Medclair

DU2100-M21
User Manual
Revision: C0

2022-11-14

Content

1. General

1.1. Definition

This document is a User Manual for the mobile N_2O 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 mobile unit is a smart solution that easily can be moved between different treatment rooms. The unit is a solution for collecting residual Nitrous Oxide from exhaled air and decomposing it. The MDU is a self supporting system with low noise level and minimum energy consumption.

The mobile unit purifies more than 99 % of the nitrous oxide entering the unit. This facilitates a healthy work environment for healthcare professionals and a minimal impact on the external environment.

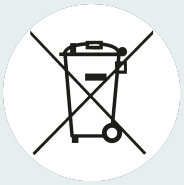
The MDU is specially adapted to suit the mobile needs of healthcare professionals allowing them to use it in an easy and reliable manner. The unit has room for a nitrous oxide cylinder (either pre-mixed or concentrated) as well as an oxygen tube, and if needed an associated mixing unit (titration unit.)

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.
- MDU may only be used by trained personnel.
- The unit has a maximum allowance of 16 grams of nitrous oxide per minute.
- 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.
- Only approved gas tubes can be connected to the MDU.
- To avoid the possibility for foreign objects to come into the unit the incoming air/nitrous ports shall always be connected to an exhaust tube or protected with the provided rubber cap.
- Air supply towards the MDU is never allowed to be closed, if this is done 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 authorized personnel.



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

Read the complete user's manual before use!

2. Installation, service & daily care

2.1. Installation

As the MDU is an independent and movable unit there is no need for any installation. The unit is ready for use after connection to 230V wall socket and applicable tubes for the N_2O exhaust (and O_2 exhaust when used).

2.2. Service

Contact **Medclair** in case of need for 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.

2.3. Connection to remote server

The MDU has the possibility to connect to the internet via a router, this to get a quick response of any malfunction from the support team in Sweden.

2.4. Daily care

When needed the unit shall be cleaned using a light detergent.

2.5. Change of CO_2 filter

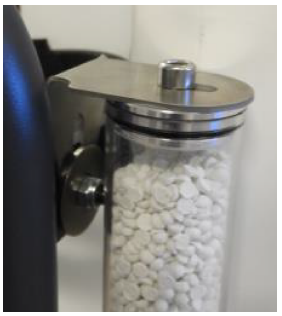
The filter needs to be changed when saturated (becomes purple) to have the gas alarm to function correctly.
This is done as described in the pictures below, no tools needed for this. Additional filters for the change are delivered with the unit.

- The filter becomes loose by pressing down the “tongue” as seen in picture 2 and the filter is lifted.

Picture 1

Picture 2

Picture 3



Picture 4

3. Product overview

3.1. Front

On the front there are two tube connection ports for exhaust air. Normally the exhaust air containing N_2O is connected to gas inlet #1 (blue) and exhaust air containing normal air only or O_2 to gas inlet #2 (white). Technically there is no difference between the two ports since they are connected on the inside. If only one port is used, the provided plug shall be connected to the port not used. The dimensions of the inlet connections are 22mm female, 30mm male.

MDU is equipped with a handle and wheels to be easily moved (the front wheels are possible to lock for a stable placement during treatment).

At the bottom of the unit there is an impact protection bumper to prohibit damages when hitting e.g. a door frame when moving the unit between wards.

Gas cylinders are placed at their intended place (*Gas bottle stand*) and shall be fixed with the flexible bracket so they are securely anchored to the MDU. Different sizes of gas cylinders can be used.

MDU is provided with a washable operator panel with buttons for start (ON), stop (OFF), indications for operating status and possible fault situations. See separate chapter in this manual for detailed information of the use of the unit and explanation of the different indications on the panel.

3.2. Back

On the back there is a drawer where the user manual, plug and other miscellaneous items can be placed.

At the bottom of the unit there is a particle filter where the purified air is let out, this filter is checked/changed at the yearly service. In addition, there is a separate exhaust for the air from the cooling system.

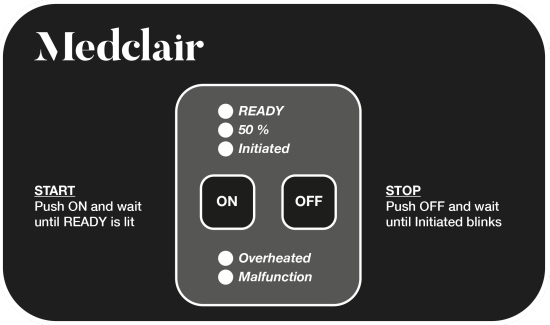
3.3. Dimension sketch

Below are the dimensions of the MDU in mm.

4. Preparation, start and shut down

4.1. Preparation

- Use the handle to move the unit in position.
- Secure that the CO2 filter has not been saturated (become purple). If saturated, change the filter before use of the MDU.
- Lock the wheels to avoid that the unit is unintentionally moved.
- Place the gas cylinder/cylinders on the unit and fix them to the unit with the straps
- Connect exhaust tube/tubes to the unit.
  NOTE: *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.* ***See picture below.***
- Connect the unit to the wall socket 230 VAC.
- The operator panel shall now indicate that the unit has electric connection, "*Initiated"* blinks.



4.2. Start of the MDU

- Press *"ON"* button
- *"Initiated"* is lit to indicate that the unit has started the heating phase (< 40 min)
- *"50%"* is lit when the heating has reached half way (*"Initiated"* is turned off)
- *"READY"* is lit when the unit is ready for use (*"50%"* is turned off)

NOTE: *If the unit has been in operation recently there will be heat remaining in the unit and therefore the indications "50%" or "READY" may be lit directly at start of the unit – this is the case after a short move of a unit that has been in operation.*
NOTE: *The unit may never be started with caps on both its connections. "Malfunction" will in this case be lit because of blockage of incoming air flow.*

4.3. Shut down

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

NOTE: *The unit will continue cooling down after that the power is disconnected*
NOTE: *If the unit has been used for N_2O treatment it shall be left running for 5 minutes after completed treatment to empty the unit from N_2O residuals.*

4.4. Option, Automatic start/stop

The MDU can be configured to start and stop at predefined times (Medclair can do the configuration before delivery or remotely by connecting the unit to internet)

This function is very useful when you do not have planned treatments but want the MDU to be ready to use when needed during the working day.

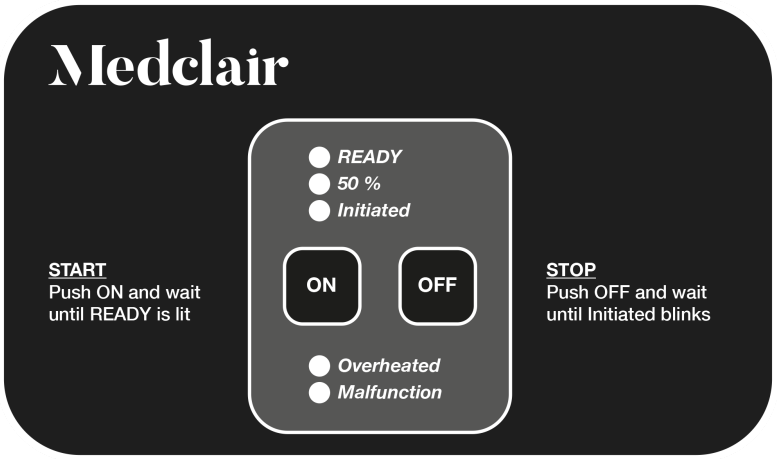
The requirement for this function to work is that the MDU is connected to a wall socket.

4.5. Option, rest mode

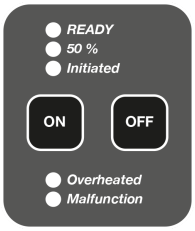
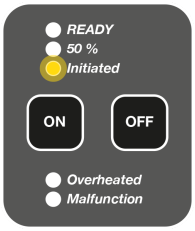
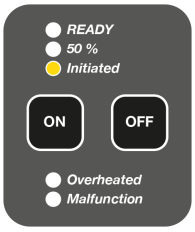
This function is for customers that want the MDU to be ready for use 24 hours a day i.e. emergency departments.
The MDU is then configured to automatically go into rest mode after a predefined time (the time is set to the normal length of a treatment with some margin i.e. one hour).
- If the treatment 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.

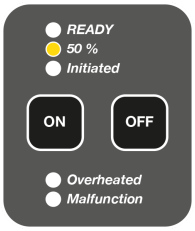
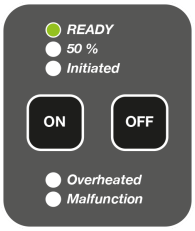
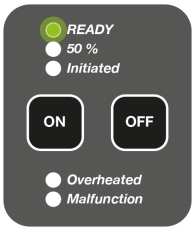
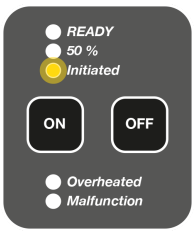
- The configuration can always be changed at service or remotely by Medclair support.

5. Summary of possible indications



5.1. Indications for operational status

Indication		Description
	No indications	The unit is not connected to 230V
	*"Initiated"* blinks	230V power connected to MDU
	"*Initiated*" is lit	*"ON"* button has been pressed and the preheating phase has been started

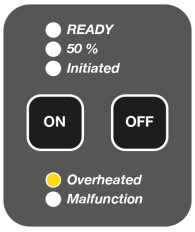
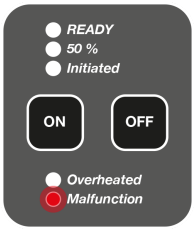
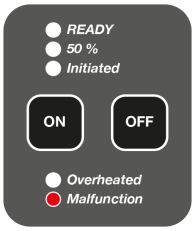
Indication		Description
	”*50%*” is lit	The unit has reached 50% of the operating temperature
	”*READY*” is lit	The unit has reached the operating temperature and MDU is now ready for use
	*”READY”* and *”Initiated”* blinks	The MDU has gone into rest mode. To put the MDU in *“READY”* mode, press *“ON”*
	”*READY*” blinks	*”OFF”* button has been pressed and the cooling down phase has been started
	”*Initiated*” blinks	The power connection can be disconnected without disturbing the cooling down phase

5.2. 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.*

	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). 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. **If the fault indication hasn’t disappeared after 30 minutes, contact Medclair (support@medclair.com).**
	“Malfunction” blinks: The purification degree has gone down and the unit needs service. **Contact Medclair for service (support@medclair.com).**
	If ”Malfunction” is lit perform the following steps: Step 1: Restart the unit by disconnecting the power cord. - Wait 15 minutes Step 2: Connect the power cord The indication should now show that power is connected by a blinking ”Initiated” indication. Step 3: Press ”ON” The heating phase will now start. **If the fault indication remains, contact Medclair (support@medclair.com).**

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. CO_2 filter

Saturated filters are taken care of by Medclair at service.

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 and 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 challanges through innovation.

Medclair