

Maintenance Manual

Primozone® GM6, GM12, GM18 Ozone Generators



INTENDED APPLICATION

The Primozone ozone generator is designed to generate an oxygen ozone gas mixture suitable for use in different types of applications.

RESPONSIBILITY AND DISCLAIMER

Primozone accepts responsibility for the reliability and performance of this equipment only:

- If any modifications to the equipment are authorized beforehand in writing by Primozone and carried out by an authorized service technician.
- If the ambient conditions for the equipment, including, but not limited to temperature, humidity, air quality, vibrations or shock are according to the requirements of this Manual at all times, both during operation and stand-still.
- If the supply of all deliverables, including, but not limited to air, oxygen, cooling water and electric current are according to the requirements of this Manual at all times, both during operation and stand-still.
- If the electrical installation for powering the equipment complies with all applicable local electrical codes and requirements including, if applicable, IEC requirements.
- If the physical installation, including, but not limited to choice of material, piping system layout, components and connections, sensors, actuators or back-flow prevention are according to our recommendations.
- If the equipment is operated in accordance with its manuals.

Primozone will provide, upon request, a service manual which contains all necessary circuit diagrams and service information to enable authorized service technicians to repair those parts of this equipment which Primozone considers to be repairable.

Since Primozone has no control over service work which is not performed by authorized service technicians, Primozone will in no way be responsible or liable for any damages resulting from the operation or performance of any device, or any injury caused thereby, after repair has been performed by any person other than a representative of Primozone.

Primozone will not be responsible or liable for the choice of, installation, maintenance or operation of safety equipment, sensors for monitoring or alarm systems, be it for surveilling or safeguarding personnel, property, environment or any other purpose.



Under no circumstances will Primozone be liable for any indirect, incidental, special or consequential damages of any kind, its liability being hereby limited solely to repair or replacement.

Note: Check your local regulations for any restrictions on ozone generators, power connections/regulation etc.

SAFETY PRECAUTIONS

All personnel must read and understand the safety precautions before installing or operating ozone systems that is, ozone generators and its peripherals.

NOTE: In addition to the instructions and guidelines in this manual, make sure to follow all local safety regulations.

Warning signs in the manual

This manual contains different messages; WARNINGS, CAUTIONS, MANDATORY ACTIONS and NOTES



WARNING (heading in red)

It is mandatory to follow the instructions of a warning message. Failure to do so can cause severe harm or death to personnel.



CAUTION (heading in black)

It is mandatory to follow the instructions of a caution message. Failure to do so can cause harm to personnel or severe damage to equipment.

WARNINGS and CAUTIONS are marked with warning signs according to below:



WARNING: General



WARNING: High voltage

Warnings referring to ozone gas



WARNING: Oxidizing

May cause or intensify fire; oxidizer.
May cause fire or explosion; strong oxidizer.

**WARNING: Acute toxicity**

Toxic if swallowed
Toxic in contact with skin
Toxic if inhaled

**WARNING: Health hazard**

May cause damage to organs

In addition to the warning signs, there are MANDATORY ACTIONS and NOTES.

**MANDATORY ACTIONS**

Necessary security and preventive actions are marked with a blue mandatory sign.

NOTE: A note is marked "Note:" and contains extra information that is useful when handling the ozone generator.

Personnel

All personnel working with the ozone installation must use appropriate safety clothing and equipment, in accordance with company policy and local regulations.

NOTE: All personnel operating the ozone generator must be trained by authorized Primozone personnel.

**WARNING: Health hazard**

Do not breathe in ozone gas
Do not eat, drink or smoke when using this product.
Get medical advice/attention if you feel unwell
If exposed: Call a POISON CENTER or doctor/physician
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
If exposed or concerned: Get medical advice/attention
Avoid breathing ozone gas
In case of inadequate ventilation wear respiratory protection
If inhaled: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing



Emergency stop

It is required that the equipment is equipped with an approved emergency stop.

NOTE: The emergency stop must be installed according to local regulation. Please check before installing.

Before you reset the emergency stop, make sure that the reason for the stop has been eliminated.



The emergency stop should only be used if there is risk for harm to personnel or damage to the equipment. DO NOT USE THE EMERGENCY STOP FOR NORMAL SHUT DOWN OF THE OZONE GENERATOR, as this will harm the equipment and the Manufacturer's warranty will be cancelled.

Electricity – ozone generator

The ozone generator has an input voltage of 3x400 Volt, which is lethal.



Do not open the door of the ozone generator unless the main power has been switched off and possible current in Neutral or Ground has been eliminated.

Only personnel with adequate training and authorization from Primozone may be allowed to open the door of the GM-series ozone generators



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator. Physical contact with electrical parts may cause severe harm or death. If an accident occurs, immediately call for medical assistance.

LOCKABLE MAIN POWER SWITCH

It is required to always install the GM6 – GM48 ozone generators with a lockable main power switch which disconnects both neutral and phase.



The ozone generator shall never be connected through a power cable with a power plug to avoid the risk or hazard.

The lockable main power switch must be locked in the OFF position before any work on the electrical components is started.

NOTE: Work on electrical equipment must be performed by authorized personnel only.

Oxygen

Oxygen is a colorless, odorless and tasteless gas. If there is a leakage of oxygen from the ozone generator, the oxygen content in the air is increased.

Pure oxygen can cause oil and grease to spontaneously combust.



OXIDIZING

May cause or intensify fire; oxidizer.

May cause fire or explosion; strong oxidizer.

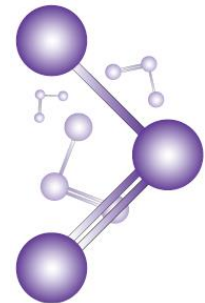
Ozone

Ozone is a pale blue gas with a characteristic odor. It is highly reactive and corrosive and can cause harm if inhaled.



TOXIC GAS

Ozone is a toxic gas. Do not inhale ozone. Install an ozone alarm near the ozone generator. Ensure good ventilation. In case of accident, evacuate the person into fresh air and call for medical assistance.



The human nose can detect ozone at concentrations above 0.02 ppm. The maximum allowable ozone concentration in industrial working areas is 0.10 ppm according to EU regulations, with a permissible human exposure of 8 hours per day, 6 days per week.

Make sure that there is a functional ozone alarm in the room where the ozone generator is installed. The ozone sensor must be located within 2 meters from the ozone generator. Make sure that applicable safety equipment is available.

NOTE: Make sure to follow applicable local regulations!

For more hazard identification on ozone go to [The International Chemical Safety Cards \(ICSC\) database \(http://www.ilo.org/dyn/icsc\)](http://www.ilo.org/dyn/icsc)



Primozone Production AB
Terminalvägen 2
246 42 Löddeköpinge, Sweden
Tel +46 46 704570
Tel +46 734 433454
Fax: +46 46 704580
support@primozone.com

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DOCUMENT INFORMATION

The Maintenance manual describes the instructions for service and maintenance work of the Primozone GM6 – GM18 ozone generator.

All users should read the Maintenance Manual before doing any maintenance work on the Primozone GM6 – GM18 ozone generator.

It is especially important that all users read and understand the chapter “Safety Precautions” before handling the generator.

Only certified personnel are allowed to do maintenance on the GM6 – GM18.

For instructions on how to operate, install and start-up the GM6 – GM18, please refer to the Operation & Installation Manual.

This manual covers the following six parts:

1. Safety precautions.
2. Generator overview.
3. Module controller overview.
4. Alarms.
5. Replace parts of the generator.
6. Service.
7. Acronyms and terms.

This manual shall only be used by people that have received complete training by Primozone.

For more information, please contact

Primozone Production AB

e-mail support@primozone.com

telephone +46 (0)46 70 45 70.

Revision information

Table 1 Revision history

Revision	Date	Description
A	2017-02-24	First version.

1 GENERAL OVERVIEW

1.1 Overview GM6

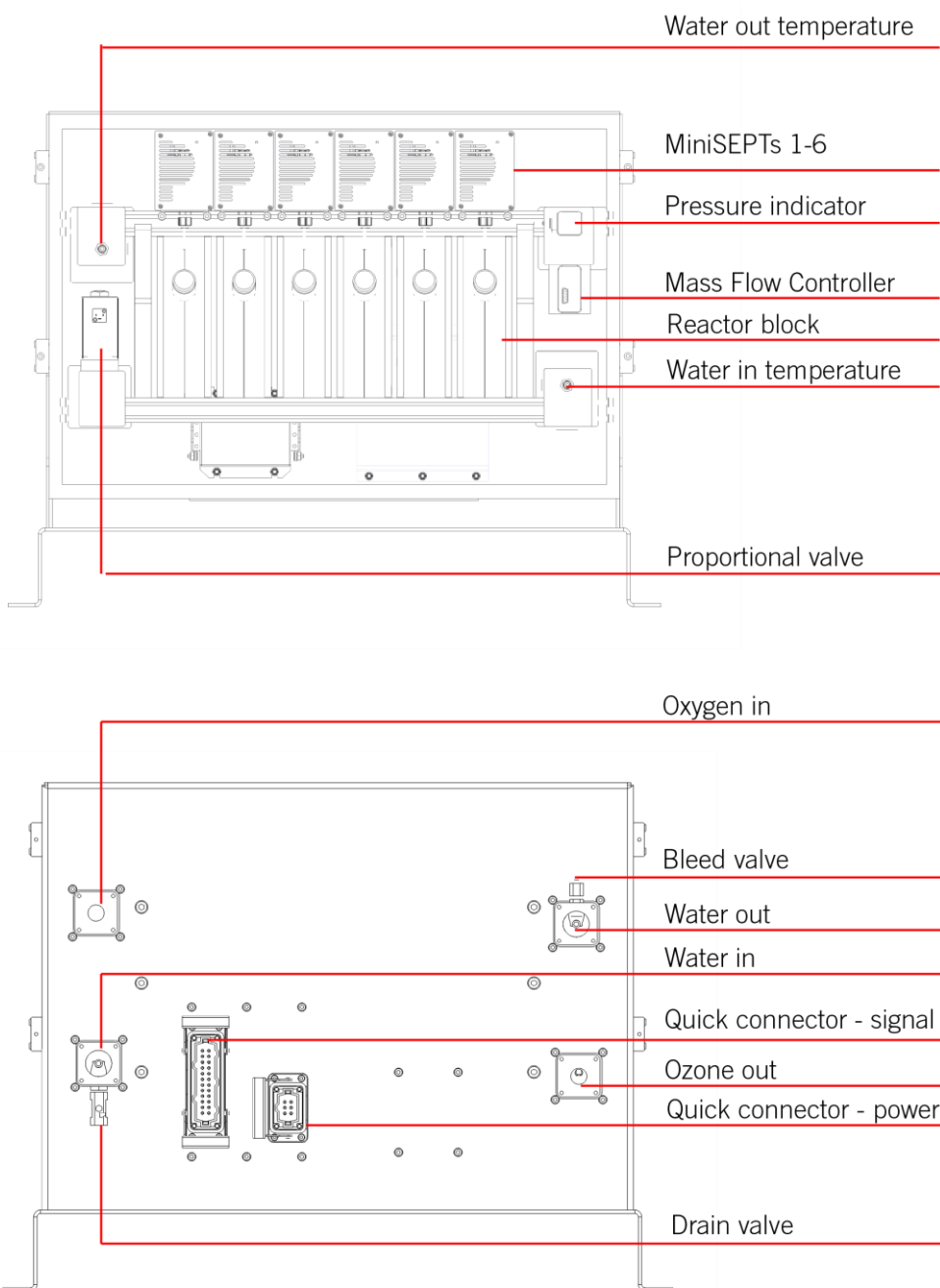


Figure 1 Overview GM6 – front and back



1.2 Overview GM12 and GM18 - generator front

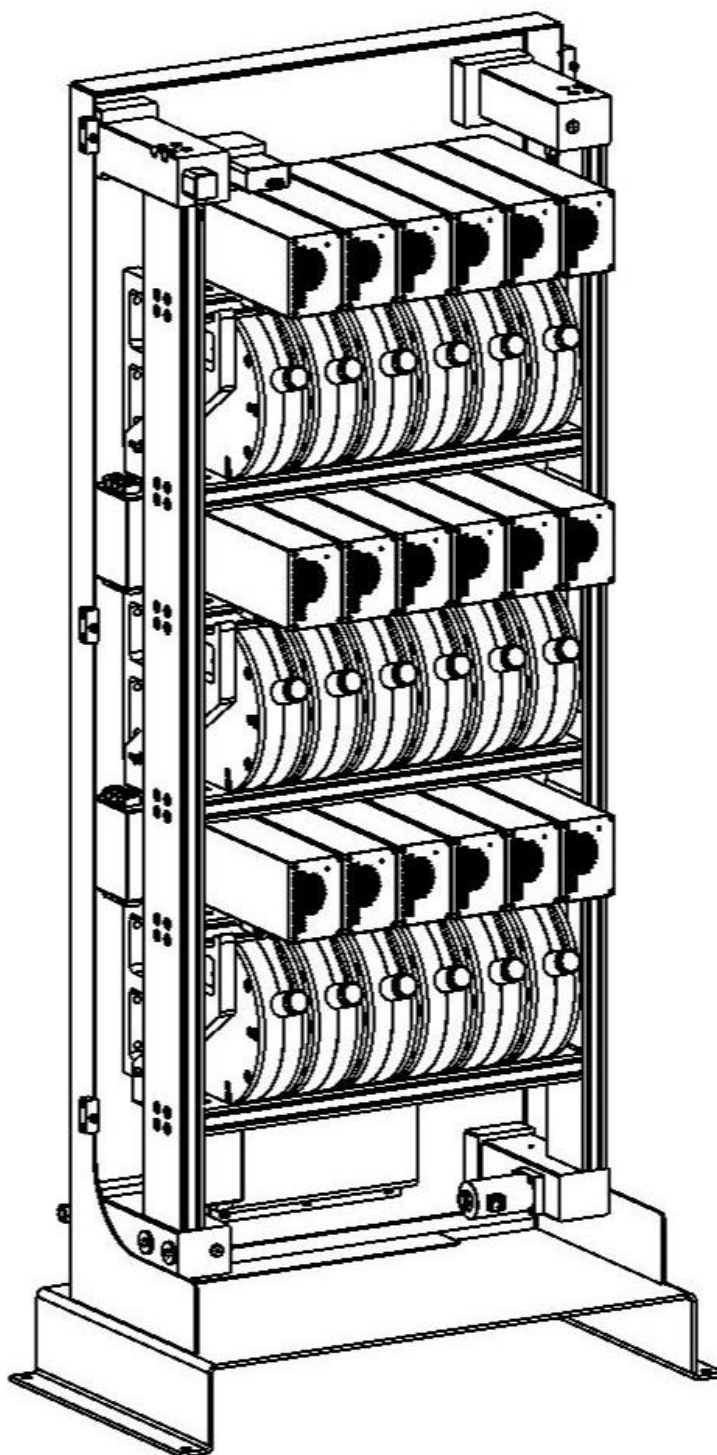


Figure 2 Generator front (GM18 in this example)

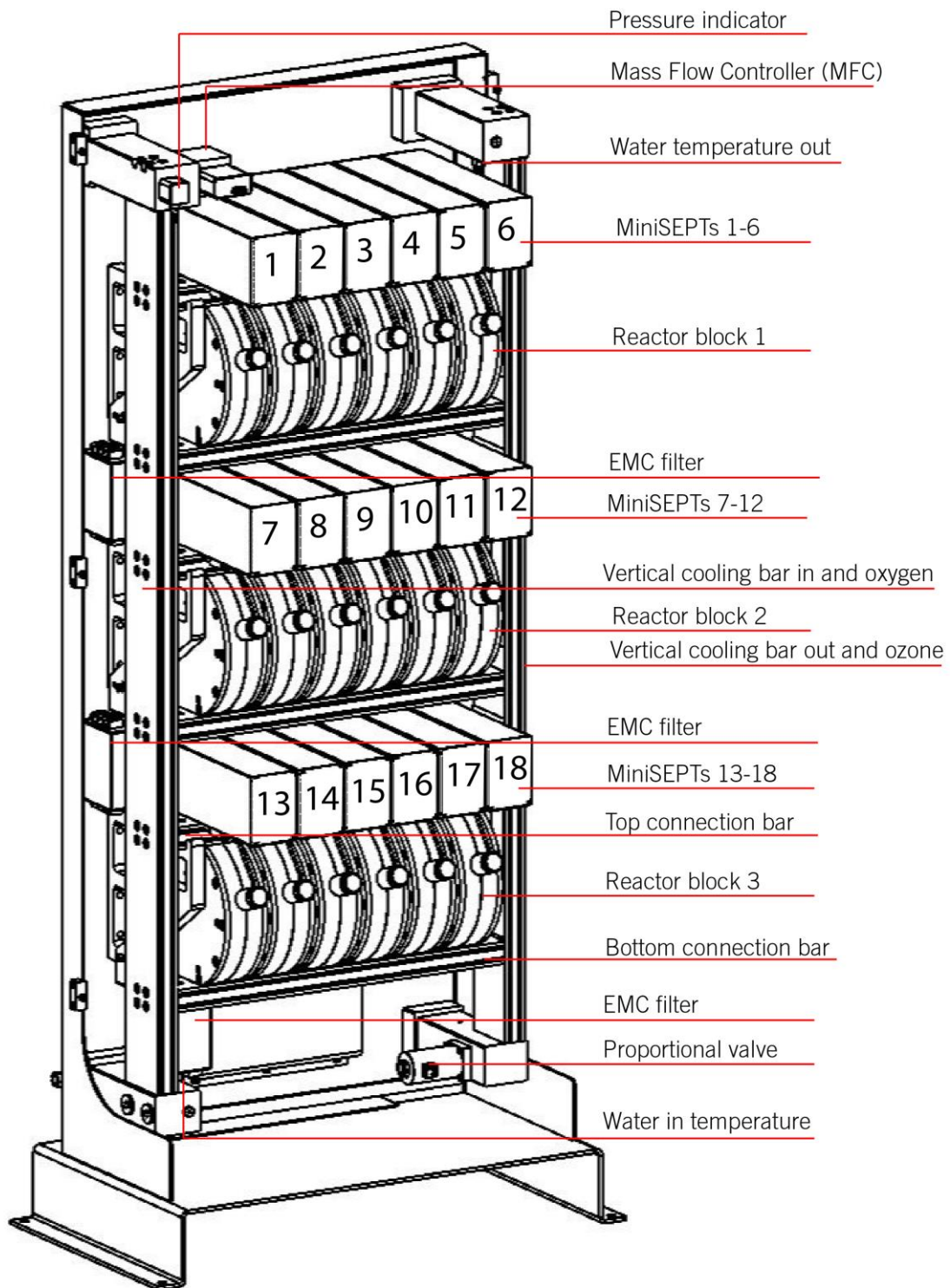


Figure 3 Generator front including MiniSEPT numbers (GM18 in this example)



1.3 Overview GM12 and GM18 - generator back

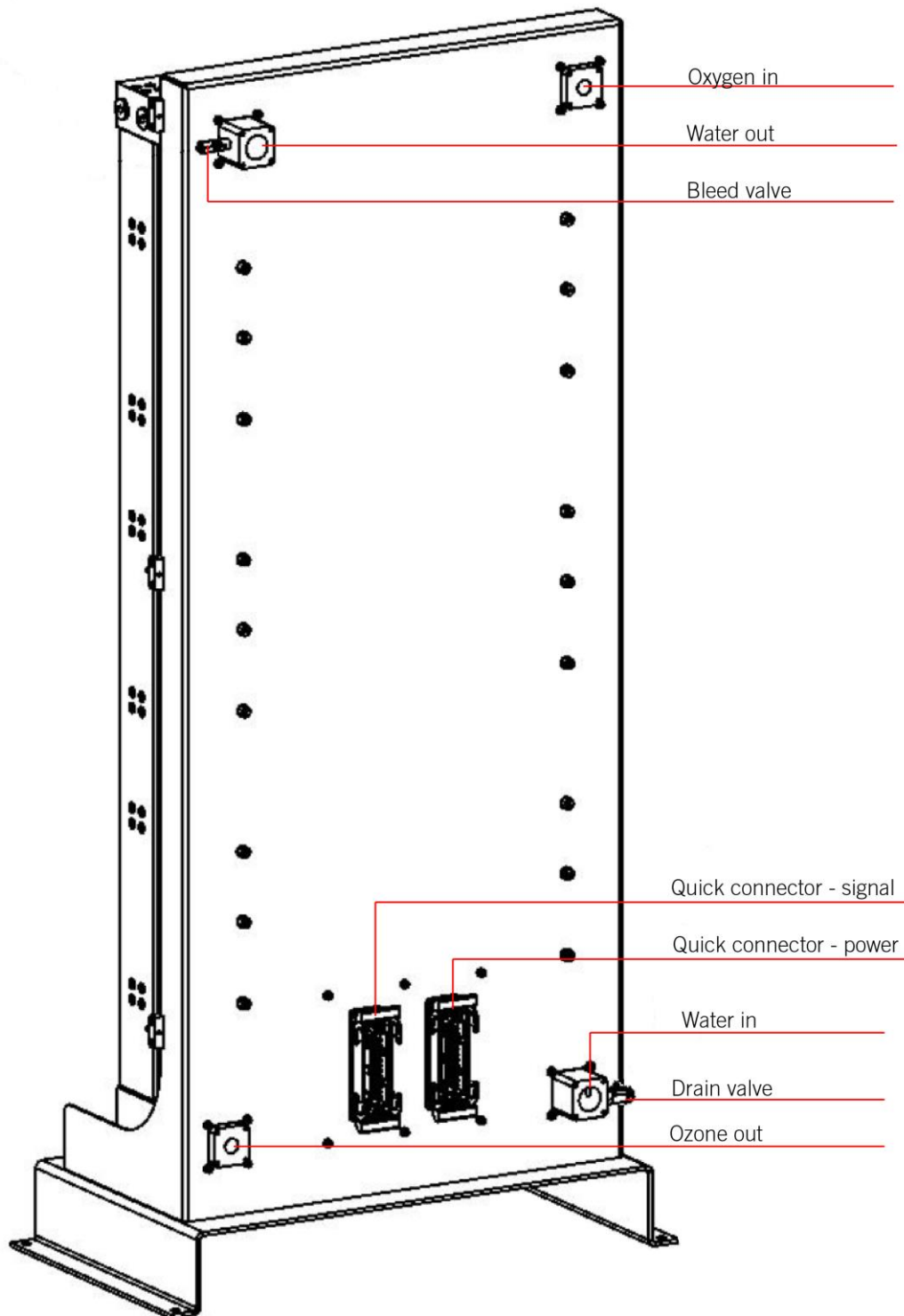


Figure 4 Generator back (GM18 in this example)

1.4 Overview control cabinet

The GM6 – GM18 ozone generator comes with a separate power and control cabinet, see Figure 5.

The power and control cabinets supplied with the GM6 – GM18 ozone generators should be wall mounted.

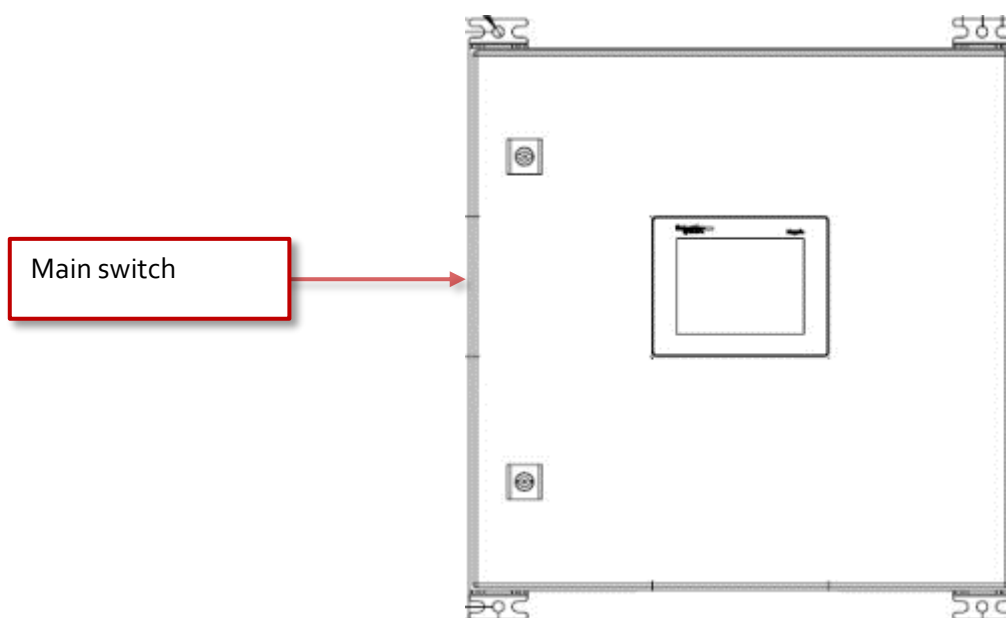


Figure 5 Power and control cabinet



2 MODULE CONTROLLER OVERVIEW

2.1 General buttons

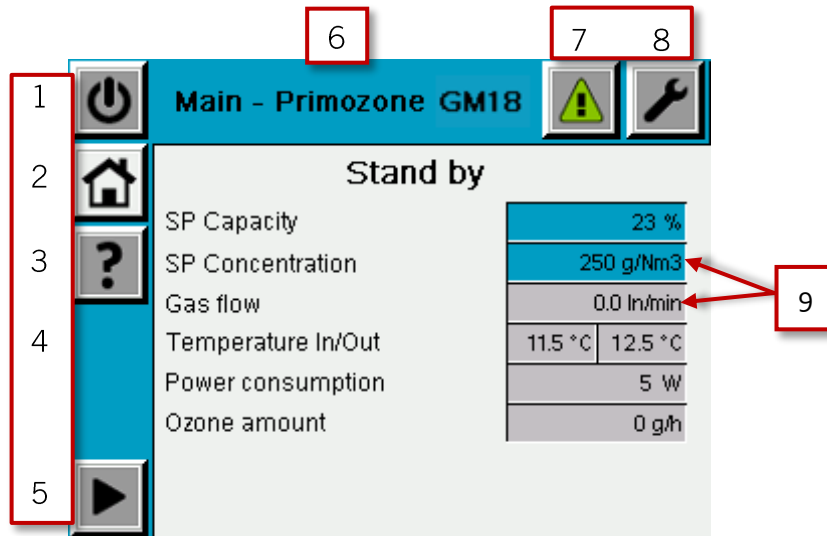


Figure 6 General buttons (example from GM18)

1. Open start and stop popup.
2. Go to main screen (this view).
3. Go to help screen.
4. Selection between local and remote mode¹. This button is visible if any remote mode (External control or Modbus control) is activated on the generator.
5. Step to the next screen.
6. Screen name and generator size.
7. Go to alarm screen.
8. Go to service login screen.
9. A blue field indicates that the value can be modified by tapping on the field. A gray field is not possible to adjust, it only displays a value.

¹Local mode is when the unit is controlled using the control panel on the generator. Remote mode is when the unit is controlled using a customer specific control system.

2.2 Main screen - standard control

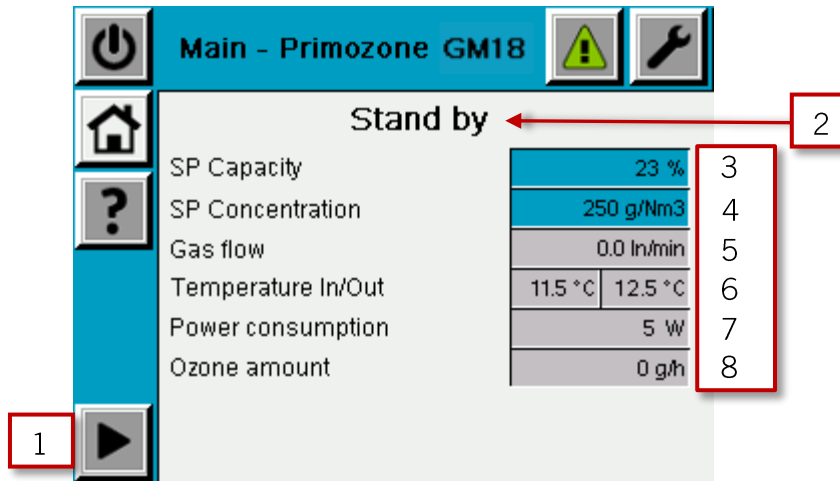


Figure 7 Main screen, standard control (example from GM18)

1. Step to the next screen, in this case the diagnostic screen.
2. Operation mode.
3. **SP Capacity** – This set point can be adjusted to a desired value in percent. For example if an ozone generator produces 800 g O₃/h at a capacity of 100%, reducing the capacity to 50% leads to the same reduction in the ozone production (that is, 400 g O₃/h).
4. **SP Concentration** – This set point can be adjusted between 150-300 /Nm³ (10-20 wt%). This is an empirically tested concentration rating on the system.
5. **Gas flow** – This process value is affected by the capacity and concentration set points and cannot be adjusted.
6. **Temperature in/out** – Displays the temperature of the cooling water at the inlet and outlet.
7. **Power consumption** – This value displays the total power consumption in the MiniSEPTs.
8. **Calculated Ozone amount** – Shows the current production rate. Only visible if configured to be shown on the service screen. See Section 2.14 for more information.



2.3 Main screen - remote control

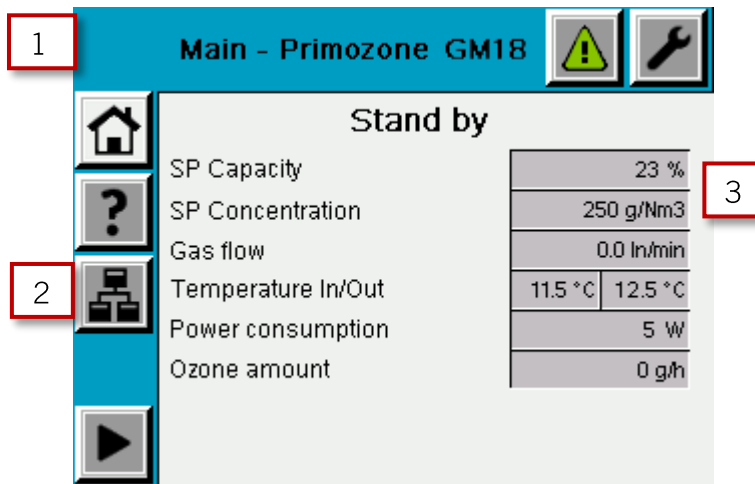


Figure 8 Main screen, remote control (example from GM18)

1. Note that the start and stop button is not visible during remote mode.
2. Selection between local and remote control. This button is visible only if any remote mode (External control² or Modbus³ control) is available on the unit.
3. When in remote control with Modbus control the set points for capacity and concentration is not accessible (turns gray).
When in remote control with External control (hardwired), the settings for capacity is not accessible (turns gray), but concentration settings is accessible (turns blue).

² External control enables the user to control the generator using hardwired signals. See External communication manual for more information.

³ External Modbus control enables the use of Modbus TCP to control and communicate with other systems. See External communication manual for more information.

2.4 Main screen – ODM mode

The ODM mode section handles a generator that is configured to operate in Ozone Distribution Module (ODM) mode. The operating mode is changed under settings after the activation code has been entered, see Section 2.20 for more information. The ODM enables ozone distribution to several different treatment lines from one single ozone generator with exact and individual dosing for each line.

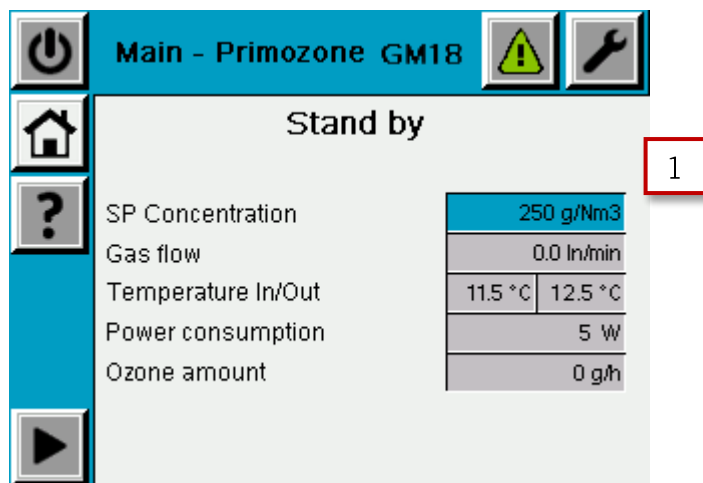


Figure 9 Main screen, ODM mode (example from GM18)

1. During ODM mode, the capacity set point is not available.



2.5 Main screen – Traditional control

The traditional control section handles a generator that is configured to operate in traditional control mode. In traditional control mode, the user sets the power and gas flow. The operating mode is changed under settings after the activation code has been entered, see Section 2.20 for more information.

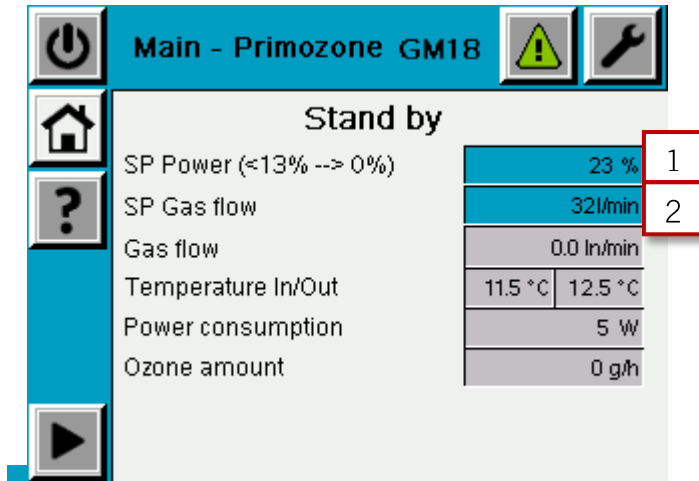


Figure 10 Main screen, traditional control (example from GM18)

1. The operator must set the desired power in %. The lowest accepted value is 13% and if a value under 13% is set the system changes it to 0%.
2. The operator must set the desired gas flow.

2.6 Main screen – with alarm indication

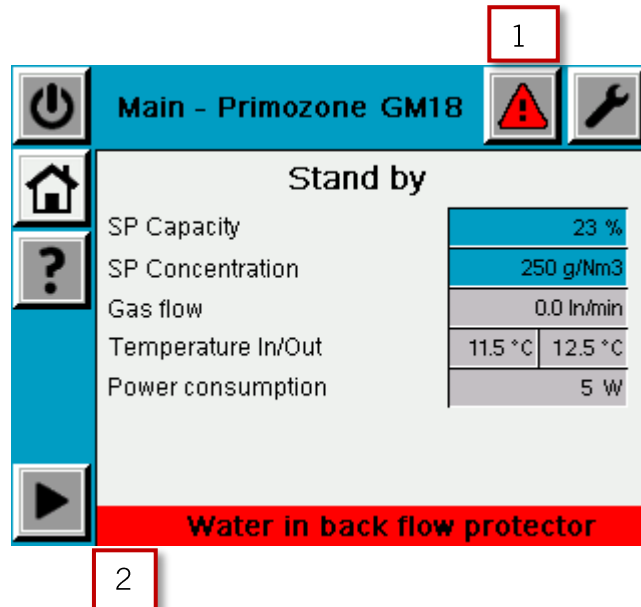


Figure 11 Main screen, alarm indication (example from GM18)

1. The alarm button turns red when there is an active alarm.
2. If there is an active alarm, an alarm banner appears.
The alarm banner has the following colors depending on the severity of the active alarm(s):
 - Red - stopping alarm (quick or controlled stop)
 - Yellow – warning alarm
 - Gray – information alarmSee Chapter 3 for more information about alarms.



2.7 Help screen

The Help screen describes the some of the symbols used in the module controller, see Figure 12.

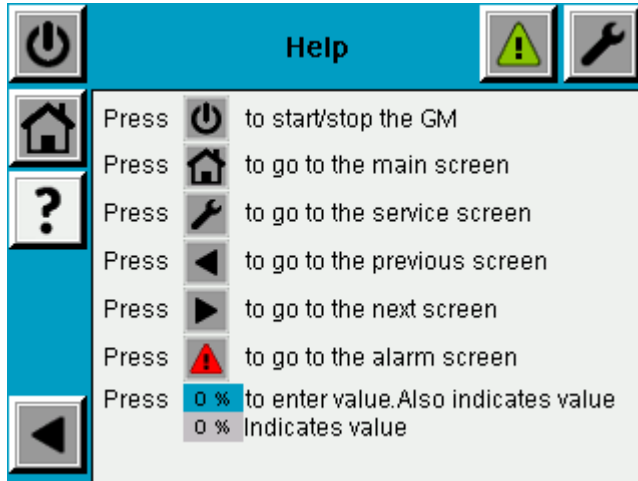


Figure 12 Help screen

2.8 Diagnostic screen

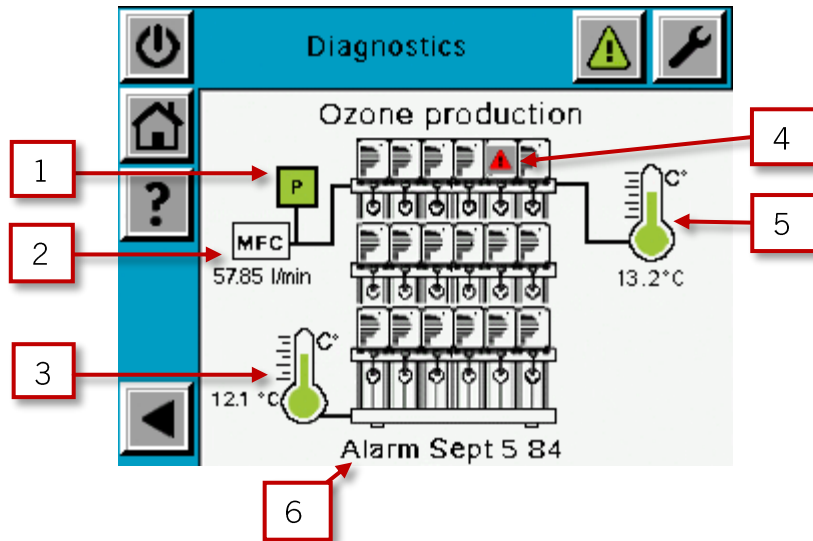


Figure 13 Diagnostic screen (example from GM18)

NOTE: The generator on the diagnostic screen look different depending on the GM-model.

1. Pressure indication, green when pressure is below max limit and red when above.
2. Gas flow.
3. Temperature of the incoming cooling water. Green indicates a temperature under 15°C, yellow indicates a temperature between 15°-21°C, and red indicates a temperature above 21°C. For information about high temperature alarm, see Section 3.3.
4. MiniSEPT with an active alarm.
5. Temperature of the outgoing cooling water. Green indicates a temperature up to 20°C, yellow indicates a temperature between 20°-26°C, and red indicates a temperature above 26°C. For information about high temperature alarm, see Section 3.3.
6. Alarm banner showing all active alarms. The number to the left indicates in which MiniSEPT the alarm is active and the number to the right indicates the alarm number.



2.9 Alarm screen

The alarm screen is accessed by pressing the alarm icon (visible on all screens except the alarm screen) in the upper right part of the screen.

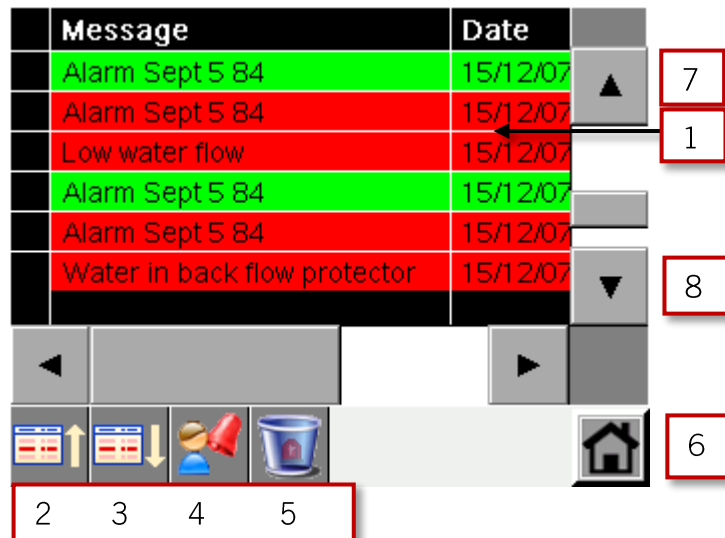


Figure 14 Alarm screen

1. List of alarms. Red alarm indicates when the alarm became active and green when it returned back to normal state.
2. Scroll up in the alarm list. Tap on the alarm list before using the scroll button. The scroll up button (7) can also be used for this purpose.
3. Scroll down in the alarm list. Tap on the alarm list before using the scroll button. The scroll down button (8) can also be used for this purpose.
4. Acknowledge all alarms.
5. Erase an alarm from the list, click on the desired alarm in the list before using the erase alarm button. After one alarm is erased the next alarm in the list is automatically selected.
6. Go to the main screen.

2.10 Service login screen

The service login screen is accessed by the spanner icon in the upper right corner.

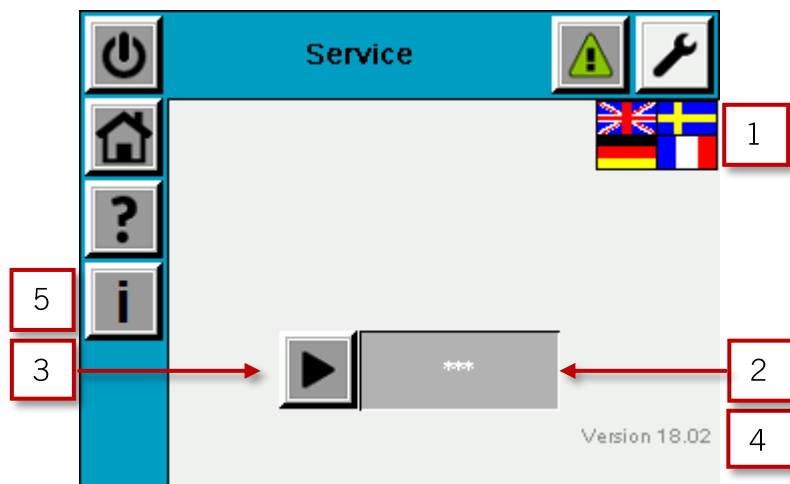


Figure 15 Service login screen

1. **Regional settings screen** button.
2. **Password** field – Press this field to enter the password. The password is “12345”.
3. **Continue** button – Appears when the correct password is entered.
4. Software version information.
5. **Information screen** button (where a QR-code can be found).



2.11 Information screen

The Information screen illustrates a QR code, which can be scanned by using a smartphone, to get quick access to manuals on the Primozone web site.



Figure 16 Information screen

2.12 Regional settings screen

The regional settings screen is accessed from the service login screen.

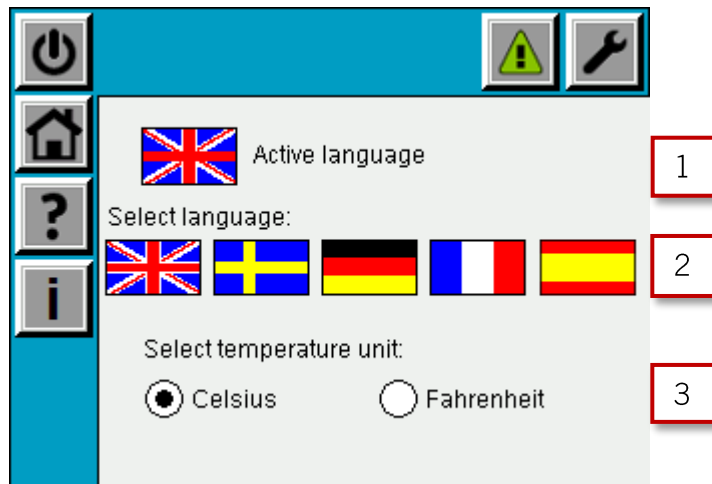


Figure 17 Regional settings screen

1. Indicates which language that is currently active.
2. Language selection. Press a flag to select the desired language. Service screens are not translated.
3. Unit selection. Press the preferred button to select the desired units.

2.13 Service menu screen

The service menu screen is accessed from the service login screen. The user is sent to this screen when the password has been entered and the user has pressed the continue button.

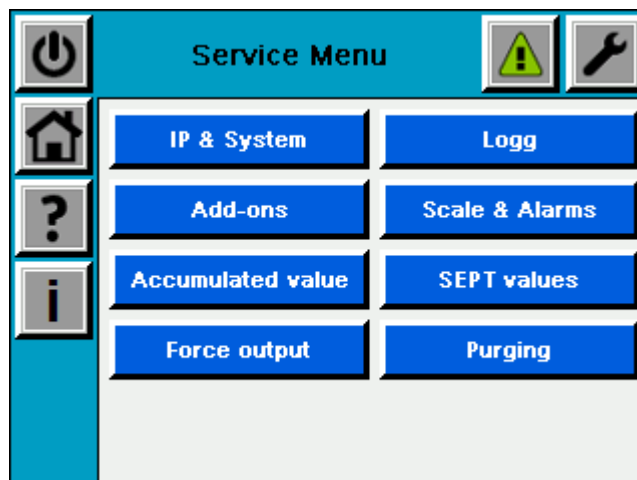


Figure 18 Service menu screen

From the service menu the eight different subscreens shown in Figure 18 can be accessed.



2.14 Service IP & System screen

The Service IP and System screen is accessed from Service login/Service main menu screen/IP & System.

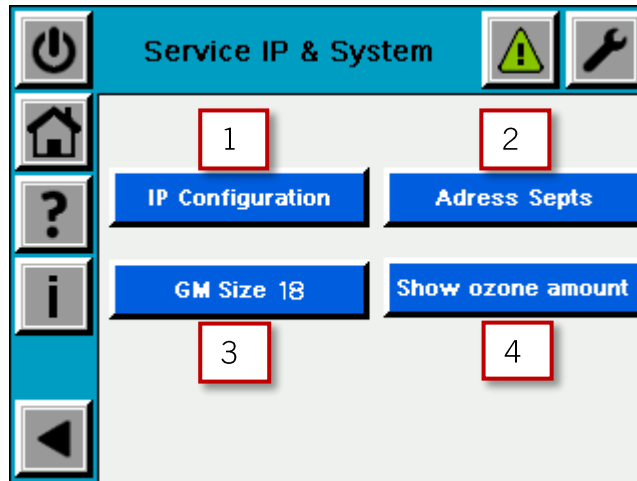


Figure 19 Service IP & system screen (example from GM18)

1. **IP Configuration** – Access to the controllers menu for setting IP. See Section 2.15 for more information.
2. **Address Septs** – Open the addressing screen for MiniSEPTs. See Section 2.16 for more information.
3. **GM size X** (number according to selected size) – Open the size selection screen. See Section 2.18 for more information.
4. **Show ozone amount** – Selects ozone amount field to be displayed on the main screen. The button turns green if the selection is active.

2.15 Set IP address

NOTE: Only set the IP address when the generator is in stand by state.

1. Select the IP Configuration button on the IP & System screen. This screen is accessed from Service login/Service main menu screen.

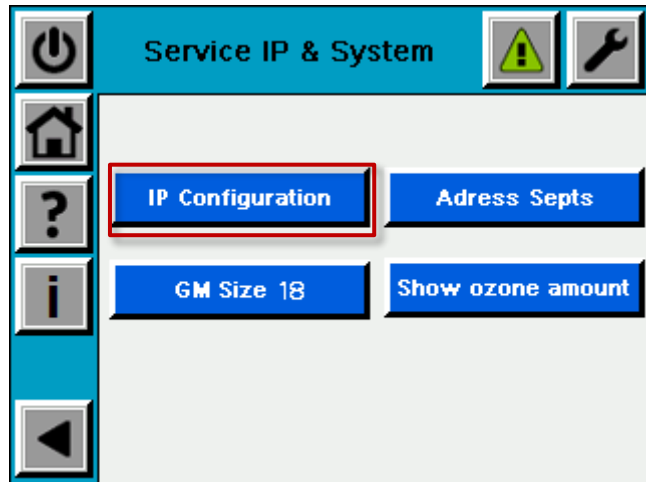


Figure 20 Set IP address start screen (example from GM18)

2. Press the Offline tab.

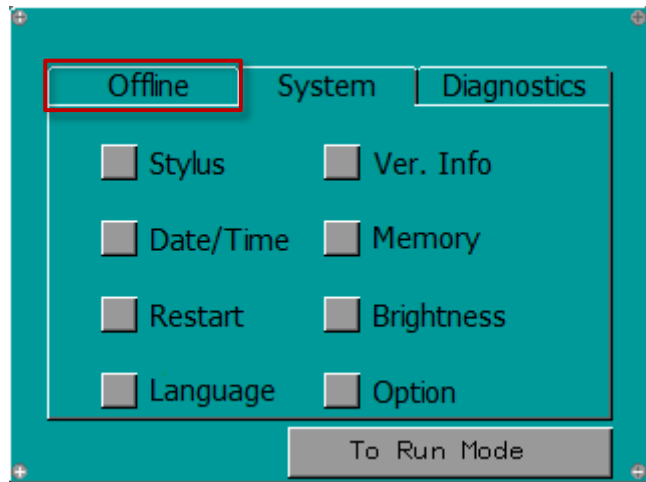


Figure 21 Select Offline tab



3. Press the **Network** button.

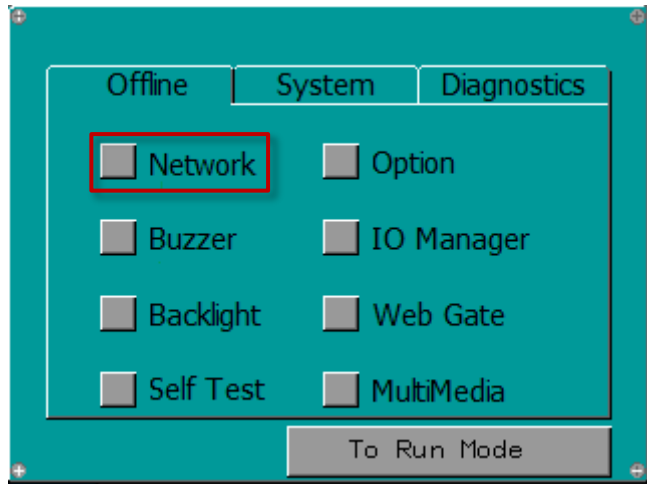


Figure 22 Select Network button

4. Press **OK** to stop runtime.

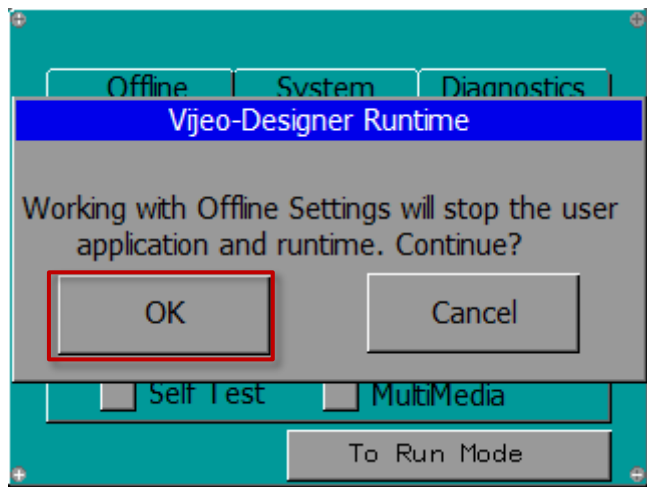


Figure 23 Click OK

5. Do the desired network settings.
6. Press **OK**.

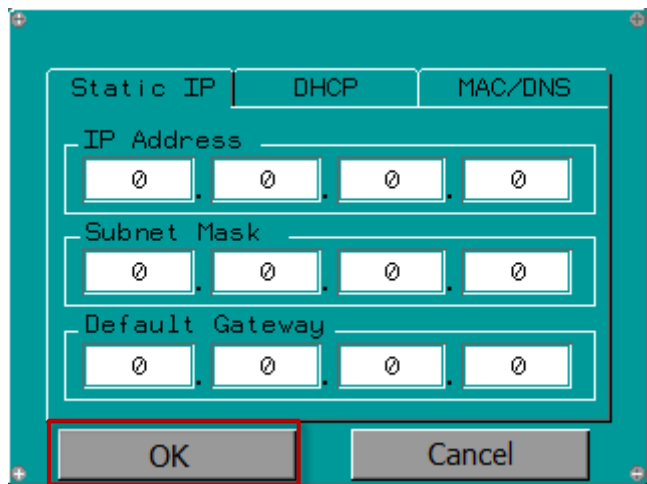


Figure 24 Enter Network settings

7. Press **To Run Mode**.
8. Press **OK** to restart the system.

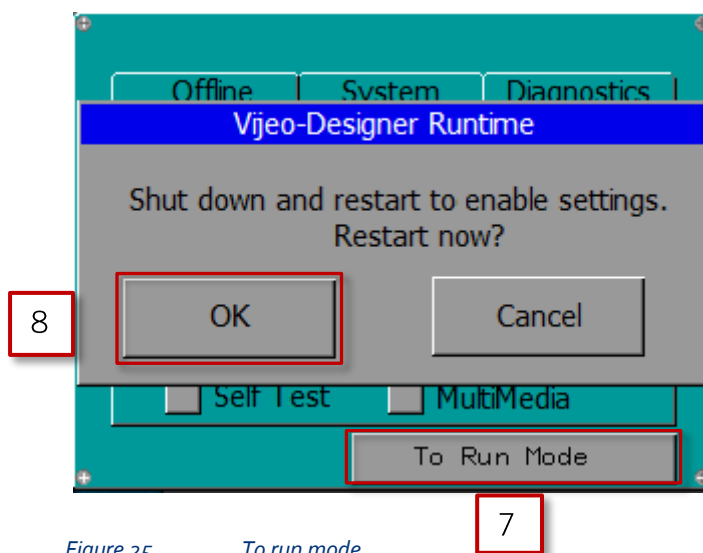


Figure 25

To run mode



2.16 Address MiniSEPTs

The Address MiniSEPTs screen is accessed from Service login/Service main menu/IP & System/Address SEPTs.

The user is automatically redirected to the MiniSEPT addressing subscreen for individual addressing. See Section 2.17.

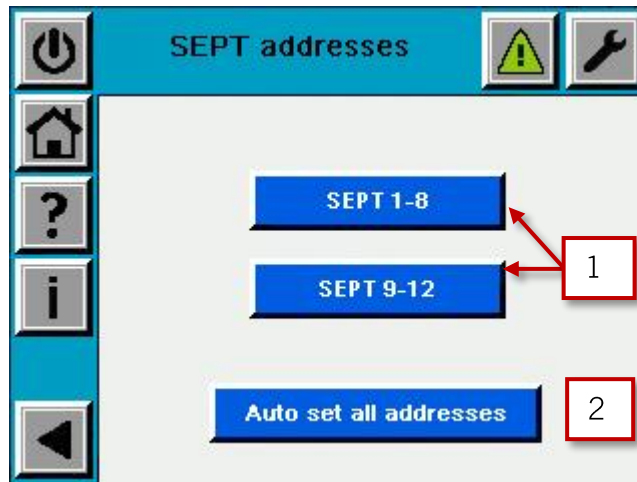


Figure 26 Address MiniSEPTs (example from GM12)

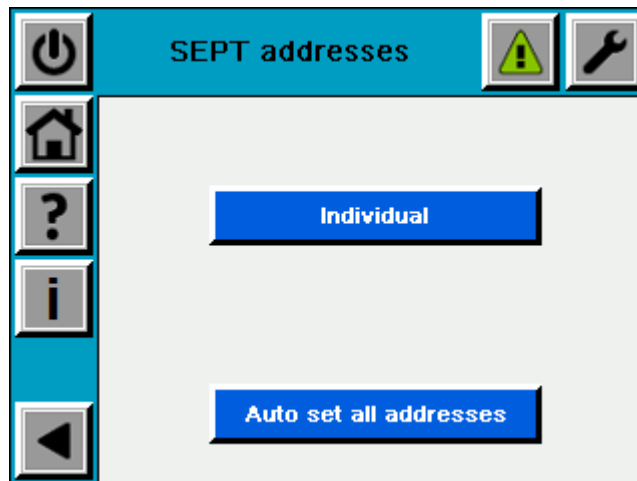


Figure 27 Address MiniSEPTs (example from GM6)

1. The buttons SEPT X-Y – Open the subscreens for individual addressing of the different MiniSEPTs.

NOTE: For GM6 it is only possible to choose individual addressing or auto set all addresses. See Figure 27.

2. Auto set all addresses – Open the popup for changing all MiniSEPT addresses. This shall only be used when all MiniSEPT addresses are the same as the position in which they are installed, for example, MiniSEPT 5 in position 5.

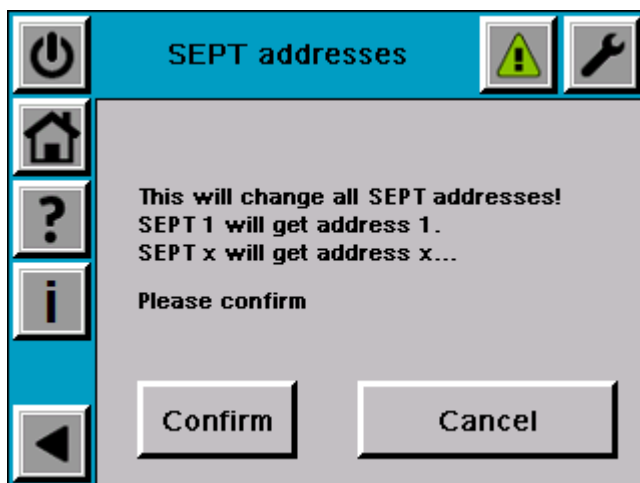


Figure 28 Auto set all addresses

3. To do a quick change for all addresses press **Confirm**.



2.17 Address MiniSEPTs subscreen for individual addressing

The Address MiniSEPTs subscreen for individual addressing screen is accessed from Service login/Service main menu/IP & System/Address SEPTs/SEPT X-Y (or Individual).

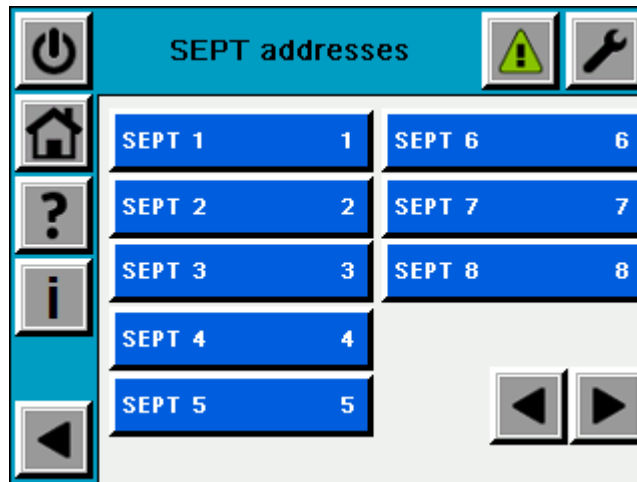


Figure 29 Address MiniSEPT subscreen for individual addressing screen

The MiniSEPT number (position in the generator) is displayed to the left on the button and the address is displayed to the right.

1. Press the button SEPT X – To be able to enter the address for the desired MiniSEPT.
2. Press the arrow buttons to change the MiniSEPT numbers that are displayed.

2.18 Service GM size screen

The Service GM size screen is accessed from Service login/Service main menu/IP & System/GM Size X.

NOTE: This setting is done before delivery and it is normally not needed to be done by the customer.

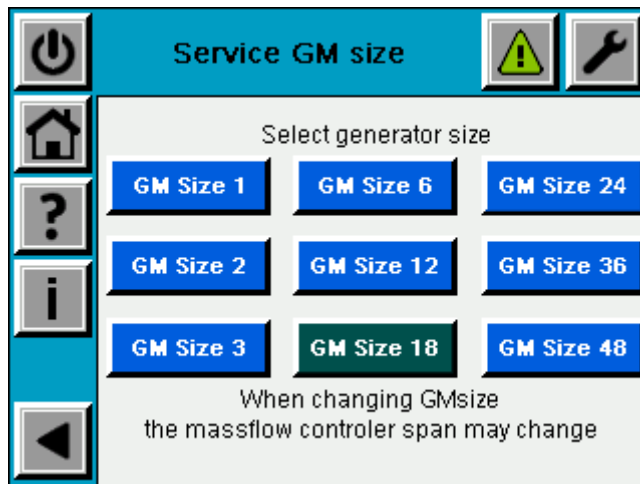


Figure 30 Service GM size (example from GM18)

1. Press a button to select the correct GM size. The active selection is shown in green.



2.19 Service log

The Service log screen is accessed from Service login/Service main menu/Log.

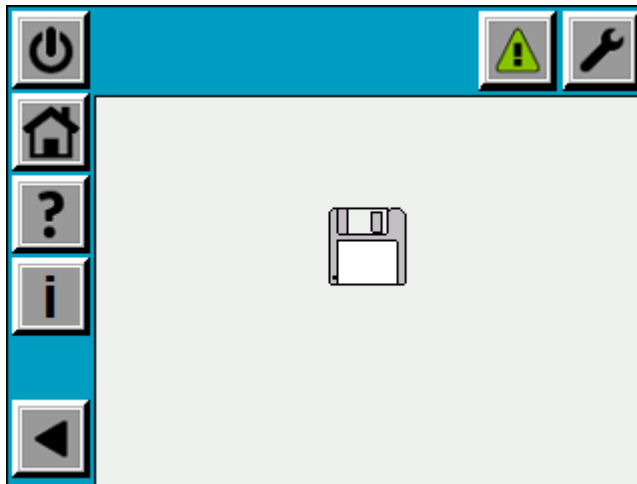


Figure 31. Service log screen

This function is intended to be used during fault finding when production values must be sent to Primozone for evaluation.

1. Insert an empty FAT32 formatted USB stick at the back of the controller.
2. Press the floppy disk symbol to write production values to the USB.

2.20 Service Add-ons

The Service Add-ons screen is accessed from Service login/Service main menu/Add-ons.

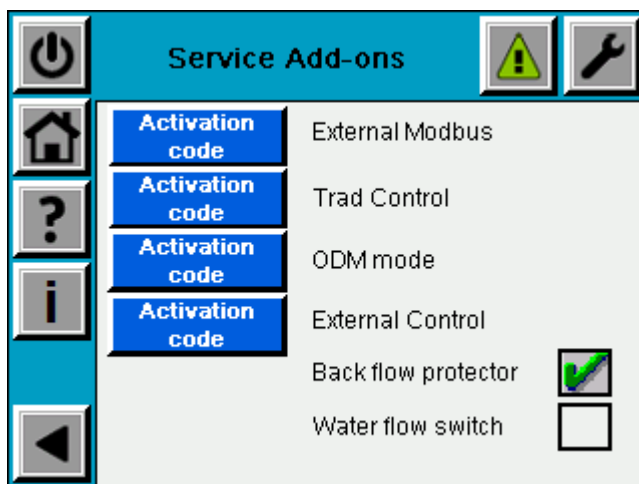
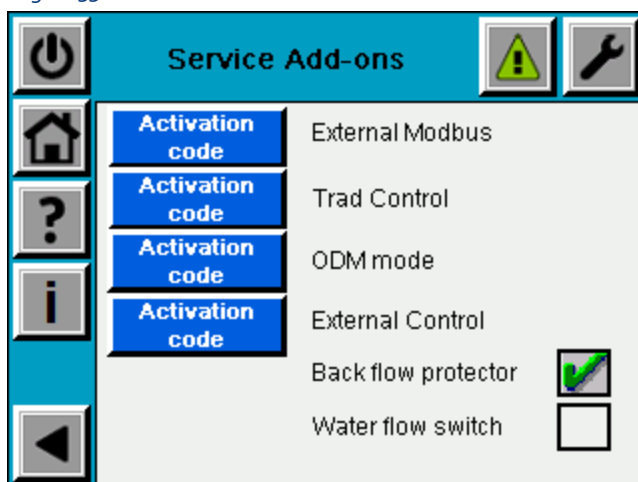


Figure 32 Service Add-ons screen (example with backflow protector enabled)

If the backflow protector or the water flow switch is installed, the box to the right of the text must be selected. These two functions can be activated without a code.

The following steps describes how to activate a function using an activation code.

Figure 33 Select desired Activation code button



1. Press the appropriate **Activation code** button for the desired function.

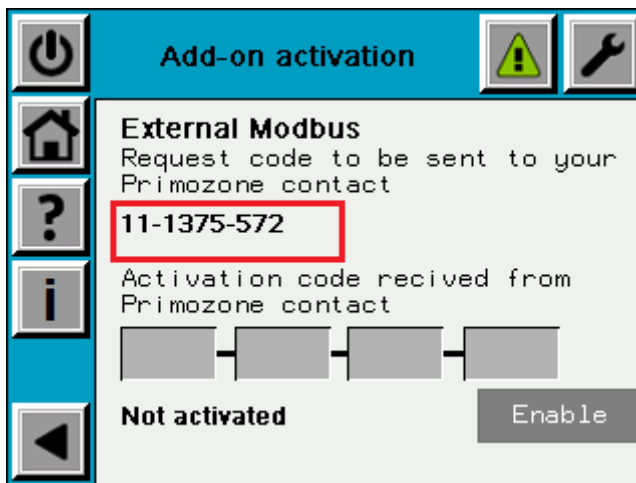


Figure 34 Request Activation code

2. Send the displayed request code to your Primozone contact together with information about the machine serial number.

NOTE: It is possible to leave the screen while waiting for the activation code.

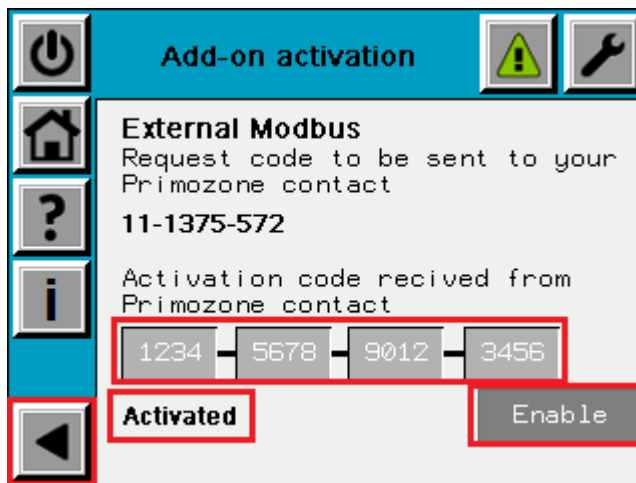


Figure 35 Enter received activation code

3. Return to the activation screen when the activation code is received.
4. Fill in the 16 digit number in the boxes.
5. Press the **Enable** button.
6. Ensure that the text **Activated** appears.
7. Press the **previous screen** button.

The desired function is now enabled and it is possible to select the desired function to be activated. This must not be mixed up with the operator's possibility to select remote and local operation (for communication add-ons) that can be done during operation, when the function is active.

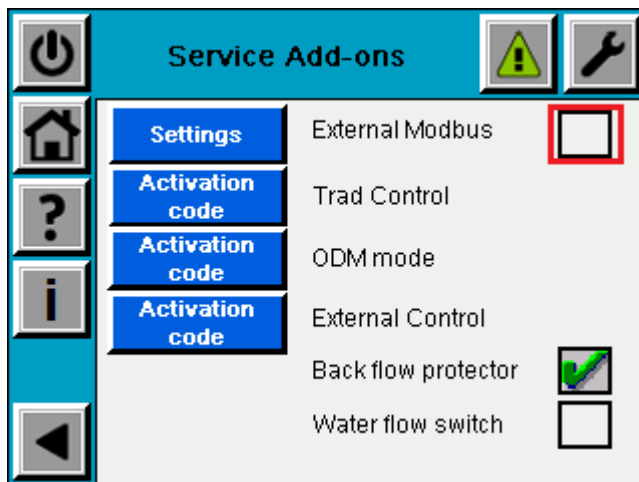


Figure 36 Select the desired function

- Press the checkbox for the desired function and make sure that there is a green symbol inside it.

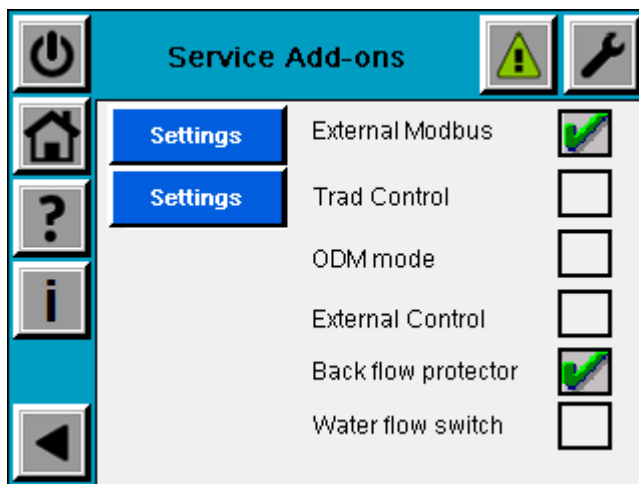


Figure 37 External Modbus selected

NOTE: A settings button has appeared for the activated function.

- The configuration is now done. It is now recommended to do the settings for the function, if there are settings to be made for the desired function.



2.21 Service Add-ons settings External Modbus

The Service Add-ons settings External Modbus screen is accessed from Service login/Service main menu/Add-ons/Settings (when the service add-ons is activated click on the settings button for External Modbus to get to this screen).

NOTE: Figure 38 illustrates that all choices are selected. However, it is only possible to select one item in “Stop method WD alarm” and one in “Set point selection”.

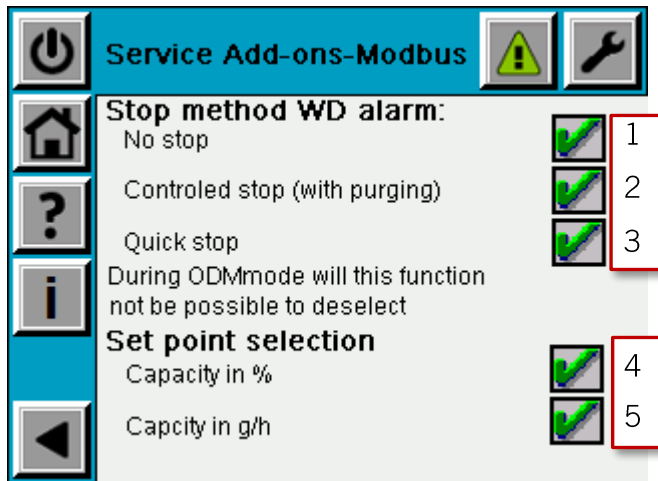


Figure 38 Service Add-ons settings External Modbus screen

Settings for stop on Communication to overhead system (WD) alarm (communication lost with overhead system)

1. **No stop** – The generator continues the operation.
2. **Controlled stop** (with purging) – The generator jumps to post purge and makes a normal stop.
3. **Quick stop** – The generator stops directly, with ozone in the generator and the pipes.

Set point selection

4. **Capacity in %** – The normal operating behavior. The set point is received in percent of the maximum capacity.
5. **Capacity in g/h** - The set point is received in form of requested dosage. The produced dosage is a calculated value that can deviate from the actual value.

2.22 Service Add-ons settings Traditional Control

The Service Add-ons settings Traditional control screen is accessed from Service login/Service main menu/Add-ons/Settings (when the service add-ons is activated press the settings button for Traditional Control to get to this screen).

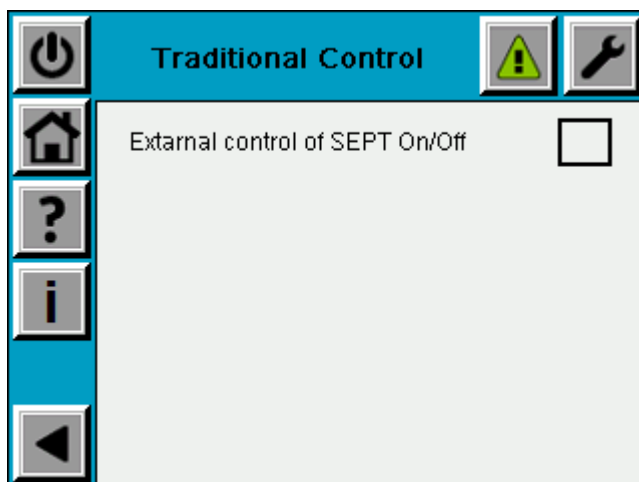


Figure 39 Service Add-ons settings for Traditional Control screen

External control of MiniSEPT On/Off- Activates the possibility to turn off the power to the MiniSEPTs by the communication interface for hardwired external communication.



2.23 Scale and alarm

The Scale and alarms screen is accessed from Service login/Service main menu/Scale & Alarms.

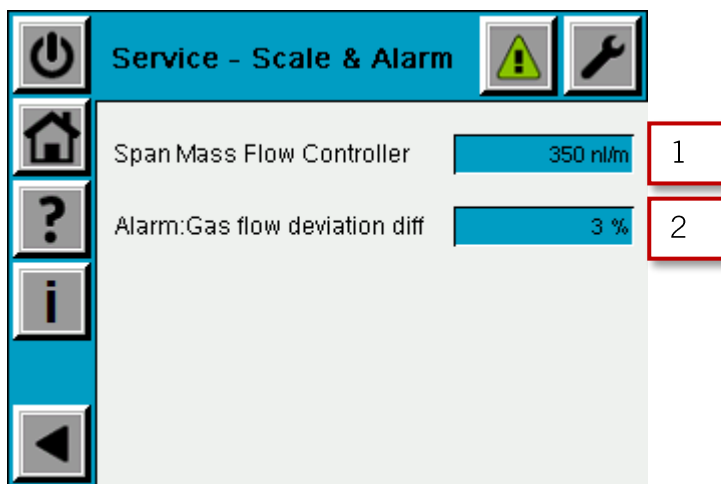


Figure 40 Scale and alarm screen

1. **Span Mass Flow Controller** – Set the range of the mass flow controller for gas. This value must be the same as for the installed sensor (that is, depending on the size of the GM this value may have to be altered). This value automatically changes when the GM size is changed.
2. **Alarm: Gas flow deviation diff** – Max allowed deviation for gas flow before the alarm is generated. This alarm has a 2 minute delay.

2.24 Accumulated values

The Accumulated values screen is accessed from Service login/Service main menu/Accumulated values.

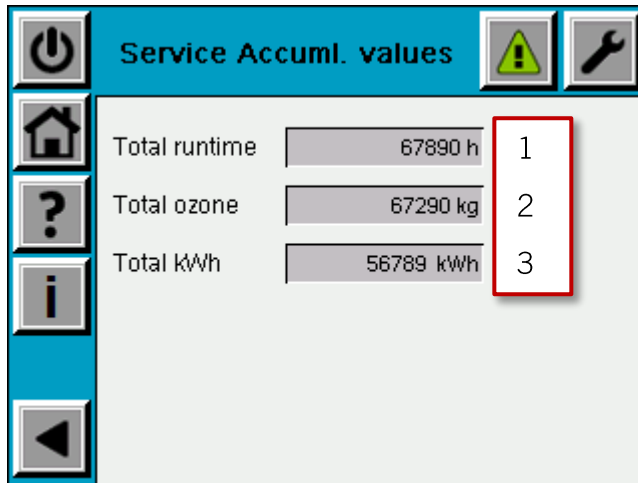


Figure 41 Accumulated values

1. **Total runtime** – Shows for how long time the generator has been in operation.
2. **Total ozone** – Shows how much ozone the generator has produced.
3. **Total kWh** – Shows how much energy the MiniSEPTs has consumed.



2.25 MiniSEPT values

The Service MiniSEPT values screen is accessed from Service login/Service main menu/SEPT values.

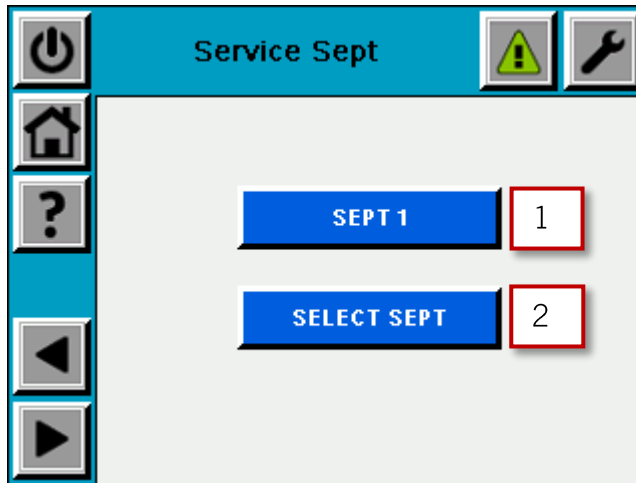


Figure 42 Service MiniSEPT values screen (example from GM18)

1. **SEPT 1** – Displays the MiniSEPT value subscreen for MiniSEPT 1. See Section 2.26 for more information.
2. **SELECT SEPT** – Gives the operator the possibility to select which MiniSEPT value subscreen that is displayed.

2.26 MiniSEPT subscreen values

The MiniSEPT subscreen values screen is accessed from Service login/Service main menu/SEPT values/Select SEPT.

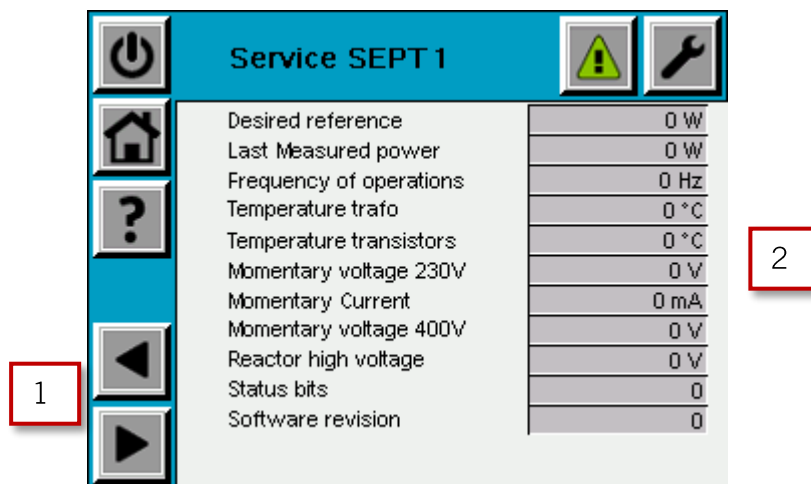


Figure 43 MiniSEPT subscreen values

1. Step through the different MiniSEPTs to select from which MiniSEPT the values are to be displayed.
2. Shows a range of values from the MiniSEPT that can be used for fault tracking together with Primozone.



2.27 Force output

The Force output screen is accessed from Service login/Service main menu/Force output.

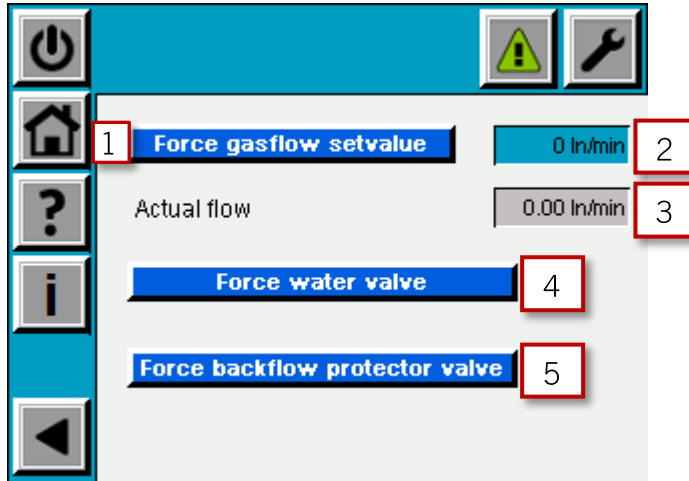


Figure 44 Force output screen

1. **Force gas flow set value** – to activate the forced set point to the mass flow controller. The button turns green if activated.
2. Set point for flow when forced.
3. Actual gas flow.
4. **Force water valve** – to activate the forcing of water valve for the cooling water. The button turns green if activated. This valve is an option that not all generators are equipped with.
5. **Force backflow protector valve** – to activate the forcing of the valve in the backflow protector. The button turns green if activated. This button is only visible if the backflow protector is enabled in the add-ons, see Section 2.20 for more information.

When this screen is left, all forced settings are automatically deselected.

2.28 Purging

The Service Purging screen is accessed from Service login/Service main menu/Purging.

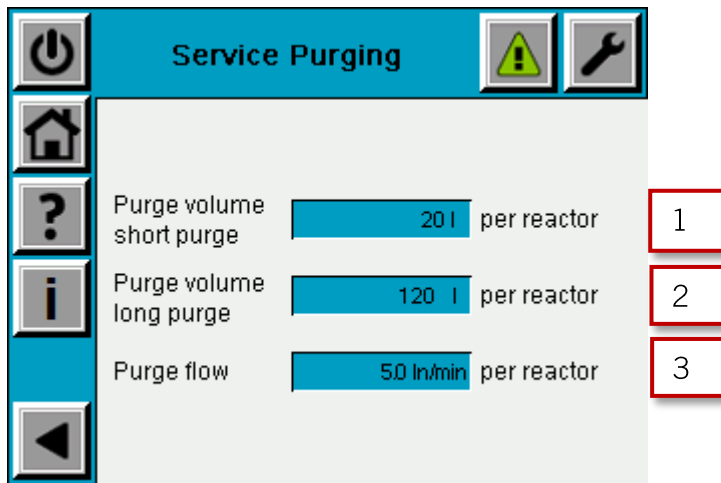


Figure 45 Service Purging screen

1. **Purge volume short purge** – normal purging volume.
2. **Purge volume long purge** – purging volume used when the generator has been turned off for more than 24 hours.
3. **Purge flow** – purging flow rate used during purging.



3 ALARMS GENERATED BY THE OZONE GENERATOR

The GM6, GM12, and GM18 has the following three types of alarms:

1. Stopping alarms - indicated by a red banner on the ozone generator. Stopping alarms are divided into the following two groups depending on the way the ozone generator reacts:
 - (i) Alarms that trigger quick stops. This means that the ozone generator closes the proportional valve as quickly as possible and turns off the MiniSEPTs.



The result of this behavior is that there is ozone left in the system. This has to be taken into consideration before any attempts of maintenance is made.

- (ii) Alarms that trigger controlled stops. These alarms shuts down the ozone generator but it is done gradually. The first step is to shut down the power supply unit and go into post purging. When the post purging is complete, the ozone generator closes the proportional valve. This means that it indicates standby on the main screen.

2. Warning alarms - indicated by a yellow banner on the ozone generator.
3. Information alarms – indicated by a gray banner on the ozone generator. These alarms are non-critical and indicates that there is something that could affect the ozone output or the wellbeing of the generator.

The following lists the alarms that are handled in this manual:

- High gas pressure, see Section 3.1 for more information.
- Backflow protector, see Section 3.2 for more information.
- High water temp, see Section 3.3 for more information.
- Communication to overhead system, see Section 3.4 for more information.
- Low gas flow, see Section 3.5 for more information.
- Gas flow regulation, see Section 3.6 for more information.
- Low water flow, see Section 3.7 for more information.
- Faulty temperature sensor, see Section 3.8 for more information.
- MiniSEPT X alarm, see Section 3.9 for more information.
- Communication error MiniSEPT X, see Section 3.10 for more information.



BEFORE REMOVAL OF COVERS

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator. Physical contact with electrical parts can cause severe harm or death. If an accident occurs, immediately call for medical assistance.

Table 2 lists the possible alarms on GM6, GM12, and GM18.

Table 2 Alarms

Description	Comment	Used in GM size
Low gas flow	Low gas flow <7% of the max flow of the generator.	All
High gas pressure	Gas pressure is above 3.0 bar	All
High water temp	Cooling water is above 25°C (inlet) or 30°C (outlet).	All
Backflow protector	Water in BFP	All, if BFP is enabled
Gas flow regulation	Gas flow regulation is not working correctly.	All
Watchdog alarm (communication to overhead system alarm)	Communication to customer lost or watchdog (toggling bit) not implemented correctly.	All, if Modbus communication is enabled
Faulty temp sensor	Temperature sensor has faulty signal.	All
Low water flow	Water flow too low.	All, if flow switch is enabled
ALARM MiniSEPT 1 (with error number)		All
ALARM MiniSEPT 2 (with error number)		All
ALARM MiniSEPT 3 (with error number)		All
ALARM MiniSEPT 4 (with error number)		All
ALARM MiniSEPT 5 (with error number)		All
ALARM MiniSEPT 6 (with error number)		All
ALARM MiniSEPT 7 (with error number)		GM12 and GM18
ALARM MiniSEPT 8 (with error number)		GM12 and GM18
ALARM MiniSEPT 9 (with error number)		GM12 and GM18
ALARM MiniSEPT 10 (with error number)		GM12 and GM18



Description	Comment	Used in GM size
ALARM MiniSEPT 11 (with error number)		GM12 and GM18
ALARM MiniSEPT 12 (with error number)		GM12 and GM18
ALARM MiniSEPT 13 (with error number)		GM18
ALARM MiniSEPT 14 (with error number)		GM18
ALARM MiniSEPT 15 (with error number)		GM18
ALARM MiniSEPT 16 (with error number)		GM18
ALARM MiniSEPT 17 (with error number)		GM18
ALARM MiniSEPT 18 (with error number)		GM18
Communication error MiniSEPT 1		All
Communication error MiniSEPT 2		All
Communication error MiniSEPT 3		All
Communication error MiniSEPT 4		All
Communication error MiniSEPT 5		All
Communication error MiniSEPT 6		All
Communication error MiniSEPT 7		GM12 and GM18
Communication error MiniSEPT 8		GM12 and GM18
Communication error MiniSEPT 9		GM12 and GM18
Communication error MiniSEPT 10		GM12 and GM18
Communication error MiniSEPT 11		GM12 and GM18
Communication error MiniSEPT 12		GM12 and GM18
Communication error MiniSEPT 13		GM18
Communication error MiniSEPT 14		GM18
Communication error MiniSEPT 15		GM18
Communication error MiniSEPT 16		GM18
Communication error MiniSEPT 17		GM18
Communication error MiniSEPT 18		GM18

3.1 High gas pressure

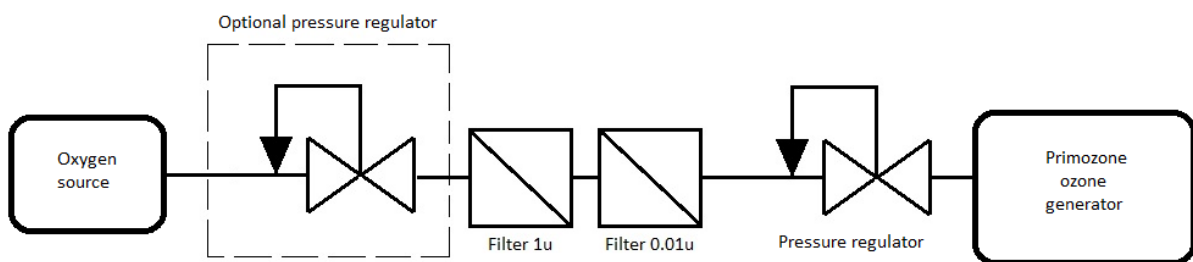
The high gas pressure alarm triggers a quick stop and shuts down the ozone generator immediately.

3.1.1 Cause of the alarm:

The incoming pressure is too high.

3.1.2 Action on the ozone generator:

Start by making sure that the oxygen supply is connected the right way:



Note: The pressure after the optional regulator must be at least 4 bar(g)

Figure 46 Oxygen supply

If the oxygen pressure from the oxygen source is varying a lot, make sure to install a second pressure regulator in front of the filters.

If the rest of the system is set up in accordance with Figure 46 do the following:

1. Change the setting in the pressure regulator closest to the ozone generator.
2. Check that the incoming pressure to the generator has decreased, by checking the pressure indicator. The red box in the lower left corner of the pressure indicator disappears if the alarm is resolved, see red arrow in Figure 47 for GM6 and Figure 48 for GM12 and GM18.
3. Acknowledge the alarm.
4. Start the generator.
5. If it is not possible to reset the alarm, force set the gas valve, see Section 2.27 for more information.

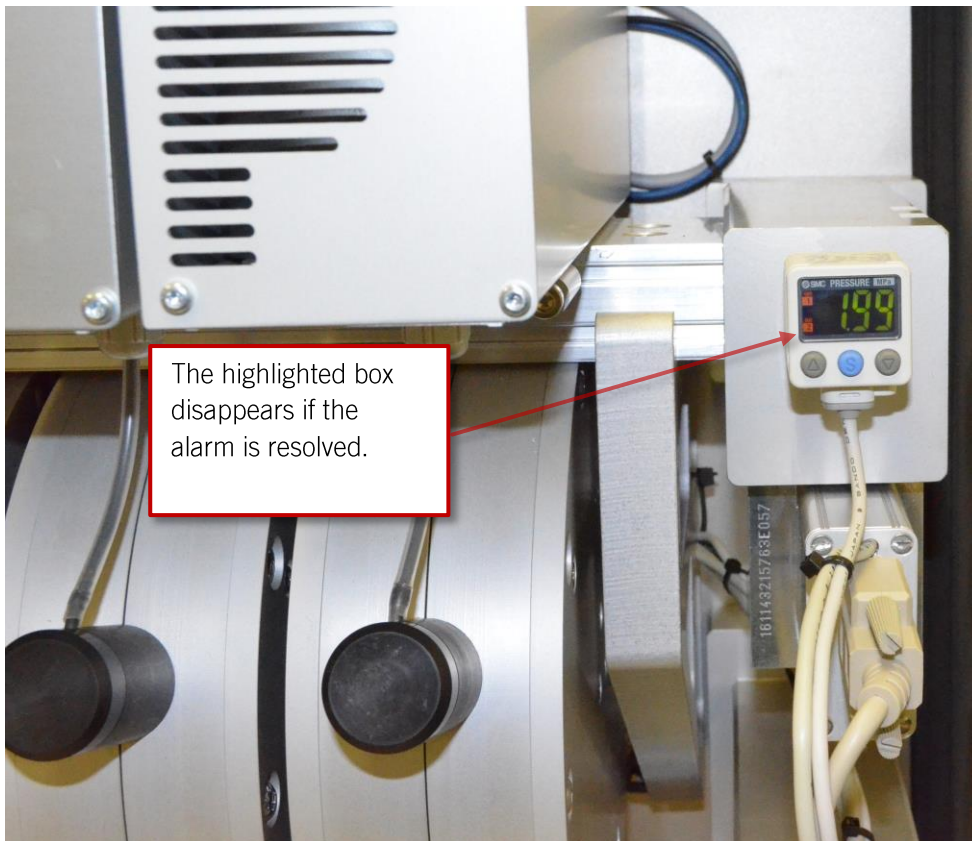


Figure 47 Cabinet inside GM6 – Pressure indicator



Figure 48 Cabinet inside GM12 and GM18 – Pressure indicator

3.2 Backflow protector

This alarm triggers a quick stop and shuts down the ozone generator immediately.

This alarm is only applicable if a Primozone Backflow protector (BFP) has been installed on the generator.

3.2.1 Cause of the alarm

Water has started to flow backward in the gas-stream toward the ozone generator. The BFP has detected this and stopped the water from flowing backward. This is schematically shown in Figure 49.

3.2.2 Action

Make sure the system is installed in accordance with the installation manual and Figure 49.

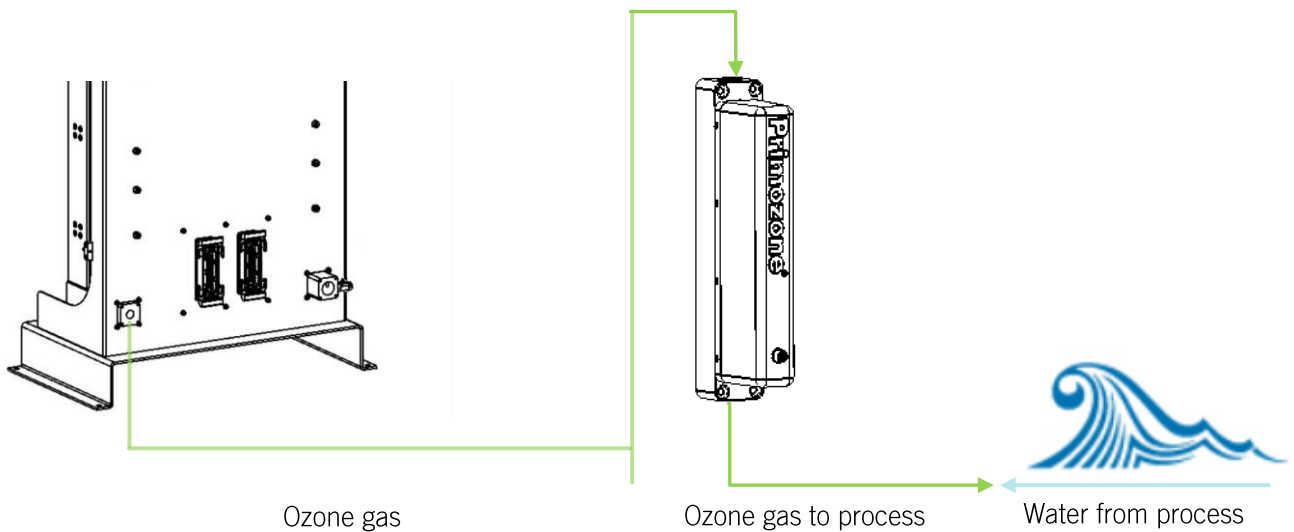


Figure 49 System installation



Caution

When emptying the BFP, left over ozone will come out to the ambient environment. Make sure to follow the local regulations to use appropriate precaution.



Step by step instructions:

1. Start by identifying why the problem has occurred by analyzing the dissolution system.
2. Remedy the root cause of the problem so that future problems could be avoided.
3. Open the vents to let the water out, see vents in Figure 50, indicated with red arrows.
4. Replace the o-rings (see Table 4 for spare part number), close the vents and make sure that the vents are sealed. See vents in Figure 50, indicated with red arrows.
5. Acknowledge the alarm.
6. Start the generator.

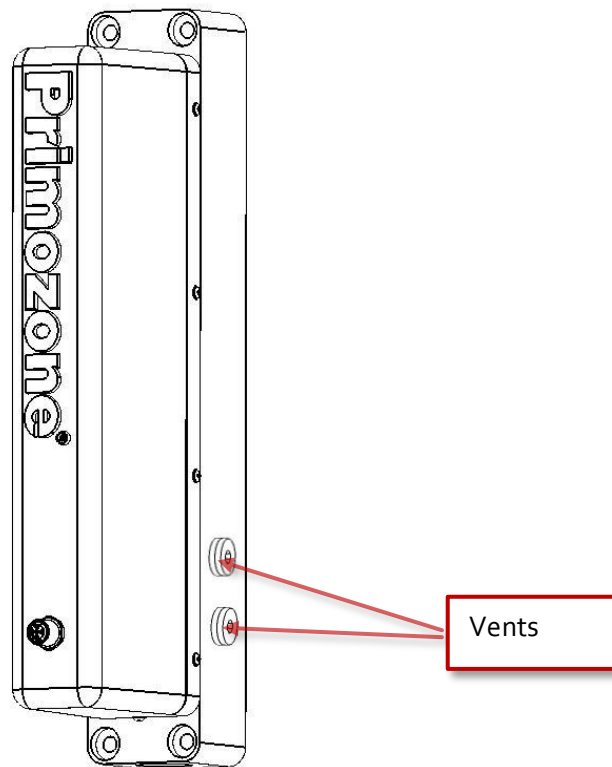


Figure 50 Open vents on the BFP to let water out

3.3 High water temperature

This alarm triggers a controlled stop and shuts down the ozone generator after purging.

3.3.1 Cause of the alarm

If the inlet water temperature is above 25°C or the outlet water temperature is above 30°C this alarm is triggered.

3.3.2 Action

1. Check the cooling water flow and temperature.
2. Make sure that the cooling water goes in at the bottom and out at the top, see Figure 51.
3. Force the water valve (if the generator is equipped with the optional water valve) in accordance with Section 2.27.
4. Acknowledge the alarm.
5. Start the ozone generator.

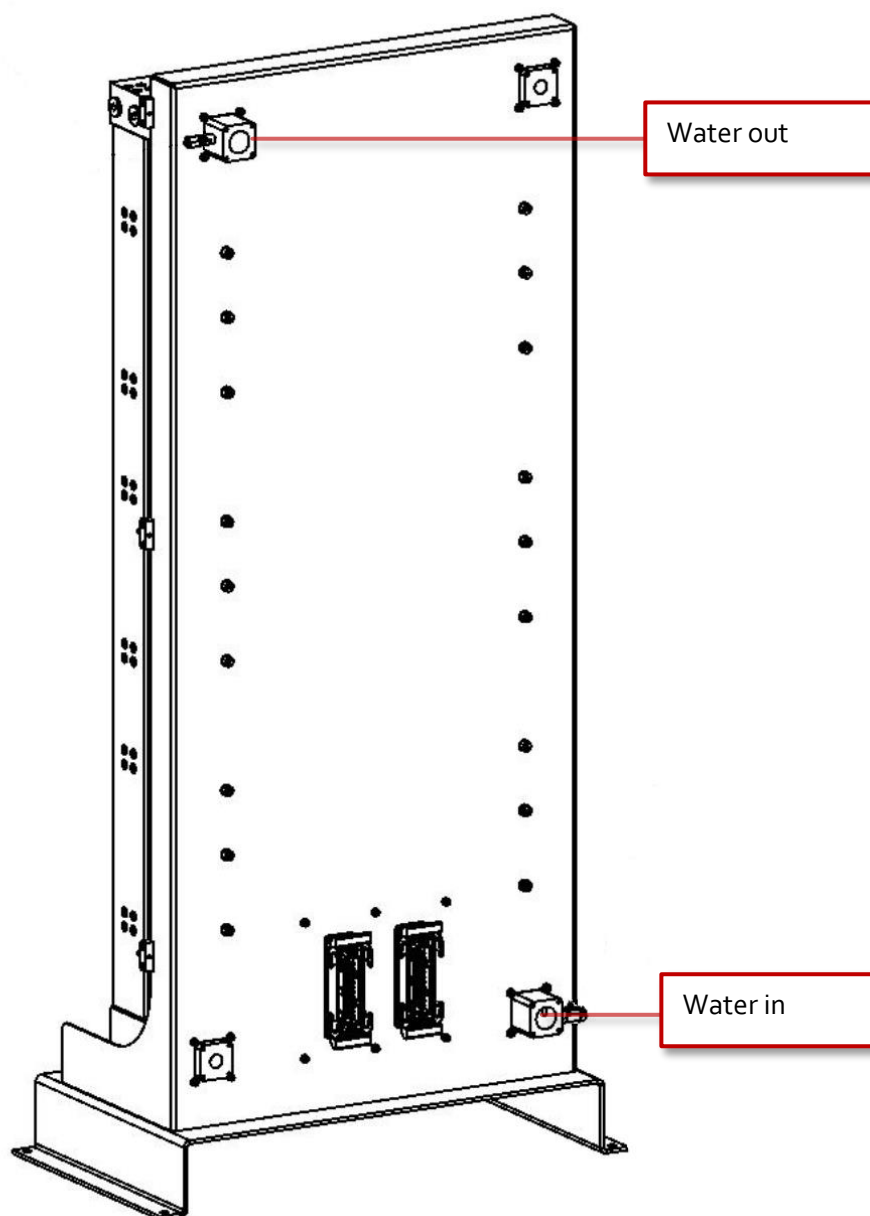


Figure 51 Water direction (GM18 in this example)



3.4 Communication watchdog (Communication to overhead system)

When a Watchdog (WD) (Communication to overhead system) alarm has occurred, the result is as follows:

- A quick stop – the generator stops directly, with ozone in the generator and pipes.
- A controlled stop – shuts down the generator after purging.
- No stop – the generator continues operation.

Which one is triggered depends on the settings made earlier, see Section 2.21 for more information.

This alarm is only applicable if the External Modbus TCP is installed.

3.4.1 Cause of the alarm

The system communicating with the generator over Modbus TCP has not changed the watchdog bit that shall be altered every second. For more information, see the External Communication manual.

3.4.2 Action

1. Check the implementation of the Modbus TCP protocol between the systems.
2. Check the cable between the systems
3. Check if the cable runs in the proximity of a disturbance source.
4. Check that the communication partner is powered and running.
5. Remedy the problem identified in steps 1-4.
6. Acknowledge the alarm
7. If the alarm has caused a controlled stop, restart the ozone generator.

3.5 Low gas flow

The Low gas flow alarm triggers a warning alarm. In this case, the generator stops producing ozone and shuts down the MiniSEPTs.

3.5.1 Cause of the alarm

The Low gas flow alarm is triggered due to less than 7% of the maximum gas flow given a concentration was obtained. This means that the alarm limit varies for different concentrations.

3.5.2 Action

1. Check if a valve or dissolution is obstructing the gas flow downstream.
2. Check if the gas pressure is high enough. Note that the pressure can differ depending on whether or not the generator is running.
3. Remedy the cause found in points 1 and 2.
4. The generator starts by itself when the alarm condition is no longer present.

If the problem is still present, test to force gas flow in accordance with Section 2.27.

3.6 Gas flow regulation

The Gas flow regulation alarm triggers an information alarm. This means that the ozone generator continues to function and keeps producing ozone, but not at the correct rate. See Section 2.23 for information about how to set the gas flow.

3.6.1 Cause of the alarm

The alarm is triggered if the set value and the process value of the gas flow differs for more than 2 minutes.

3.6.2 Action

1. Check if a valve or dissolution is obstructing the gas flow downstream.
2. Check if the gas pressure is high enough. Note that the pressure can differ whether or not the generator is running.
3. Remedy the cause found in points 1 and 2.
4. The generator starts by itself when the alarm condition is no longer present.

If the problem is still present, test to force gas flow in accordance with Section 2.27.



3.7 Low water flow

The Low water flow alarm is a stopping alarm and it triggers a controlled stop. This only occurs if a flow switch is present.

3.7.1 Cause of the alarm

The alarm is triggered if the generator is in step prepurge, ramp-up or ozone production for more than 10 s and the cooling water flow switch indicates that the water flow is low.

3.7.2 Action

Check the water supply.

3.8 Faulty temperature sensor

The Faulty water temperature sensor alarm is a stopping alarm which triggers a controlled stop.

3.8.1 Cause of the alarm

The signal from either water in or water out is not working properly.

3.8.2 Action

Check the water sensor and the sensor wires.

3.9 MiniSEPT x alarm xx

The MiniSEPT X (1-6 in GM6, 1-12 in GM12, and 1-18 in GM18) alarm triggers a non-critical information alarm. This means that one of the MiniSEPTs (1-6 in GM6, 1-12 in GM12, and 1-18 in GM18) in the generator has gone into safety mode.

If all of the MiniSEPTs have triggered similar alarms, the generator is no longer producing ozone. If other MiniSEPTs are without alarms, the generator is producing ozone with reduced capability. The state of the MiniSEPTs is quickly assessed by the following indication lights.

- MiniSEPTs in safe state, blinks with green light.
- MiniSEPTs in standby show continuous green light.
- MiniSEPTs in ozone production show continuous blue light.
- MiniSEPTs that have lost communication show continuous yellow light.

3.9.1 Cause of the alarm

This means that the MiniSEPT has gone into safety mode.

3.9.2 Action



BEFORE REMOVAL OF COVERS

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator. Physical contact with electrical parts can cause severe harm or death. If an accident occurs, immediately call for medical assistance.



Caution

The following actions shall be avoided if the automatic fuse has already been tripped.

The operator must restart the MiniSEPT by turning off the FX-automatic fuse (see Figure 52 for GM6 and Figure 53 for GM12 and GM18) and then turn it back on after 10 seconds.

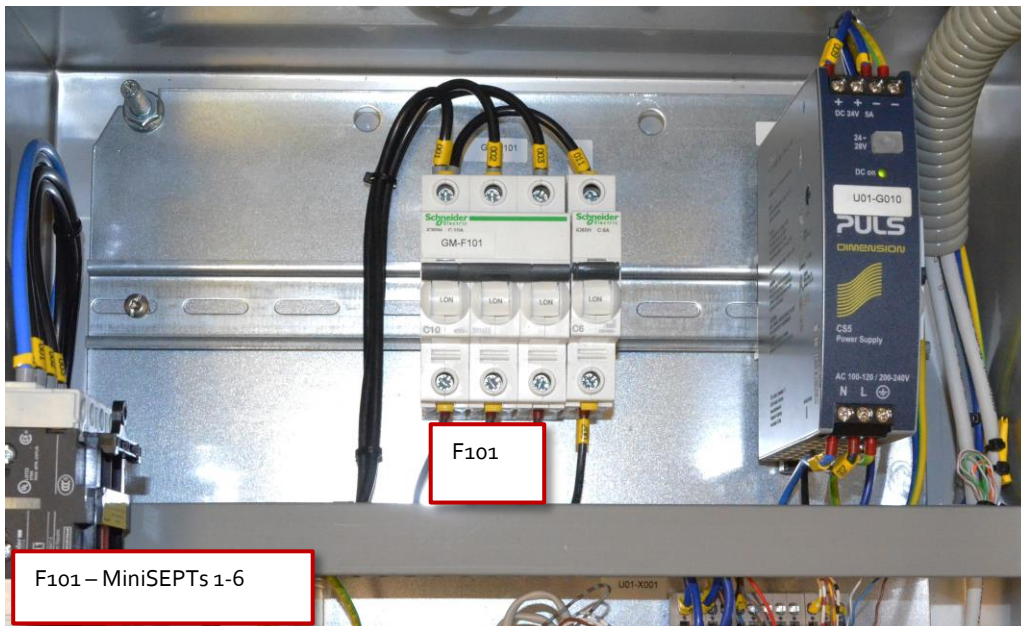


Figure 52 Inside GM6 power and control cabinet - Turn off FX automatic fuse to restart the MiniSEPT

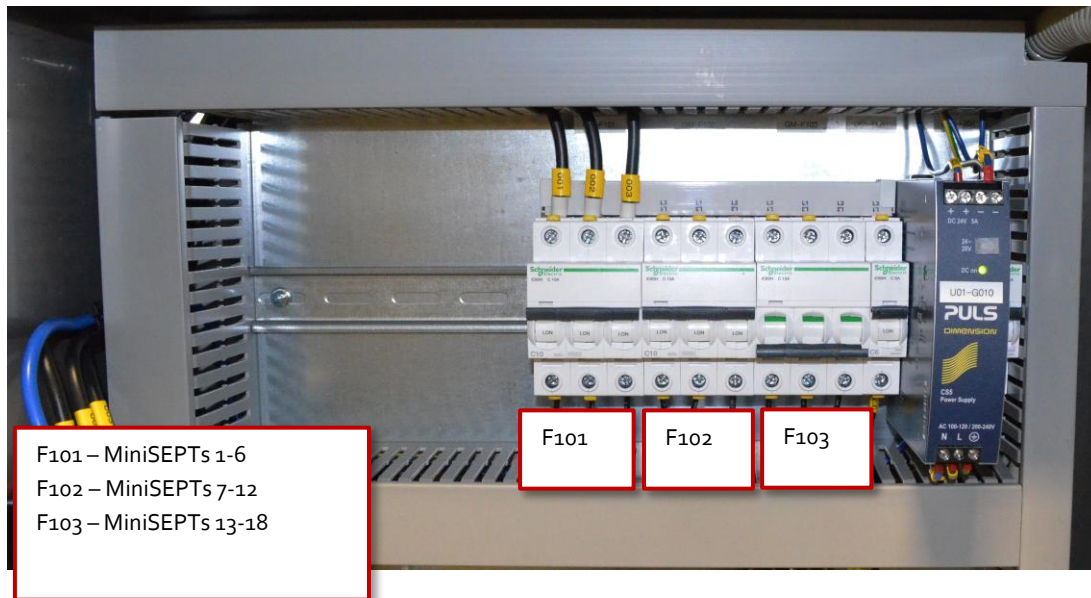


Figure 53 Inside GM12 and GM18 power and control cabinet - Turn off FX automatic fuse to restart the MiniSEPT

If the restart does not fix the problem, write down the alarm identification number (for example, MiniSEPT 1 alarm 52) and contact Primozone.

3.10 MiniSEPT Communication Alarm

The MiniSEPT Communication Alarm triggers a non-critical information alarm. This means that the PLC cannot read from one or more of the MiniSEPTs. This does not mean that the MiniSEPTs are not running, as the alarm is only triggered if the reading fails.

The state of the MiniSEPTs is quickly assessed by the following indication lights:

- MiniSEPTs in safe state, blink with green light.
- MiniSEPTs in standby show green continuous light.
- MiniSEPTs in ozone production show continuous blue light.
- MiniSEPTs that have lost communication show continuous yellow light.

If all of the MiniSEPTs are blinking in safe state, the generator is no longer producing ozone.

3.11 Cause of the alarm

The PLC is not able to read from one or more of the MiniSEPTs. The PLC communicates over Modbus RTU with the MiniSEPTs and this alarm is based on the read function failing.

3.11.1 Action



BEFORE REMOVAL OF COVERS

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator.

Physical contact with electrical parts can cause severe harm or death.

If an accident occurs, immediately call for medical assistance.



Caution

Turn off the main switch whenever removing the cover.

1. Turn off the generator and wait for the post purging to complete.
2. Turn off the main switch.
3. If the communication is lost to all MiniSEPTs, check the bus connections in accordance with the circuit diagram.
4. Check the cables for the MiniSEPTs.
5. Switch on the main switch.
6. If the alarm keeps coming back, try the troubleshooting section for Modbus RTU communication.



4 REPLACE PARTS OF THE GENERATOR

4.1 Tools

Tools required to service the generator.

1. Allen keys metric
2. Torque wrench (1-25 Nm)
3. Wrench metric
4. Rubber mallet
5. Multimeter
6. High-Voltage Insulation Tester

4.2 Replacing a MiniSEPT



BEFORE REMOVAL OF COVERS

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator.

Physical contact with electrical parts can cause severe harm or death. If an accident occurs, immediately call for medical assistance.



Warning:

Make sure to disconnect the electricity prior to starting any reparation instructions.

1. Turn off the main switch.
2. Remove the front cover of the ozone generator to get access to the MiniSEPTs.

3. Carefully remove the high voltage cable from the reactor, see Figure 54.

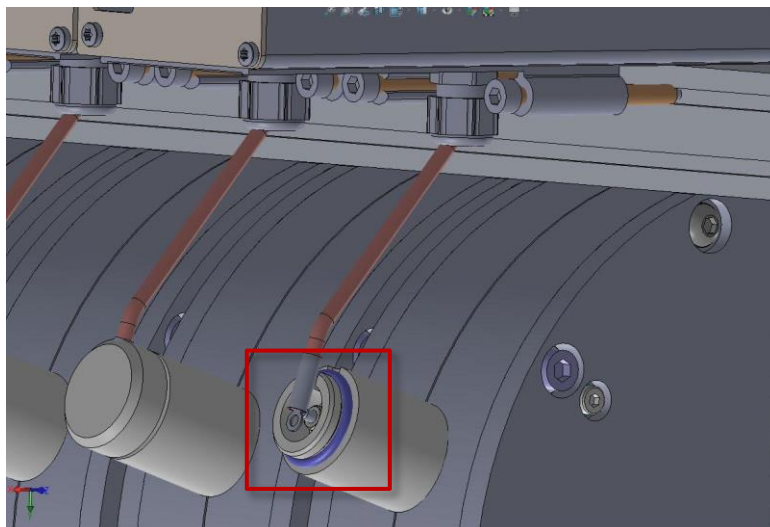


Figure 54 Remove high voltage cable

4. Loosen the two screws at the bottom of the MiniSEPT, see Figure 55. Gently move the MiniSEPT backward so that it is separated from the connection bar, see Figure 56.

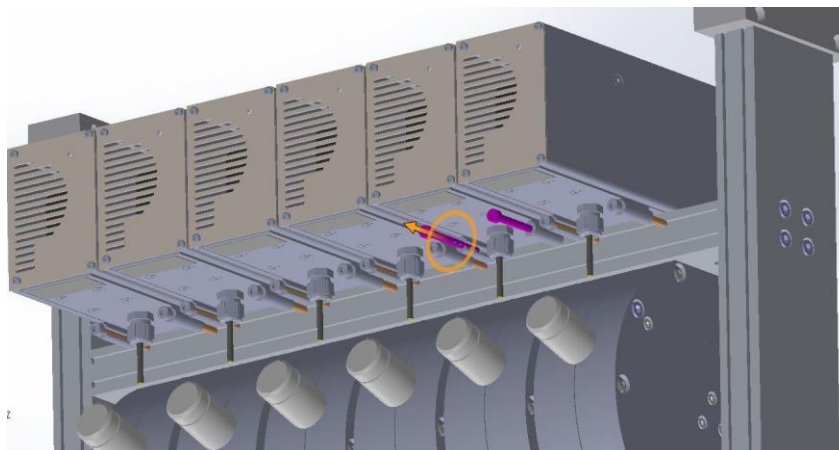


Figure 55 Remove a MiniSEPT

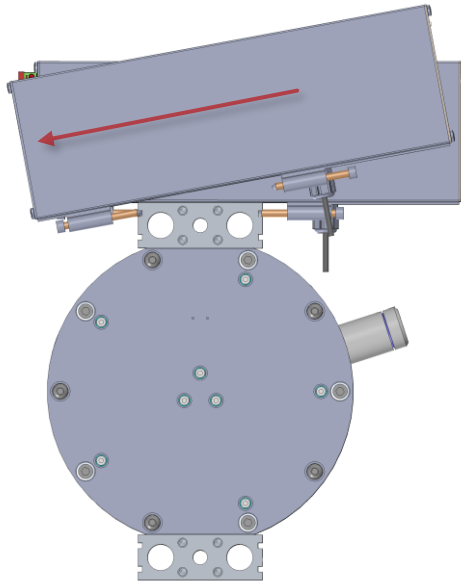


Figure 56 Move the MiniSEPT gently backward

5. Move the MiniSEPT forward so that it is possible to reach the signal and power connection at the back, see Figure 57.

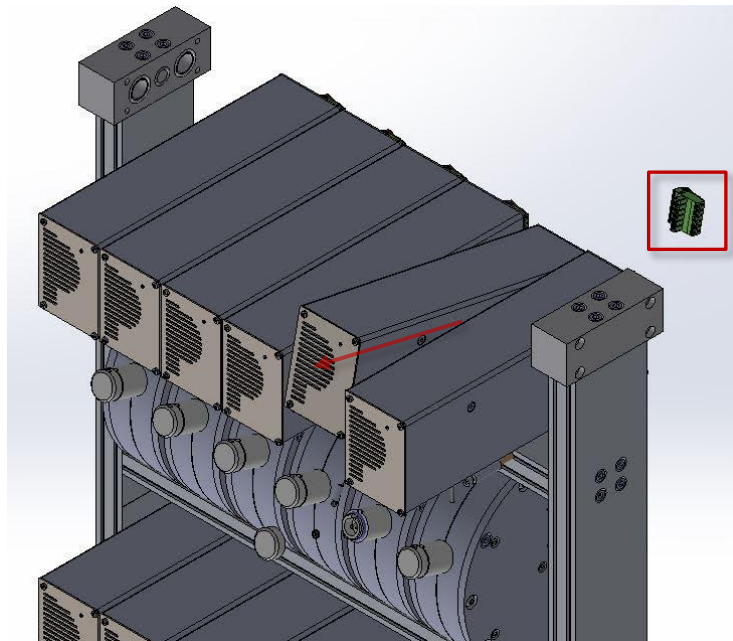


Figure 57 Move the MiniSEPT forward

6. Remove the signal and power connector at the back of the MiniSEPT, see red box in Figure 57.
7. Remove the MiniSEPT.
8. Set the positions (address) of the DIP-switches in the new MiniSEPT. The DIP-switches must have the same positions as the removed MiniSEPT had. The following steps describe how to do this:
 - a. Remove the two screws at the front left of the MiniSEPT (see

Figure 58) using torx T10.

- b. Remove the two screws at the back of the MiniSEPT that are placed diagonally to the just removed front screws, see Figure 59.

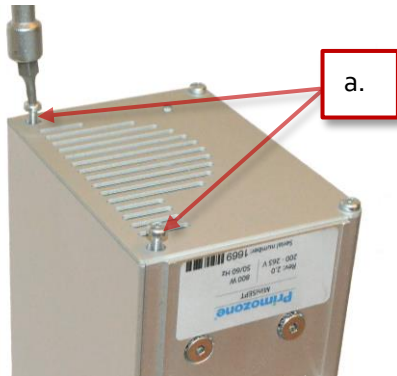


Figure 58 Remove screws at the front

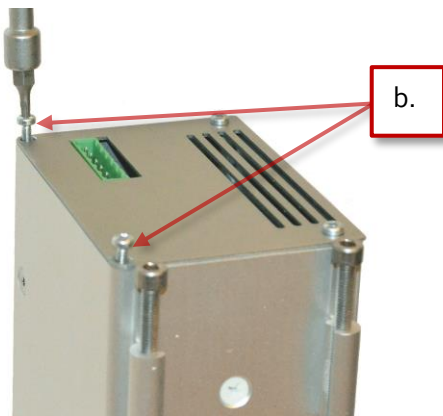


Figure 59 Remove screws at the back

Note: It is important to remove the screws in the described manner above so that the cover is removed by sliding it backward on the left hand side of the MiniSEPT.



- c. Remove the cover, see Figure 60.

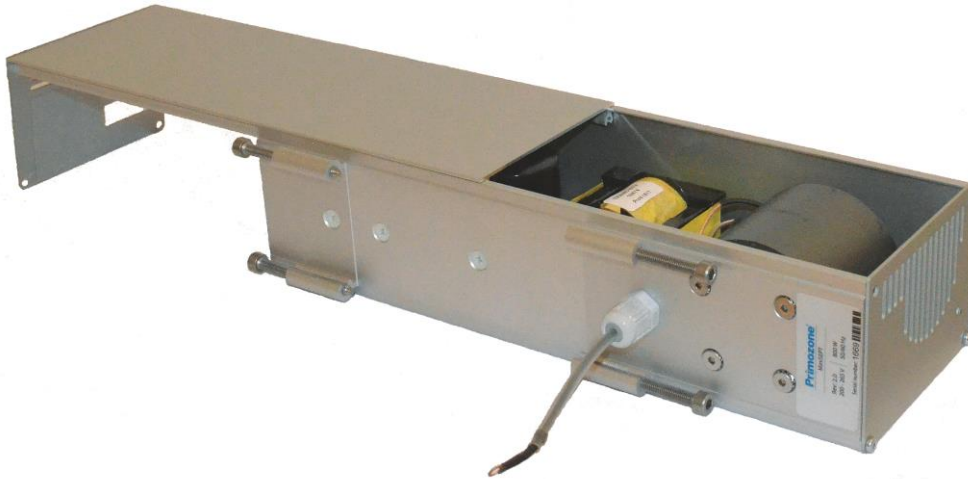


Figure 60 Remove the cover

- d. Locate the DIP-switches on the PCB, see the red circled area in Figure 61.

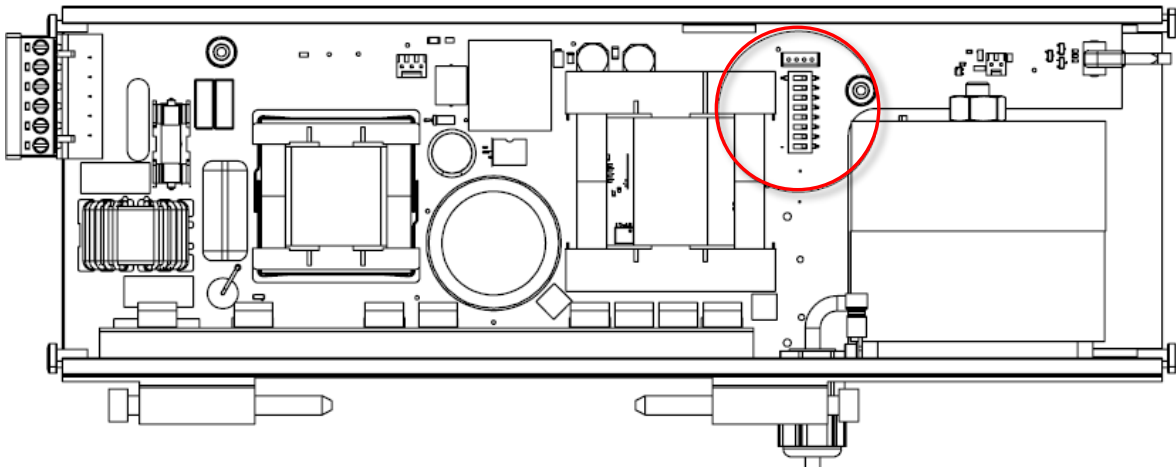


Figure 61 Locate the DIP-switches

- e. Use a small screwdriver or something similar to gently alter the DIP-switches. They must be set in exactly the same positions (address) as in the just removed MiniSEPT, see Figure 62.

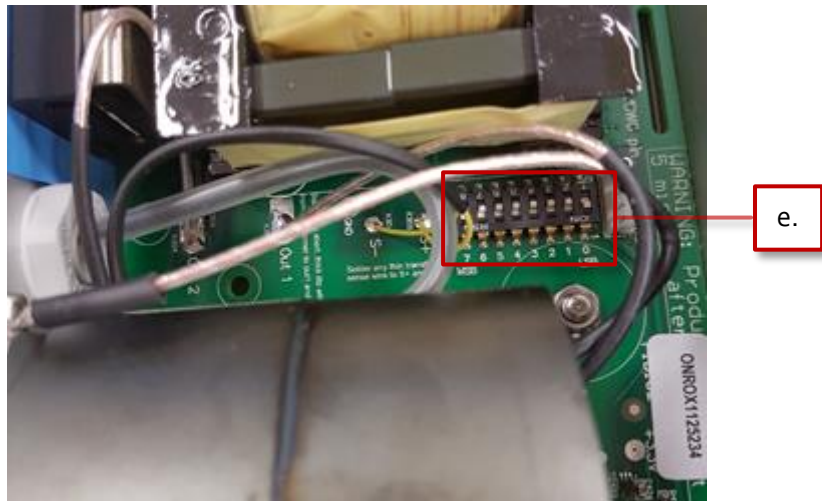


Figure 62 Set the positions of the DIP-switches in the new MiniSEPT

- f. Do the same procedure in reverse order when the correct positions has been set.
9. Do the same procedure in reverse order when changing to the new MiniSEPT. Make sure that the new MiniSEPT is firmly mounted on the connection bar and that the connection bar is dust free so that the cooling works properly.



Caution:

Gently dry the top bar and the top of the reactors with a clean and dust free rag. The rag must be clean and without traces of oil.

4.3 Replacing a reactor block – GM6



BEFORE REMOVAL OF COVERS

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator.

Physical contact with electrical parts can cause severe harm or death.

If an accident occurs, immediately call for medical assistance.

**Warning:**

Make sure that the system is fully purged, so that no residual ozone is left in the system.

**Warning:**

Make sure to disconnect the electricity prior to starting any reparation instructions.

1. Turn off the main switch
2. Close the supply valves for the cooling water and the valves for oxygen and ozone.
3. Remove the generator cover.
4. Place a water container under the drain valve and open the drain valve gently to release the water pressure, see Figure 63.
5. Open the bleed valve at the top of the generator, see Figure 63. The generator contains about 3 liters.

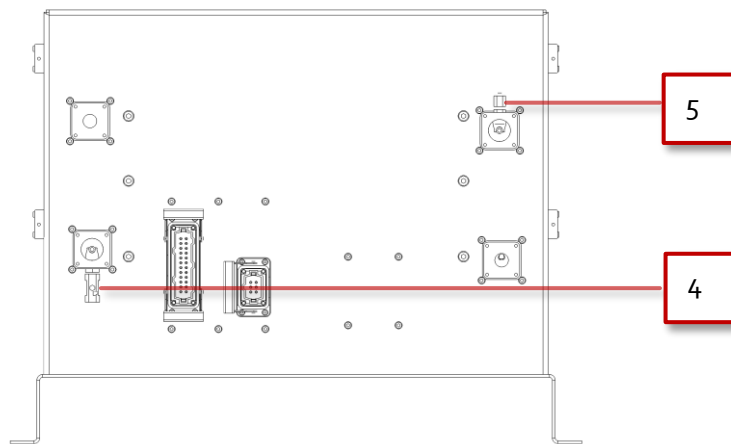


Figure 63 Open the drain and bleed valves

6. Loosen the screws around water in and water out and the screws around oxygen in and ozone out connections at the back of the generator, see red highlighting in Figure 64.

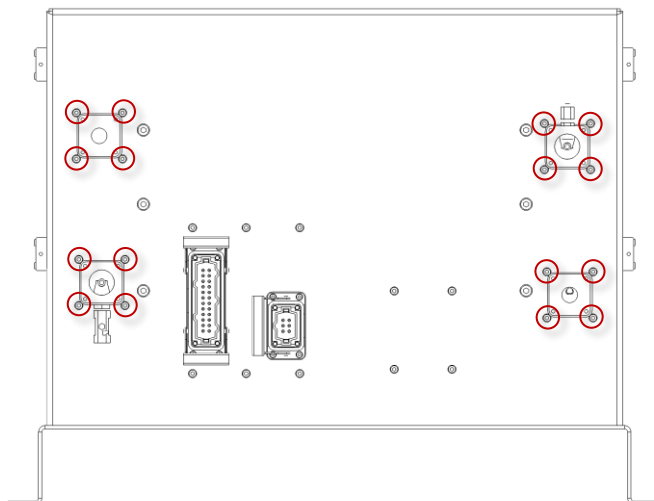


Figure 64 Loosen the screws at the back of the generator

7. Remove the screws on both sides holding the bottom connection bar (M6), see Figure 65.
8. Remove the screws on both sides holding the top connection bar (M6), see Figure 65.

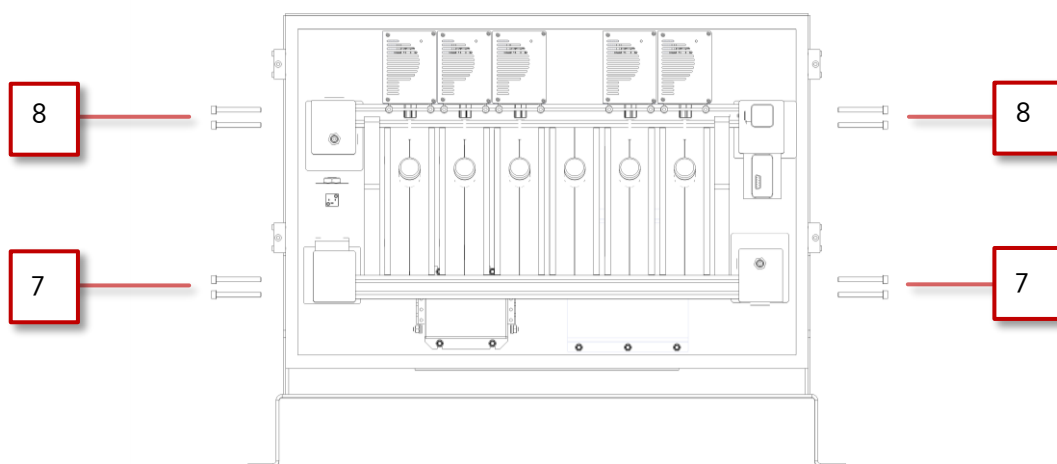


Figure 65 Remove the screws holding the bottom and top connection bars for the reactor block

9. Move the block a little to the side and lift it out gently.

**Caution:**

A reactor block weighs around 40 kg. Remove it carefully.

10. Replace the o-rings on the vertical bars (see Table 4 for spare part number).
11. Carefully slide the new reactor block in place.
12. Reassemble in reverse order, tighten the bolts to the correct torque, see Table 3.

4.4 Replacing a reactor block – GM12 and GM18

**BEFORE REMOVAL OF COVERS**

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.

**HIGH VOLTAGE**

Do not touch any inner electrical parts of the ozone generator.

Physical contact with electrical parts can cause severe harm or death.

If an accident occurs, immediately call for medical assistance.

**Warning:**

Make sure that the system is fully purged, so that no residual ozone is left in the system.

**Warning:**

Make sure to disconnect the electricity prior to starting any reparation instructions.

1. Turn off the main switch
2. Close the supply valves for the cooling water and the valves for oxygen and ozone.
3. Remove the generator cover.

4. Place a water container under the drain valve and open the drain valve gently to release the water pressure, see Figure 66.

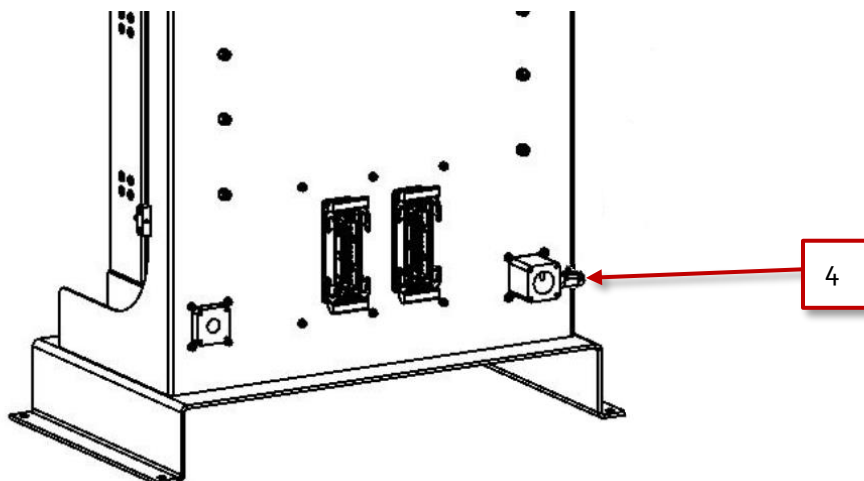


Figure 66 Open drain valve

5. Open the bleed valve at the top of the generator, see Figure 67. The generator contains about 3 liters.

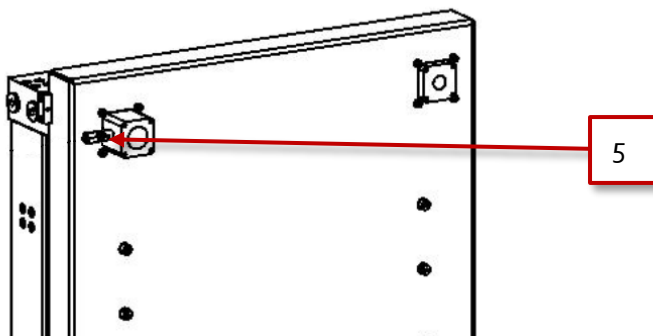


Figure 67 Open bleed valve



6. Remove the MiniSEPTs above the reactor block before removing the reactor block, see Section 4.2. Make sure that their placements are clearly marked so that they are placed in the same place when the new reactor block has been inserted.
7. Loosen the four screws (M5) at the back of the generator around the water connection out unit, see Figure 68.

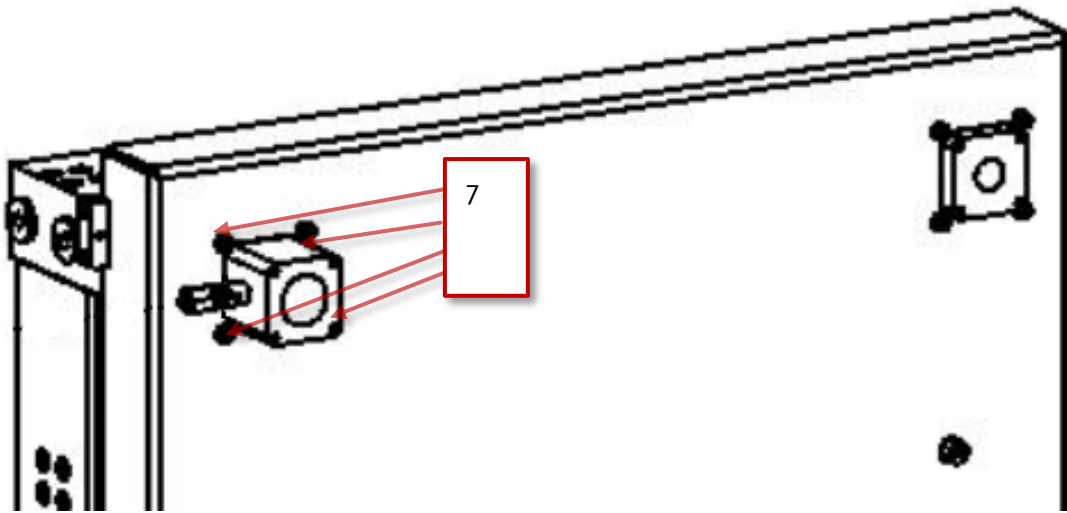


Figure 68 Loosen screws at the back

8. Remove the four screws on the front top water connection out, see Figure 69.

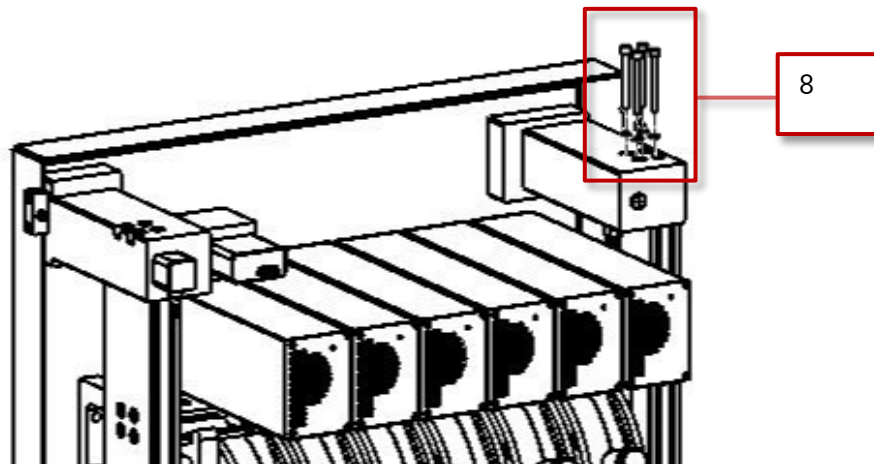


Figure 69 Remove screws to loosen the vertical connection bar

9. Remove the screws under the ozone out connection, see Figure 70.

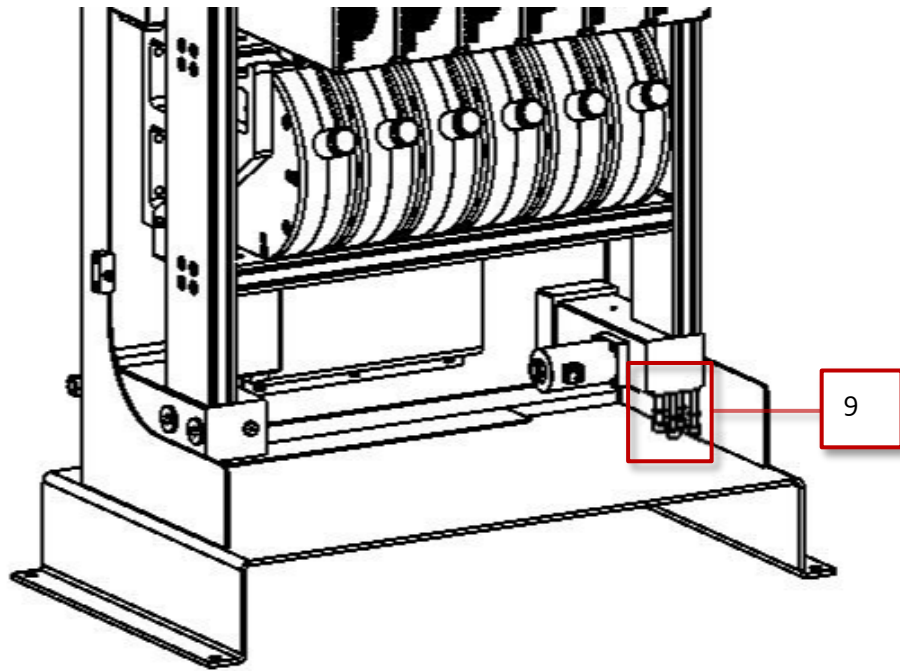


Figure 70 Remove screws to loosen the vertical connection bar



10. Remove all the screws (M6) on the right vertical bar on the generator, see Figure 71.

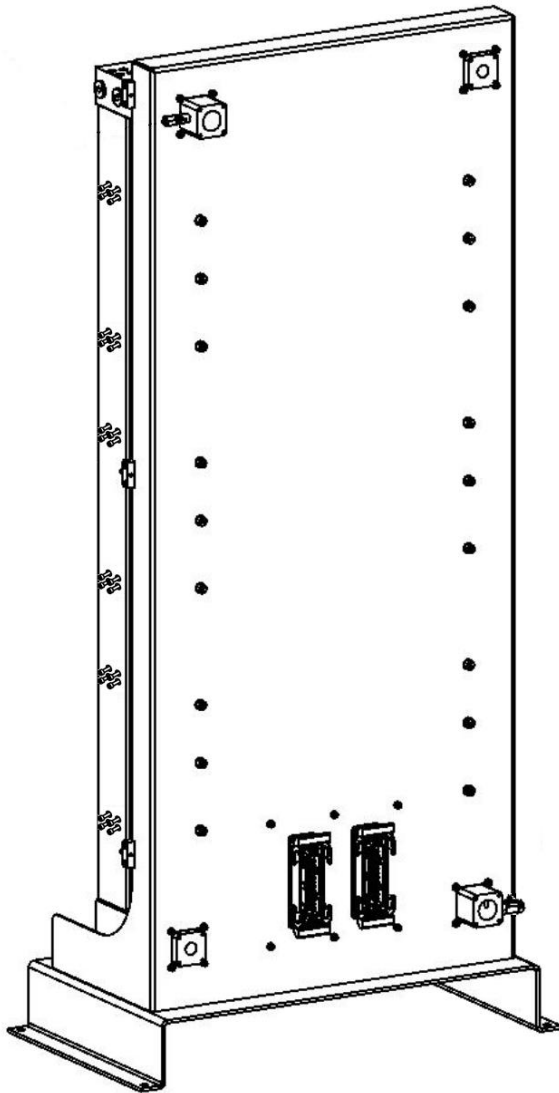


Figure 71. Loosen screws and remove the vertical bar

11. Remove the vertical connection bar on the right side.
12. Remove the eight screws on the left side (M6) for the reactor block that is to be changed, see Figure 72.

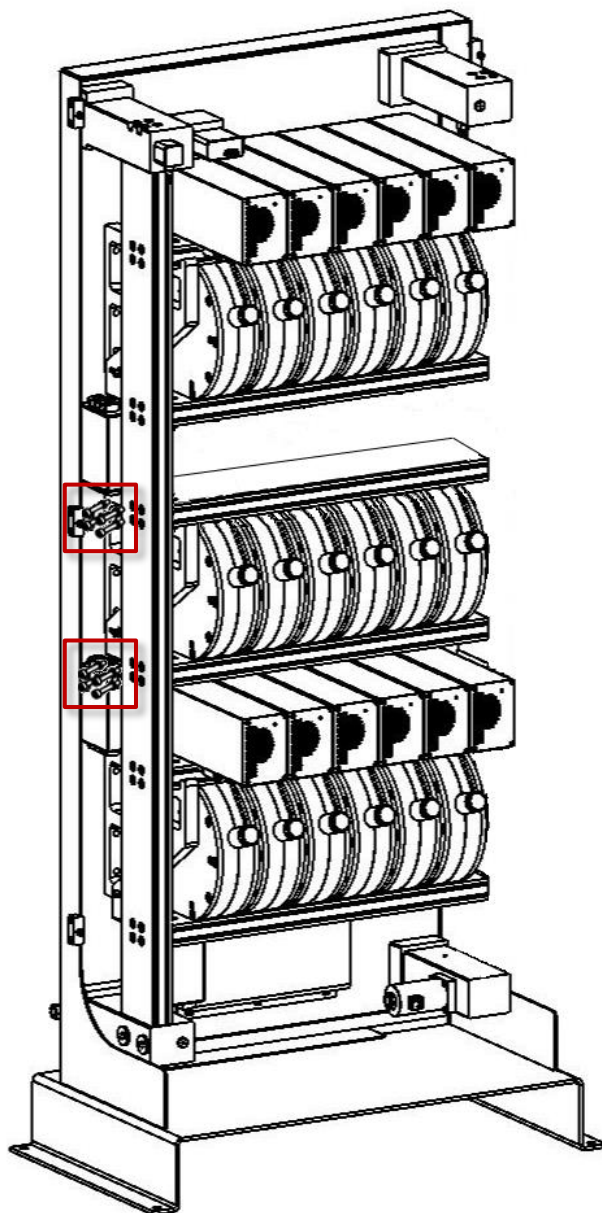


Figure 72 Remove screws for the broken reactor on the left vertical bar

13. Move the block a little to the side and lift it out gently.



Caution:
A reactor block weighs around 40 kg. Remove it carefully.

14. Replace the o-rings on the vertical bars (see Table 4 for spare part number).
15. Carefully slide the new reactor block in place.



16. Reassemble in reverse order, tighten the bolts to the correct torque, see Table 3.

4.5 Replacing a reactor – GM6



BEFORE REMOVAL OF COVERS

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator.

Physical contact with electrical parts can cause severe harm or death.

If an accident occurs, immediately call for medical assistance.



Warning:

Make sure that the system is fully purged, so that no residual ozone is left in the system.



Warning:

Make sure to disconnect the electricity prior to starting any reparation instructions.

1. Turn off the main switch.
2. Close the supply valves for the cooling water and the valves for oxygen and ozone.
3. Remove the generator cover.

4. Place a water container under the drain valve and open the drain valve gently to release the water pressure, see Figure 73.
5. Open the bleed valve at the top of the generator, see Figure 73. The generator contains about 3 liters.

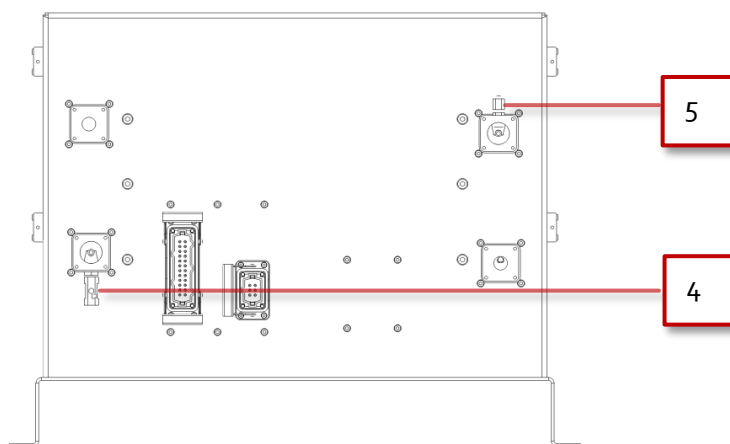


Figure 73 Open drain and bleed valves

6. Use a megohmmeter to test that the reactor indeed must be replaced. Use test voltage 5000 V and check the resistance, which should be between 10-100 G Ω for a properly working reactor.
7. Remove at least two MiniSEPTs above the broken reactor before removing the reactor, see Section 4.2 for more information. Make sure that their placements are clearly marked so that they are placed in the same place when the new reactor has been inserted.
8. Loosen the screws around water in and ozone out connections at the back of the generator, see red highlighting in Figure 74.

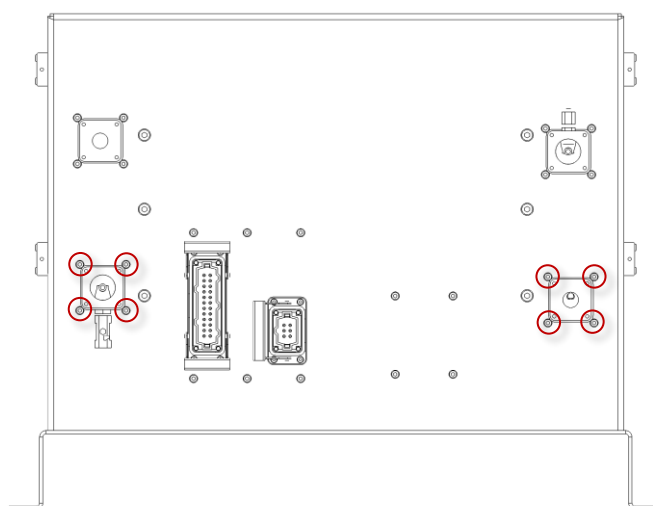


Figure 74 Loosen screws at the back of the generator



- Loosen all of the screws (M6) on the bottom connection bar for the broken reactor block 5 mm, see Figure 75.

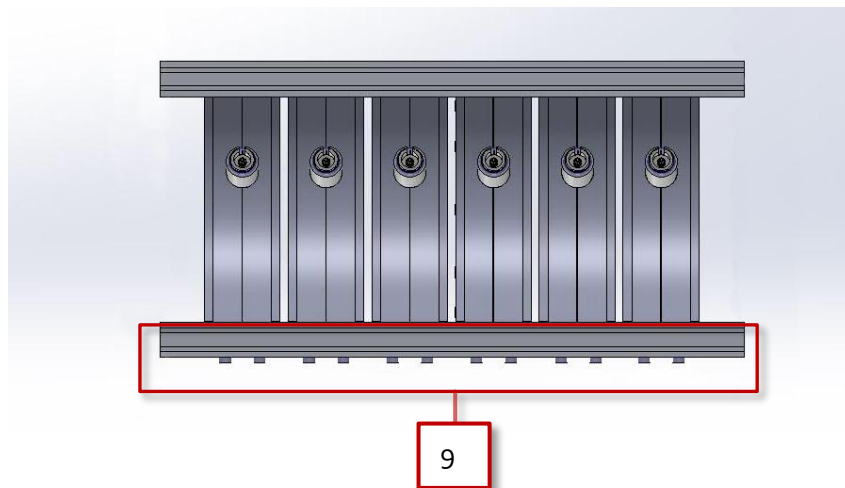


Figure 75 Loosen all screws on the bottom connection bar

- Remove the four screws on each side of the bottom connection bar (M6), see Figure 76.

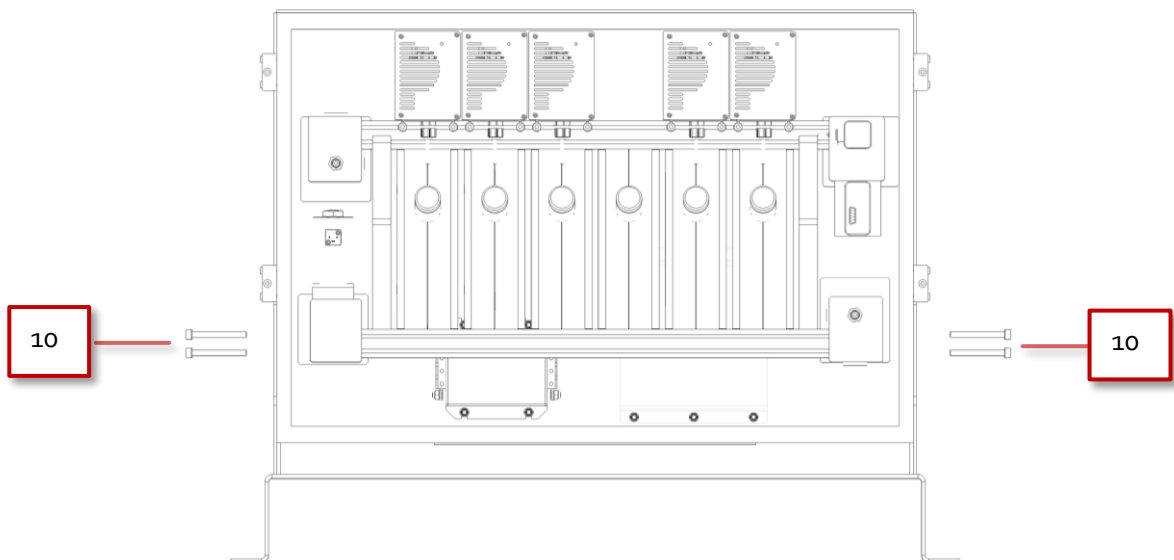


Figure 76 Remove the screws holding the bottom connection bar

- Remove the four screws (M6) on the bottom connection bar holding the broken reactor, see Figure 77.
- Remove the four screws (M6) on the top connecting bar holding the broken reactor, see Figure 77.

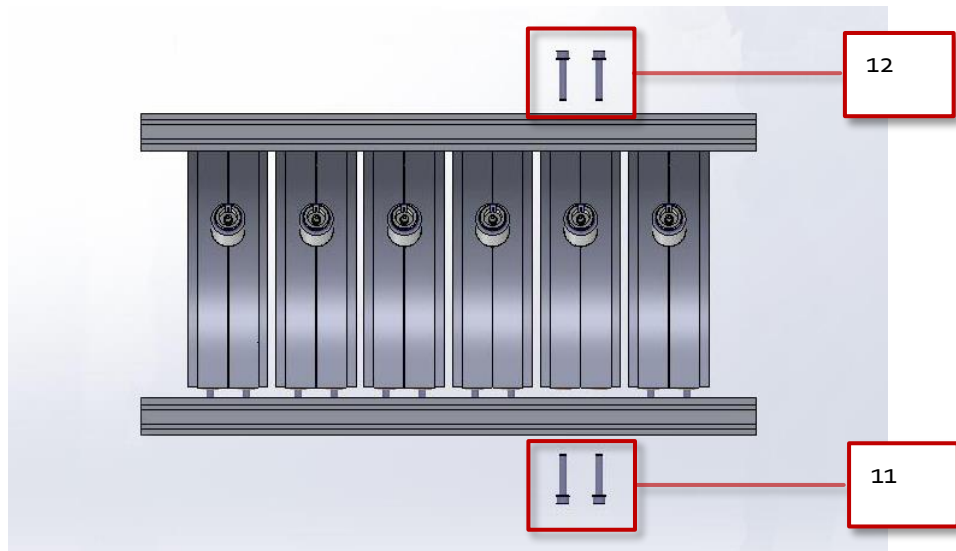


Figure 77 Remove screws on the connection bars

13. Gently tap the bottom connection bar with a rubber mallet to loosen the reactor.
14. Carefully slide out the reactor, see Figure 78.

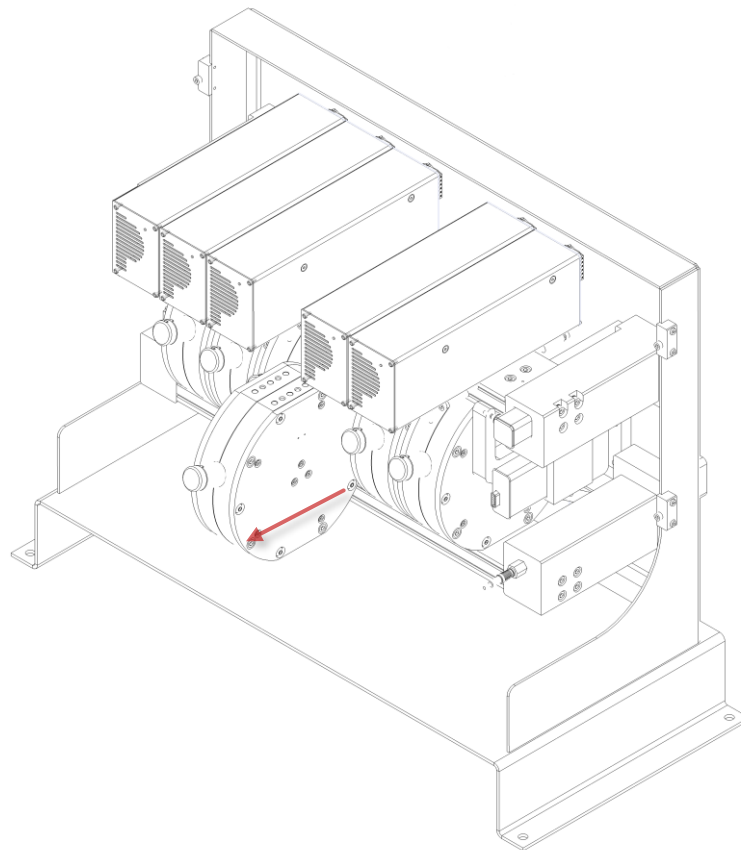


Figure 78 Gently slide out the broken reactor

15. Replace the o-rings on the top and bottom connection bars, see Table 4 for spare part number.



16. Carefully slide in the new reactor.
17. Reassemble in reverse order, tighten the bolts to the correct torque, see Table 3. Replace the o-rings on the vertical bars, see Table 4 for spare part number.

4.6 Replacing a reactor – GM12 and GM18



BEFORE REMOVAL OF COVERS

Do not remove the covers of an ozone generator unless the main power has been switched off.

Do not remove the covers of the GM-series ozone generators if not trained by Primozone personnel and have a written authorization.



HIGH VOLTAGE

Do not touch any inner electrical parts of the ozone generator.

Physical contact with electrical parts can cause severe harm or death.

If an accident occurs, immediately call for medical assistance.



Warning:

Make sure that the system is fully purged, so that no residual ozone is left in the system.



Warning:

Make sure to disconnect the electricity prior to starting any reparation instructions.

1. Turn off the main switch.
2. Close the supply valves for the cooling water and the valves for oxygen and ozone.
3. Remove the generator cover.

4. Place a water container under the drain valve and open the drain valve gently to release the water pressure, see Figure 79.

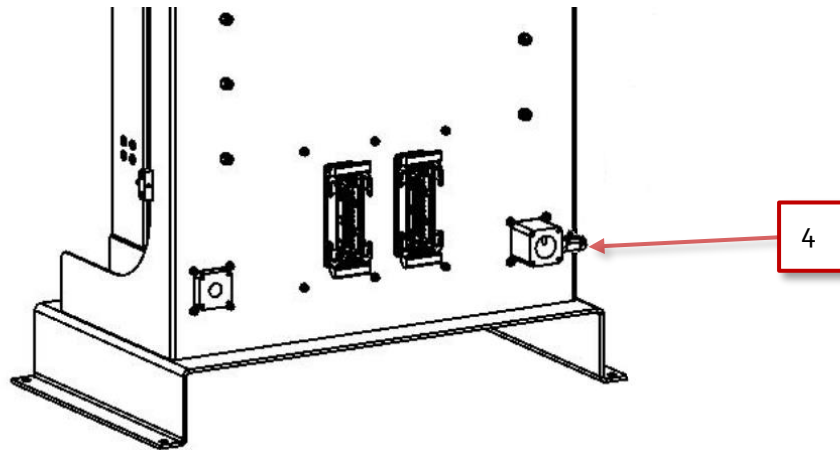


Figure 79 Open drain valve

5. Open the bleed valve on the side of the generator, see Figure 80. The generator contains about 3 liters.

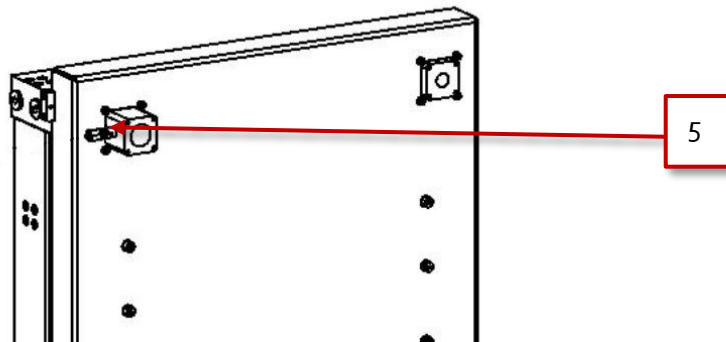


Figure 80 Open bleed valve

6. Use a megohmmeter to test that the reactor indeed must be replaced. Use test voltage 5000 V and check the resistance, which should be between 10-100 G Ω for a properly working reactor.



7. Remove the at least two MiniSEPTs above the broken reactor before removing the reactor, see Section 4.2 for more information. Make sure that their placements are clearly marked so that they are placed in the same place when the new reactor has been inserted.
8. Loosen the four screws (M5) at the back of the generator around the water connection out unit, see Figure 81.

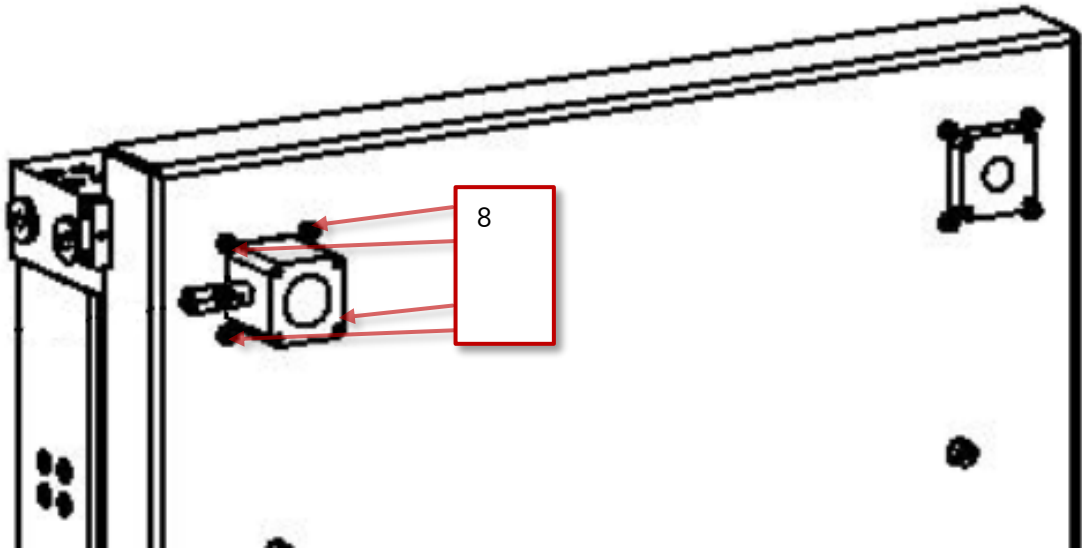


Figure 81 Loosen screws at the back

9. Remove the four screws on the front top water connection out, see Figure 82.

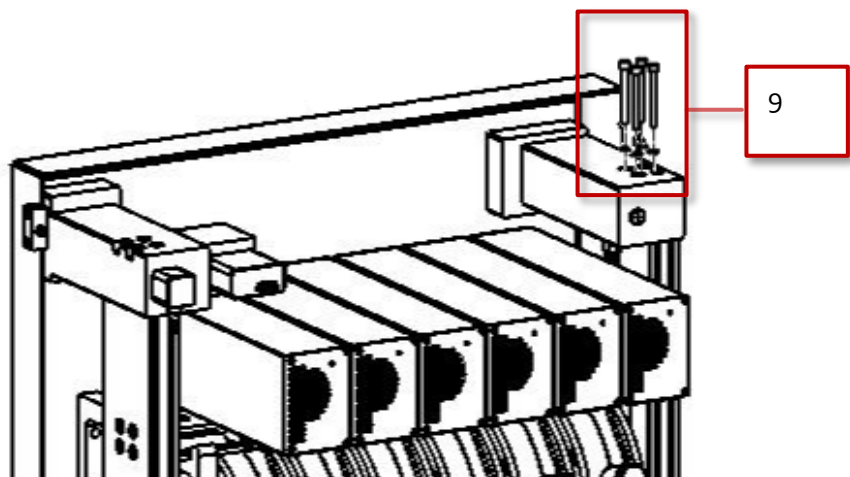


Figure 82 Remove screws to loosen the vertical connection bar

10. Remove the screws under the ozone out connection, see Figure 83.

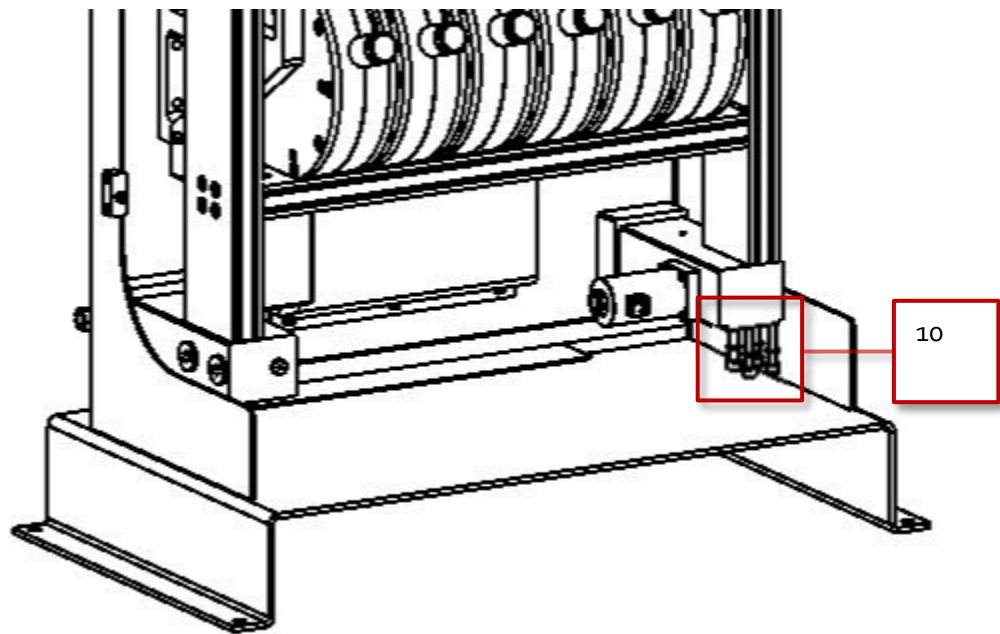


Figure 83 Remove screws to loosen the vertical connection bar



11. Loosen all the screws (M6) on the vertical bars 5 mm, that is, on both sides of the generator, see Figure 84.

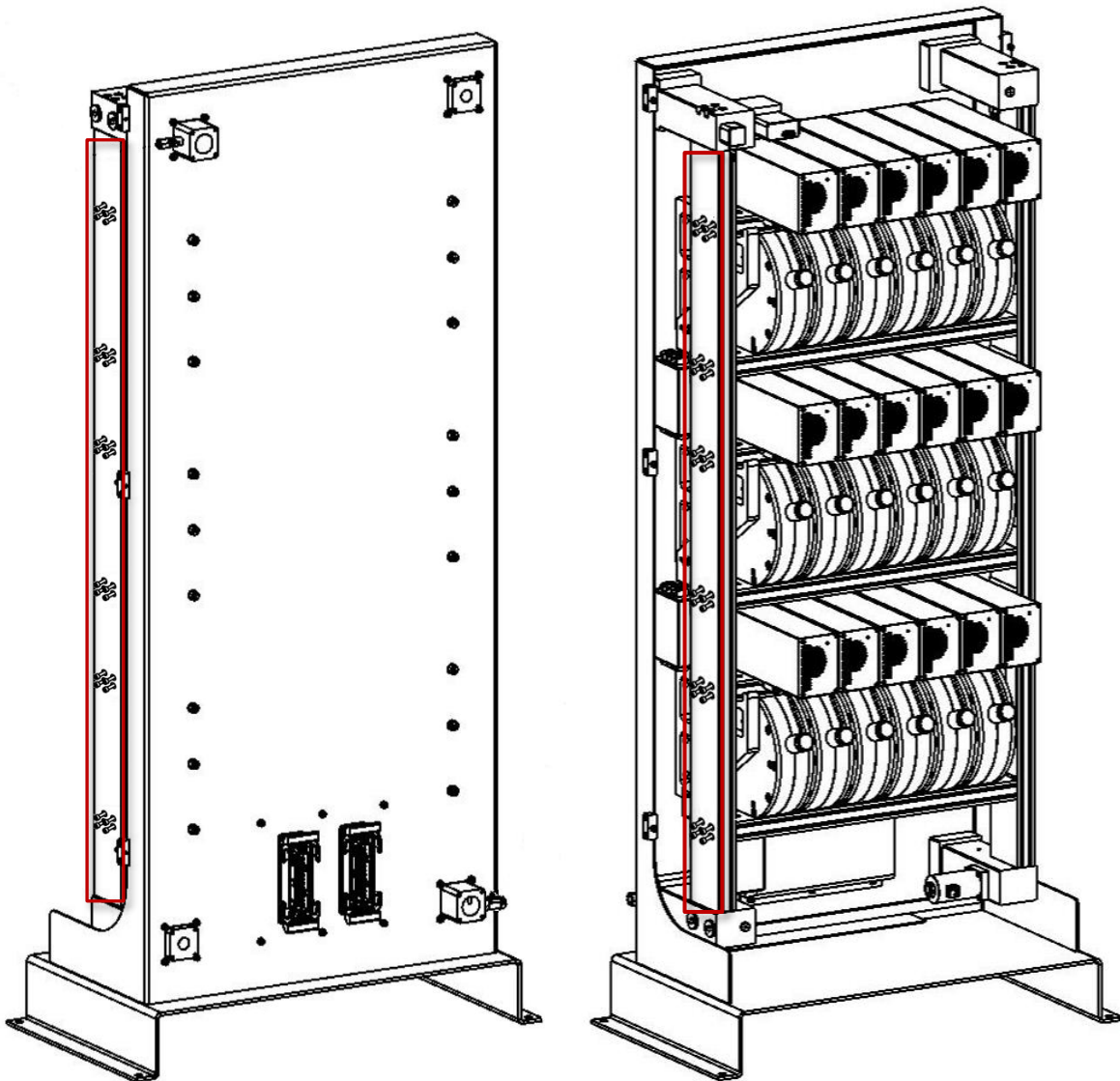


Figure 84 Loosen screws on vertical bars

12. Loosen all the screws 5 mm (M6) on the bottom connection bar under the broken reactor, see Figure 85.
13. Remove the 4 screws (M6) on each side of the vertical bars holding the bottom connection bar under the broken reactor, see Figure 85.

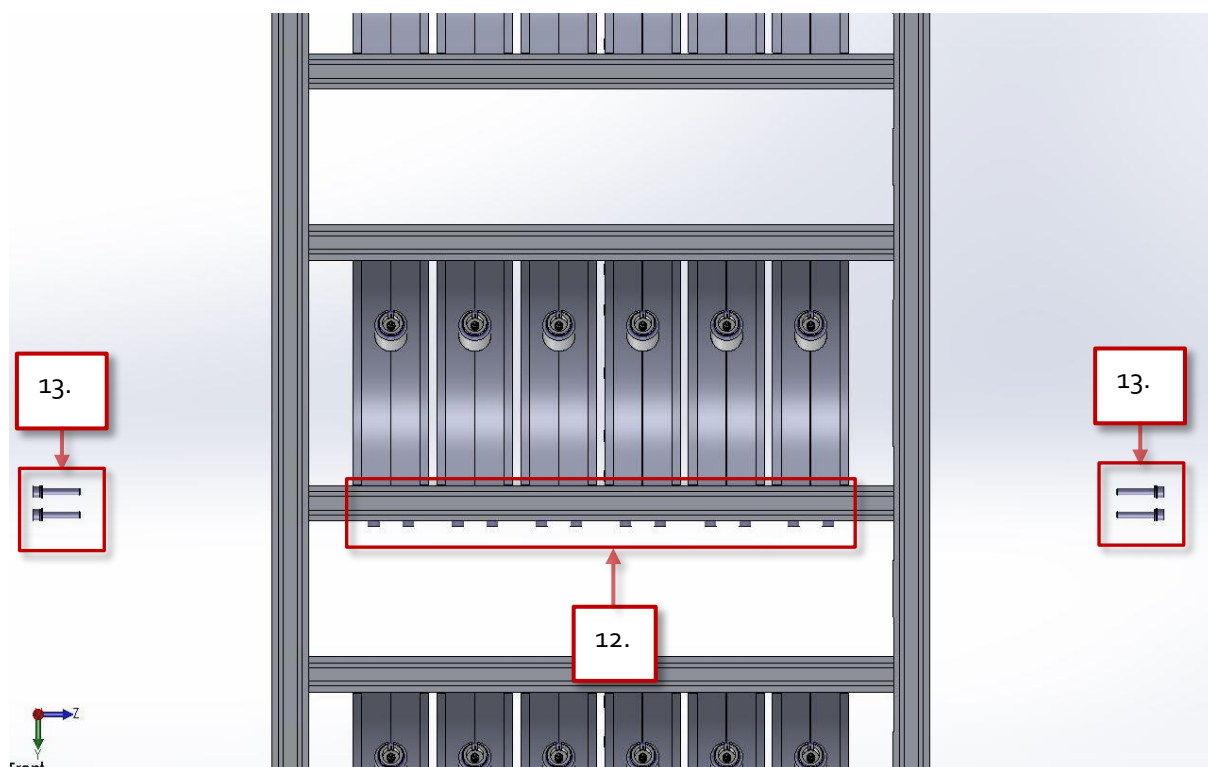


Figure 85 Loosen screws on the bottom connection bar

14. Remove the 4 screws (M6) on the bottom connection bar holding the broken reactor, see Figure 86.
15. Remove the 4 screws (M6) on the top connecting bar holding the reactor, see Figure 86.

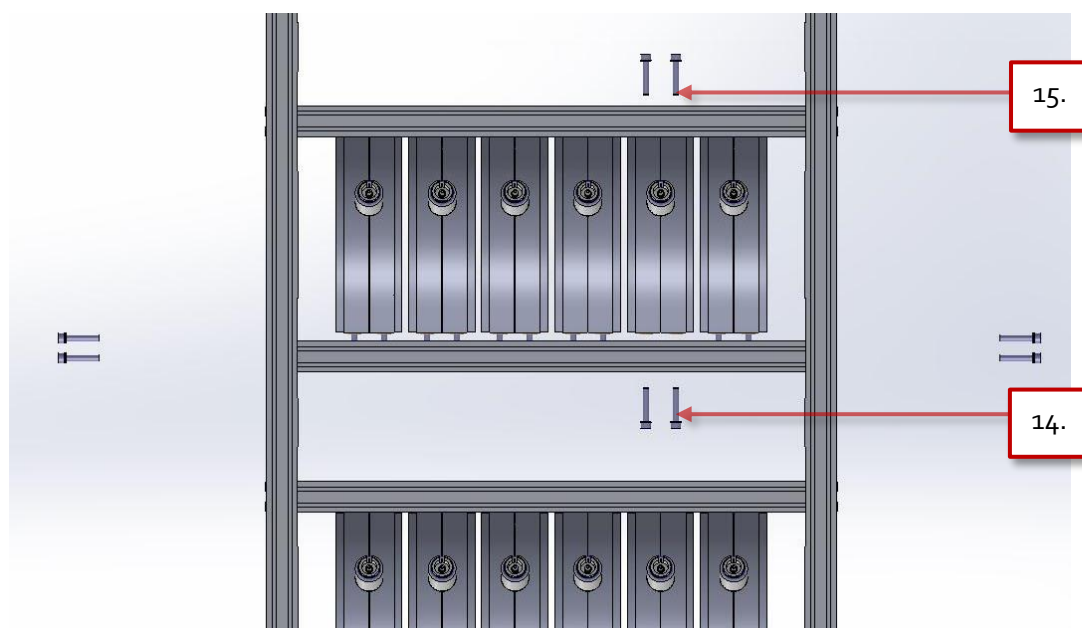


Figure 86 Remove screws on the connection bars

16. Gently tap the bottom connection bar with a rubber mallet to



loosen the reactor.

17. Carefully slide out the reactor, see Figure 87.

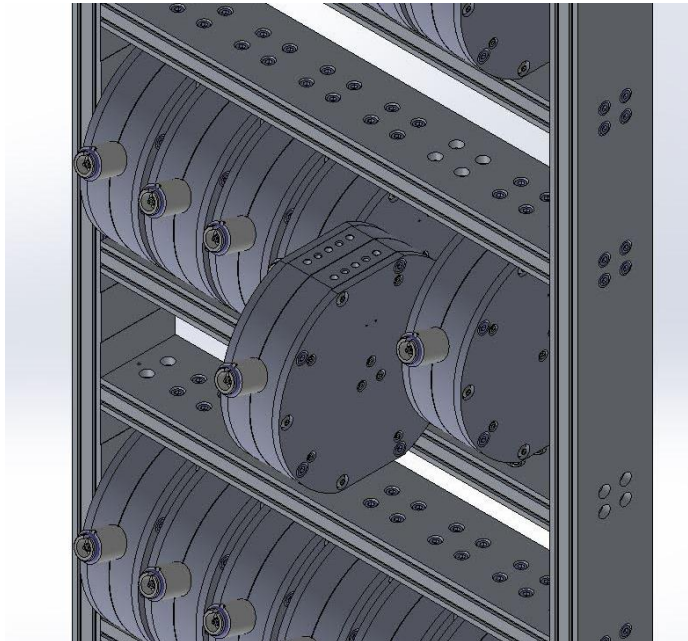


Figure 87 Remove the broken reactor

18. Replace the o-rings on the top and bottom connection bars, see Table 4 for spare part number.

19. Carefully slide in the new reactor.

20. Reassemble in reverse order, tighten the bolts to the correct torque, see Table 3. Replace the o-rings on the vertical bars, see Table 4 for spare part number.

4.6.1 Torque Table

Table 3 describes the tightening torque for the screws in the whole assembly of the GM6-18. Make sure to tighten all the screws in accordance with this table.

Table 3 Torque table

Screw size	Torque N · m	Torque lb · ft
M3	1.2	0.9
M4	2.9	2.1
M5	5.7	4.2
M6	9.8	7.3
M8	24	17.8
M10	47	35
M12	81	60

Screw size	Torque N · m	Torque lb · ft
M14	128	95
M16	197	146

4.6.2 Spare parts

Table 4 lists the spare parts mentioned in this chapter. Contact Primozone for more information about spare parts.

Table 4 Spare parts list

Description	GM size	Part number
MiniSEPT	All	100516
Reactor block	All	100862
Reactor S2	All	100200
O-ring (teflon), vertical bars	All	400009
O-ring (teflon), top and bottom connection bars	All	400010
O-ring (teflon), vents on the BFP	BFP	400012



5 SERVICE

5.1 Service checklist

Table 5 Service checklist

Ozone generator	Ok	Comments
Leakage check		
Check of module controller functionality		
Check and if necessary tighten insulation tube		
Download of log files and check of log values		
Check and adjustment of valves		
Check functionality of gas pressure sensor		
Check and monitor MiniSEPTs		
Check ozone concentration		
Check functionality of backflow protector		
Replace filter oxygen supply		
Affixing of service sticker		

TEST PROTOCOL OZONE CONCENTRATION

Customer:		Project nr:	
Generator s/n:		Run time:	
Date:	Oxygen:	Purity:	

Set point	Measured value	Temp in	Temp out	Flow L/m	Gas pressure	BMT flow
150						
175						
200						
225						
250						
275						
300						



6 ACRONYMS AND TERMS

BFP	Backflow Protector
MFC	Mass Flow Controller
ODM	Ozone Distribution Module
PLC	Programmable Logic Controller
RTU	Remote Terminal Unit

Primozone[®]
Clean water. The natural way.[™]