **floats** due to the underneath water agitation. The floating bio-media allows for **beneficial bacteria development** and reduces meanwhile the accumulation of dirt and bio-filter development on top of the bio-fiches.

The needed and remaining filtration stages and UV disinfection are completed **inside NOVA** as follows.

FINE MECHANICAL FILTRATION

Water is pressurized through a **316L s/s bead filter canister** to primarily provide **mechanical filtration** by trapping solid waste particles by means of a **dense bed of small plastic beads**.

This filter also includes a **self-cleaning mechanism** through an integrated, automated **backwash cycle** that periodically **agitates the beads** and **flushes** accumulated **debris** from the system to the building drain.

CARBON FILTRATION

A smaller **316L s/s canister** is installed downstream the mechanical filter to ensure the **chemical filtration** of water. The canister includes a **polyester bag of 1kg acid-washed carbon** that is held inside a **sock bag (100µm)** that itself acts as a **polishing filtration** step after the bead filter.

UV DISINFECTION

Ultraviolet rays (UVc) generated by the UV bulbs are able to pass through the microorganism cellular wall causing a reaction in microorganism DNA, breaking the C=C bonds in the microorganism molecule. This causes a sudden cellular death, preventing the microorganism from growing and propagating.

UV lamps work at 254nm wavelength. From a design standpoint, the **316L s/s UV canister** is now **installed horizontally** for easier replacement even in case of a low ceiling. **UV bulbs** are constantly powered and they must be **replaced every 12000h**. Each UV bulb is protected inside a **quartz sleeve** to prevent direct contact with water and to reduce the additional heating effect on system water.

5 bulbs of 80W (each one) are installed and provide a disinfection power of **160000 µw/sec/cm²** (calculated at the **end life** of bulbs).



MONITORING SYSTEM

A **standard** set of **reading probes** (temperature, pH, conductivity) is installed inside the technical sump to constantly read the corresponding value for temperature, pH and conductivity. The **TDG** (total dissolved gases) **probe** is **optional** and can be installed at a later stage.

BUFFERING SYSTEM

Two membrane dosing pumps are installed to fine tune the levels of pH and conductivity whenever their values drop below the set points. **Two** concentrated/saturated **buffering solutions** of sodium bicarbonate (for pH) or synthetic salt (for conductivity) are stored inside **two** dedicated **buffer reservoirs** where the suction valve is located. **Heating elements** automatically turn on and off when needed to maintain stable water temperature. **Cooling system with chiller** is **optional** and is not included in the standard design.

RECIRCULATING PUMPS

Two external silent pumps with **redundancy** features are part of the mechanical design. They operate water circulation through NOVA and supply clean water to the racks and tanks. They **automatically switch** every **24 hours** and are **variable frequency driven** through an **inverter**.

FLOW METER AND PRESSURE TRANSDUCER

Both of them are installed along the **supply line** to provide references of **system flow** and **pressure**.

QUALITY CONSTRUCTION

NOVA has a robust support **structure** made from **AISI 316L stainless steel** with a durable **polyester resin** finish. This also includes the mechanical and carbon filter canisters. The **technical sump** is made from **fiberglass** to ensure long lasting and full compatibility with water. PVC plastic pipes and valves are easily assembled and feature smooth surfaces with low roughness to reduce biofilm formation, upholding the highest standards of safety and hygiene.

SAFETY AND ALERT FEATURES

NOVA includes several **safety** and **alert features** to ensure operator protection and system reliability:

- **Electrical cabinet:** a sliding e-box is installed to improve accessibility for ease of maintenance.
- **Emergency Push button:** one emergency push-button is installed at the front of the electrical cabinet. When triggered, the system is immediately made inoperative to protect the operator.

- **Uninterruptible Power Supply (UPS):** A UPS unit is installed inside the electrical cabinet, allowing the system to send out alarm emails even in the unlikely event of a power supply fault.

- **Panel Remote Control: NOVA** allows remote access to the main panel and e-mail messages to forward alarms, enabling prompt response to issues.

- **Volt Free Contact:** This feature allows the connection of the unit with a centralized Building Management System (BMS), facilitating integrated control and monitoring.

POWER REQUIREMENTS

VOLTAGE/FREQUENCY:

Europe: single phase, 230V, 50Hz, 32A. Single plug IEC 309

USA: single phase, 208V (208-230V), 60 Hz, 30°. Single plug NEMA L6-30, UL compliant.

ROOM REQUIREMENTS

TEMPERATURE: 25 ÷ 26°C (60.8 ÷ 71.6°F). Usually 2-3°C lower than water temperature.

HUMIDITY: Max 60%

VENTILATION: Minimum 10 air changes per hour

DATA TRANSFER: RJ45 Ethernet connection

VALIDATION AND QUALIFICATION

A set of tests and protocols are available to verify the performance:

- Factory Acceptance Test (FAT)
- Site Acceptance Test (SAT)



COMPLIANCE TO DIRECTIVES AND STANDARDS

2006/42/EC	Machinery Directive
2014/35/EU	Low Voltage Directive
2014/30/EU	EMC Directive
EN ISO 12100:2010	Safety of machinery. General principles for design. Risk assessment and risk reduction.
EN ISO 3744:2010	Acoustics - Determination of sound power levels and sound energy levels of noise sources.
CEI EN 60204-1:2018	Safety of machinery - Electrical equipment of machines

DOCUMENTATION

NOVA comes with the following standard documentation:

- User and Maintenance Manual
- Wiring diagram
- Spare part list
- EC conformity declaration – UL/CSA compliant

