



Medclair

DU2100-M21

User Manual

Revision: D0

2024-03-13

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1. General

1.1. Definition

This document is a User Manual for the mobile N₂O destruction unit DU2100-M21.

For a technical overview see document "Technical Brief DU2100-M21".

When the acronym MDU is used within the document it refers to DU2100-M21.

1.2. Overview

The MDU can easily be manoeuvred around the facility and is designed to meet the needs of healthcare professionals. The unit has room for a nitrous oxide cylinder (either pre-mixed or concentrated), as well as an oxygen tube, and, if needed, a compatible mixing unit (titration unit).

Both inhalation and exhalation equipment can be placed on the mobile unit together with gas cylinders. Inhalation devices such as demand valves or mixers can easily be placed on the MDU. Exhalation tubes for scavenging (collect and remove) are connected to the outlet of the MDU making it a complete closed system for removal of nitrous oxide from ambient air.

1.3. Safety information

- The User Manual shall always be available for users.
- The MDU may only be used by trained personnel.
- The unit has a maximum allowance of 16 grams of nitrous oxide per minute.
- The MDU shall not be placed within reach for the patient to touch the display.
- The MDU is only intended to handle gases where the concentration of VOC (volatile organic compound) is below 100 ppm.
- The MDU is only intended to handle gases where the concentration of halogenated hydrocarbons of the type other anaesthetic gases is below 1 ppm.
- During normal treatment the white hose connector should have a one way valve mounted.
- The air supply into the MDU is never allowed to be closed, if this occurs, the MDU will trigger a malfunction alarm.
- The MDU is designed for enabling two connections for return gases from the demand valves (for instance one for nitrous and one for oxygen). If only one is used, the buffer tube (delivered with the MDU) shall be connected to the free gas inlet.



Inside the chassis there is a risk for lethal voltage.
The chassis may only be opened by authorised personnel.



The MDU shall be sorted as electronic waste. Included battery, placed on the circuit board, shall be sorted separately.



Read the complete user manual before use!



The MDU should not be exposed to direct water contact or to any aggressive chemicals. See cleaning guide for instructions.



MDU should only be used in an environment with nationally approved ventilation.

2. Product overview

2.1. Front

Two connection ports for exhaled air are located on the front. Typically, the blue port (gas inlet 1#), is used for exhaled gas containing N₂O, while the white port (gas inlet #2) is normally not in use and must be fitted with a one-way valve. The dimensions of the inlet connections are 22 mm female, 30 mm male.

The MDU has a sturdy handle and can easily be manoeuvred with its 4 castors. For safety reasons, the front castors are lockable, ensuring stable placement during treatment. The impact protection bumper at the bottom prevents the device from damage, for instance, when hitting a door frame while moving the device between wards.



If gas cylinders are in use they should be placed in the designated area and secured to the MDU using the flexible bracket. This ensures that they are securely anchored. Gas cylinders of different sizes can be used.

The MDU comes equipped with an operator panel that includes buttons for starting (ON) and stopping (OFF) the unit, as well as indicators for operational status and potential fault situations. For detailed information on how to use the unit and explanations of the various panel indications, please refer to the separate chapter in this manual.

2.2. Back



Drawer for useful items



Electrical connection

At the bottom of the unit there is a particle filter where the decomposed air is released. During annual servicing, the particle filter in the lower section of the unit undergoes inspection or replacement. Additionally, the unit features a separate outlet for the air expelled from the cooling system.

2.3. Dimension sketch

Below are the dimensions of the MDU in mm.



3. Preparation, start and shut down

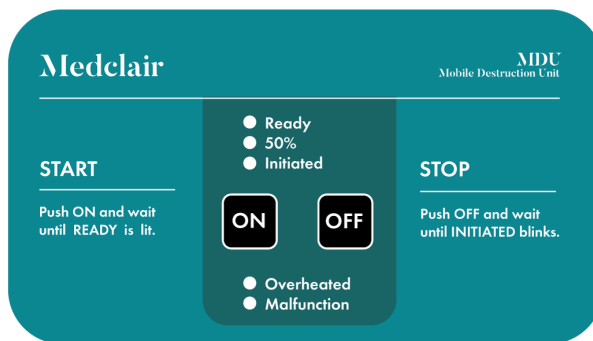
3.1. Preparation

- Place the unit in the desired position by using the handle.
- Secure that the CO2 filter has not been saturated (become purple). If saturated, change the filter before use of the MDU.
- For safety reasons, lock the wheels.
- Place the gas cylinder/cylinders on the designated area of the unit. Attach them with the straps provided.
- Connect the exhaust hose to the gas inlet 1, blue.
NOTE: The one-way valve together with the trunk must be connected to the unit to gas inlet 2 (white), when using a gas mixture of N2O + O2. If the treatment shall be concluded with oxygen gas, remove the one way valve together with trunk upon the initiation of the treatment and connect the corresponding hose.
- Connect the unit to the wall socket 230 VAC.
- The lamp for "Initiated" flashes on the operator panel which shall indicate that the unit has electric connection.



3.2. Start the MDU

- Press the "ON" button firmly.
- When "initiated" lights up, the unit has started the heating phase (< 40 min).
- When the "50%" lights up, the heating has reached half way.
- When the 'READY' lamp lights up, the unit is ready for operation.



NOTE: If the unit has been in operation recently, it may retain internal heat. This residual heat can trigger the "50%" or "READY" indicators to activate upon startup, especially after a brief relocation.

NOTE: Never start the unit with the protection caps on. Doing so will block airflow and illuminate the "Malfunction" indicator.

3.3. Shut down

- Press the "OFF" button.
- The unit now starts the cooling phase and the "READY" indication will flash for one minute.
- "Initiated" will flash to indicate that the power cord can be disconnected

NOTE: Note that the unit will remain in the cooling phase for a short period even after you disconnect the power cord.

NOTE: Please note that the unit will remain in the cooling phase for a short period even after you disconnected the power cord. Following the N2O treatment, leave the unit running for an additional 5 minutes to allow for complete removal of N2O residuals. You can then safely disconnect the power cord.

3.4. Option, Automatic start/stop

The MDU can be configured to start and stop at predefined times (Medclair can configure this remotely upon request or before delivery.)

This feature is very useful when you have scheduled treatments and want the MDU to be ready for use at those times.

The requirement for this function is that the MDU is connected to a wall socket.

3.5. Option, rest mode

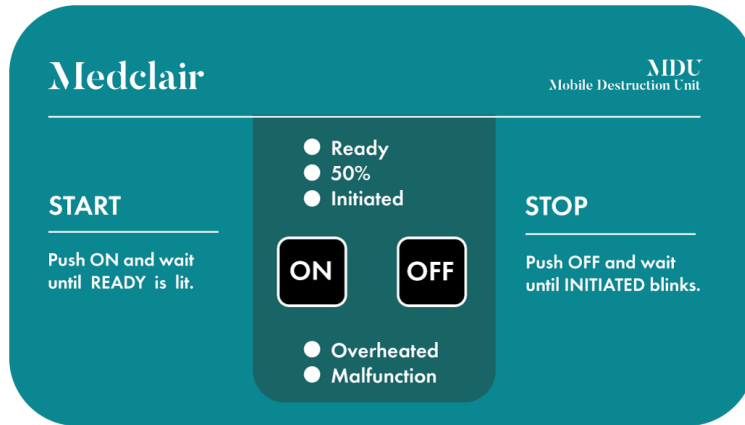
This function is for customers that would like the MDU to be ready for use 24 hours a day i.e. emergency departments.

The MDU is then configured to automatically go into rest mode after a predefined time (the time is set to the normal length of a treatment with some margin i.e. one hour).




- If the treatment should go over the configured limit (i.e. 1 hour) the MDU can be set in operation again by pressing ON and then it will operate for another hour.






- The configuration can always be changed at service or remotely by Medclair support.

4. Summary of possible indications



4.1. Indications for operational status

Indication	Description	
	No indication	The unit is not connected to 230V
	"Initiated" flashes	The unit is connected to 230V power.
	"Initiated" is lit	The "ON" button has been pressed and the preheating phase has started




Indication	Description	
 <p>The diagram shows a control panel with a green background. At the top, there are three indicator lights: 'Ready' (white), '50%' (yellow), and 'Initiated' (white). Below these are two buttons labeled 'ON' and 'OFF'. At the bottom, there are two more indicator lights: 'Overheated' (white) and 'Malfunction' (white). The '50%' indicator is lit.</p>	<p>"50%" is lit</p>	<p>The unit has reached 50% of the operating temperature</p>
 <p>The diagram shows a control panel with a green background. At the top, there are three indicator lights: 'Ready' (green), '50%' (white), and 'Initiated' (white). Below these are two buttons labeled 'ON' and 'OFF'. At the bottom, there are two more indicator lights: 'Overheated' (white) and 'Malfunction' (white). The 'Ready' indicator is lit.</p>	<p>"READY" is lit</p>	<p>The unit has reached the operating temperature and the MDU is now ready for use</p>
 <p>The diagram shows a control panel with a green background. At the top, there are three indicator lights: 'Ready' (green), '50%' (white), and 'Initiated' (yellow). Below these are two buttons labeled 'ON' and 'OFF'. At the bottom, there are two more indicator lights: 'Overheated' (white) and 'Malfunction' (white). The 'Ready' and 'Initiated' indicators are flashing.</p>	<p>"READY" and "Initiated" flashes</p>	<p>The MDU has gone into rest mode. To put the MDU in "READY" mode, press "ON"</p>
 <p>The diagram shows a control panel with a green background. At the top, there are three indicator lights: 'Ready' (green), '50%' (white), and 'Initiated' (white). Below these are two buttons labeled 'ON' and 'OFF'. At the bottom, there are two more indicator lights: 'Overheated' (white) and 'Malfunction' (white). The 'Ready' indicator is flashing.</p>	<p>"READY" flashes</p>	<p>"OFF" button has been pressed and the cooling down phase has been started</p>
 <p>The diagram shows a control panel with a green background. At the top, there are three indicator lights: 'Ready' (white), '50%' (white), and 'Initiated' (yellow). Below these are two buttons labeled 'ON' and 'OFF'. At the bottom, there are two more indicator lights: 'Overheated' (white) and 'Malfunction' (white). The 'Initiated' indicator is flashing.</p>	<p>"Initiated" flashes</p>	<p>The power connection can be disconnected without disturbing the cooling down phase</p>

4.2. Indications for fault status

MDU has a built-in control system to monitor temperatures and gas flows and the unit will stop automatically in the case of problems.

Indication: "Overheated" alternatively "Malfunction" is indicated on the operator panel.

NOTE: Indication "Malfunction" can be lit if caps are mounted on both the inlets due to blockage of air flow.

 <p>The diagram shows a control panel with three status indicators: 'Ready' (white dot), '50%' (white dot), and 'Initiated' (white dot). Below these are two buttons labeled 'ON' and 'OFF'. At the bottom, there are two indicators: 'Overheated' (yellow dot) and 'Malfunction' (white dot).</p>	<p>If "Overheated" is lit it means that too high temperature has been reached within the catalytic reactor (this can happen when the unit has been exposed with high load e.g. a concentration higher than 70% nitrous oxide has been connected to the unit).</p> <p>The MDU will rectify this automatically i.e. heating will be stopped and the MDU starts up again when the temperature has fallen below the limit.</p> <p>If the fault indication hasn't disappeared after 30 minutes, contact your reseller.</p>
 <p>The diagram shows the same control panel as above, but the 'Overheated' indicator is now white and the 'Malfunction' indicator is red.</p>	<p>"Malfunction" flashes:</p> <p>The purification degree has gone down and the unit needs service.</p> <p>Contact your reseller</p>
 <p>The diagram shows the same control panel as above, with the 'Malfunction' indicator still red.</p>	<p>If "Malfunction" is lit perform the following steps:</p> <p>Step 1: Restart the unit by disconnecting the power cord. - Wait 15 minutes</p> <p>Step 2: Connect the power cord</p> <p>The indication should now show that power is connected by a blinking "Initiated" indication.</p> <p>Step 3: Press "ON"</p> <p>The heating phase will now start.</p> <p>If the fault indication remains, contact your reseller.</p>

5. Service and maintenance

5.1. Service

During service a full check-up of the functionality as well as preventive actions like change of filter and battery (if needed) will be performed.

Contact your reseller in case of need for service.

5.2. Connection to remote server

Remove the drawer and then connect the MDU to the internet via a router. The MDU can now send real-time notifications about potential issues directly to your reseller's support team, ensuring a fast and efficient response to any malfunctions.



5.3. Cleaning

For cleaning the product see cleaning guide.

5.4. Change of CO₂ filter

It is possible to change the filter if needed if it becomes saturated and turns purple. This is done as described in the pictures below, no tools are needed.



Press the release lever as seen in the pictures below. then you lift the filter away.

6. Environment and recycling

6.1. Terms of Use

DU2100-M21 shall only be used in a controlled inhouse environment with for the operation approved ventilation.

6.2. CO₂ filter

Your local Medclair certified service partner/provider will handle saturated filters.

6.3. Worn-out equipment

When worn-out the equipment will be taken back by Medclair AB for dismantling and then left for recycling.

Battery, DU2100-M21 contains a lithium battery which shall be left for battery recycling.

Electric components, to be dismantled and left as electronic waste.

Catalytic mass will be sent back to the supplier for recovery of metal components.

Mechanics, divided into plastic and metal, are then sent for recycling.



Medclair, founded in 2013, is a Swedish Research and Development company with leading-edge expertise in process gas purification, gas measurement, ventilation and control. We solve healthcare and environmental challenges through innovation.