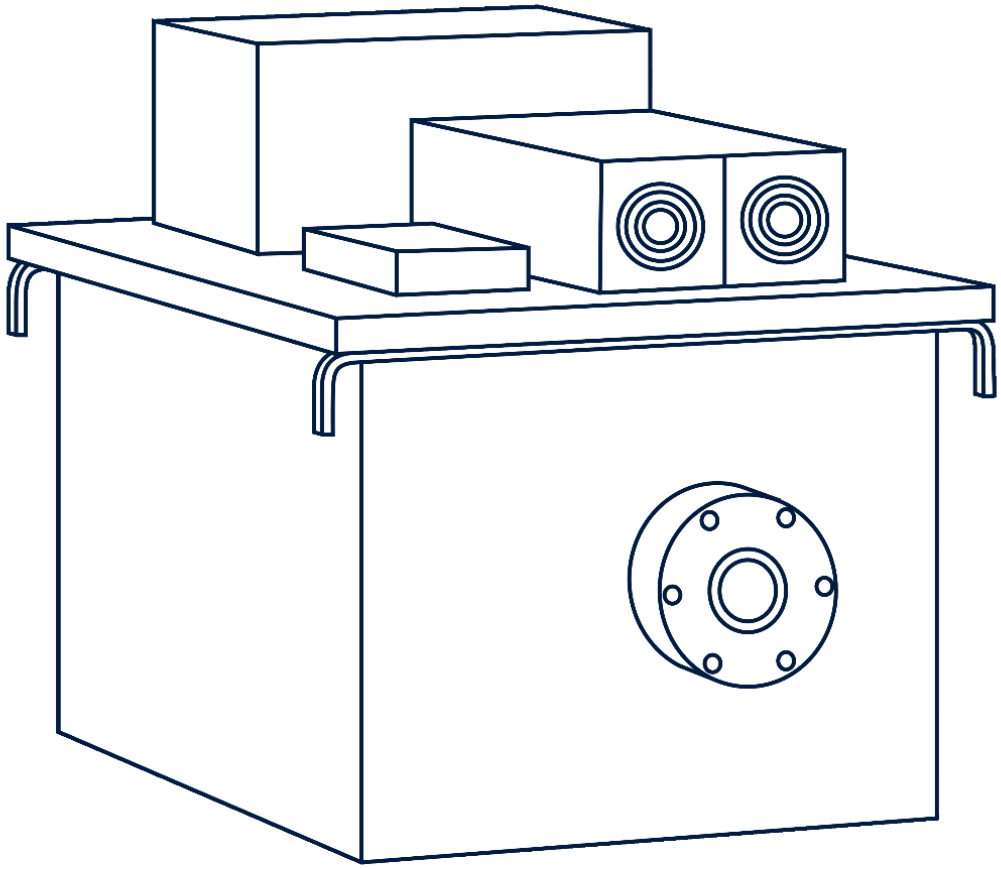
Integrator manual

Web UI Manual

SW V.4.0.0



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Content

1 Information

1.1 Purpose

This Web UI Manual describes how to operate and adjust the settings of the iVario generator with the Web User Interface (Web UI) server application. All possible applications of the Web UI are described, and corresponding functionalities are explained in detail. All default values are documented and allow configuring a general X-Ray set up with this user manual.

1.2 Scope

This document is intended for OEM users who configure or operate the iVario generator. It is part of the iVario engineering documentation (including OEM Manual, description of the T3 protocol and T3 Status). This Web UI Manual presumes basic knowledge about the configuration and a deep understanding of the iVario Generator family.

2 Web User Interface specification

AUX supply is required to be able to connect with the iVario generator after the booting process (LED A2 is steady shining green after successful reboot –for more information consult the OEM Manual).

2.1 Start conditions

1. Restart the iVario generator (AUX off-on).
2. Open a browser window, e.g. Edge or Chrome.
3. Enter the IP address into the browser's address bar, e.g. 192.168.177.199
4. Press the RETURN key.
5. The Web UI login page is displayed. Please enter a valid username (oem, ser) and the corresponding password.
6. Click the Login button

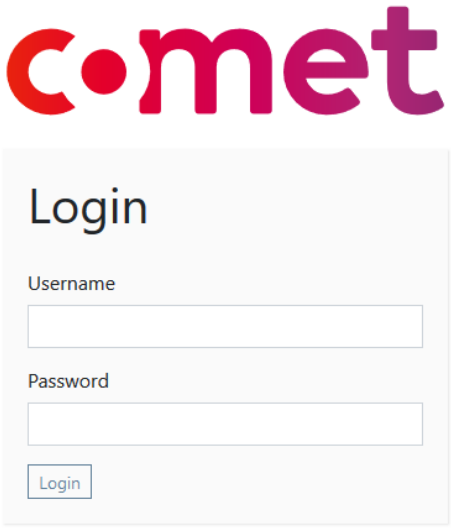


Fig. 1: Web UI login page

3 Generator information

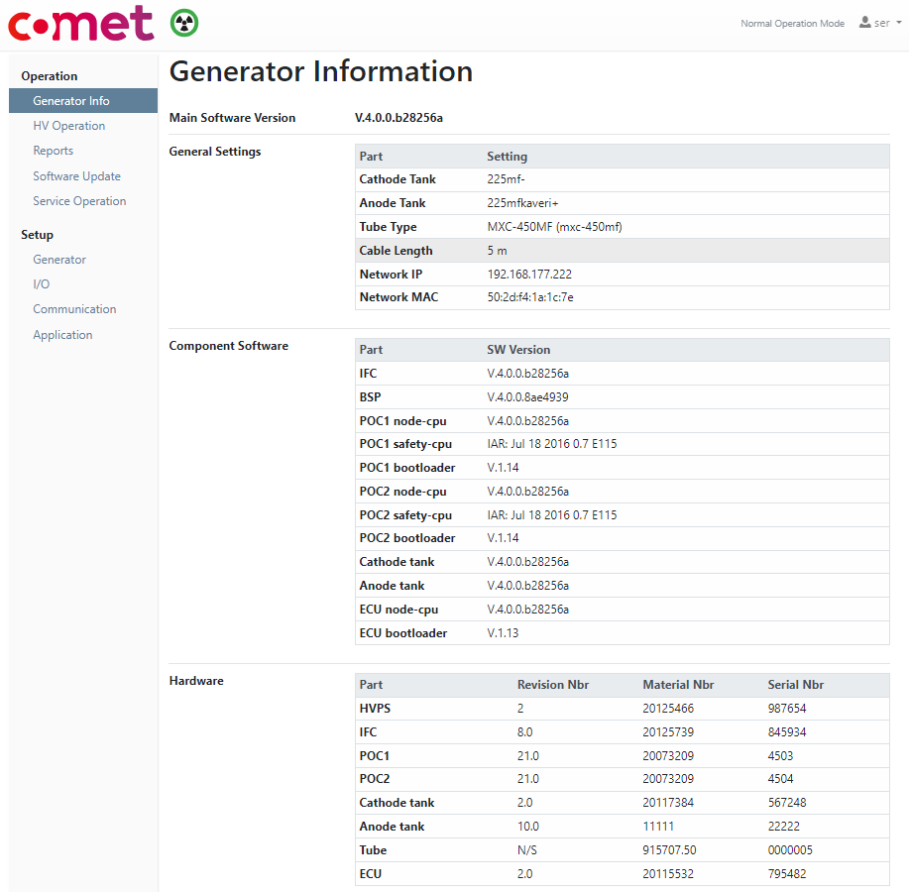


Fig. 2: General information

Basic information is summarized on this page. The page covers software versions, general iVario generator settings and the stored hardware information.

On the header the operating mode is visible for the user as well as the user information on the right-hand side.

The left side is user dependent and will variate depending on which user is logged in. The navigation in Fig. 2: with current possible elements is presented and will appear in such shape only for the service technician user “ser”.

Legend for returned values:

- Empty or “.” → hardware component not installed
- N/A → not available (device or data cannot been read)
- N/S → not specified (data are not set on the iVario generator and the default value)

4 HV operation

This is the landing page.
Operating the iVario generator is possible through this page and the status of the iVario generator can be supervised.

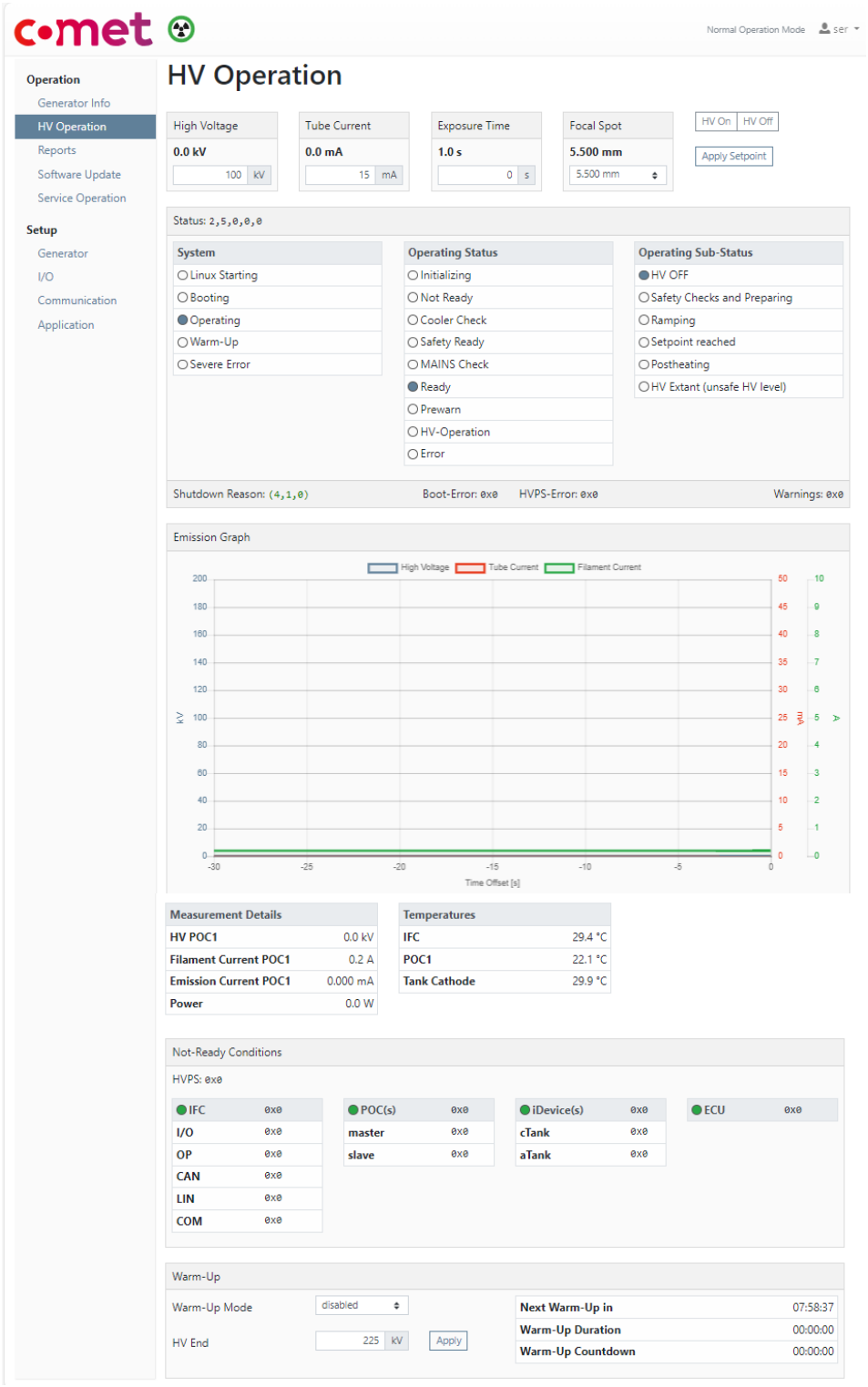


Fig. 3: HV operation for an iVario generator iVario-225

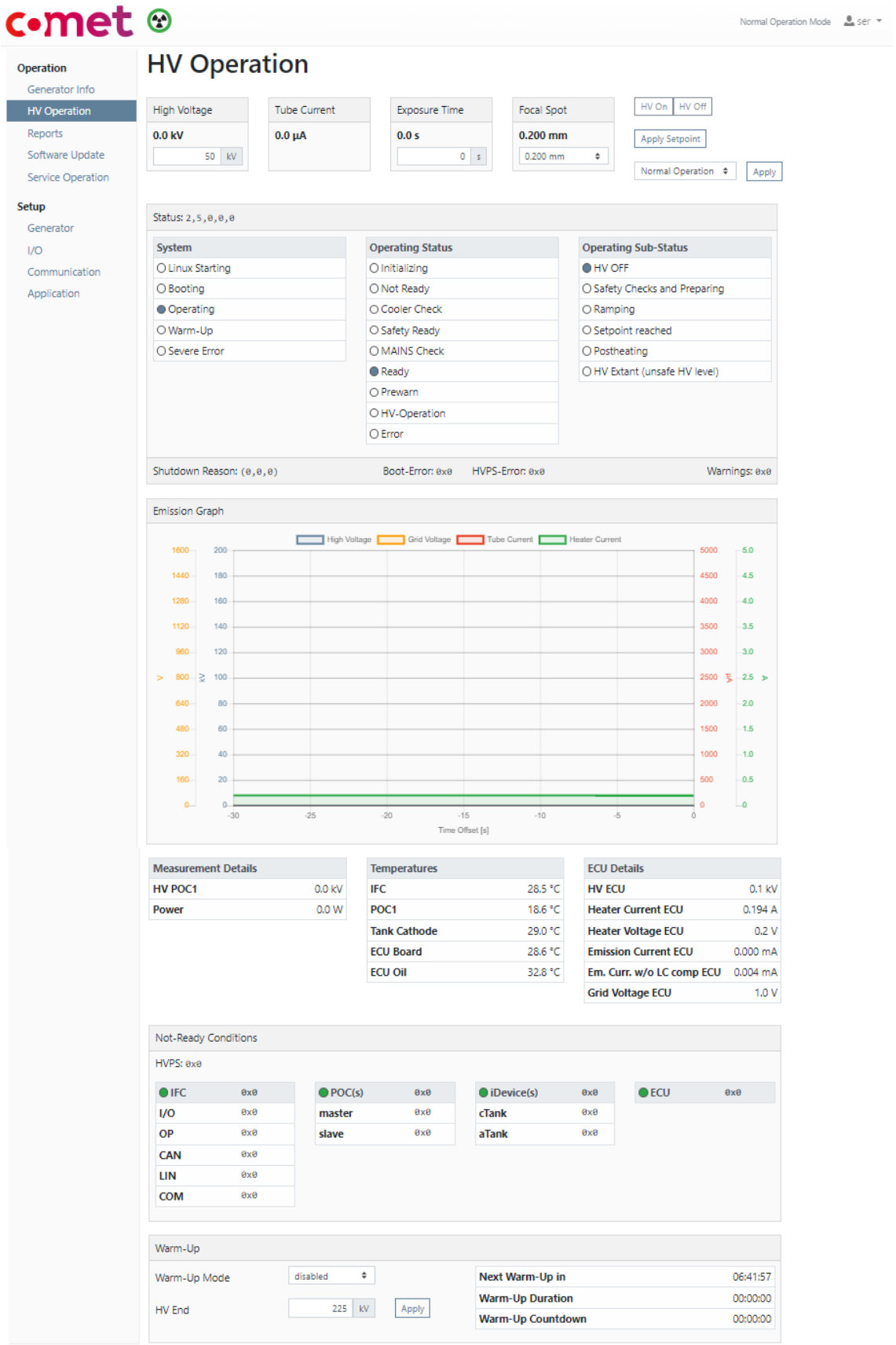


Fig. 4: HV operation for an iVario Mesofocus generator iVario-225MF

4.1 Input and measurement data

The desired high voltage value, tube emission current, exposure time and focal spot are presented as input and measurement values. The values will only be stored after pressing the button “Apply Setpoint”. Further the generator can get switched on/off with the buttons “HV On” and “HV Off”.

4.1.1 High voltage

It shows the received value from the data server and representing the initially measured signal from the POC’s. The values from POC 1 and POC 2 must be within the range of tolerance because they operate in parallel if two POCs are connected.

Range: 0kV – iVario generator limit. Minimum set value is limited by the installed tube, e.g. 10kV for a 225kV minifocus tube or 50kV for a mesofocus tube 225MF.

4.1.2 Tube current

0mA – iVario generator limit (22mA 1 POC / 45mA 2 POC or less depending on the max. tube current allowed)

4.1.3 Exposure time

Exposer time can operate in two different modes. The value will increment since the exposure has been started if the value in the input box is zero (before pressing button “HV On”). None zero values will change the live value form the exposure timer into a countdown timer with the initial value from the input box.

4.1.4 Focal spot

It shows and sets the focal spot size of the electron beam. The power limits are dependent on this setting.

4.2 Status

4.2.1 System status, operating status and operating sub-status

The values return the actual status of the iVario generator in five numbers. In the specific boxes (ex. System, ...) it is presented in a human readable form and the filled dot, marks the status of the iVario generator. If the warm-up mode is not set to “disabled”, the last box changes to the “Warm-up Sub-Status”.

4.2.2 Shutdown reason

This value represents the shutdown reason and is generated by the sum of reasons coming from the iVario generator. Further details will appear above codes as you hover over the text/number.

4.2.3 Boot error

The number shows the detailed information about a boot error. Further details are displayed as you hover over the number.

4.2.4 HVPS error

If during normal operation a severe error occurs this is showed as HVPS-Error. Further details are displayed as you hover over the number.

4.2.5 Warning code

It visualizes the warnings from the iVario generator in a hexadecimal code as you hover over the label will display further details.

4.3 Emission graph, measurement details, temperatures

More detailed measurements are shown in this section.

4.4 Not-ready conditions

More detailed information about the component (e.g. IO, CAN, LIN …) and/or service (e.g. data-server, lin-svc, …) specific reasons can be extracted from the HEX code in the bar. To get the detailed view, the user must click on the bar and the dedicated component. Further information is available in the T3 status manual or in the service manual.

4.5 Warm-up

If the tube was not used for some time, it is favorable to slowly increase the HV as well as the emission current. Depending on the set type of the warm-up and the time since the tube was used the last time, the required steps are calculated. After the warm-up procedure it is possible to operate the iVario generator again without executing a warm-up until a next one is required. Depending how long tube and generator were not used a different warm-up mode should be done: short, medium, long

If a tube shall not be used over the full voltage range a reduced warm up can be done. The warmup will increase the voltage only up to the specified HV End.

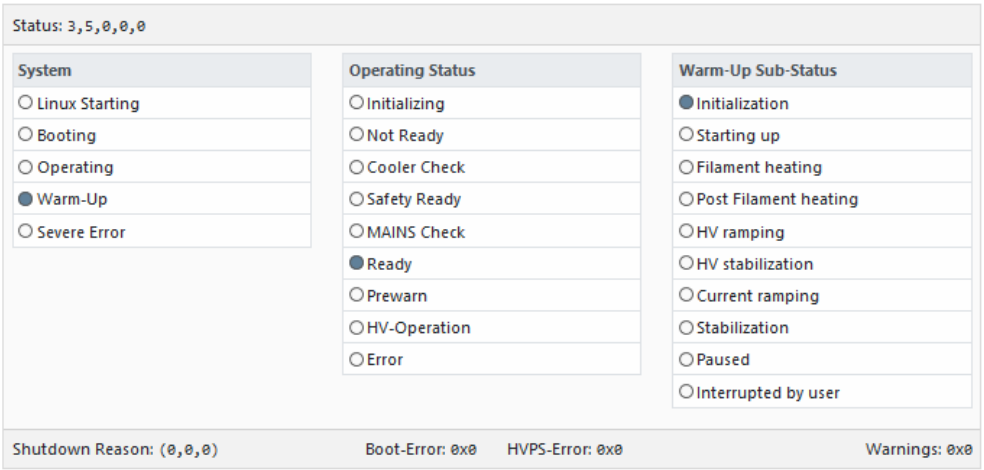


Fig. 5: Status information during warm-up mode

5 Software update

This page provides the update feature of all the different components in the iVario generator, dependent on the connected hardware components. The current status of the operation (e.g. during update) is provided in a page overlay window.

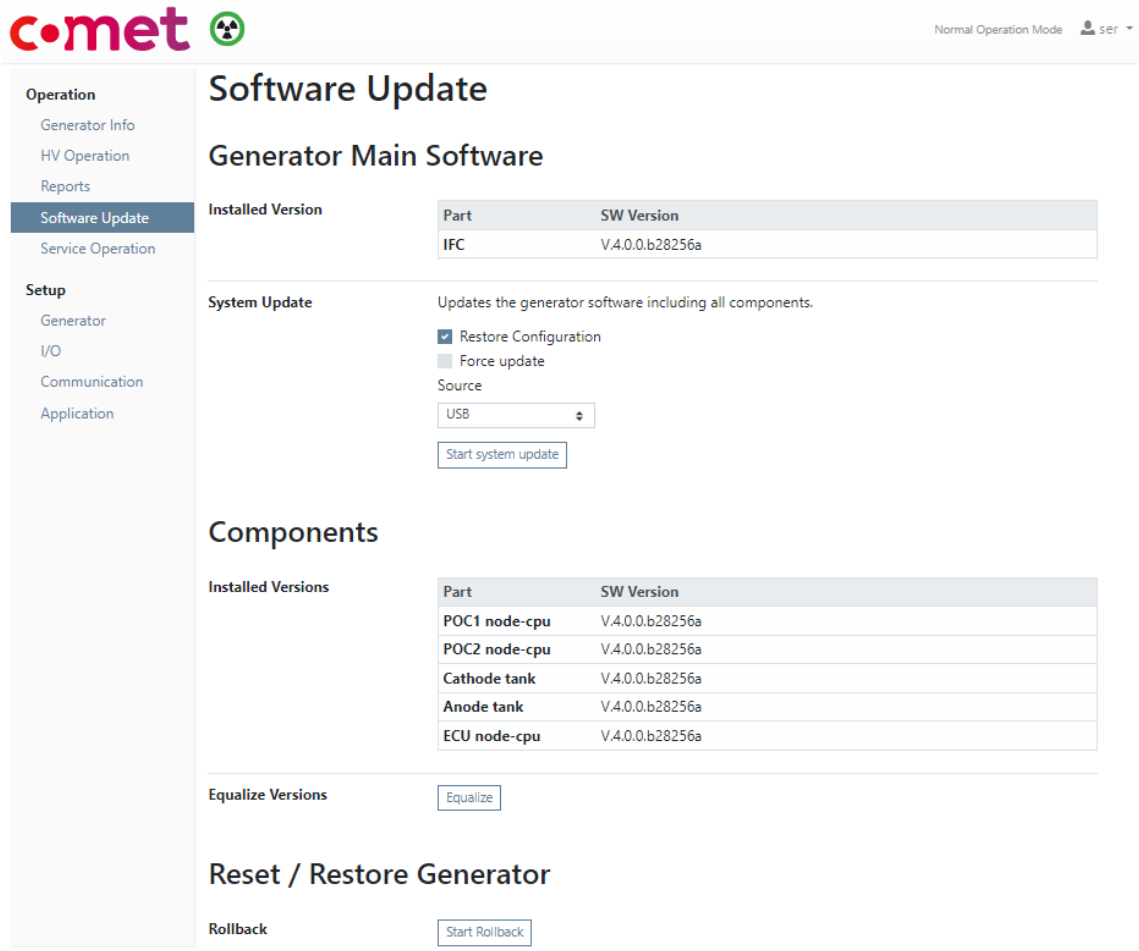


Fig. 6: Software update

5.1 Generator mains software

5.1.1 System update

If “Restore Configuration” is checked, the current configuration will be kept. If it gets unchecked, the default configuration will be loaded after the software update, e.g. the configuration will be restored to default values and configuration files/parameters will be generated from scratch.

Three sources are possible for a software update:

USB

Executing this update requires a USB stick by default and the desired SW to proceed with the update. The SW is expected on the root folder (ex. D:\) of the USB stick and has to be named “t3-release.fw”. The external storage device must be plugged into X6. Press “Start system update” to trigger the update procedure. When successfully started a page overlay window will appear with detailed information.

URL

It is also possible to execute the update through a given URL. Select the source “URL” and write the desired link into the predefined input field (ex. http://<path>/<release version string>/<SW package name>). Press the button “Start system update” to trigger the update procedure.

File

The third possibility to run a SW update is through a file on the device where the Web UI is open in the browser. Select the source “File” and load the desired file by pressing the button “Choose File”. Once the file has been selected the name of the file will be visible next to the button. Press the button “Start system update” to trigger the update procedure.

5.2 Components

5.2.1 Installed versions

In the table all currently installed SW versions are visible and shall be the same for each component. The main SW version from the iVario generator is visible on top of the page.

5.2.2 Equalize versions

This feature is useful in two cases. First it is possible to change the version of a single connected component to the IFC and further it is possible to update connected components to the IFC in case of problems during an update procedure. Pressing this button will check all components connected to the IFC and update only if the SW version is not matching with the IFC version. While the update of a specific device is running the status is showed in a page overlay. “updating <Device> …”.

5.3 Reset/Restore Generator

5.3.1 Rollback

If problem occurs after an update, it is possible to go back one step and reload the previous software version before the last update was triggered. The following parameters are set back to the previous configuration:

- COM configuration (IP, Serial configuration)

- I/O configuration
- Application configuration
- Report history
- Tube selection
- Cable selection

6 Reports

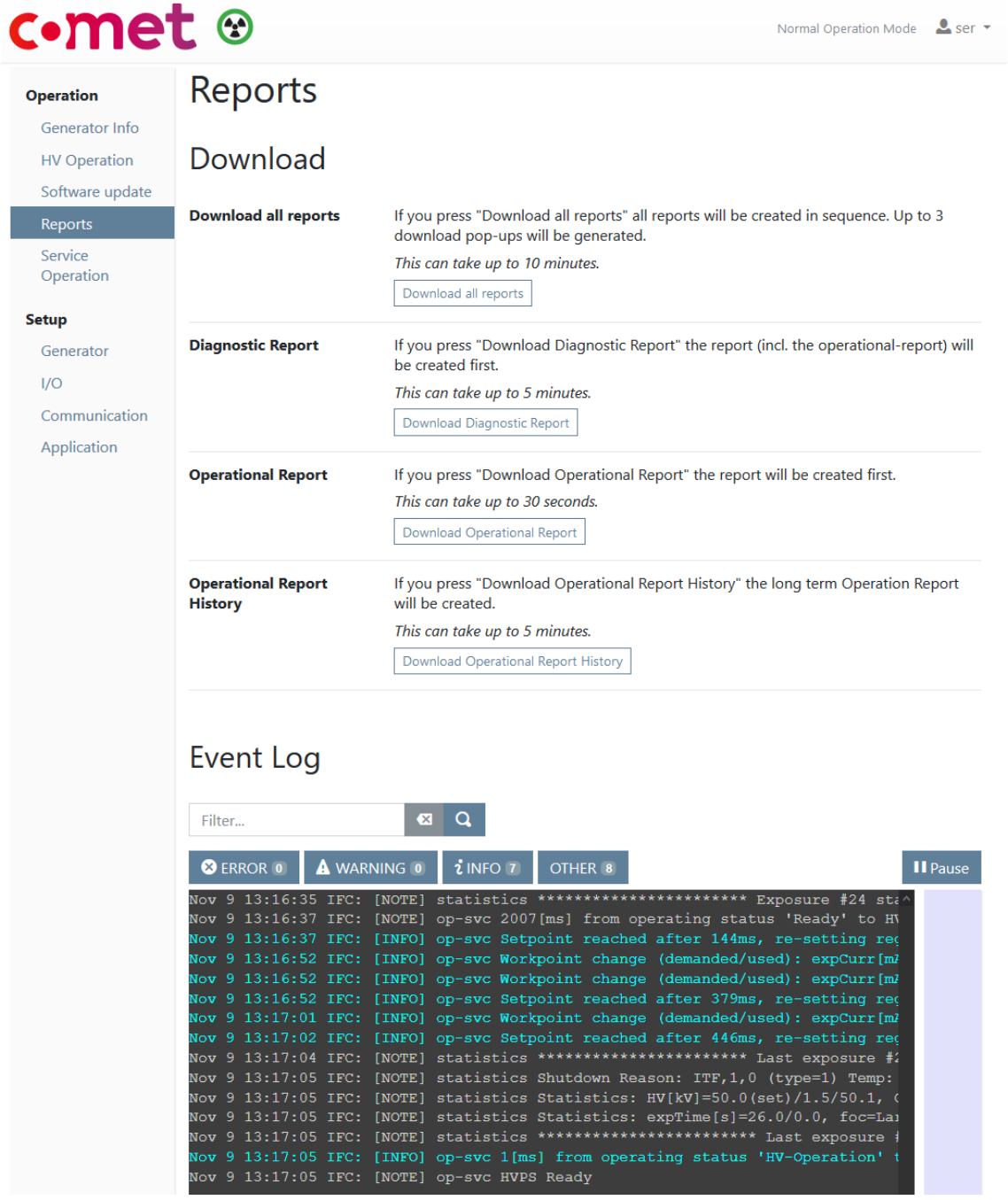


Fig. 7: Reports

6.1 Download

6.1.1 Download all reports

This will download all three reports sequentially.

6.1.2 Diagnostic report

It will create a diagnostic report. The diagnostic report will collect data (syslog, config, …) from the generator and put it in the diagnostic file. The diagnostic file is used from Comet to support customers.

6.1.3 Operational report

It will generate a report with a summary of current conditions about the iVario generator and create a PDF file. The file is stored in the Download folder of the Browser.

6.1.4 Operational report history

Downloads a zip file containing the operational system log file.

6.2 Event log

On the lower section of the page, you will find the log messages from the iVario generator. It shows the last couple of lines of the newest log messages and will capture all new log messages of the iVario generator until it has been paused with the button “Pause”. New log messages are added to event log after the button “Play” has been pressed. To improve the overview in the amount of log messages it is possible to deactivate (button will turn gray) predefined filters. The number next to the filter name indicates how many log messages are available in the window of the specific type.

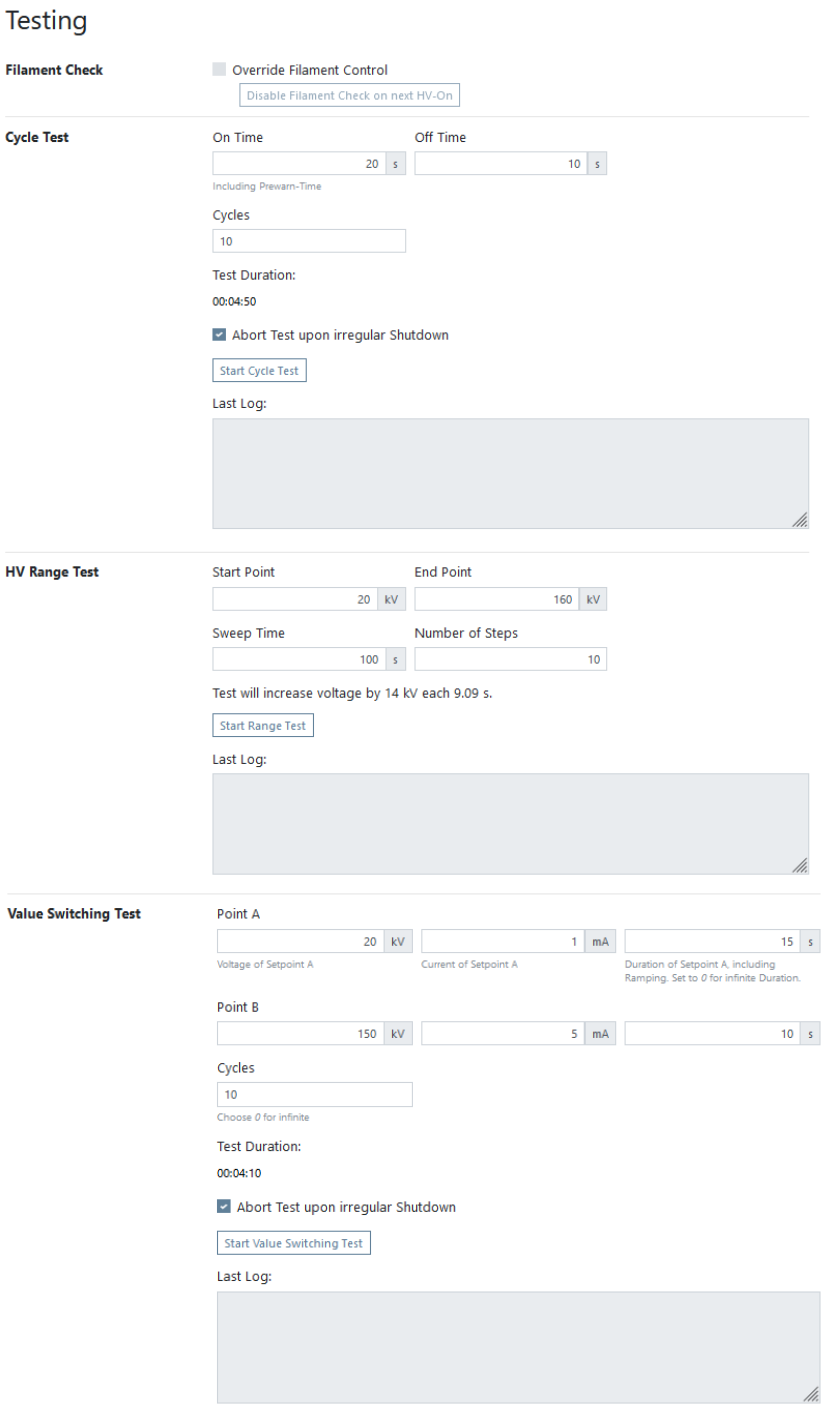
- ERROR
- WARNING
- INFO
- OTHER (all messages without ERROR, WARNING, INFO)

Further it is possible to show only log messages with a customized text, by entering the field “Filter...”. Confirm the given text by clicking on the search icon and only messages with the desired message will appear in the event log. The rectangle right to the event log window helps to navigate through the large amounts of log messages. The gray represents the entire logs, and the blue represents shown lines in the text field. In addition, you get the warnings in yellow and errors in red. With one click to the specific bar it will show the appropriate section.

7 Service operation

This page is specially designed for service users and provides further functionalities for defect analysis of the iVario generator. The first part has the same layout as the normal HV Operation page and provides the same functionality.

7.1 Testing



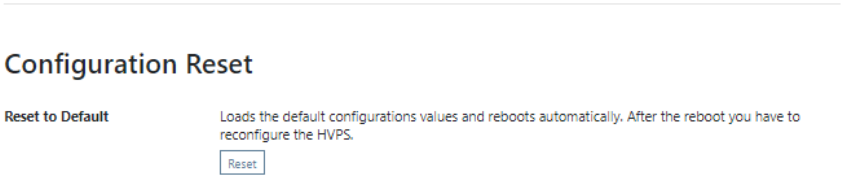


Fig. 8: Service operation: testing

7.1.1 Filament check (not required for Mesofocus)

By activating the check box “Override Filament Control” the filament check is bypassed.

7.1.2 Cycle test

The iVario generator is driving HV for the configured “On Time” and pausing as long as the “Off Time” is set. This procedure is repeated as many times as cycles are set. When pressing on the “Start Cycle Test” a page overlay and all necessary operational parameters will be shown. In addition, the log window will provide further details. A test summary will be displayed at the end of the performed cycles.

7.1.3 HV range test

With this test it is possible to increase the HV set point in a defined interval until it reaches the end value “End Point”. In case of the step size, the interface calculates the other parameter automatically as well as the number of steps. The “Sweep Time” indicates the duration of the test until the summary is displayed. During the test cycles the operational data is displayed as on the cycle test.

7.1.4 Value switching test

The service user can define two working points for the iVario generator and how long it shall remain on each. With the desired cycles it calculates the duration and automatically performs the entire test once “Start Value Switching Test” is clicked. New page overlay appears and provide operational values to the user as well as the option to jump to the opposite working point.

7.2 Configuration reset

7.2.1 Reset to default

All configuration data as indicated above the button “Reset” will be set the iVario generator default values. “Reset to Default” is not the same as a factory reset as it will take the default values from the installed SW version.

8 Generator setup

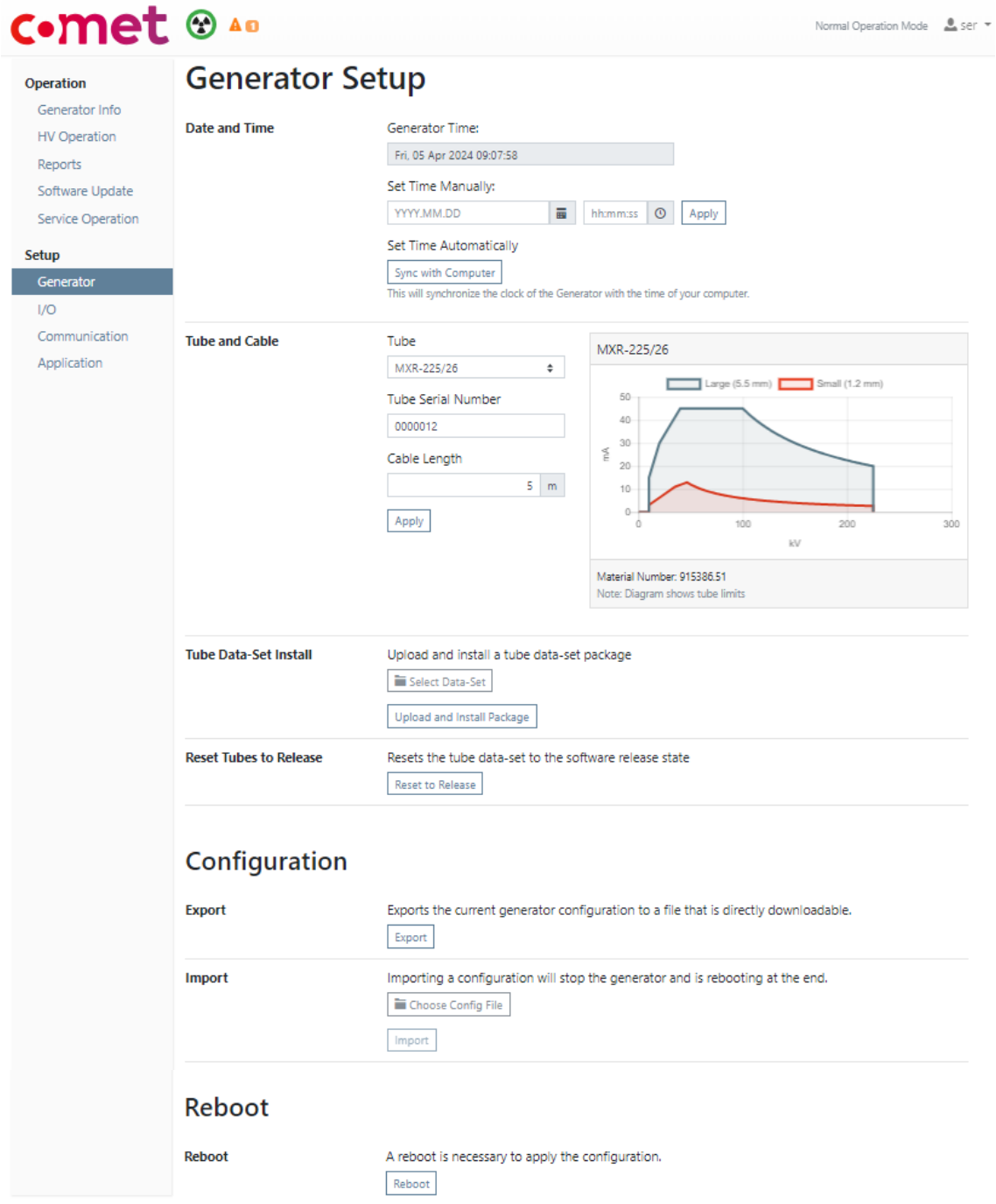


Fig. 9: Generator page iVario-225

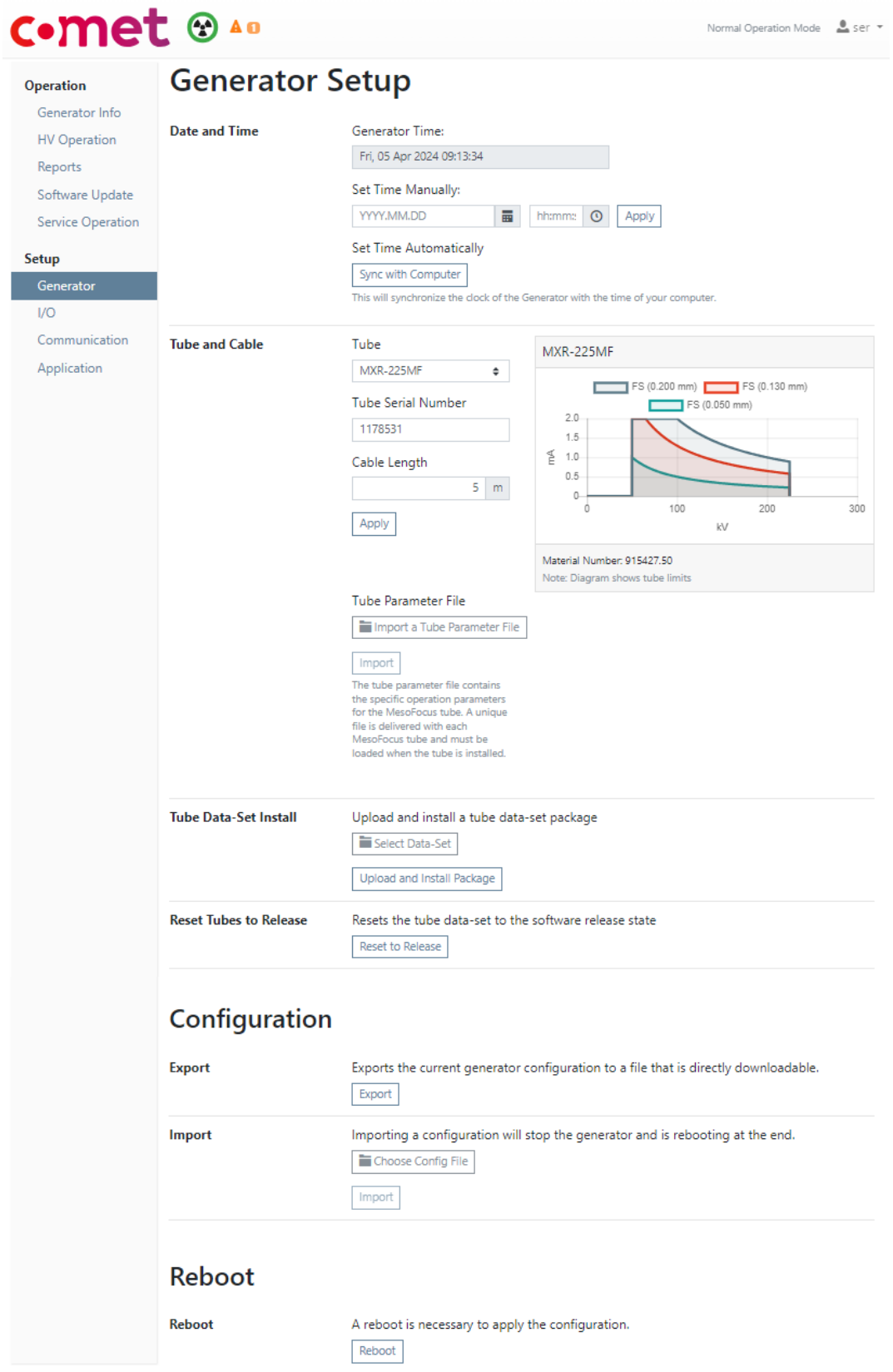


Fig. 10: Generator page iVario-225MF

8.1.1 Data and time

Set the time either manually or synchronized with the connected computer

8.1.2 Tube and cable

Select the correct tube and enter the tube serial number as well as the correct cable length. Follow those steps to setup an iVario generator:

1. Chose connected tube type
2. Enter correct serial number from the tube
3. Choose connected cable length
4. Press “Apply”
5. Import a Tube Parameter file (only for Mesofocus)
6. Press “Import”
7. Press “Reboot”

8.1.3 Tube data set install

To use a tube that is not part of the default tube files. The user can upload and install a tube data set. During installation of the tube data set the default tubes will be removed. After successful installing a tube data set the generator will reboot. After that the user must select a tube for operation.

8.2 Reset tubes to release

If a user wants to get back the default tube files, he can press the “Reset to Release” button. The installed tube data set is deleted, and the default tubes will be restored.

8.3 Configuration

8.3.1 Export

Export feature is useful to get the customer configuration back without missing any settings at the end of a service case. It gets a „iVario-Config-Export.tar.gz“ file where all current iVario generator configuration data is stored. Contains following data:

- I/O configuration
- Generator setup settings
- Communication
- Serial numbers
- Tube files
- Tank files
- Cable file
- Application configuration
- Serial numbers
- Installed Tube Data Set

8.3.2 Import

In case the configuration data is extracted, it is possible to load the entire set with this feature. Simply load the file and click “Import” where the iVario generator will automatically reboot. After the restart the iVario generator is configured with the set of parameters that were stored in the file.

9 I/O configuration

This page is used to configure the behavior of outputs 1-6 (whereas output 5 and 6 are on the optional panel), warning lights 1-4 (whereas warning light 4 is on the optional panel), the optional panel and auto start cycle. Mesofocus does not support the optional panel.

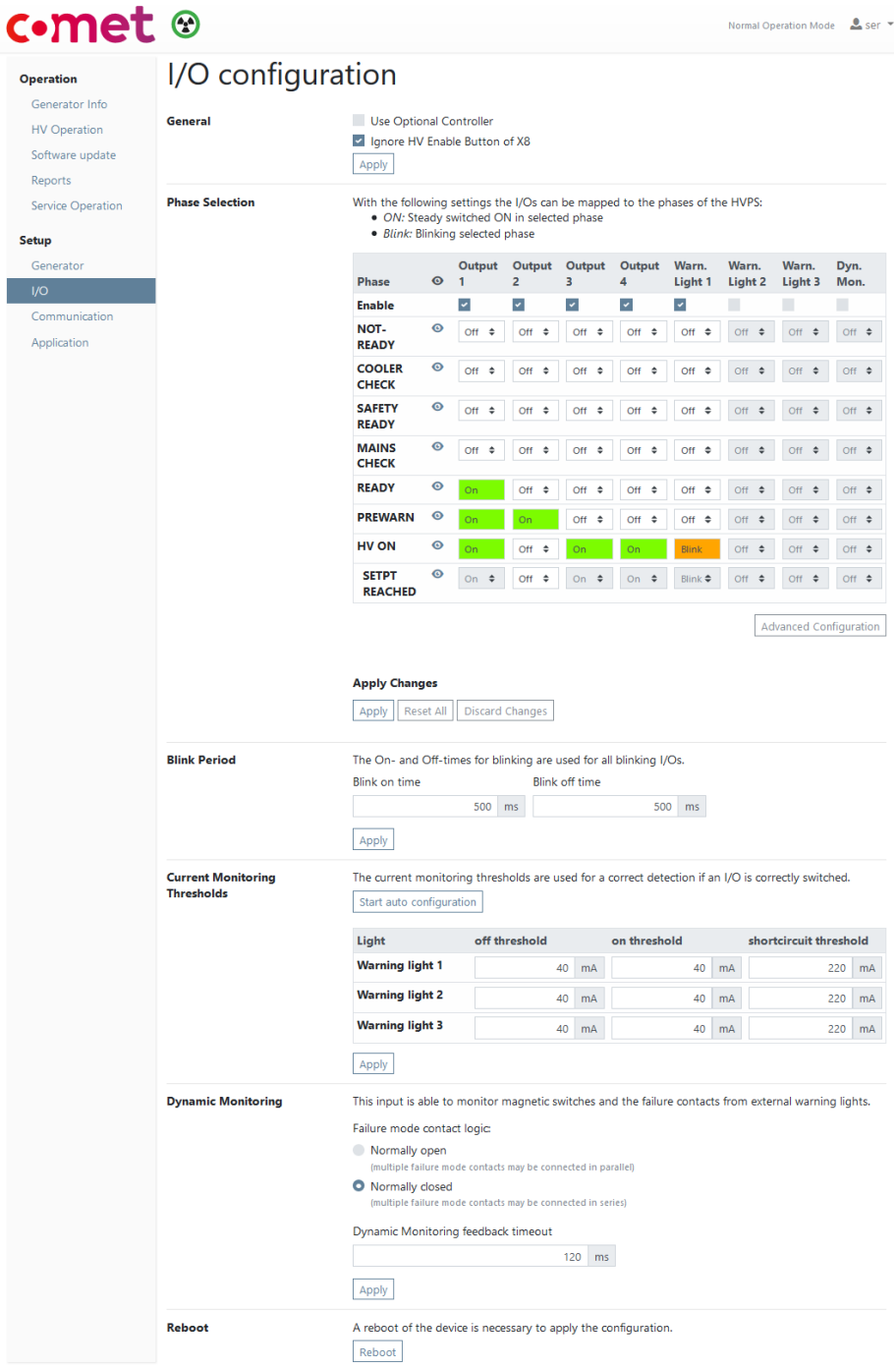


Fig. 11: I/O configuration

9.1 General

- The optional iVario Controller requires the check box to be active if the warning light, the key switch, output 5 and output 6 shall be operational.
- If the check box “Ignore HV Enable Button of X8” is checked, the start button is no longer required to be pressed before driving HV. This is used if the iVario generator is integrated in another machine and the signal to start HV operation is requested via the communication interface (ex. iVario Control, iVario Controller).

9.2 Phase selection

The I/Os (Output, Warning Lights and Dynamic Monitoring) can be mapped to the phases of the HVPS:

- ON: Steady switched ON in selected phase
- Blink: Blinking selected phase

It is required to enable each I/O individually. Before the settings are valid it is required to press the “Apply” button.

9.3 Blink period

The configured time values will be valid for all warning lights (and dynamic monitoring) where the phase “Blink” has been selected in chapter 9.2.

9.4 Current monitoring thresholds

Setting the three threshold values is possible by simply pushing the button “Start auto configuration”. It will trigger a measurement procedure for the three warning lamps (each will flicker once) and set the values based on the connected feedback. Further it is possible to set each value by the operator or to adjust the returned values.

Following rules are valid:

- OFF threshold is below the ON threshold
- Shortcut threshold is above the ON threshold

9.5 Dynamic monitoring

In this section it is possible to change the connection logic for dynamic monitoring as well as the timeout until feedback is required (impact to configuration of subcategory “Output Configuration” part Dynamic Monitoring).

10 Communication configuration

Multiple communication interfaces are available on the IFC platform, and the corresponding parameters are configurable on this page. Two interfaces are physically integrated on the iVario generator. Ethernet works through the TCP/IP protocol and the serial connector with the MG or T3 protocol.

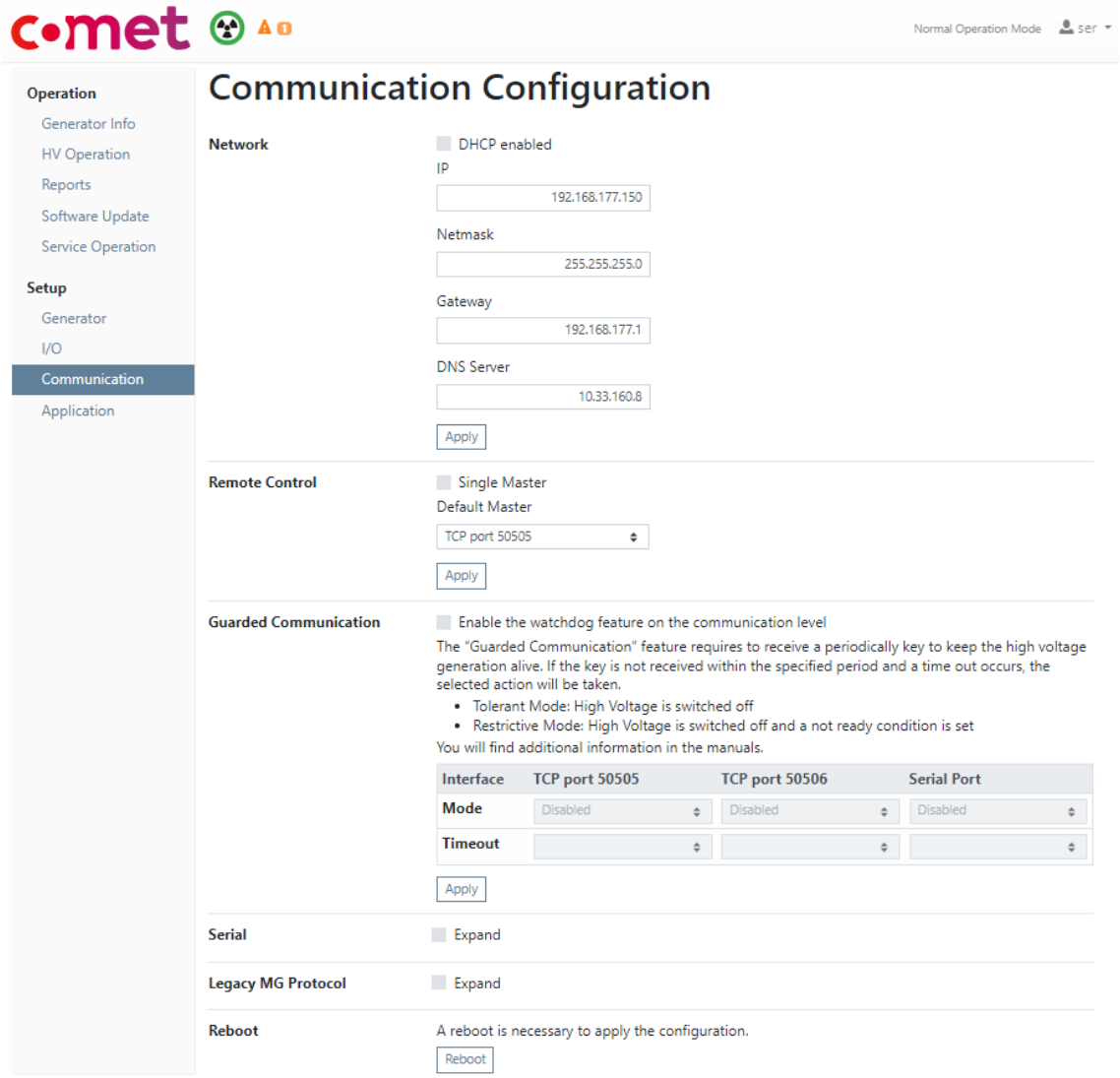


Fig. 12: Communication configuration

10.1 Network

To set up a communication through ethernet it is required to set the network parameters according to the values from the network to which the iVario generator is connected.
Default settings:

- DHCP enable inactive
- IP: 192.168.177.199
- Netmask: 255.255.255.0
- Gateway: 192.168.177.1
- DNS server: 192.168.177.1

After entering the configuration, the iVario generator does require to confirm by pressing “Apply. New values are only valid after a restart.

10.2 Remote control

- *Single master*:
  If active it is only possible to send commands/keys (write type) via master (if not registered it will take the default master).
- *Default master*:
  Select a default master in case the single master mode is active, and no remote controller is registered as master.

10.3 Guarded communication

If enabled, this sets the guard-mode for the given interface. On guarded interfaces, the client has to send the keep-alive key (GRDKA) on regular basis and within the timeout, or action is taken depending on the mode set. There are three modes:

- DISABLED: the feature is disabled for this interface.
- RESTRICTIVE: when this mode is configured on an interface, the connected client has to send the keep-alive t3 protocol keys (GRDKA) periodically, otherwise the generator will set a not-ready code and will therefore not be able to start generating high-voltage. If the generator is already generating high-voltage, it will switch off and then set the not-ready code. The system gets ready as soon as all needed clients are back online. This should be the default mode if the guard is enabled.
- TOLERANT: in this mode, as soon as a client sends the keep-alive key (GRDKA) periodically, it will be guarded. If the generator is generating high voltage, it switches off when the client stops sending the keep alive. But the generator will not require the client to send the keep-alive key again, to switch on the next time.

Note: When using the guarded communication on the serial interface, make sure the serial protocol is set to T3. If the MG protocol is set, the guarded communication setting for the serial port is ignored.

10.4 Serial

- Bitrate: rate in bit/s
- Protocol: MG (old generator platform) protocol or T3 protocol, available only on iVario, not on Mesofocus.

10.5 Legacy MG Protocol

Specific settings from the MG protocol are possible to activate to fit system specific versions of the MG protocol in existing machines. All sent keys P<XX> (see legend below) are persistently changed in the data server.
Legend:

P99: Special key to include MG features (Programmplatz 99) but does not exist in the old MG protocol. Set the persisted voltage for UU/UD fast voltage step on MG (T3 key MGP99 provides more details) but only through the iVario Controller (not through other interfaces).

PE: Set to activate the automatic message after reaching the state “Ready”. Output if active:

- X1 (ready)
- X0 (not ready)

PF: Activate the automatic message after changing the focal spot. (F0 is the large focus/ F1 is the small focus).
PM: Set to activate automatic output of the mode after change (410/411 as normal mode with the control unit and 400/401 as remote-controlled mode)
PN: If selected, the automatic output of the last 5 digits from the EPROM number code after mains ON, is active.
PQ: If selected, a response for each input is given even if the value would not be acknowledged.

11 Application configuration

The text boxes allow entering a parameter and below the current limit of the iVario generator is visible. The units can be different (between entered value and current valid iVario generator value) as it is calculated out of iVario generator settings and application settings by the SW (e.g., required slope to achieve a certain response time).

11.1 Settings

Global Parameters for the iVario generator can be configured according to requirements from the application in which the iVario generator is operating.

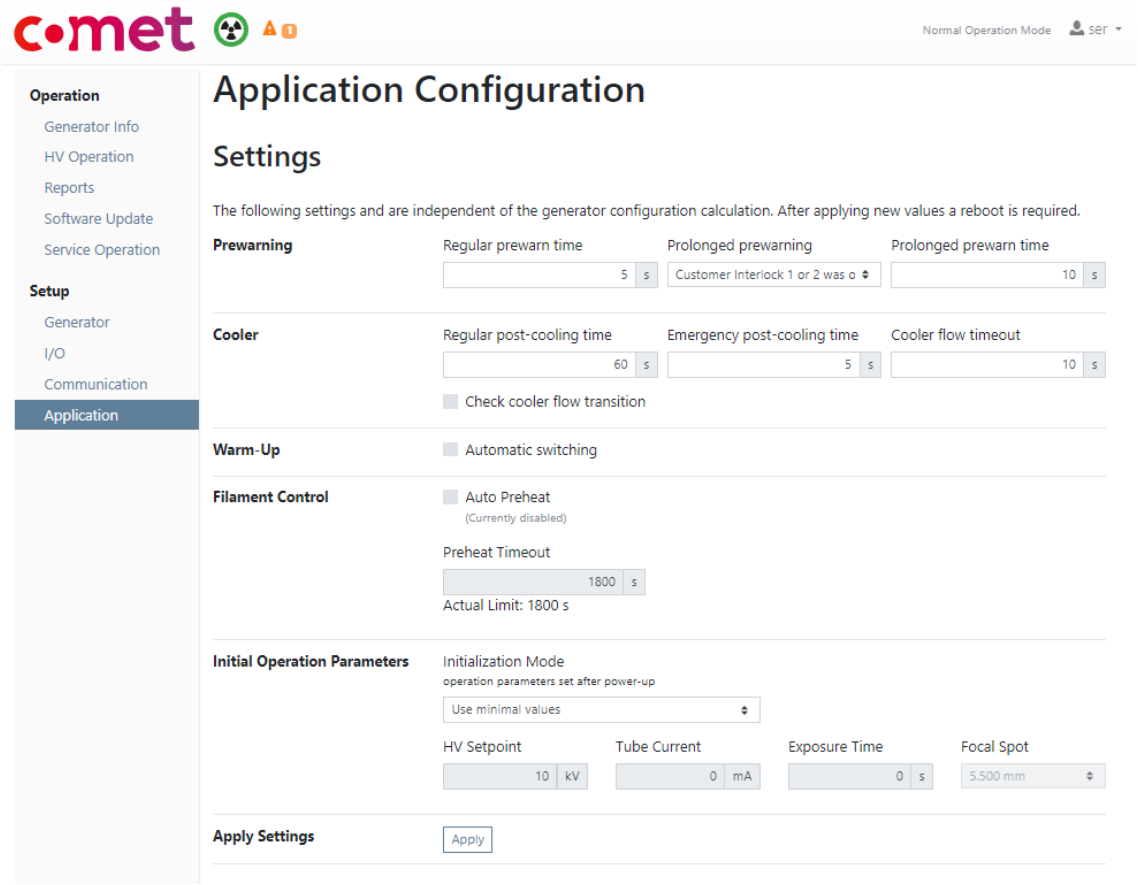


Fig. 13: Application configuration:setting

11.1.1 Prewarning

Defines the time between the iVario generator is switched ON and physically ramping up the voltage and current.

- Prewarning mode
  - Not enabled
  - Prolonged prewarn is enabled when custom interlock 1 has been opened
  - Prolonged prewarn is enabled when custom interlock 2 has been opened
  - Prolonged prewarn is enabled when custom interlock 1&2 has been opened
- Range: 0 – 3 [s]
- Regular prewarning time
  In mode 0 this time is always valid even if customer interlock has been opened

between HV OFF and HV ON. This time is taken in case the custom interlock 1 or 2 was not open between switching HV OFF and ON again. range: 0 – 300 [s]

- Prolonged prewarning time
  This time is valid in case the interlock 1 or 2 has been opened between the last HV ON and the actual request to switch the iVario generator to an operational state. Once the HV state could be reached successfully, the regular pre-warning time is valid again, until the next opening of the customer interlock. range: 0 – 300 [s]

11.1.2 Cooler

- Regular post-cooling time
  If the iVario generator is switching into the state NOT READY (e.g., safety or customer interlocks are opened), the cooler will be switched off after the defined time. range: 10 - 3’600 [s]
- Emergency post-cooling time
  This value is valid in case of an emergency stop and does switch off the cooler after the defined value. range: 0 – 4294967295 [s] (default is 5)
- Cooler flow timeout
  This time does define how long it can stay in the status “Cooler Check” before the iVario generator falls back into the “Not Ready” state. The value offers the option to connect all different kind of coolers and the one with slow feedback from the cooler flow sensor. range: 1 – 10 [s]
- Check cooler flow transition
  This checkbox selects a cooler flow check on transition. If selected, then cooler flow input signal must show a transition from open to closed when the cooler ON output signal is switched on. If not selected, then the cooler flow input signal must be closed when the cooler ON output signal is on (but no transition needed).

11.1.3 Warm-Up

- Automatic switching
  If this feature is activated, it is required in certain conditions to run the warm-up before it is possible to turn HV on.

11.1.4 Filament control (not for Mesofocus)

- **Auto Preheat**
  If active, the iVario generator does fulfill possible check after MAINS is ON and will allow a faster change into the HV operation state once the start button is pressed.

- **Preheat Timeout**
  To protect the tube, the preheat current must be switched OFF after a long time in standby (without operation). range: 300-1800 [s]

11.1.5 Initial operation parameters

This setting controls the operation parameters which are set after a reboot of the generator. The operation values are the exposure time, the selected focal spot, the high voltage and the tube current.

- Use minimal values
  After a reboot, the minimal values for high voltage and tube current are set. The focal spot is set to “large” and the exposure time to zero.

- Use configured values
  A set of values for the operation parameters can be configured below. After a reboot, these values are loaded.
- Use auto saved values
  The system keeps the last used operation parameters after a reboot. The values are stored every time the system enters the HV-off state. Therefore, you have to start HV at least once for new values to be saved.

11.2 Additional limits

It allows changing global valid limits for the iVario generator that may be necessary to meet physical requirements. Can be the case due regulatory restrictions in which the iVario generator has to operate.

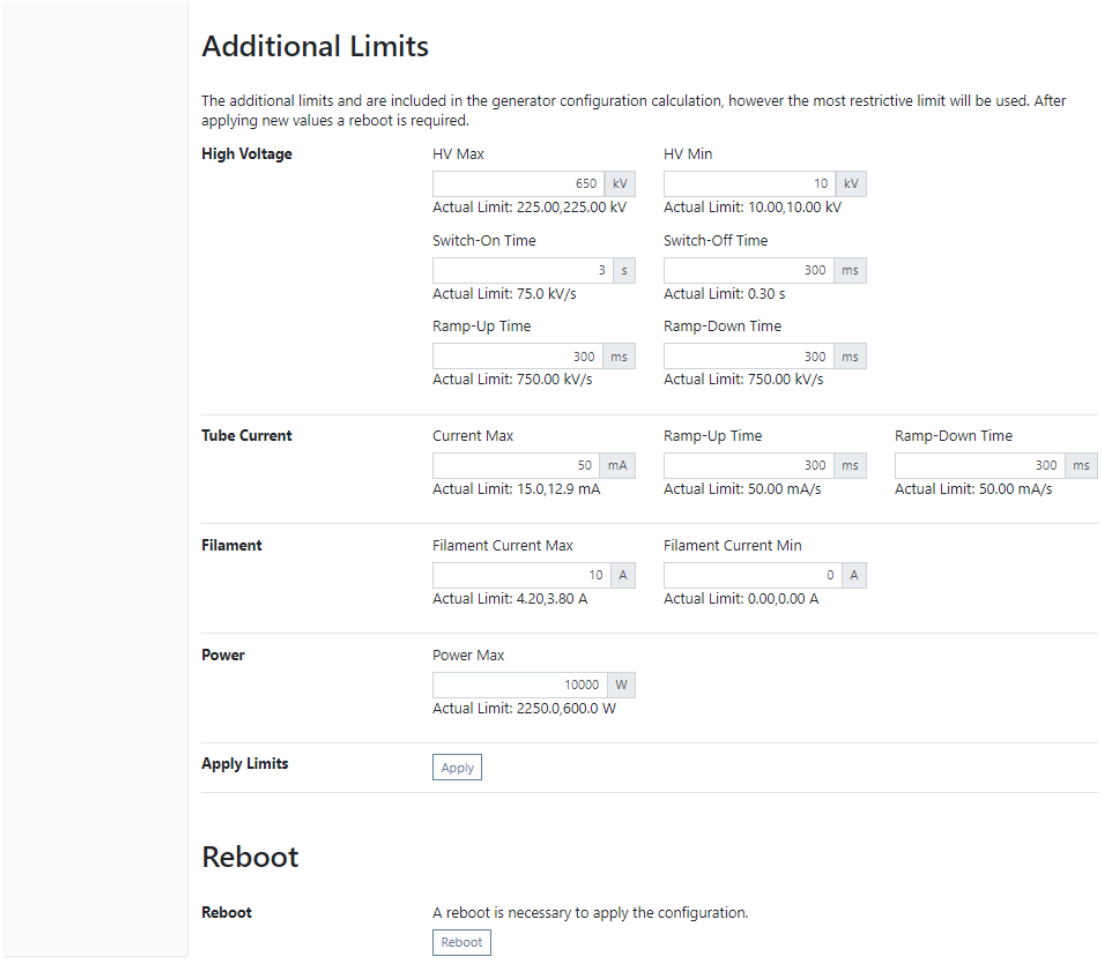


Fig. 14: Application configuration: additional limits

11.2.1 High-voltage

- HV max
  Possible to define a maximal HV value of the iVario generator and this will act as a generator limit. It not possible to go above the iVario generator lowest default configuration value of configured component. It is useful to configure a lower application limit due to limitations from external operational parameters where the iVario generator is built in (e.g., cabinet, application, …) Range: 0 to lowest max in configuration files [V] (tank, tube, cable, application).

- HV min
  Set a minimal HV value for the iVario generator after the HV ON command. If the value is not set to 0kV the generator will automatically generate the required voltage on the output after pressing the start button is pressed. Range: 0 – HV nom [V]
- Switch-On Time
  Defines the max time between the iVario generator is ramping from HVmin up to HVnom value. It corresponds to the delay between the “Prewarn” operating status to the “HV Operation” operating status. The iVario generator calculates the required HV slope to achieve the required time and shows the currently calculated iVario generator value on the right-hand side.
- Switch-Off Time
  Defines the time in which the iVario generator is ramping down from current HV value to 0kV. The iVario generator now calculates the required slope to reach the given time within the worst-case scenario (max HVmax of tank, cable, tube, or application).
- Ramp-Up time
  This parameter is used in case of a change to the operating point is required and the HV value need to be adapted to a higher value than existing. The parameter is calculated on basis of maximal possible differences in HV (0kV to HVmax – if it is a bipolar iVario generator the HV max is divided by 2).
- Ramp-Down time
  This parameter is used in case of a change of the operating point is required and the HV value must be adapted to a lower value than existing. The parameter value is calculated based on maximal possible difference in HV (HV max to 0kV – if it is a bipolar iVario generator the HV max is divided by 2).

11.2.2 Tube current

- Current max [mA].
  This value limits the maximal emission current unless another component owns a lower max limit (configuration parameter of tube, tank, or cable)
- Ramp-Up time
  Set the max time to reach any increased current value within the specified tolerances (0 to “Current max”). The iVario generator will calculate the required slope and use this number as a parameter.
- Ramp-Down time
  Set the max time to reach any required lower current value within the specified tolerances (0 to “Current max”). The iVario generator will calculate the required slope and use this number as a parameter.

11.2.3 Filament

- Filament current max
  Define the maximal possible filament current unless another component (tank, tube, cable) parameter does limit to a lower max value.
- Filament current min
  Define the minimal possible filament current unless another component (tank, tube, cable) parameter does limit to a higher min value.

11.2.4 Power

- Power max
  Defines the maximal power limit for the iVario generator if there is no other component (dependent on iVario generator settings and operational mode) to limit this value. Generator will use the most restrictive value between mA, kV and power limitation.
- Range:
  - unipolar: 0 - 2’250 with 1 POC | 0 – 4’500 [W] with 2 POCs
  - bipolar: 0 - 4’500 [W]

All limits need to be applied (press “Apply”) and limits become valid after a reboot.

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