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Installation Manual Solar Desalination Greenhouse

March 2024

Project

Improving MEDiterranean irrigation and Water supply for smallholder farmers by providing Efficient, low-cost and nature-based Technologies and practices Project (MED-WET)

Deliverable Leader

EcoGozo Directorate

Ministry for Gozo and Planning

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Dissemination Level

MedWet partner countries

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- **Disclaimer:** [Equipment Variability: While this manual provides guidelines for the installation of the SDGH, users should be aware that equipment and components might vary in brands and sizes. Always consult specific instructions provided by equipment manufacturers or suppliers.
- **Liability:** The SDGH installation must be carried out under the supervision of qualified personnel. The responsibility for ensuring that all installations adhere to local and international safety standards lies with the installing party. Neither the Ministry for Gozo and Planning nor alchemia-nova GmbH will be held liable for any damages or injuries resulting from incorrect installation or operation of the SDGH.
- **Dynamic Document:** This installation manual is subject to periodic updates to incorporate technological advancements or feedback. Users are encouraged to ensure they are referencing to the most recent version of the manual.

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1. Introduction

The Solar Desalination Greenhouse (SDGH) represents a groundbreaking convergence of agricultural and desalination technologies, tailored to confront the challenges of water scarcity and food security in arid and semi-arid regions. By integrating innovative systems and processes, the SDGH offers an unparalleled solution to these pressing issues, ensuring a sustainable approach to crop cultivation and freshwater production.

The SDGH is not just a greenhouse—it is a holistic system that merges the principles of solar energy, vertical farming, and advanced water desalination. At its core lies the humidification-dehumidification process, where saline water is converted into freshwater, powered by the crops grown within the greenhouse. Halophytes, salt-tolerant plants, play a dual role by contributing to the humidification process and offering potential as a valuable crop.

As with any advanced system, the proper installation and setup of the SDGH are crucial for its efficient functioning. This manual provides a comprehensive guide to installing the various components of the SDGH. It is designed to be a quintessential resource for those entrusted with the assembly and operation of the SDGH, from system operators and technicians to facility managers. Whether retrofitting these components to an existing greenhouse or starting anew, the instructions within this manual should ensure an efficient and effective setup.

Given the dynamic nature of the SDGH's operation, where research and development are ongoing, it's essential to approach the installation with both precision and adaptability. While this manual offers a detailed installation guide, it's imperative to remember that the SDGH operates in a synergistic manner—each component interacts with and influences the others. Thus, understanding the broader system dynamics will significantly enhance the installation process.

Furthermore, given the unique and innovative approach of the SDGH, feedback is invaluable. As this system is continually being refined and improved, users are encouraged to provide insights and suggestions, ensuring that the SDGH remains at the forefront of sustainable agricultural and desalination solutions.

The installation manual is a living document that should be updated periodically to incorporate any changes in equipment, technologies, or best practices. Users are encouraged to provide feedback and suggestions for improvements to ensure that the manual remains up-to-date and relevant. Please contact igor.luketina@alchemia-nova.net for feedback and suggestions.

1.1 Acronyms

O&M Operation and Maintenance

SDGH Solar Desalination GreenHouse.

2. General Guidelines

Before commencing the installation of the Solar Desalination Greenhouse (SDGH), it's crucial to familiarize oneself with the following general guidelines. These recommendations are designed to ensure a smooth and safe installation process.

2.1 Pre-installation Checks

Site Inspection: Ensure that the site where the SDGH will be set up has been adequately prepared by the construction company. The ground should be level, and there should be no obstructions or debris in the designated area.

- **Component Verification:** Confirm that all the necessary parts and components for the SDGH have been delivered. Cross-check with the inventory list provided.
- **Greenhouse Structure:** Ensure the shell of the greenhouse is intact, with no significant air gaps. The greenhouse should not be too high or voluminous.

2.2 Tools and Equipment

- Gather all required tools and equipment beforehand. Basic installation tools like a well-stocked toolbox and equipment like ladders will be needed.
- Ensure all water-related equipment, such as pumps, are available and in working condition.

2.3 Safety Precautions

- **Electricity:** Always ensure that any electrical connections are made under the supervision of a certified electrician. Ensure that the power is turned off when working with electrical components.
- **Handling:** Handle all components, especially sensitive ones like sensors, with care. Avoid submerging sensors or other components that are not water-resistant. Keep them as clean and dust free as possible.
- **Protective Gear:** Wear appropriate protective gear, especially when handling saline water. Basic protection like gloves is recommended.
- **Chemical Exposure:** Always be cautious when working with or near chemicals, ensuring that they are stored and handled safely.

2.4 Professional Assistance

While some aspects of the installation can be managed by general personnel, certain components might require specialized skills. It's recommended to have access to a plumber, botanist, and electrician during the installation process. Always follow guidelines or instructions provided by technicians or experts when installing specific components.

2.5 Documentation and Compliance

- Ensure that the documentation of the installation process aligns with the standards set by the Ministry for Gozo and Planning and alchemia-nova GmbH.
- In case of any discrepancies or issues, it's essential to contact the relevant authorities or representatives from the mentioned organizations.

3. Vertical Farming System

The Vertical Farming System within the SDGH allows for the cultivation of crops in vertically stacked layers, maximizing space efficiency and promoting optimal plant growth. The following guidelines will aid in the proper installation of this system.

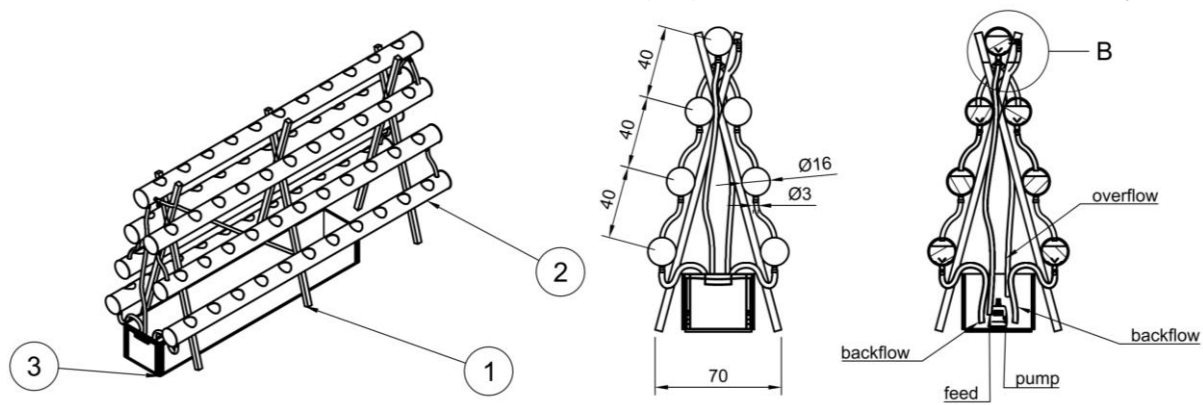


Figure 1 Supporting rack (1), PVC pipe with expanded clay as substrate (2), water tank with pump (3), side view of vertical farming with various components

3.1 Pre-installation Checks for Vertical Farming

Component Verification: Before starting the installation, ensure that all parts listed under the vertical farming system, from water tanks to PVC pipes, are available and in good condition.

Location: Determine the ideal location for the vertical farming setup within the greenhouse, ensuring adequate space for all components. The ideal locations are to be discussed in exchange with alchemia-nova and the Ministry for Gozo and Planning and can be subject to changes during the installation or operation phase.

3.2 Installation Procedures

3.2.1 A-Frame Structure

- Begin by preparing the galvanized steel hollow sections (40x40mm) to form the A-frame structure, as illustrated in Figure 3.
- Stiffen the A-frames using galvanized steel flat bars (40mm x 2mm) and self-drilling screws.
- Join the A-frames using the galvanized L-profiles (40mm x 40mm x 2mm).

3.2.2 PVC Pipe Arrangement

- Position the large PVC pipes with pre-drilled holes (for the crops) on the A-frame using the lochband and self-tapping screws, referring to Figure 3.
- Close both ends of each PVC pipe using the provided end caps.
- Drill holes at the bottom of one end of the PVC pipes to connect the top pipe to the one below using the flexible hose.

3.2.3 Water tank and Pump Setup

- Position the low-profile water tank beneath the A-frame structure.
- Install the pump as per the manufacturer's instructions. Connect the flexible pipe to the topmost PVC pipe, ensuring a consistent flow.

3.2.4 Filling and Testing

- Fill the PVC tubes with the provided expanded clay trays.
- Fill the bottom tank with water, ensuring it reaches a level approximately 5 cm from the lid. Monitor the flow rate to ensure it remains above 8 L/min, adjusting as necessary to prevent overflow or splashing.

3.3 Post- installation Checks

- Flow Rate: After setting up, run the system to ensure the water flows consistently through the pipes and reaches all sections of the vertical farm. Make sure that no water overflows.
- Leakage: Check for any potential leak points, especially at connection joints.

4. Dehumidifier System

The dehumidifier is central to the SDGH's operation, aiding in both water desalination and the maintenance of an optimal environment for plant growth. It achieves this by extracting excess moisture from the greenhouse's air. This section outlines the procedures for setting up and connecting the dehumidifier system.

4.1 Pre-Installation Checks for Dehumidifier

- Component Verification: Ensure that the dehumidifier and its associated parts, such as the water tank, are present and undamaged.
- Power Source: Confirm the availability of an electrical connection point close to where the dehumidifier will be installed.

4.2 Installation Procedures

4.2.1 Dehumidifier Setup

- Choose an appropriate location for the dehumidifier. Ideally, it should be where the dew point is frequently the highest, but the air temperature remains within the manufacturer's specified limits.
- Position the dehumidifier in such a way that its air outlet faces the side with the extractor fans, promoting efficient airflow throughout the SDGH.
- Follow the manufacturer's instructions closely to set up the dehumidifier.

4.2.2 Water collection System

- Place the water tank (with a capacity of at least 100 litres) near the dehumidifier. Ensure it's easily accessible for maintenance and emptying. If no extra tank is available, use the internal water collection tank of the dehumidifier. It should be inspected more frequently to avoid overflow or down-time of the dehumidifier.
- Connect the dehumidifier's water outlet to the water tank using the provided flexible hose. Ensure the hose's end goes through a PVC elbow fixed on the tank's cap, enabling efficient water collection. Make use of gravimetric positioning of dehumidifier and tank.

4.2.3 Electrical connections

- Connect the dehumidifier to the power source. This step should be performed by a certified electrician to ensure safety and compliance with electrical standards.

4.3 Post-installation Checks

- Operation Test: Turn on the dehumidifier to verify that it's functioning. Monitor its performance for a few hours to ensure moisture is being effectively removed from the air and collected in the water tank. Repeat an inspection overnight the next day and monitor the dehumidifier for at least 3 consecutive days.
- Safety Precautions: Ensure the area around the dehumidifier remains clear, and there's no risk of water spillage. Also, ensure that the electrical connections are secure and there's no risk of electrocution.

5. Wet Walls System

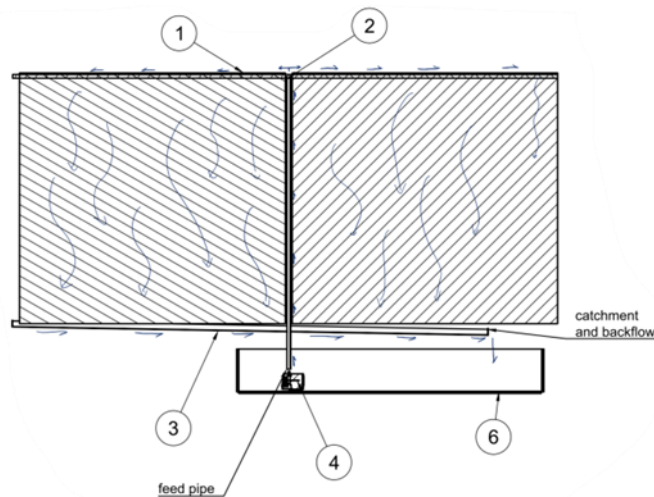


Figure 2 Wet wall with Netting (1), galvanised 1/2 inch pipe for structural support (2), gutter pipe (3), Pump with delivery pipe (4) water tank (6)

Wet walls play a vital role in the SDGH, serving as pivotal components for environmental control. By circulating water through these absorbent structures, they assist in regulating temperature and humidity, ensuring a cooling effect for better plant growth and more humidity for the desalination process.

5.1 Pre-Installation Checks

- **Component Verification:** Before installation, ensure that all parts required for the wet walls, such as the low-profile water tank and PVC pipes, are available and in proper condition.
- **Location:** Identify the designated location for the wet walls based on the greenhouse design.

5.2 Installation Procedure

5.2.1 Wet wall structure Setup

- Prepare the T-shaped galvanized steel pipes ($\frac{1}{2}$ inch diameter) for the wet wall structure as depicted in Figure 4.
- Securely attach the structure to the water tank, ensuring stability.

5.2.2 Water Circulation System

- Install the pump as per the manufacturer's guidelines. Connect the $\frac{1}{2}$ inch PVC pipe to ensure water is delivered from the tank to the upper portion of the wet wall.
- Position the netting to hang over the wet wall, ensuring it's adequately anchored. The netting should overlap the gutter installed just above the water tank so that the recirculating water can flow back into the tank.

5.2.3 Water Recovery

- Attach the provided guttering system beneath the wet wall. This will ensure that water dripping down from the wet wall is captured and directed back to the water tank, promoting water conservation.
- Inspect the wet walls for physical damage or clogs in the water distribution system.
- Check water distribution pipes, nozzles, and valves for clogs or leaks.
- Repair or replace damaged components promptly to maintain even wetting.

5.3 Post- Installation Checks

- **Water Flow:** Once the system is set up, initiate the water circulation to confirm the wet walls are being uniformly wetted. Adjust the flow rate if necessary to prevent excessive splashing or overflow.
- **System Integrity:** Check for any leaks or drips outside the designated areas. Ensure that the water recovery system is effectively redirecting water back to the tank.

6. Ventilation System

The SDGH's ventilation system, comprising the roll-up sides and extractor fan, ensures a balanced microclimate within the structure. By allowing for controlled airflow, the system efficiently regulates temperature and facilitates optimal plant growth conditions. The roll-up sides can be adjusted to release excess heat, while the extractor fan aids in maintaining consistent air circulation.

6.1 Pre-Installation Checks for Ventilation

- **Component Verification:** Before the installation process begins, verify that the motorized rolling canvas system, aluminium profiles and the extractor fan are present and in good condition.
- **Electrical Provisions:** Ensure that electrical connection points are available nearby for the motorized roll-up system and extractor fan.

6.2 Installation Procedures

6.2.1 Roll-up sides Setup

- As per the manufacturer's instructions, install the motorized rolling canvas system. Ensure the canvas rolls up and down smoothly and is taut when fully extended.
- Connect the motor control system to the designated control. The specifics of this connection will be in accordance with the greenhouse manufacturer's guidelines.
- Make sure that the sides and the wet walls are not in contact with each other and no water is being splashed on the roll-up sides, especially on the motor system and the structural elements.

6.2.2 Ventilation Extractor Fan Installation

- Identify the optimal location for the extractor fan on the side opposite the wet wall, to facilitate a suction effect throughout the SDGH. Make sure no structural elements of the shell are present when placing the fan.
- Following the manufacturer's instructions, install the wall-mounted extractor fan. Ensure it is securely fastened and that no structural elements hinder its airflow.
- Connect the fan to the available electrical connection point, ensuring that it operates smoothly without any abnormal noises or vibrations.

6.3 Post-Installation Checks

- **Functionality Test:** Test the roll-up sides' operation, ensuring they move smoothly without any obstructions. Turn on the extractor fan to verify its functionality and airflow capacity.
- **Safety Protocols:** Ensure that all electrical connections are safe and secured. Ensure the roll-up sides' motor system is out of reach to prevent unauthorized or accidental operation.

7. Passive Condensation System

Capitalizing on the principles of dew formation, the Passive Condensation system is a sustainable and energy-efficient approach to augment the SDGH's freshwater production. By leveraging temperature differentials, particularly during cooler nights, the system facilitates the condensation of water vapor onto cooler surfaces. This condensed water is then collected and stored, contributing to the SDGH's water resources.

7.1 Pre-installation Checks

- **Component Verification:** Ensure that all parts required for the passive condensation system, such as the plastic foil, clips, and gutter PVC pipes, are present and undamaged.
- **Surface Preparation:** Identify and prepare the surfaces where the plastic foil will be installed to ensure maximum condensation capture.

7.2 Installation Procedures

7.2.1 Passive Condensation Surface Setup

- Choose the appropriate location for setting up the plastic foil. This location should typically be where temperature differentials are most likely to cause condensation. The exact location is subject to identification during time and can change due to weather conditions like wind direction or seasons. It is important to keep an eye on the passive condensation patterns throughout the entire operation of the greenhouse.
- Using the provided clips, hang the plastic foil ensuring it's taut and covers the designated area completely.

- Ensure that the bottom edge of the foil is positioned directly above the guttering system to allow condensed water to drip directly into the gutter.

7.2.2 Water Collection System

- Install the provided guttering system beneath the passive condensation surface. This will ensure that condensed water is captured effectively.
- Ensure the gutter system channels the collected water to a designated storage area or tank.

7.3 Post-Installation Checks

- **Water Collection Efficiency:** After a cool night with clear sky or cold winds, inspect the system to check if water is condensing on the plastic foil and if it's being effectively channelled into the gutter system. The condensation can occur outside and inside the greenhouse.
- **System Integrity:** Ensure that the plastic foil remains taut and that there are no obstructions or gaps in the gutter system that might lead to water spillage.

8. Condensation Catchment System

The Condensation Catchment System is vital for harvesting the freshwater produced through both active and passive condensation methods in the SDGH. By efficiently capturing, directing, and storing this water, the system ensures a reliable source of freshwater for various greenhouse needs. This step needs to be done once the SDGH is producing constantly high volumes of water, and the catchment needs to be centralized. In the first phase of operation and experimentation this catchment doesn't need to be performed immediately.

8.1 Pre-Installation Checks

- **Component Verification:** Check and confirm the availability and condition of all the necessary parts such as the gutter PVC pipes, end caps, and any connecting hoses.
- **Site Preparation:** Identify the optimal locations for the gutter system based on the sources of condensation (e.g., passive condensation surfaces, dehumidifiers).

8.2 Installation Procedures

8.2.1 Gutter System Setup

- Measure and mark the desired length and position of the gutter system, ensuring it aligns with the primary sources of condensation.
- Install the PVC gutter pipes, ensuring they have a slight incline to facilitate water flow towards the storage reservoirs.
- Affix the end caps to both ends of the gutter pipes to prevent water spillage and direct the flow.

- If needed, connect additional hoses or pipes to the gutter system to channel the collected water to the designated storage tanks.

8.2.2 Storage Reservoir Setup

- Position the storage reservoirs or tanks in locations where they can easily collect the water channeled from the gutter system.
- Ensure each reservoir has an overflow mechanism to prevent overflowing and potential water damage.
- Install any necessary filtration or treatment systems as per the design of the SDGH to ensure the collected water meets the required standards for use.

8.3 Post-Installation Checks

- **Functionality Test:** Simulate a water flow in the gutter system to verify that water is being effectively channeled into the storage reservoirs without any leaks.
- **Storage Integrity:** Inspect the storage reservoirs for any potential leaks or weaknesses that could compromise their capacity to hold water.

9. Controlling System

The Controlling System of the SDGH is the nervous system of the entire operation. It integrates and manages all automated components, ensuring the greenhouse operates optimally. Through an array of sensors and controllers, it monitors and adjusts various parameters such as temperature, humidity, and salinity levels, ensuring that the SDGH maintains the best conditions for crop cultivation, water desalination, and energy management. When referring to the software and hardware of the controlling and monitoring always contact alchemia-nova GmbH prior to making any changes. Changes without prior agreement can lead to malfunction and human health hazard. A more detailed description can be found in a separate more extensive Controlling and Monitoring manual.

9.1 Pre-Installation Checks

- **Component Verification:** Confirm the presence and condition of all components like sensors, controllers, and connecting cables.
- **Software Verification:** Ensure that the controlling software, if separate from the hardware, is up-to-date and compatible with the specific SDGH setup. Please refer to the Controlling and Monitoring manual.

9.2 Installation Procedures

9.2.1 Sensor Installation

- Identify strategic locations within the SDGH for placing sensors. These spots should provide accurate readings for parameters like temperature, humidity and salinity.

- Ensure that sensors, especially those sensitive to moisture, are positioned in places where they won't be submerged in water or exposed to direct liquid.
- Securely fix sensors in place, ensuring their connecting cables are well-routed to avoid any tripping hazards or potential damage. Make sure the inlets for the measuring medium, e.g. air are not covered. Follow manufacturer's instructions.

9.2.2 Controller Setup

- Install the PLC controller box in a location that's easily accessible, preferably in a dust and moisture-free environment (preferably close to the main grid junction box). After installing, an electrician needs to perform an acceptance test.
- Connect all the sensors to the main controller as per the provided schematics or manufacturer's guidelines.

9.2.3 System Calibration

- Once everything is connected, power on the system.
- Calibrate the sensors and controllers to ensure they provide accurate readings and responses. This might require referring to the manufacturer's instruction manuals of each model.

9.3 Post -Installation Checks

- **System Test:** Simulate various environmental scenarios to test if the controlling system responds appropriately. For instance, if the temperature reading is artificially increased, the system should trigger cooling mechanisms like the wet walls or roll-up sides.
- **Feedback Loop:** Ensure that the system not only reads parameters but can also execute actions based on those readings. For example, if humidity levels drop, the system should be able to initiate the wet walls.

10. Power Supply System

The Power Supply System is the heartbeat of the SDGH, ensuring that all components receive the necessary energy to function. While the SDGH is designed to utilize sustainable energy sources, this system ensures the consistent and efficient distribution of power to all components. All the steps below need to be performed by a certified electrician.

10.1 Pre-Installation Checks

- **Component Verification:** Check the availability and condition of all necessary components, such as power cables, connectors, and circuit breakers.

- Energy Source Verification: Confirm that the main power supply (from the grid) is available and stable.

10.2 Installation Procedures

10.2.1 Setting up mains power connection

- Identify a suitable location for the main power input, preferably close to the main controller or central hub of the SDGH.
- Ensure that the connection is set up by a certified electrician, adhering to all safety standards and local regulations.
- Install circuit breakers and safety switches to ensure protection from any potential electrical faults or overloads.

10.2.2 Distributing Power to SDGH Components

- Route power cables from the main connection point to different components of the SDGH. Ensure cables are organized, labeled and protected from potential damage.
- Use appropriate connectors and junction boxes to ensure secure and safe connections.
- For components with higher power requirements, ensure they are connected directly to the main power source or have dedicated lines to handle their load.

10.2.3 Backup Power (if applicable)

- If a backup power source like a generator or battery bank is available, ensure it's connected with an automatic switch-over mechanism in case of main power failures.
- Test the backup system to ensure it kicks in automatically when required and can handle the load of the SDGH.

10.3 Post-Installation Checks

- System Power-Up: Turn on the main power and ensure all components of the SDGH are receiving power and functioning correctly.
- Safety Checks: Ensure there are no exposed wires, and all connections are secure. Use a multimeter or similar device to check for any potential shorts or issues.

11. Water Source System

The Water Source System ensures the consistent supply of saline water, which is critical for the SDGH's desalination process and its associated functions. The saline water can come from various sources, such as bore hole water or output from a reverse osmosis plant.

11.1 Pre-Installation Checks

- **Water Quality Verification:** Ensure that the incoming water has the desired salinity levels suitable for the SDGH's operations. There should be no solids (mainly sand) in the feed water of the SDGH.
- **Component Verification:** Confirm the presence and good condition of all necessary components, such as pipelines, valves, connectors and storage tanks.

11.2 Installation Procedures

11.2.1 Setting up the main Water Intake

- Identify a suitable location for the main water intake, ensuring easy access for regular checks and maintenance.
- Install necessary filters or pre-treatment systems to ensure the water quality remains consistent.

11.2.2 Establishing the Intermittent Storage System

- Position the intermittent tank in a central location within the greenhouse for efficient distribution of the saline water.
- Connect the main water intake to this tank, ensuring the installation of an overflow system or release valve to prevent overfilling. The main water intake can also happen manually every now and then.
- Make sure the tank has a lid or covering to prevent contamination and evaporation. Also make sure no sunlight reaches the intermittent tank content to avoid algae growth.

11.2.3 Distributing Water to SDGH Components

- From the intermittent tank, set up distribution lines to various components, such as the wet wall and vertical farming systems. In the beginning a manual distribution line like a hose to fill the tanks is good enough. Once the SDGH is running smoothly and reliably, distribution lines can be installed.
- Utilize pumps and valves to regulate the flow and ensure consistent water supply as per requirements.

11.3 Post-Installation Checks

- **System Flow Test:** Initiate the water flow, ensuring all components of the SDGH are receiving water as intended and without leaks or blockages.
- **Quality Checks:** Periodically test the water quality, ensuring the salinity and other parameters are within desired limits.

12. Emergency Protocols and Contacts

While the SDGH is designed with safety and efficiency in mind, unforeseen circumstances or malfunctions can arise. In such situations, it's crucial to have a well-defined set of emergency protocols and a list of contacts to address the situation promptly and minimize potential damage.

12.1 Equipment Malfunction

- **Immediate Shut Down:** If any component or equipment shows signs of malfunction, such as unusual noises, excessive heat, or smoke, immediately shut down the equipment.
- **Avoid Direct Contact:** Do not touch any equipment that appears to be malfunctioning or overheating. Wait for it to cool down or for a professional to assess the situation.
- **Isolate the Area:** Cordon off the affected area to prevent any unauthorized or uninformed individuals from coming into contact with malfunctioning equipment.

12.2 Structural Damage

- **Evacuate:** If there's any sign of structural damage to the SDGH, such as cracks or collapses, ensure that everyone inside the greenhouse is safely evacuated.
- **Inspect and Repair:** Once the area is secured, conduct a thorough inspection to assess the damage. Seek professional assistance for any necessary repairs.

12.3 Power supply (Electrical)

- **Turn Off Power:** If you suspect any electrical malfunctions, immediately turn off the main power supply to the SDGH.
- **Seek Professional Help:** Do not attempt to fix electrical issues without the guidance of a certified electrician.

12.4 Emergency Contact

For immediate assistance, the following individuals can be contacted:

(this is a site specific information and is to be filled by owner)

[Contact details of person 1]

[Contact details of person 2]

In case of any issue, please contact the following:

- Ministry for Gozo and Planning: Joseph Piscopo, joseph.d.piscopo@gov.mt
- alchemia-nova GmbH: Igor Luketina, igor.luketina@alchemia-nova.net

13. Feedback and Updates

The Solar Desalination Greenhouse (SDGH) is an innovative system, and as with any advanced technology, continuous improvement and iteration are vital. Feedback from users, technicians, and managers is invaluable for the enhancement of the SDGH and its associated processes.

13.1 Importance of feedback

Continuous Improvement: Constructive feedback helps identify areas of improvement, ensuring that the SDGH remains at the forefront of sustainable agriculture and water production technologies.

User Experience: Feedback provides insights into the practical experiences of those operating and maintaining the SDGH, ensuring that its design and functionality align with user needs.

Safety: Feedback can help identify potential safety concerns or areas where clearer instructions may be required, ensuring the safety and well-being of all personnel.

13.2 Providing Feedback

Documentation: When providing feedback, be sure to document any specific issues, observations, or recommendations in detail. This helps in understanding the context and addressing the feedback effectively.

Timeliness: If you notice an issue or have a suggestion, it's essential to provide feedback as soon as possible. Timely feedback can help prevent potential problems or improve the system promptly.

Channels for Feedback: Feedback can be directed to:

- alchemia-nova GmbH: igor.luketina@alchemia-nova.net
- Ministry for Gozo and Planning: joseph.d.piscopo@gov.mt

13.3 Updates

The SDGH installation manual is a dynamic document. Periodic updates will be made to incorporate new technological advancements, address feedback, and ensure that the manual remains relevant and up to date. Users are encouraged to regularly check for updates and ensure they are working with the latest version of the manual.

14. Acknowledgments

The development and realization of the Solar Desalination Greenhouse (SDGH) is the culmination of significant efforts from various teams, institutions, and individuals. We extend our heartfelt gratitude to:

- alchemia-nova GmbH and their dedicated team, for their expertise and continuous efforts in research, design, and implementation of the SDGH.
- The Ministry for Gozo and Planning for their unwavering support and collaboration in bringing this project to fruition.
- The European Union for providing the framework, interest and funding for the culmination of the Solar Desalination Greenhouse.
- All technical experts including botanists, plumbers, engineers and electricians who contributed their specialized skills to make the SDGH a reality.
- The local community and all stakeholders involved in the project for their valuable insights and cooperation.
- The contribution and support from all the eight partners of the MedWet project.

15. Emergency Contacts and Support

In the event of unexpected issues, emergencies, or situations where immediate assistance is required, it is essential to have quick access to relevant contact information. This section provides crucial contacts for emergencies and technical support related to the Solar Desalination Greenhouse (SDGH).

15.1 Emergency Contacts

For immediate assistance in emergency situations, please contact the following individuals:

(this is a site specific information and is to be filled by owner)

1. [Name of Contact 1]

- **Position**: [Position/Title]
- **Phone**: [Phone Number]
- **Email**: [Email Address]

2. [Name of Contact 2]

- **Position**: [Position/Title]
- **Phone**: [Phone Number]
- **Email**: [Email Address]

15.2 Technical Support

For technical support or assistance with specific components or systems within the SDGH, please reach out to:

alchemia-nova GmbH: Igor Luketina +43 681 10609008 igor.luketina@alchemia-nova.net

15.3 Recommended Action

In the event of an emergency:

1. Ensure the safety of all personnel in the vicinity.
2. Disconnect power to the affected component or system if safe to do so.
3. Contact the relevant emergency contact or technical support individual.
4. Document the issue for future reference and feedback.

16. Conclusion and Referenced Documents

Remember always to consult specific instructions provided by equipment manufacturers and suppliers, as these will cater to the unique specifications and requirements of each component.

Throughout the installation process of the Solar Desalination Greenhouse (SDGH), various other documents have been referenced to provide comprehensive insights, specific instructions, and detailed guidelines. For ease of access and to ensure that all procedures are followed with utmost precision, a list of these referenced documents is provided below:

- **Cultivating Salicornia Europea:** A dedicated manual that delves into the specifics of nurturing, growing, and harvesting Salicornia Europea, a pivotal halophyte in the SDGH.
- **Operation and Maintenance Manual:** This document provides detailed guidelines on the day-to-day operations of the SDGH, ensuring its efficiency and longevity. It covers maintenance schedules, troubleshooting techniques, and best practices for each component.
- **Controlling and Monitoring Manual:** An extensive guide that covers the advanced monitoring and control systems equipped within the SDGH. It explains the sensor setups, data collection methodologies, and automation protocols that optimize the greenhouse's performance.
- **SDG Guidelines Equipment and Material:** A document outlining the standards, specifications, and guidelines for equipment and materials used within the SDGH.

It's imperative for users to familiarize themselves with these documents to ensure the smooth and efficient functioning of the SDGH. Any changes or updates to these manuals will be communicated and made accessible to all relevant stakeholders.



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