

APPLICATION NOTE

Rainbow Plus Usage Guide

PRODUCTS AFFECTED:	D Series genset controllers
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Related documents	Rainbow Plus Installation Guide

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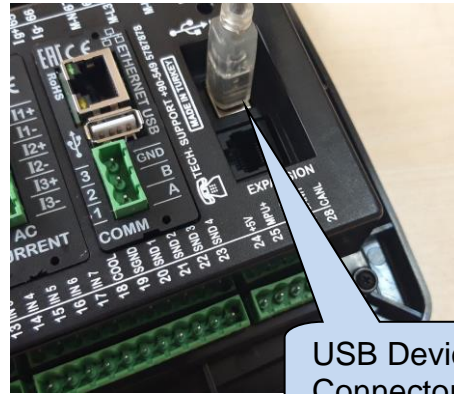
1. CONNECTING THE CONTROLLER TO PC

USB cable



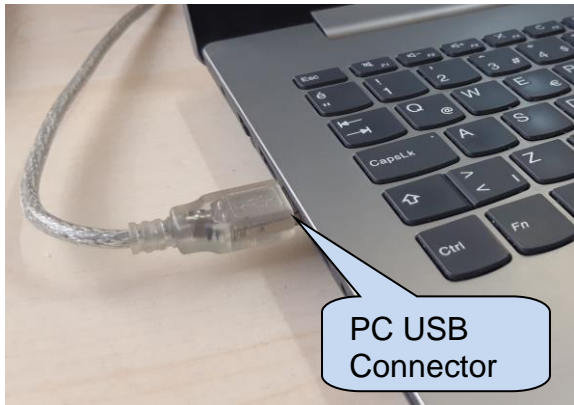
USB A to B Cable

Module USB port connection



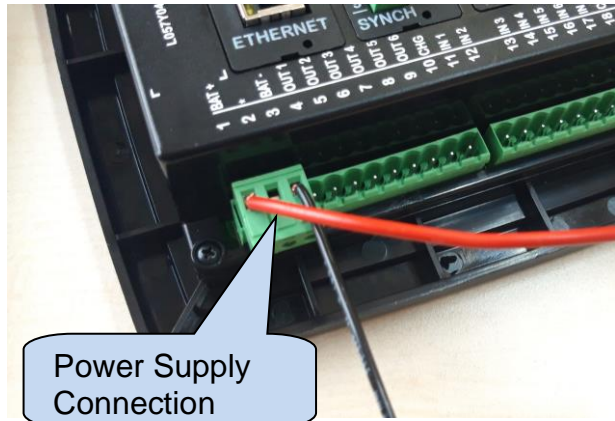
USB Device Connector

PC USB port connection



PC USB Connector

The module must be powered-up



Power Supply Connection

2. DATA CONNECTION ESTABLISHMENT



The RainbowPlus program must be installed to PC.
Please check **Rainbow Plus Installation Guide**.

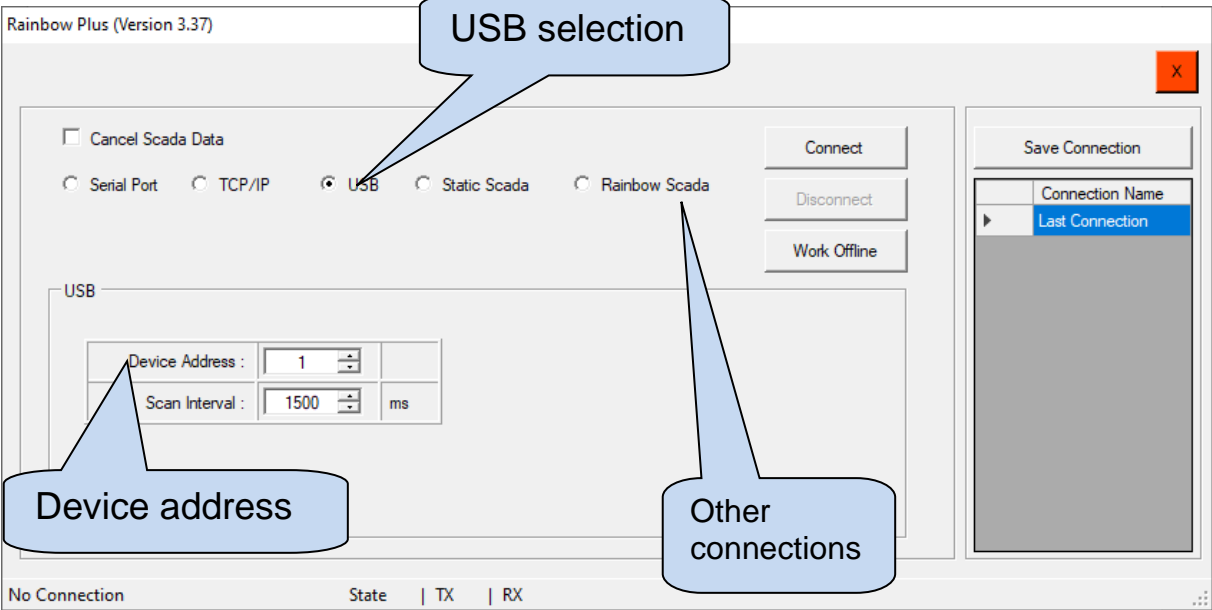


The RainbowPlus icon is on your desktop.
Double click this icon in order to start the RainbowPlus program

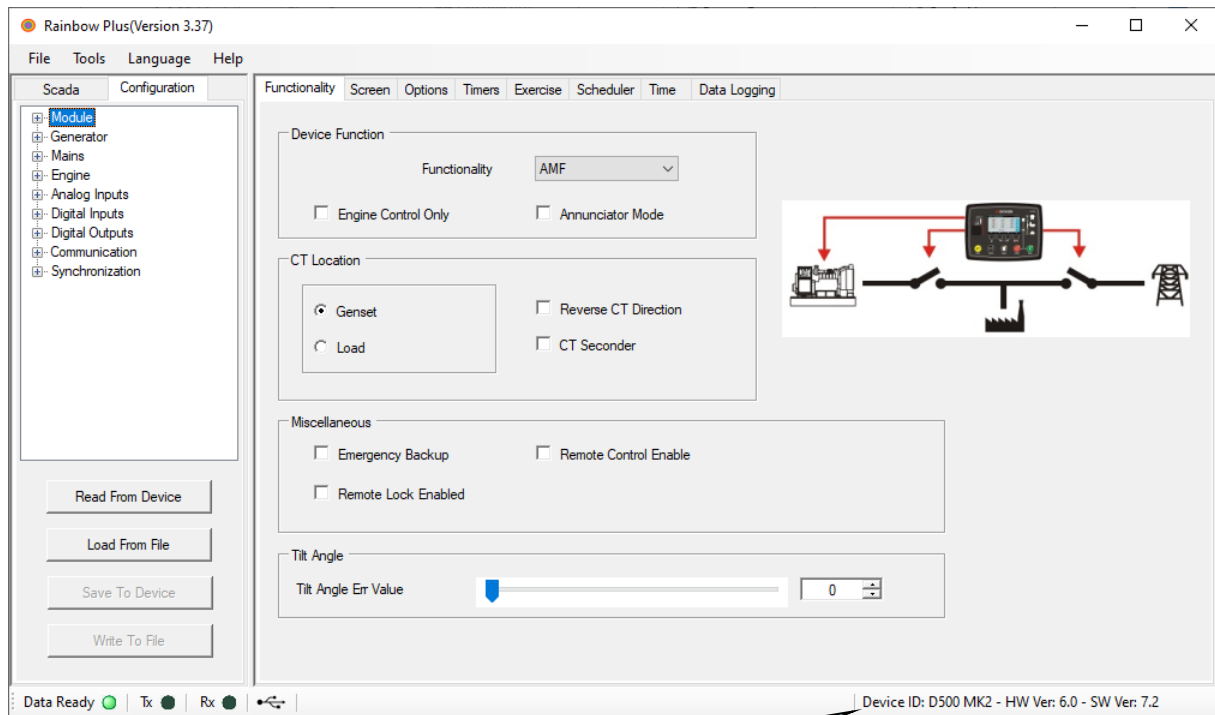


The splash screen will come prior to program execution.

Below screen will open.
Select **USB**.
Then click **Connect**.



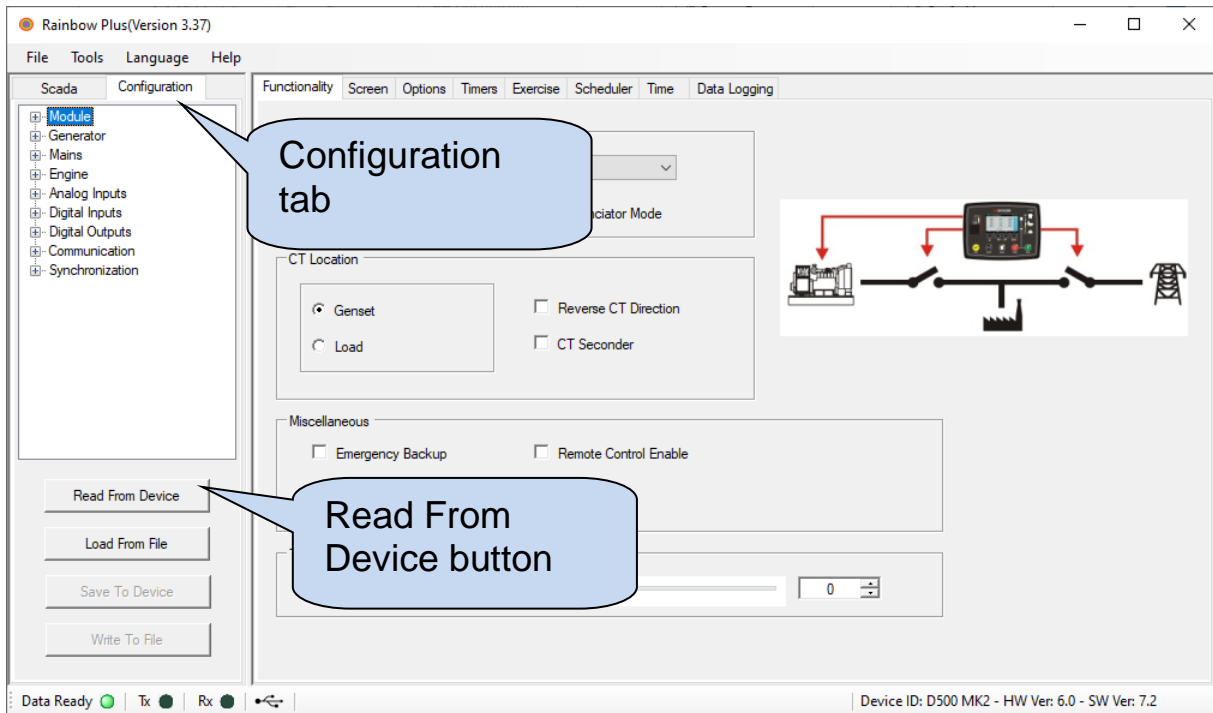
The connection status is announced in the bottom line.
If a controller is connected through the **USB port**, the connection will be detected and device id and version will appear.



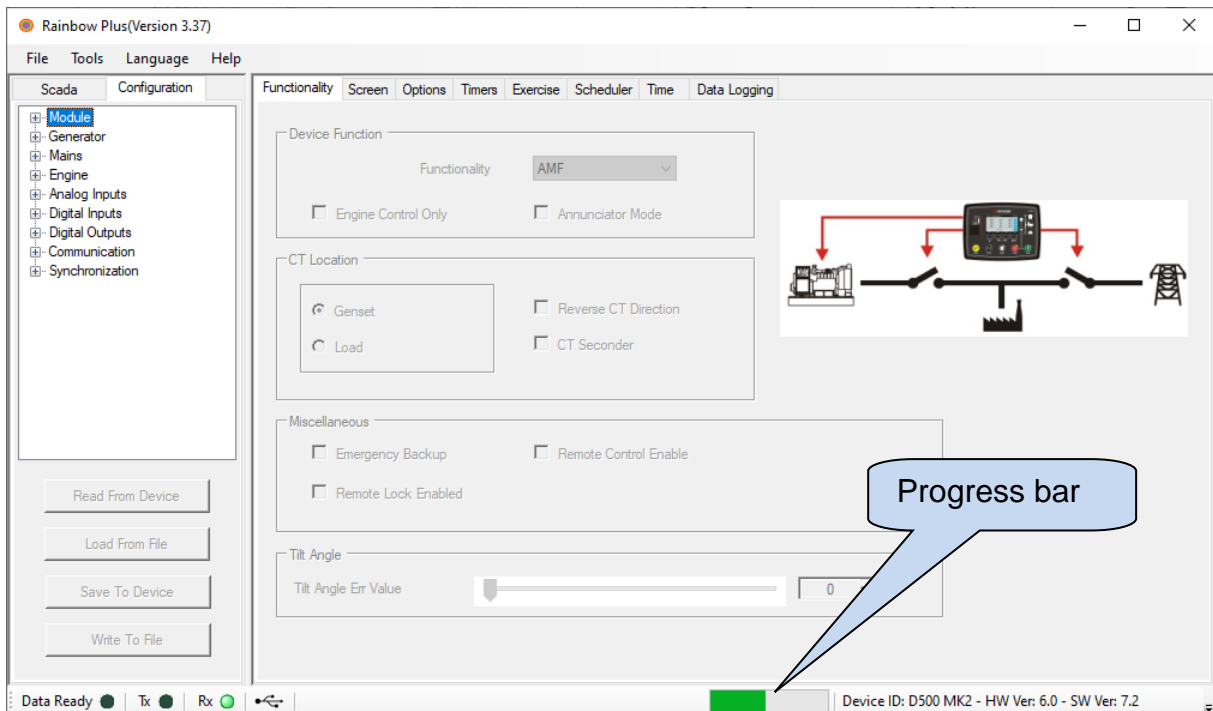
The connection status is displayed on this line

3. CONFIGURING THE CONTROLLER

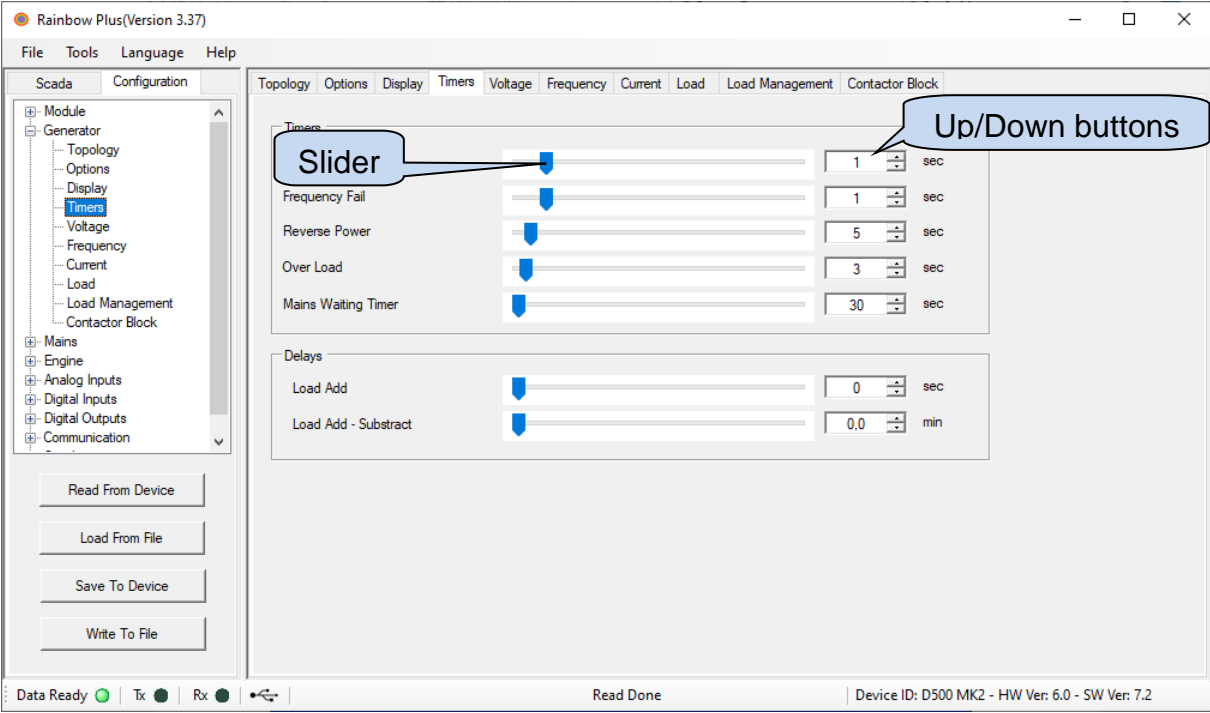
Select **Configuration** tab, then click **Read From Device**



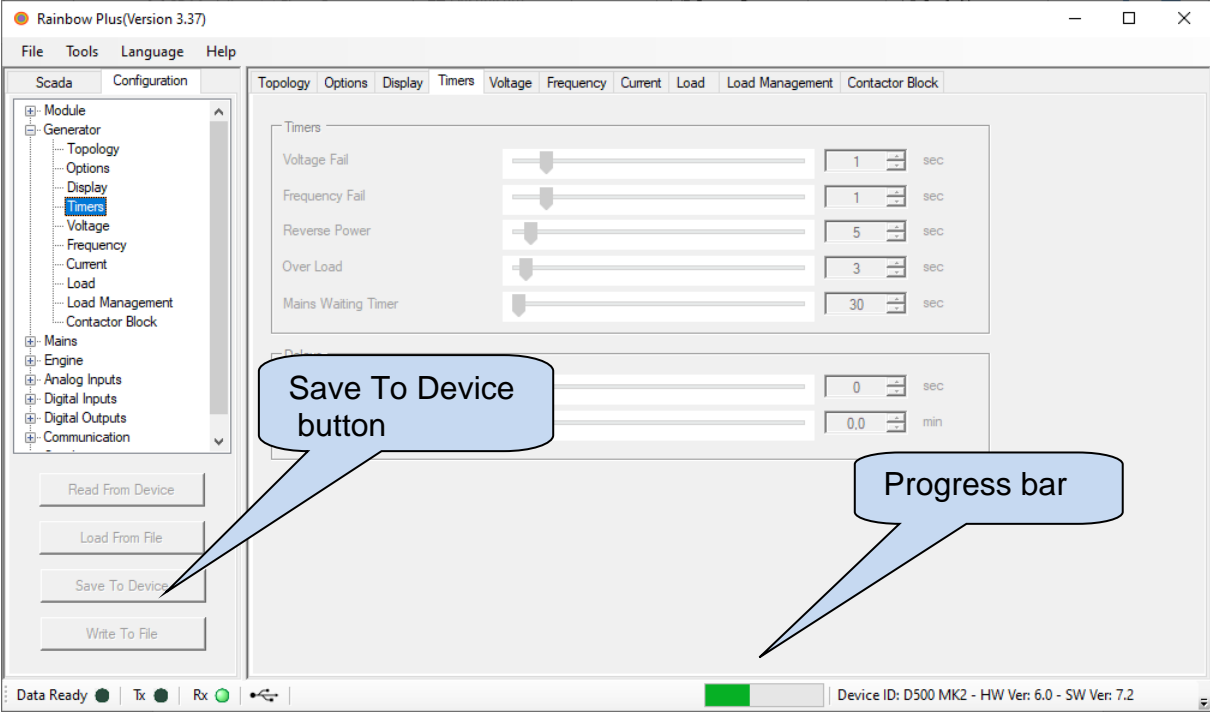
A progress bar will open. Wait until read complete.



Use the menu system to edit parameters. You can use the slider (👉) or 📏 buttons for parameter editing. You can also write directly the parameter value.



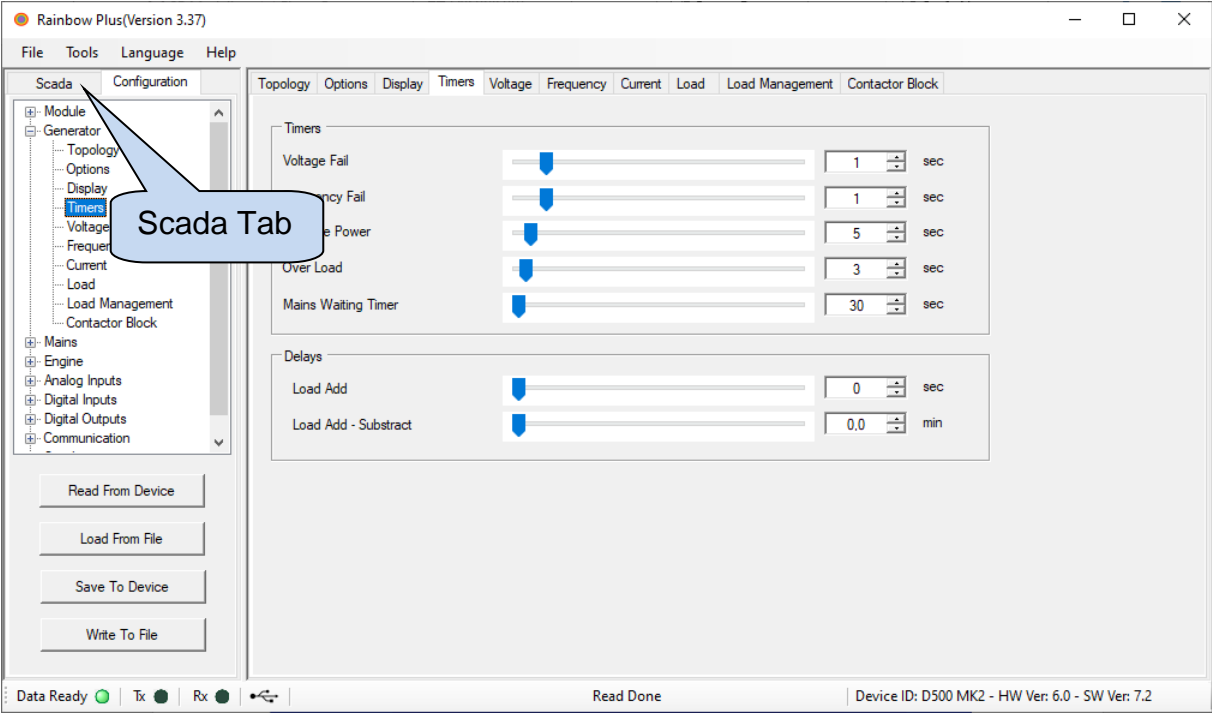
When parameter editing is over, click **Save To Device** button. A progress bar will open.



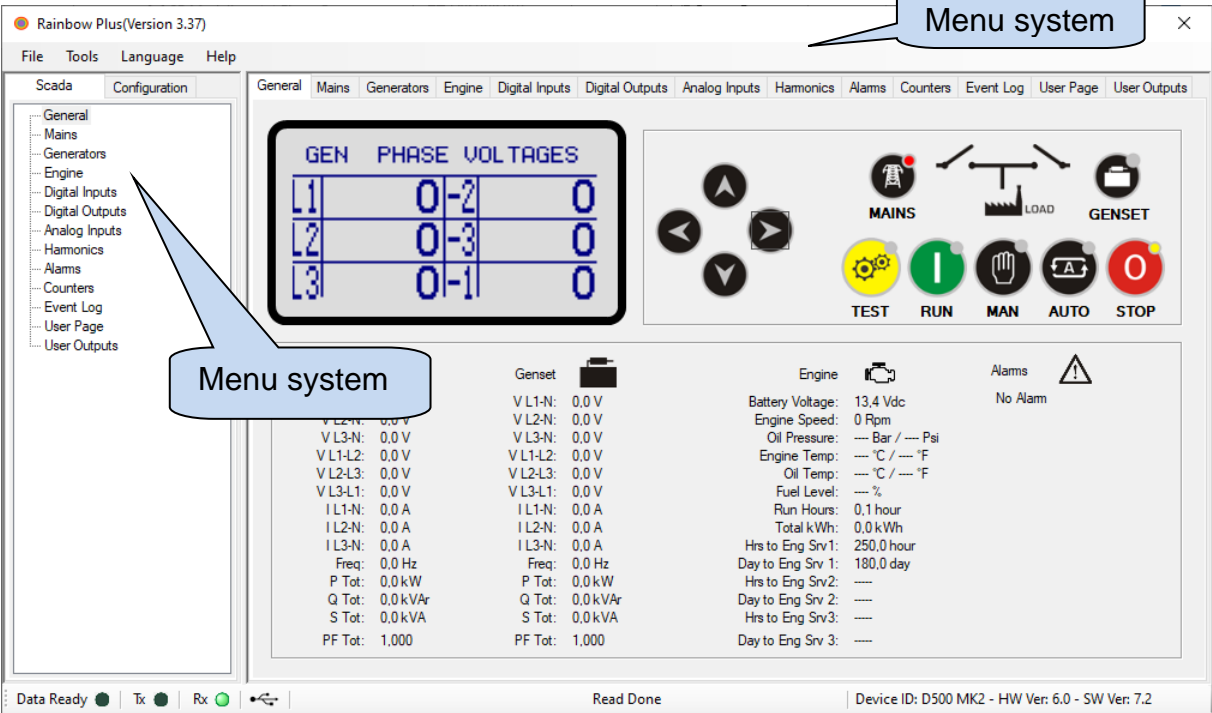
When the progress bar disappears and buttons reappear the write operation is terminated.

4. MONITORING THE CONTROLLER

In order to start monitoring, click **Scada** tab.



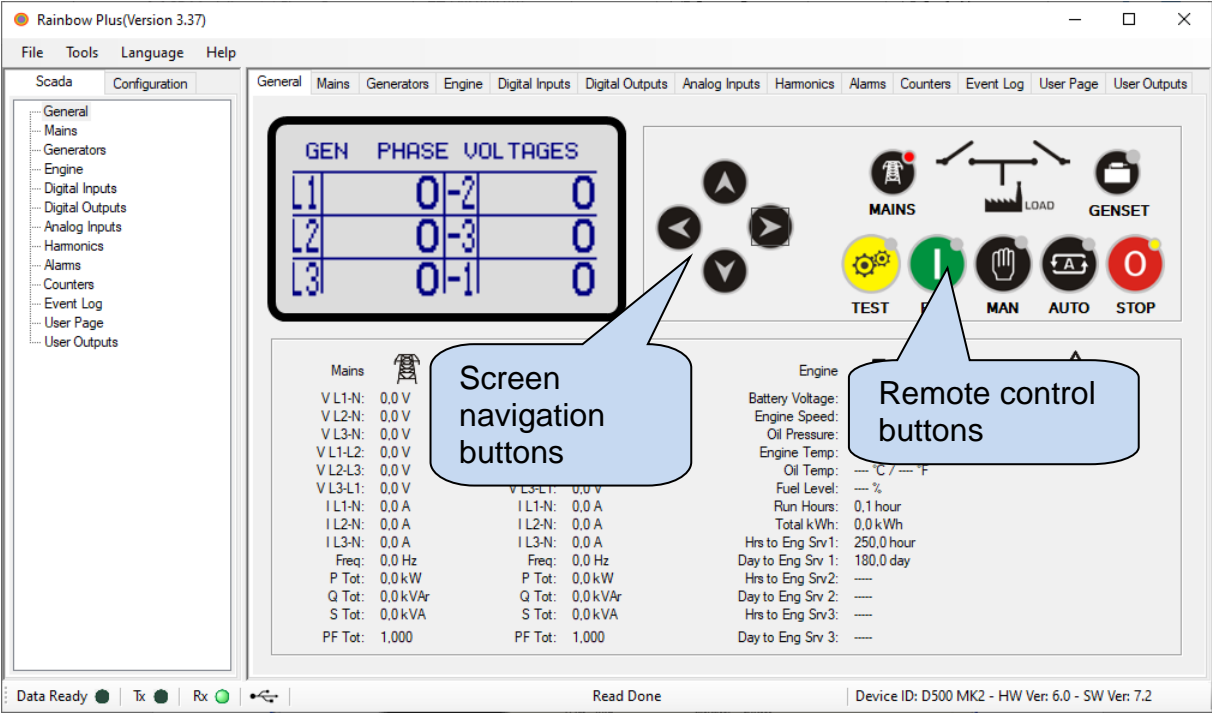
The overall monitoring screen will come. This screen presents a general overview of the generating set. Buttons, leds and the mimic diagram are fully functional. Use the menu system to view other screens.



5. REMOTE CONTROL OF THE CONTROLLER

The general monitoring screen features all buttons found on the controller. Buttons, leds and the mimic diagram are fully functional.

The screen offers also an exact copy of the controller LCD screen. The screen navigation buttons allow graphical monitoring as well.





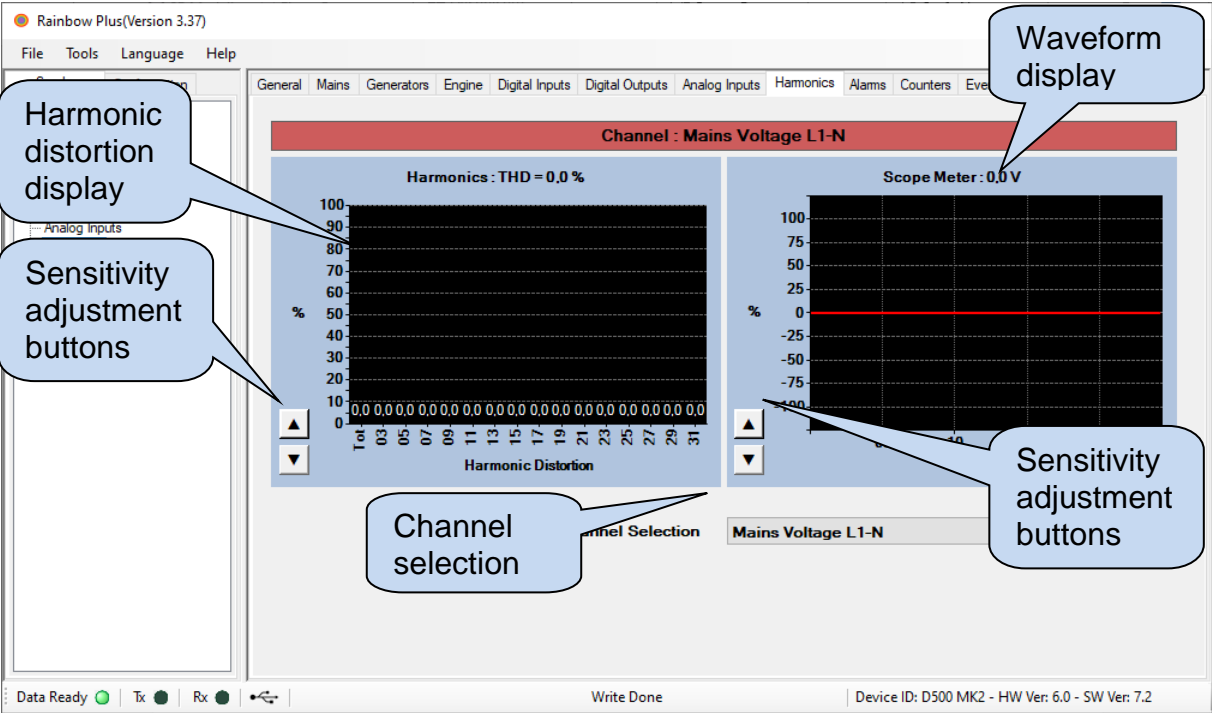
6. WAVEFORM AND HARMONIC DISPLAY

Select **Harmonics** tab.

Any available voltage or current waveform may be visualised like an oscilloscope. The selection is made using the **Harmonic Channel Selection** tab.

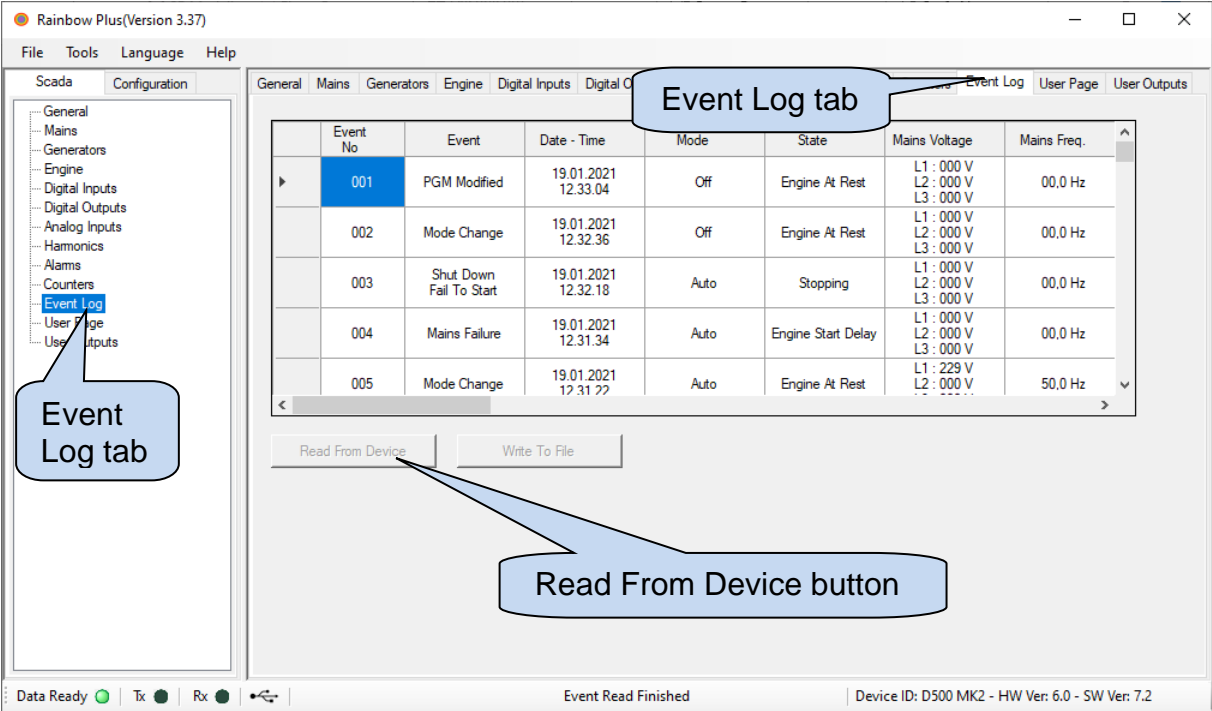
The THD (total harmonic distortion) value and individual values of each harmonic component are displayed until the 31st component.

Y-axis sensitivity of both harmonic and waveform displays is adjusted by clicking  and  buttons.



7. READ, SAVE AND DISPLAY EVENT RECORDS

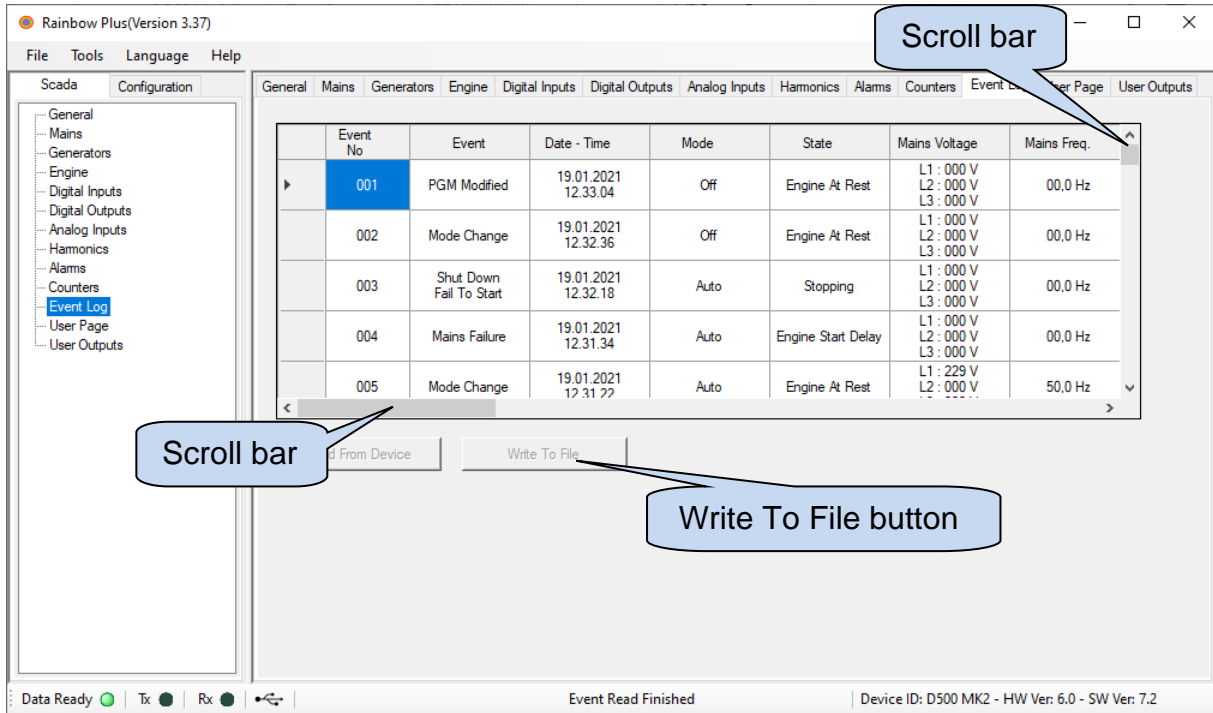
Select **Event Log** tab. Last 10 event logs are displayed.



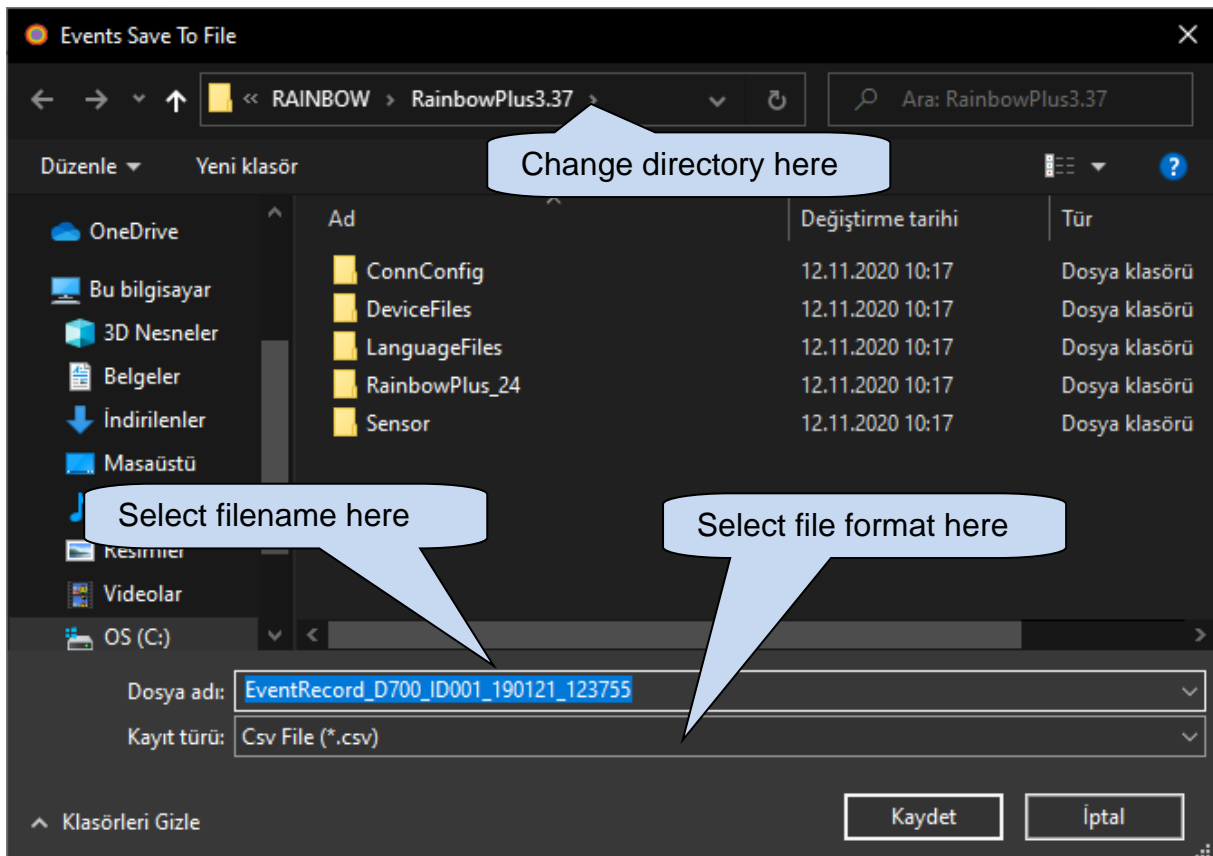
Click **Read From Device** button. A progress bar will appear and the unit will read all events. Wait until all event logs are read.



When download is complete, all events are displayed. Use horizontal and vertical scroll bars to display all values.
Click **Write To File** button to save the event log file to disk.

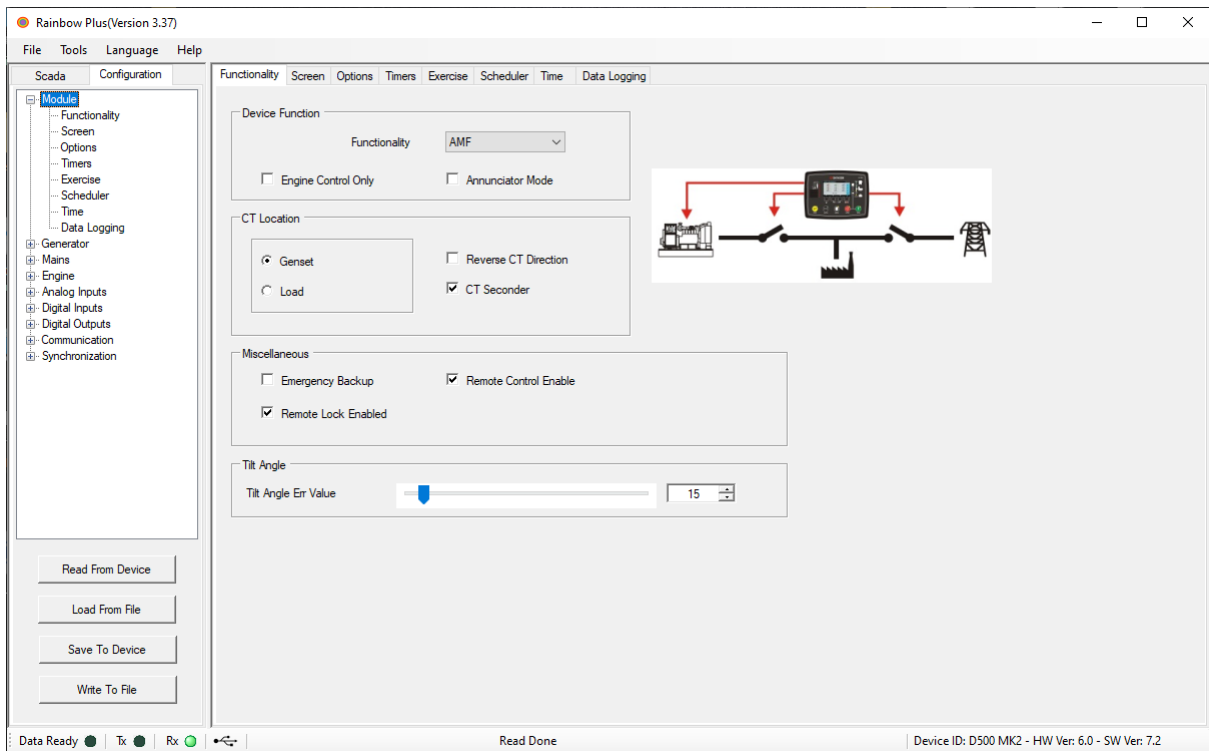


The **default file saving directory** is the same directory as RainbowPlus program. Select another directory if required.
The **default filename** includes date and time. Change filename if required.
The saved **file format** is selectable as Excel-CSV format or text format. Select as required.



8. PARAMETERS

8.1. MODULE



Functionality > Device Function > Functionality

Can be selected among AMF, ATS, REMOTE START, SYNCH, MAINS SYN, RESERVED.

AMF functionality: The unit controls both engine and load transfer. The genset starts based on mains status.

ATS functionality: The unit controls the load transfer and issues REMOTE START signal based on mains status.

REMOTE START functionality: The unit controls engine and alternator. The genset starts with external signal.

SYNCH functionality: The unit controls the synchronization and load sharing. The genset starts with remote start signal coming from a mains synchronizer or ATS module

MAINS SYN functionality: The unit controls the soft load transfer and issues REMOTE START signal based on mains status.

RESERVED: Not used

Functionality > Device Function > Engine Control Only

If selected, only controls the engine and **not** the alternator.

Functionality > Device Function > Annunciator Mode

If selected, the unit becomes an annunciator of the remote unit. Engine/genset control functions are disabled.

Functionality > CT Location > Genset

CTs are at the genset side. Mains currents are not measured.

Functionality > CT Location > Load

CTs are at load side. Both mains and genset currents are monitored following contactor status.

Functionality > CT Location > Reverse CT Direction

This parameter is useful to invert all CT polarities at the same time. If selected, CT polarity is reversed. If not selected, CT polarity is normal.

Functionality > CT Location > CT Secondary

If selected, CT secondary is 1A. If not selected, CT secondary is 5A.

Functionality > Miscellaneous > Emergency Backup

If this parameter is activated and the mains fail during engine battery charging run, then the genset will take the load.

Functionality > Miscellaneous > Remote Control Enable

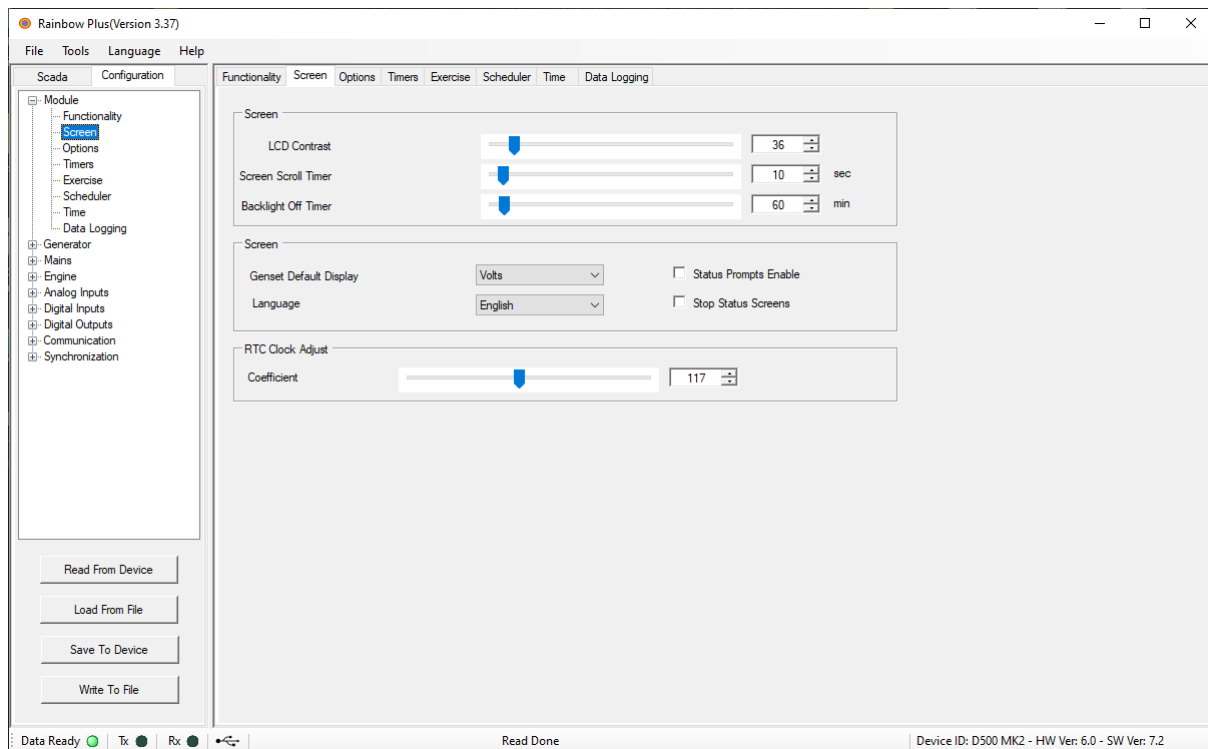
This parameter controls remote control of the unit through Rainbow, Modbus and Modbus TCP/IP. If selected, remote control is enabled. If not selected, remote control is disabled.

Functionality > Miscellaneous > Remote Lock Enabled

If selected, the front panel is completely locked. Uncheck to remove the lock.

Functionality > Tilt Angle > Tilt Angle Err Value

If the generator deviates from its initial set level by the given tilt angle, an alarm occurs. Requires Tilt Detector Plug-In Module.



Screen > LCD Contrast

This parameter is used to set LCD contrast. Adjust for the best viewing angle.

Screen > Screen Scroll Timer

The screen will scroll between different measurement displays at this duration. If set to zero, the screen scroll will be disabled.

Screen > Backlight Off Timer

If no button is pressed during this period, the unit will reduce the LCD screen backlight intensity for economy.

Screen > Genset Default Display

This parameter selects the screen which is displayed during genset on load operation. (genset voltages table, genset currents and frequency table, genset kW and pf table, genset kVA and kVA_r table, genset average measurements)

Screen > Language

Select English or Local. Local language is uploaded from **Rainbow Plus > Tools**.

Screen > Status Prompts Enable

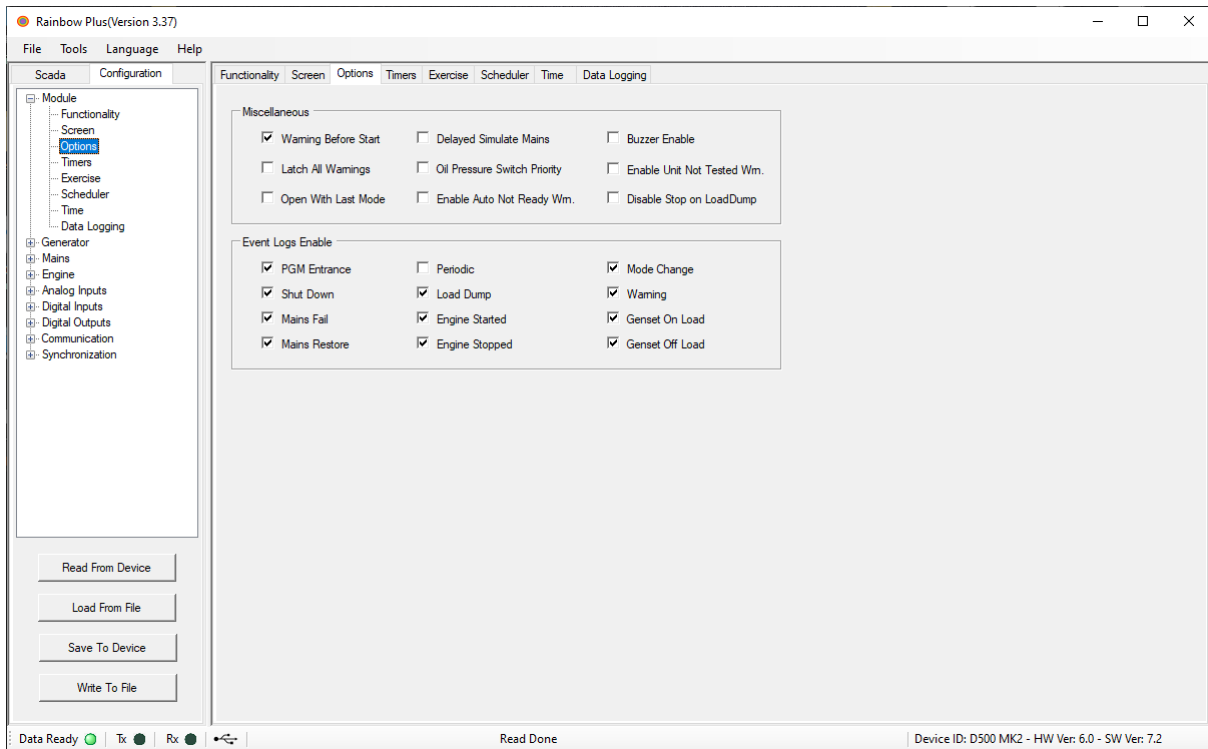
If selected, status prompts are enabled on screen.

Screen > Stop Status Screens

If selected, status screen is disabled.

Screen > RTC Clock Adjust > Coefficient

Adjusts the rate of Real Time Clock.



Options > Miscellaneous > Warning Before Start

This parameter controls the activation of the ALARM output during “Engine Start Delay” timer before engine starts. If selected, ALARM is enabled. If not selected, ALARM is disabled.

Options > Miscellaneous > Latch All Warnings

If selected, all warnings are latched. Even if the fault source is removed, warnings will persist until manually reset. If not selected, latching is determined by the relevant parameter which is causing the warning.

Options > Miscellaneous > Open With Last Mode

If selected, the unit powers up in the same operating mode before power down. If not selected, the unit will power up in STOP mode.

Options > Miscellaneous > Delayed Simulate Mains

If selected, delayed simulate mains is enabled. If the Delayed Simulate Mains program parameter is enabled, and the input signal is active when the genset is not feeding the load, the mains phases are not monitored and supposed to be inside limits. This will prevent the genset from starting when the simulate mains signal is present (batteries charged). The genset will start when mains voltages are out of limits and the simulate mains signal is not present.

Options > Miscellaneous > Oil Pressure Switch Priority

If selected, crank cut is performed only through oil pressure switch. If not selected, crank cut is performed through oil pressure switch and oil pressure sender reading.

Options > Miscellaneous > Enable Auto Not Ready Wrn.

If selected, Auto not Ready warning is enabled. This warning occurs if the genset is not in AUTO mode, or a fault condition or the weekly schedule prevents the automatic starting of the genset.

Options > Miscellaneous > Buzzer Enable

Internal buzzer control. If selected, buzzer is enabled. If not selected, buzzer is disabled.

Options > Miscellaneous > Enable Unit Not Tested Wrn.

If selected, enables the Unit not Tested warning. Uncheck this parameter to remove the warning.

Options > Miscellaneous > Disable Stop on Load Dump

If selected, enables Stop on Load Dump. If enabled, genset contactor opens and genset runs until the end of the cooldown when load dump alarm occurs.

Options > Event Logs Enable > PGM Entrance

Event log is recorded when programming mode is entered.

Options > Event Logs Enable > Shut Down

Event log is recorded when shut down alarm occurs.

Options > Event Logs Enable > Mains Fail

Event log is recorded when mains power fails.

Options > Event Logs Enable > Mains Restore

Event log is recorded when mains power is restored.

Options > Event Logs Enable > Periodic

Event log is recorded periodically with the configured parameter.

Options > Event Logs Enable > Load Dump

Event log is recorded when load dump alarm occurs.

Options > Event Logs Enable > Engine Start

Event log is recorded when engine starts.

Options > Event Logs Enable > Engine Stop

Event log is recorded when engine stops.

Options > Event Logs Enable > Mode Change

Event log is recorded when operation mode is changed.

Options > Event Logs Enable > Warning

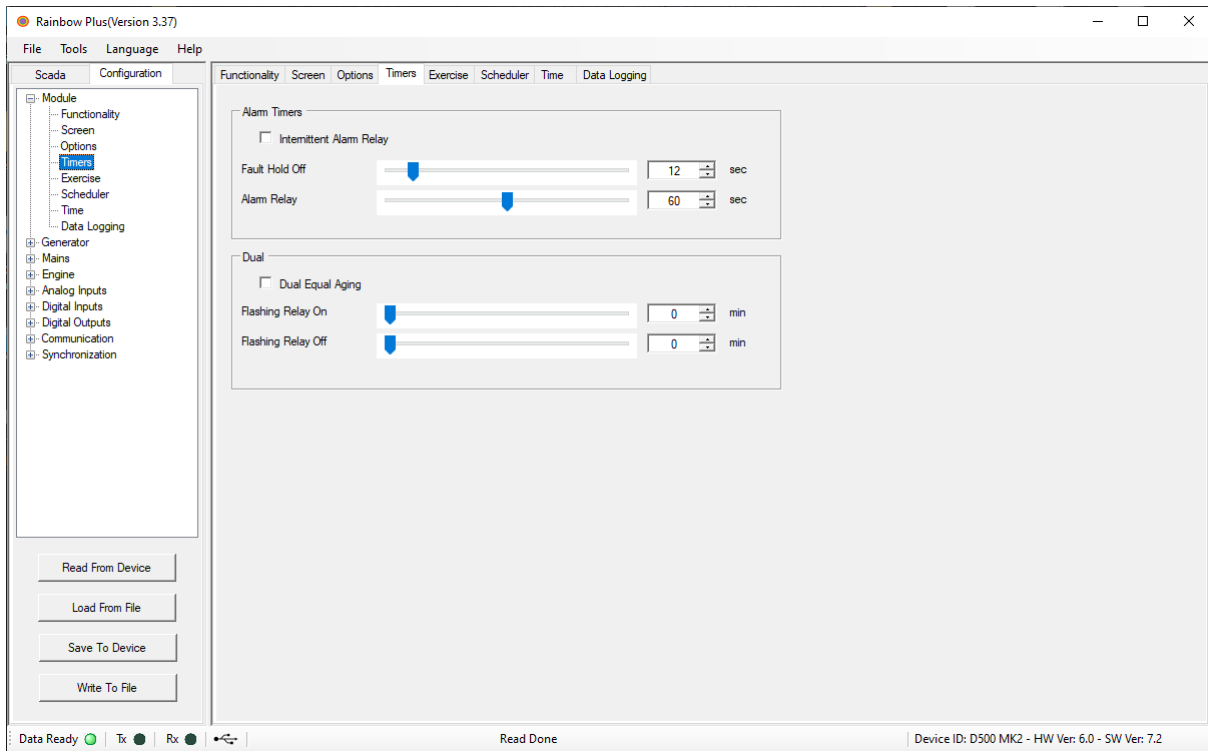
Event log is recorded when a warning occurs.

Options > Event Logs Enable > Genset On Load

Event log is recorded when genset contactor closes.

Options > Event Logs Enable > Genset Off Load

Event log is recorded when genset contactor opens.



Timers > Alarm Timers > Intermittent Alarm Relay

If selected, alarm relay output is intermittent. If not selected, the alarm relay is continuous.

Timers > Alarm Timers > Fault Hold Off

This parameter defines the delay after the engine runs and before the fault monitoring is enabled.

Timers > Alarm Timers > Alarm Relay

This is the period during which the ALARM relay is active. If the period is set to 0, this will mean that the period is unlimited.

Timers > Dual > Dual Equal Aging

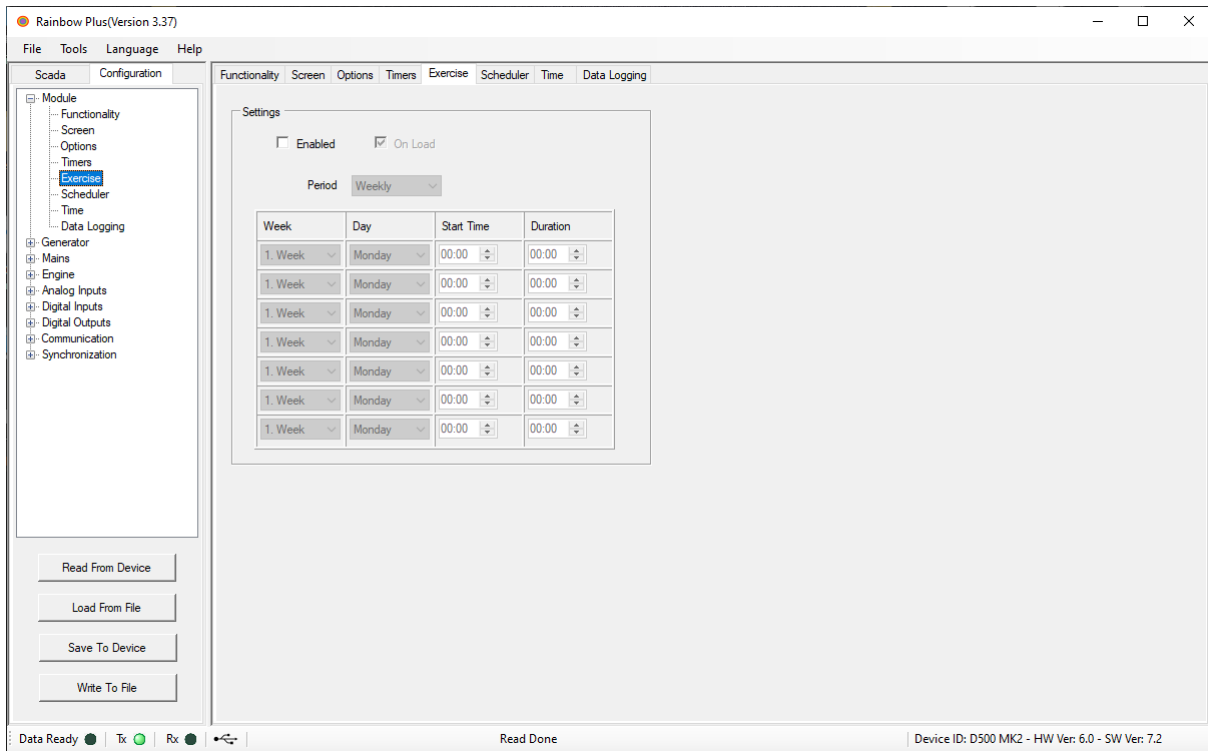
If selected, equal aging is enabled. In equal aging, two gensets are run according to remaining service hours in dual operation mode.

Timers > Dual > Flashing Relay On

Adjusts the max genset running time after Simulate Mains signal disappears in Delayed Simulate Mains Operation. In dual genset systems, adjusts the flashing relay ON timer.

Timers > Dual > Flashing Relay Off

Flashing relay OFF state duration in dual genset systems.



Exercise > Settings > Enabled

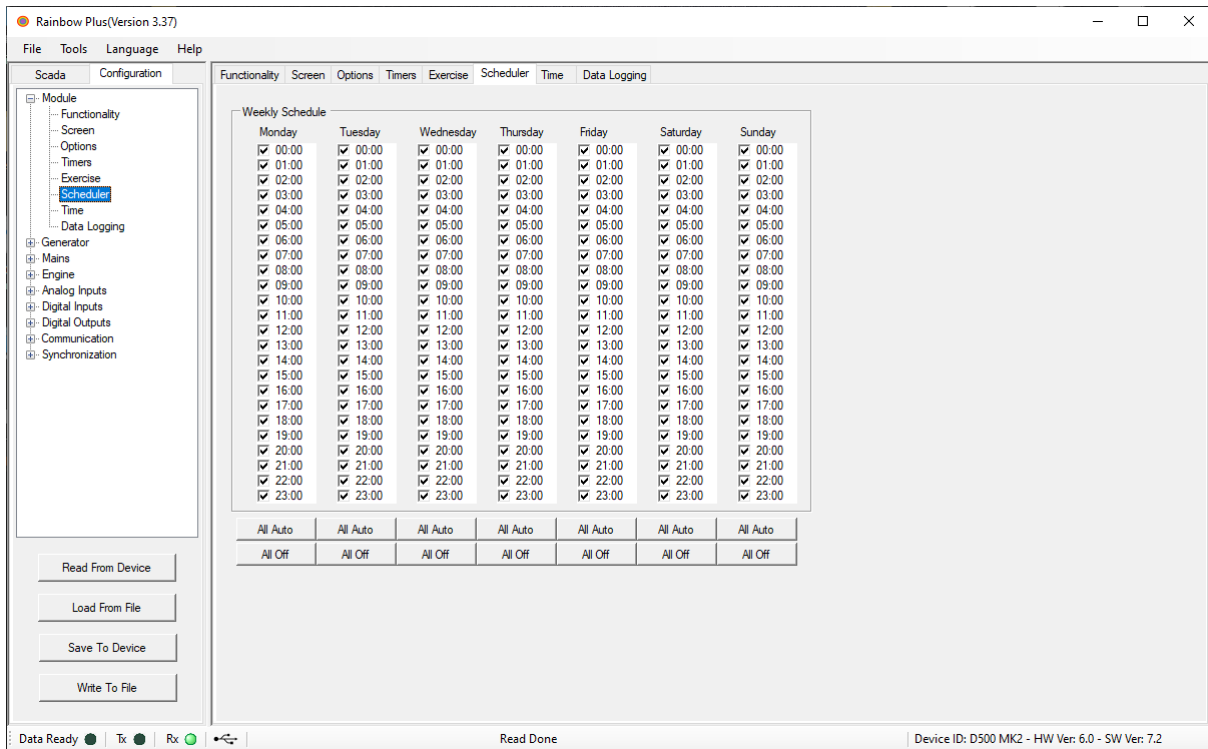
If selected, automatic exerciser is enabled. If not selected, exerciser is disabled.

Exercise > Settings > On Load

If selected, automatic exercise is performed in TEST mode. If not selected, exercise is performed in RUN mode.

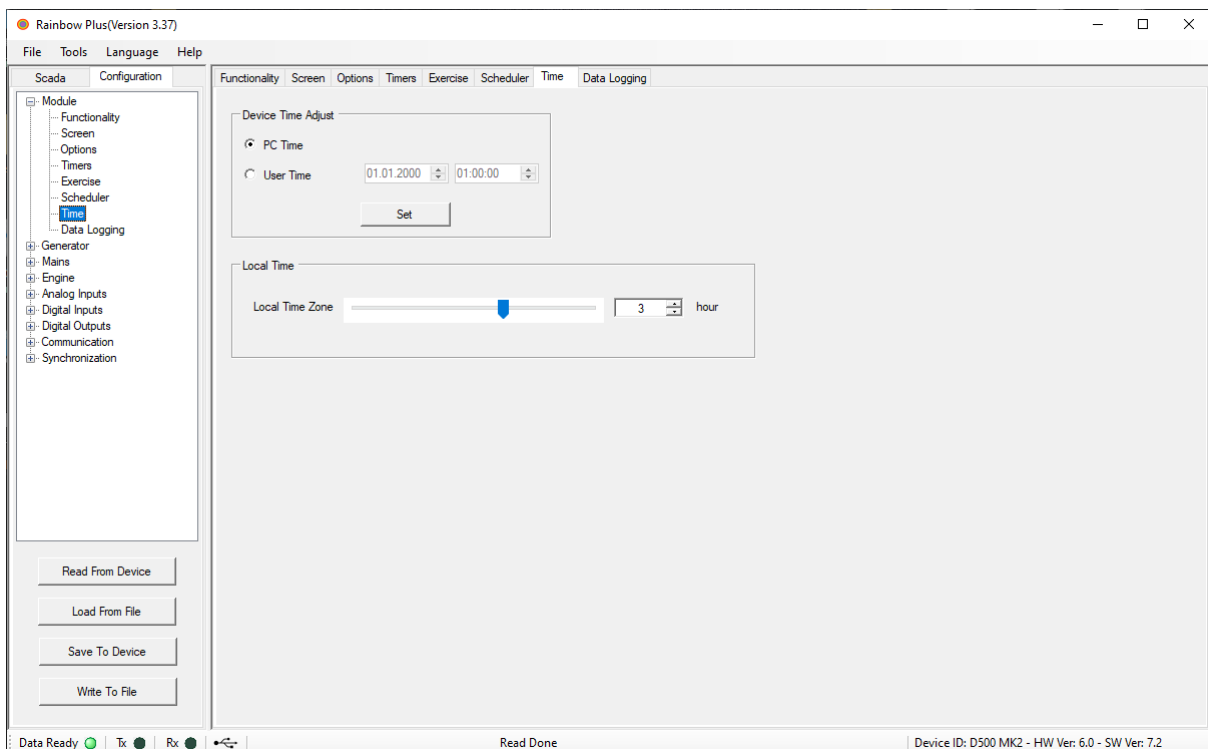
Exercise > Settings > Period

If Weekly is selected, exercises once per week. If Monthly is selected, exercises once per month. The exact exerciser day and time is adjusted from the timetable.



Scheduler > Weekly Schedule

If a box is selected, auto mode is enabled for the corresponding hour of the day. If it is not selected, the genset will not start for that period. All Auto buttons checks all the boxes for the corresponding day, All Off unchecks all the boxes.



Time > Device Time Adjust > PC Time

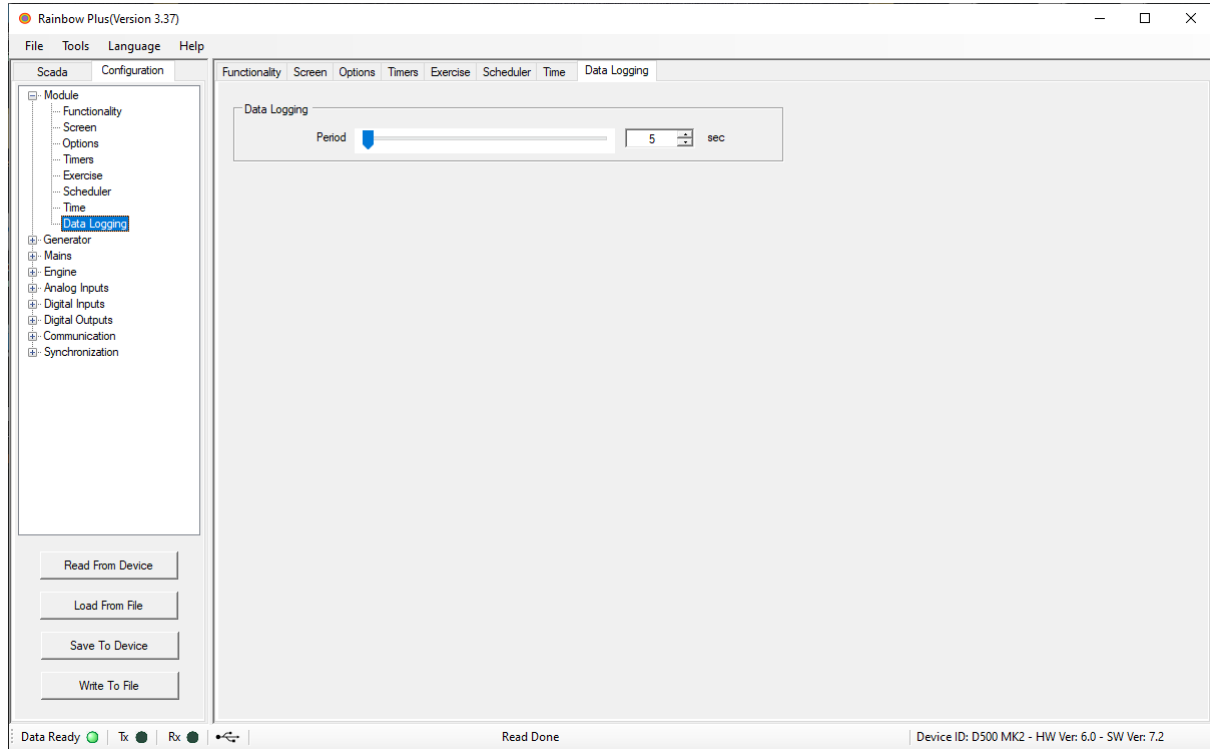
Takes date and time parameters from the connected PC. Click Set to set the time.

Time > Device Time Adjust > User Time

User manually enters date and time. Click Set to set the time.

Time > Local Time > Local Time Zone

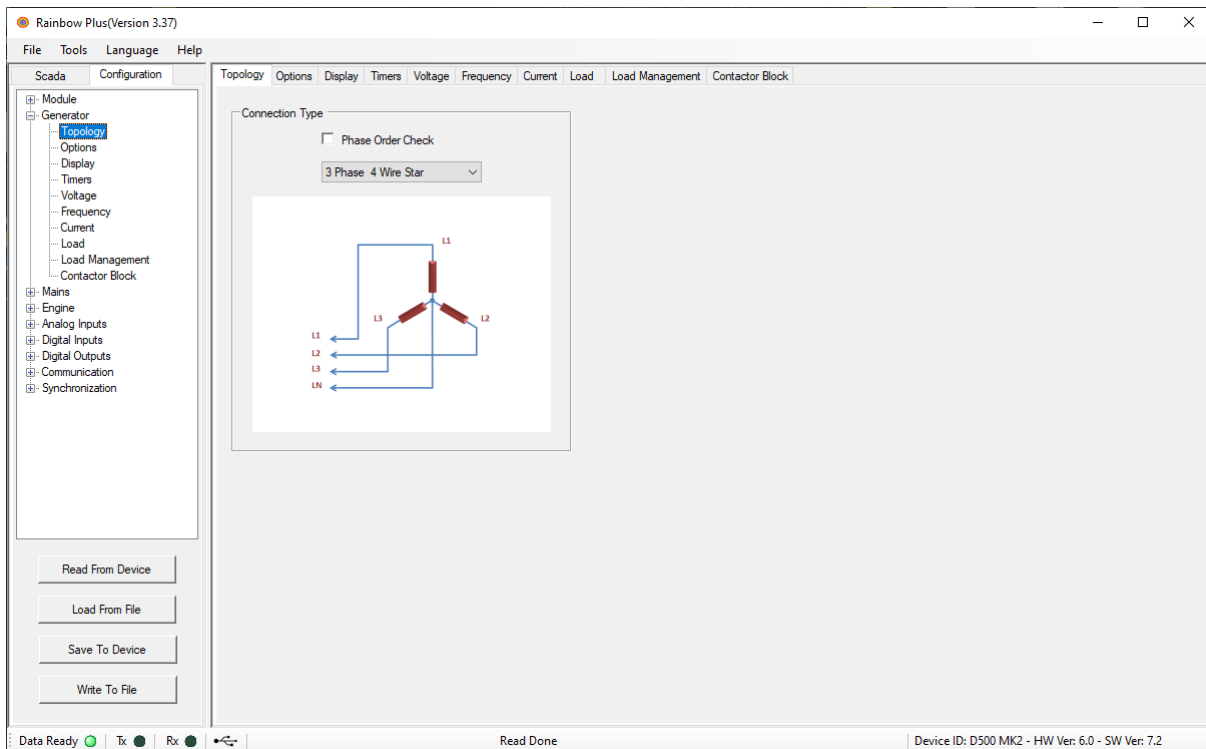
Enter local time zone with respect to GMT.



Data Logging > Data Logging > Period

Adjusts the data logging period if periodic event logging is enabled.

8.2. GENERATOR



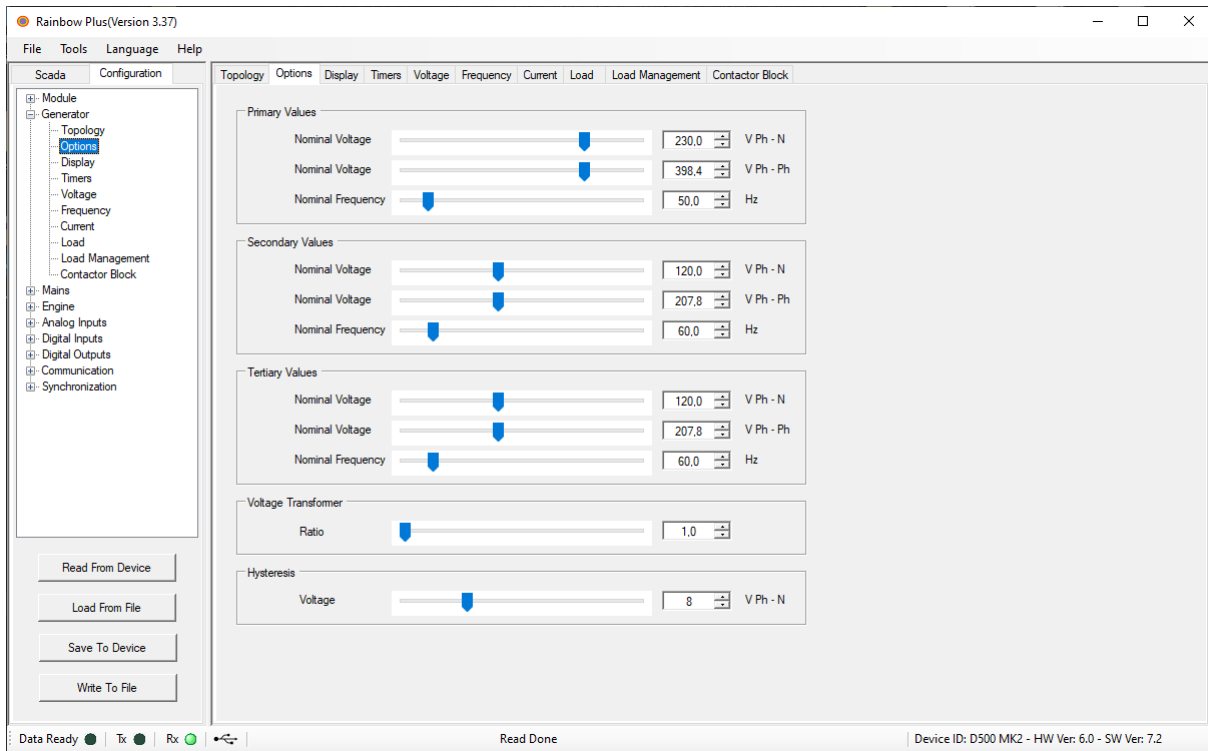
Topology > Connection Type > Phase Order Check

If selected, genset phase order fail load dump alarm is given in case genset phase order is faulty. If not selected, phase order checking is disabled.

Topology > Connection Type > Connection Topology

Can be selected from:

- 2 phase, 3 wire L1-L2,
- 2 phase, 3 wire L1-L3,
- 3 phase, 3 wire,
- 3 phase, 3 wire, 2CTs L1-L2,
- 3 phase, 3 wire, 2CTs L1-L3,
- 3 phase, 4 wire star,
- 3 phase, 4 wire delta,
- single phase, 2 wire.



Options > Primary Values > Nominal Voltage

Adjusts the nominal phase-neutral or phase-phase voltage of the genset.

Options > Primary Values > Nominal Frequency

Adjusts the nominal frequency of the genset.

Options > Secondary Values > Nominal Voltage

Adjusts the secondary nominal phase-neutral or phase-phase voltage of the genset.

Options > Secondary Values > Nominal Frequency

Adjusts the secondary nominal frequency of the genset.

Options > Tertiary Values > Nominal Voltage

Adjusts the tertiary nominal phase-neutral or phase-phase voltage of the genset.

Options > Tertiary Values > Nominal Frequency

Adjusts the tertiary nominal frequency of the genset.

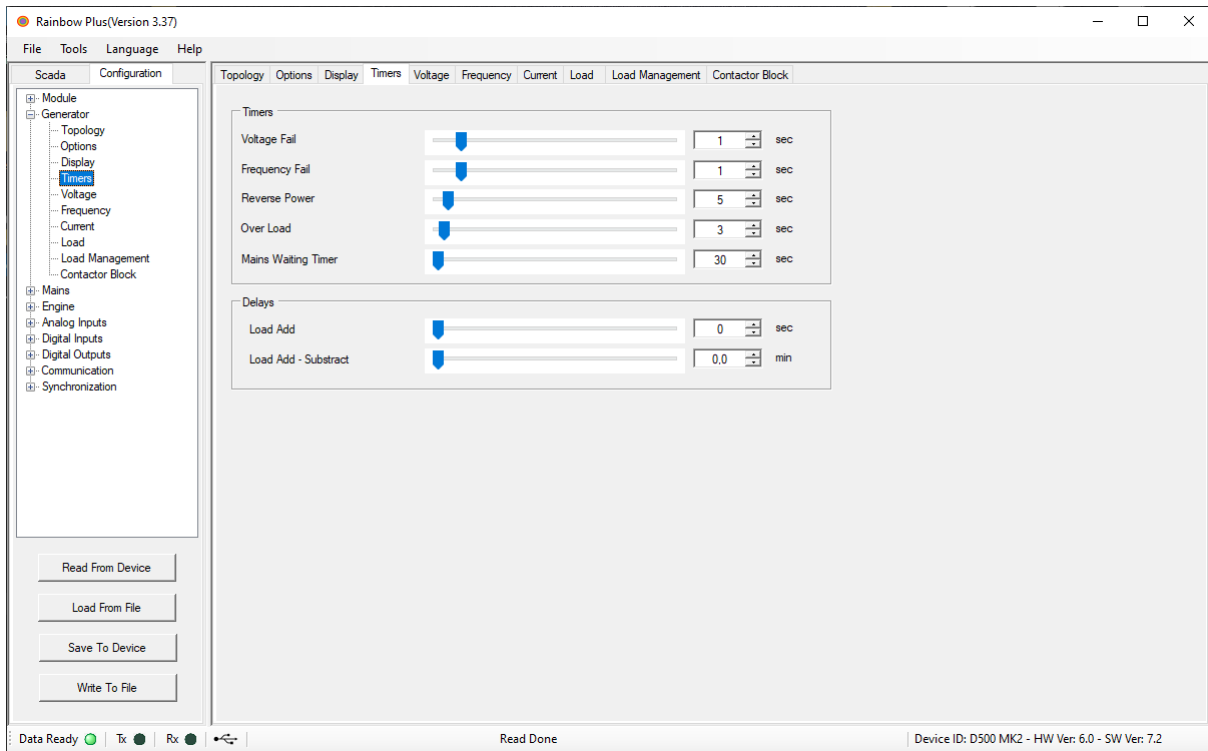
To switch to secondary values using digital input signal, one of digital inputs has to be defined as “2nd Volt-Freq Select” using “INPUT FUNCTION SELECT” program group. If third set is used, the one of the digital inputs has to be defined as “3rd Volt-Freq Select” using “INPUT FUNCTION SELECT” program group.

Options > Voltage Transformer > Ratio

Adjusts the voltage transformer ratio.

Options > Hysteresis > Voltage

Adjusts the hysteresis voltage. This parameter provides the mains and genset voltage limits with a hysteresis feature in order to prevent faulty decisions. For example, when the mains are present, the mains voltage low limit will be used as the programmed low limit. When the mains fail, the low limit will be incremented by this value. It is advised to set this value to 8 volts.



Timers > Voltage Fail

If at least one of the genset phase voltages is outside the limits for the duration of this timer, a genset voltage fault will occur.

Timers > Frequency Fail

If the genset frequency is outside of the limits during this timer, a genset frequency fault will occur.

Timers > Reverse Power

If the genset power is negative and over limits during this timer, a reverse power fault will occur.

Timers > Over Load

If the genset power supplied to the load exceeds the overload load dump limit for the duration of this timer, an alarm will occur.

Timers > Mains Waiting Timer

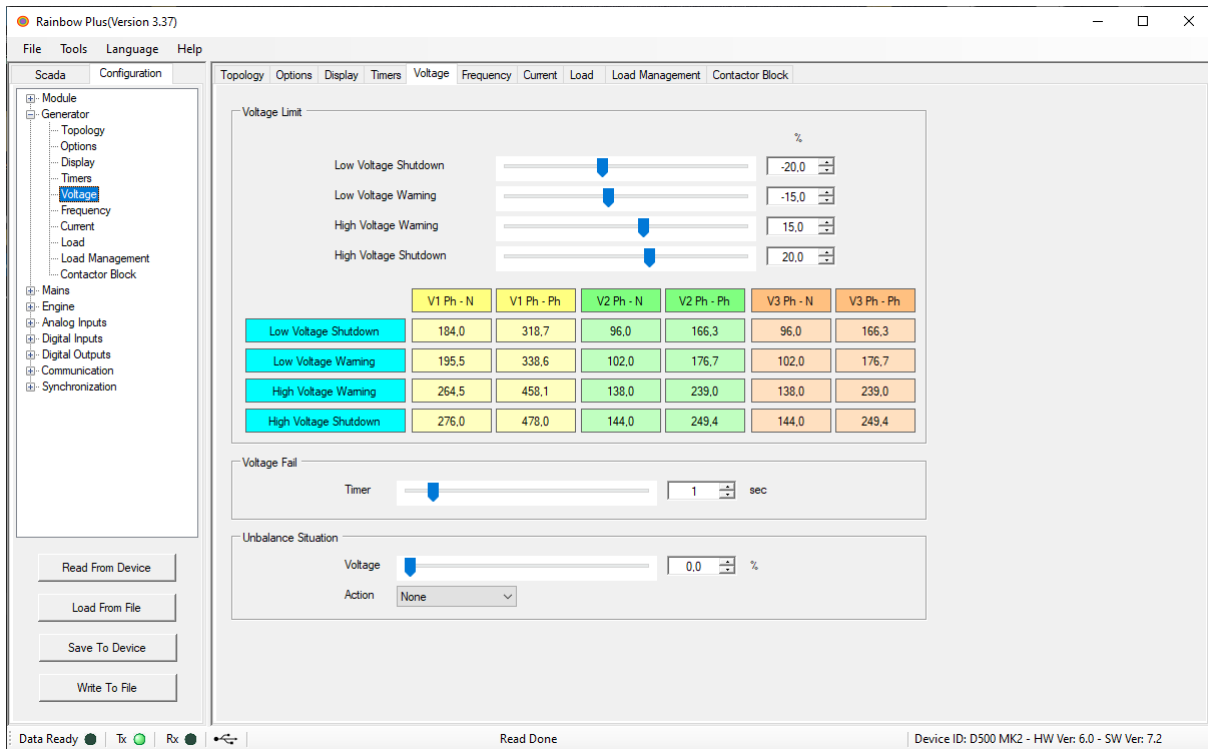
The controller waits for the duration of this timer after the mains voltages and frequency comes within nominal limits before opening the generator contactor.

Timers > Delays > Load Add

This is the minimum delay between 2 load_add pulses. This is also the minimum delay between 2 load_subtract pulses.

Timers > Delays > Load Add – Subtract

This is the minimum delay between load_add and load_subtract pulses.



Voltage > Voltage Limit > Low Voltage Shutdown

If one of the genset phase voltages goes under this limit while feeding the load, a GENSET LOW VOLTAGE shutdown alarm will occur and the engine will stop.

Voltage > Voltage Limit > Low Voltage Warning

If one of the genset phase voltages goes under this limit when feeding the load, this will generate a GENSET LOW VOLTAGE warning.

Voltage > Voltage Limit > High Voltage Warning

If one of the genset phase voltages goes over this limit when feeding the load, this will generate a GENSET HIGH VOLTAGE warning.

Voltage > Voltage Limit > High Voltage Shutdown

If one of the genset phase voltages goes over this limit when feeding the load, this will generate a GENSET HIGH VOLTAGE shutdown alarm and the engine will stop.

Voltage > Voltage Fail > Timer

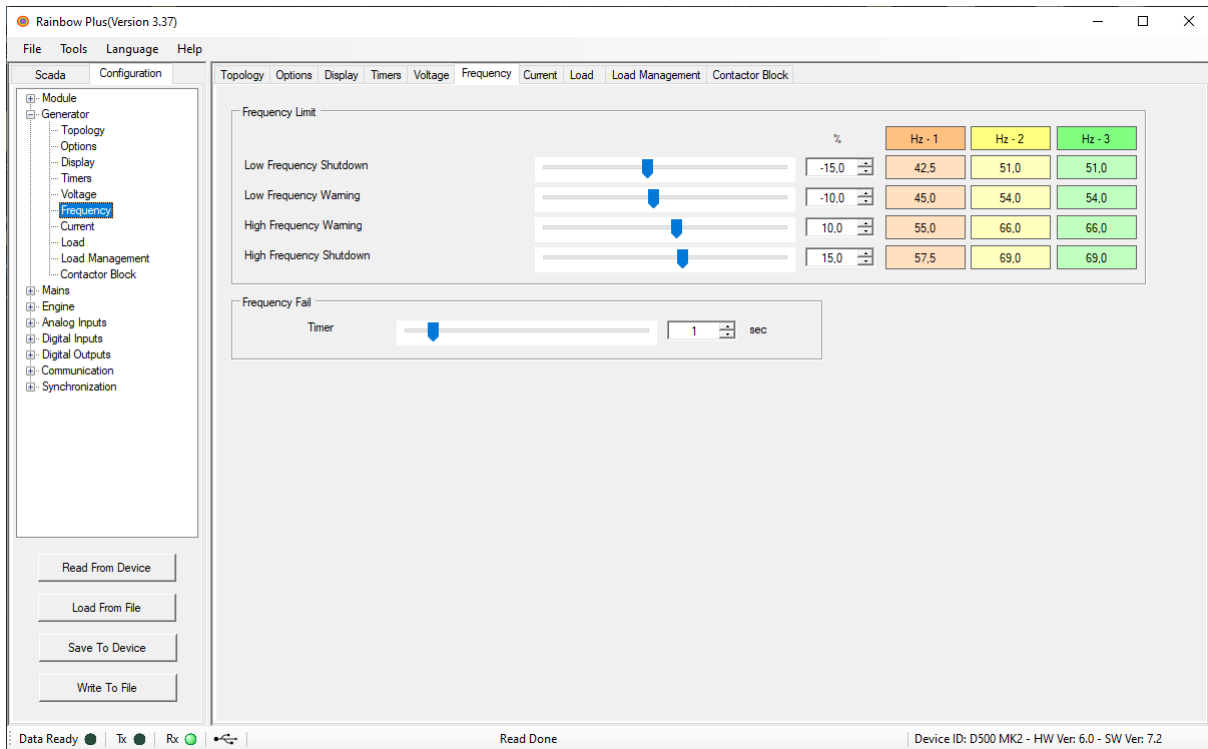
If at least one of the genset phase voltages goes outside of the limits during this timer, a genset voltage fault will occur.

Voltage > Unbalance Situation > Voltage

If any genset phase voltage differs from the average more than this limit, it will generate a Voltage Unbalance fault condition. The action taken upon fault condition is programmable. If this parameter is set to 0.0 then voltage unbalance is not monitored.

Voltage > Unbalance Situation > Action

Select among no action, shutdown alarm, load dump alarm, and warning.



Frequency > Frequency Limit > Low Frequency Shutdown

If one of the genset phase voltages goes under this limit while feeding the load, a GENSET LOW VOLTAGE shutdown alarm will occur and the engine will stop.

Frequency > Frequency Limit > Low Frequency Warning

If one of the genset phase voltages goes under this limit when feeding the load, this will generate a GENSET LOW VOLTAGE warning.

Frequency > Frequency Limit > High Frequency Warning

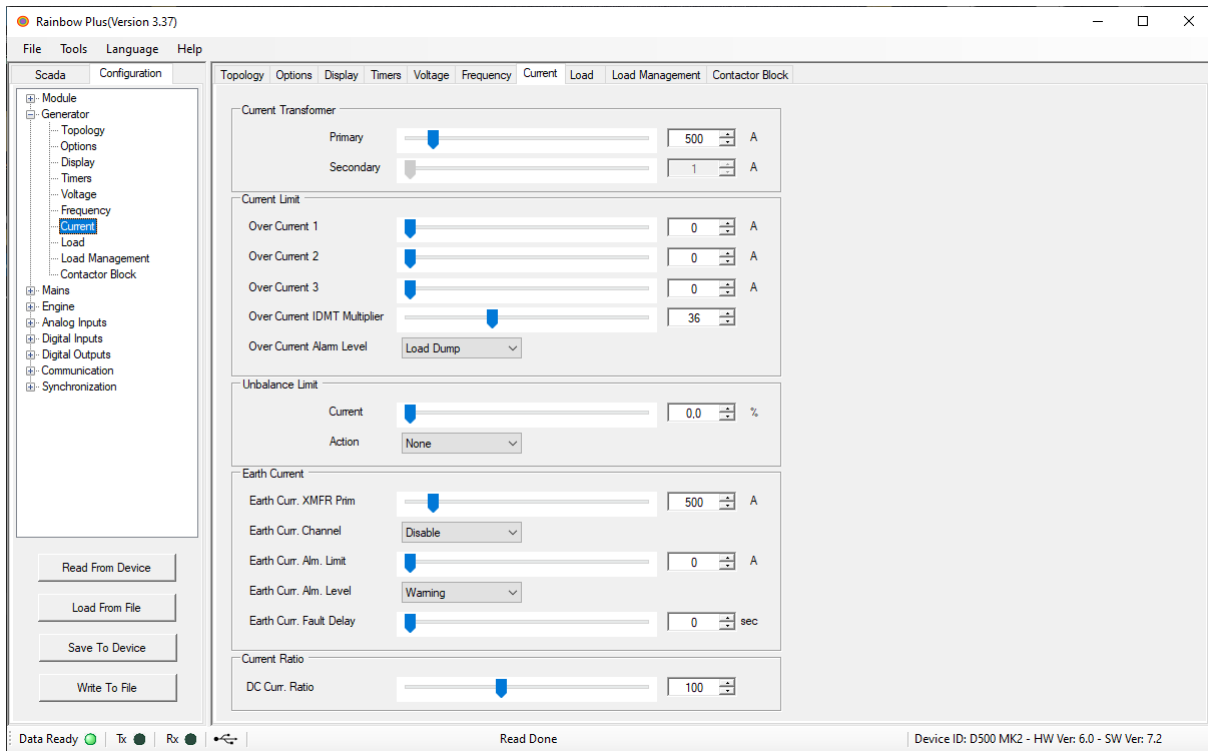
If one of the genset phase voltages goes over this limit when feeding the load, this will generate a GENSET HIGH VOLTAGE warning.

Frequency > Frequency Limit > High Frequency Shutdown

If one of the genset phase voltages goes over this limit when feeding the load, this will generate a GENSET HIGH VOLTAGE shutdown alarm and the engine will stop.

Frequency > Frequency Fail > Timer

If the genset frequency goes outside of the limits during this timer, a genset frequency fault will occur.



Current > Current Transformer > Primary
Adjust the CT primary.

Current > Current Transformer > Secondary
This parameter can be changed from **Module > Functionality > CT Location > CT Secondary**

Current > Current Limit > Over Current 1
If one of the genset phase currents goes over this limit when feeding the load, this will generate a genset overcurrent fault condition. If this parameter is set to 0 then overcurrent fault is not monitored.

Current > Current Limit > Over Current 2
When secondary voltage is selected, if one of the genset phase currents goes over this limit when feeding the load, this will generate a genset overcurrent fault condition. If this parameter is set to 0 then overcurrent fault is not monitored.

Current > Current Limit > Over Current 3
When tertiary voltage is selected, if one of the genset phase currents goes over this limit when feeding the load, this will generate a genset overcurrent fault condition. If this parameter is set to 0 then overcurrent fault is not monitored.

Current > Current Limit > Over Current IDMT Multiplier
This parameter defines the reaction speed of the overcurrent detector. A higher number means higher sensitivity.

Current > Current Limit > Over Current Alarm Level
Select among no action, shutdown alarm, load dump alarm, and warning.

Current > Unbalance Limit > Current
If any genset phase voltage differs from the average more than this limit, it will generate a Current Unbalance fault condition. If this parameter is set to 0.0 then current unbalance is not monitored.

Current > Unbalance Limit > Action

Select among no action, shutdown alarm, load dump alarm, and warning.

Current > Earth Current > Earth Curr. Transformer Primary

Adjust the Earth CT primary.

Current > Earth Current > Earth Current Channel

This parameter is available with only D700 controller. Any of the mains phase current input can be selected as earth current input.

Current > Earth Current > Earth Current Alarm Limit

If earth current goes over this limit when feeding the load, this will generate earth current fault condition. If this parameter is set to 0 then earth current fault is not monitored.

Current > Earth Current > Earth Current Alarm Level

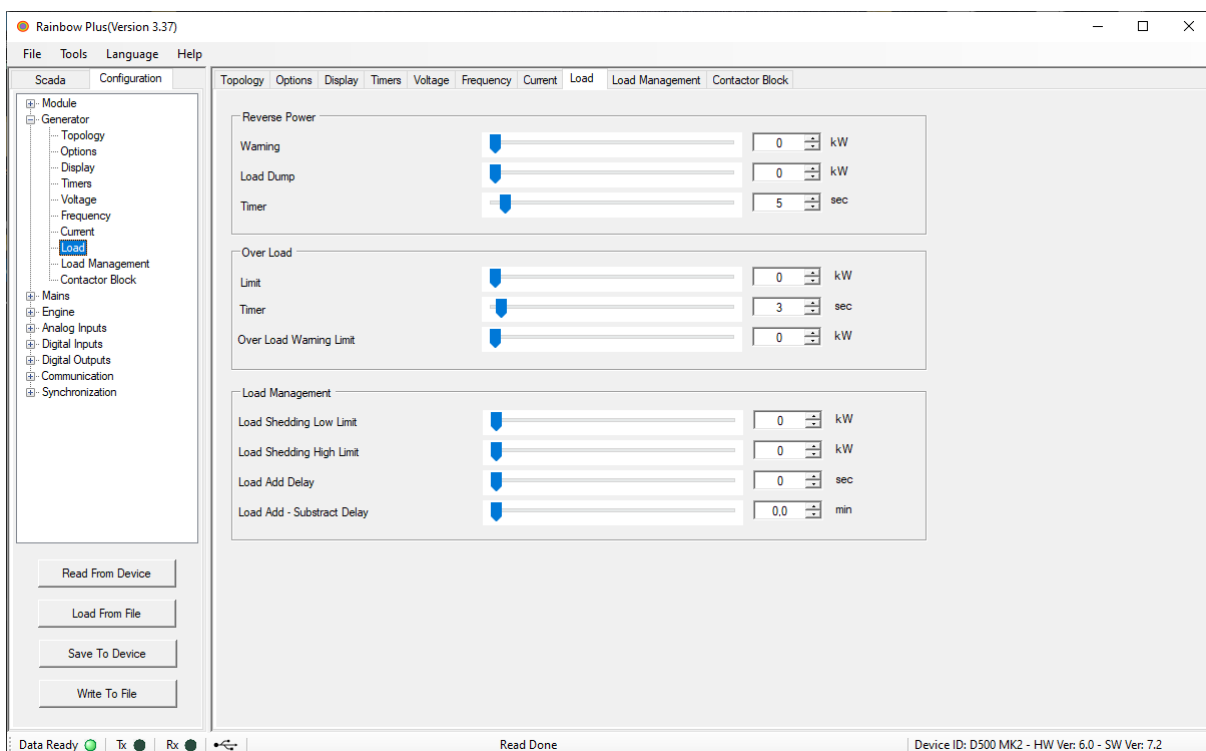
Select among no action, shutdown alarm, load dump alarm, and warning.

Current > Earth Current > Earth Current Fault Delay

If the earth current is over the limit during this timer, earth current fault will occur.

Current > Current Ratio > DC Current Ratio

This parameter adjusts the rated value of the current shunt in amperes if plug-in DC module is inserted.



Load > Reverse Power > Warning

If the genset power is negative and goes above this limit then a REVERSE POWER warning will be generated. If this parameter is set to 0 then reverse power fault is not monitored.

Load > Reverse Power > Load Dump

If the genset power is negative and goes above this limit then a REVERSE POWER load dump alarm will be generated.

Load > Reverse Power > Timer

If the genset power is negative and over limits during this timer, a reverse power fault will occur.

Load > Over Load > Limit

If the total genset active power goes over this limit when feeding the load, this will generate a genset overload loaddump alarm. If this parameter is set to 0 then overload fault is not monitored.

Load > Over Load > Timer

If the genset active power is over the limit during this timer, an overload fault will occur.

Load > Over Load > Over Load Warning Limit

If the total genset active power goes over this limit when feeding the load, this will generate a genset overload warning. If this parameter is set to 0 then overload fault is not monitored.

Load > Load Management > Load Shedding Low Limit

If the genset power goes below this limit then the load shedding relay will be deactivated. Refer to “Load Shedding” for more details.

Load > Load Management > Load Shedding High Limit

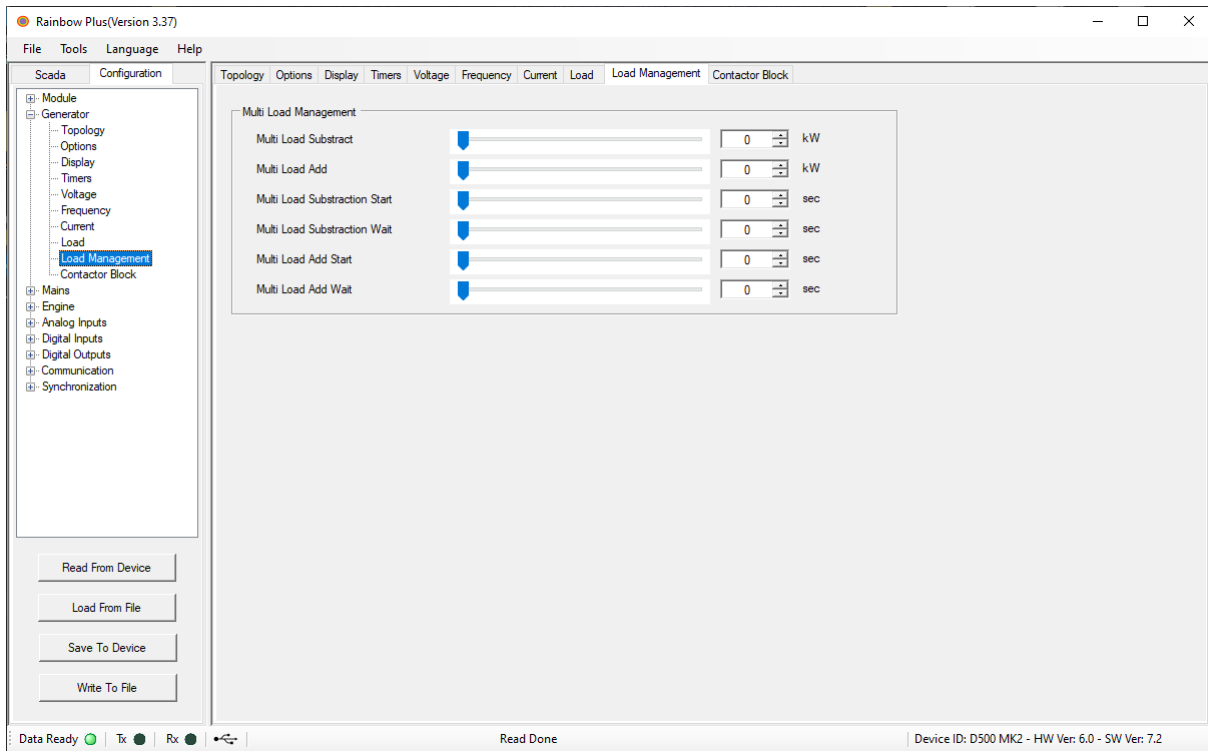
If the genset power goes above this limit then the load shedding relay will be activated. Refer to “Load Shedding” for more details.

Load > Load Management > Load Add Delay

This is the minimum delay between 2 load_add pulses.

Load > Load Management > Load Add Subtract Delay

This is the minimum delay required for a load_add pulse after a load_substract pulse.



Load Management > Multi Load Management > Multi Load Subtract

When the genset active power goes over this limit, the controller will start subtracting load as described in chapter **Five Step Load Management**.

Load Management > Multi Load Management > Multi Load Add

When the genset active power goes below this limit, the controller will start adding load as described in chapter **Five Step Load Management**.

Load Management > Multi Load Management > Multi Load Subtraction Start

If the load stays over the **Multi Load Subtract Power Level** parameter during this timer, then 1 step of load is subtracted.

Load Management > Multi Load Management > Multi Load Subtraction Wait

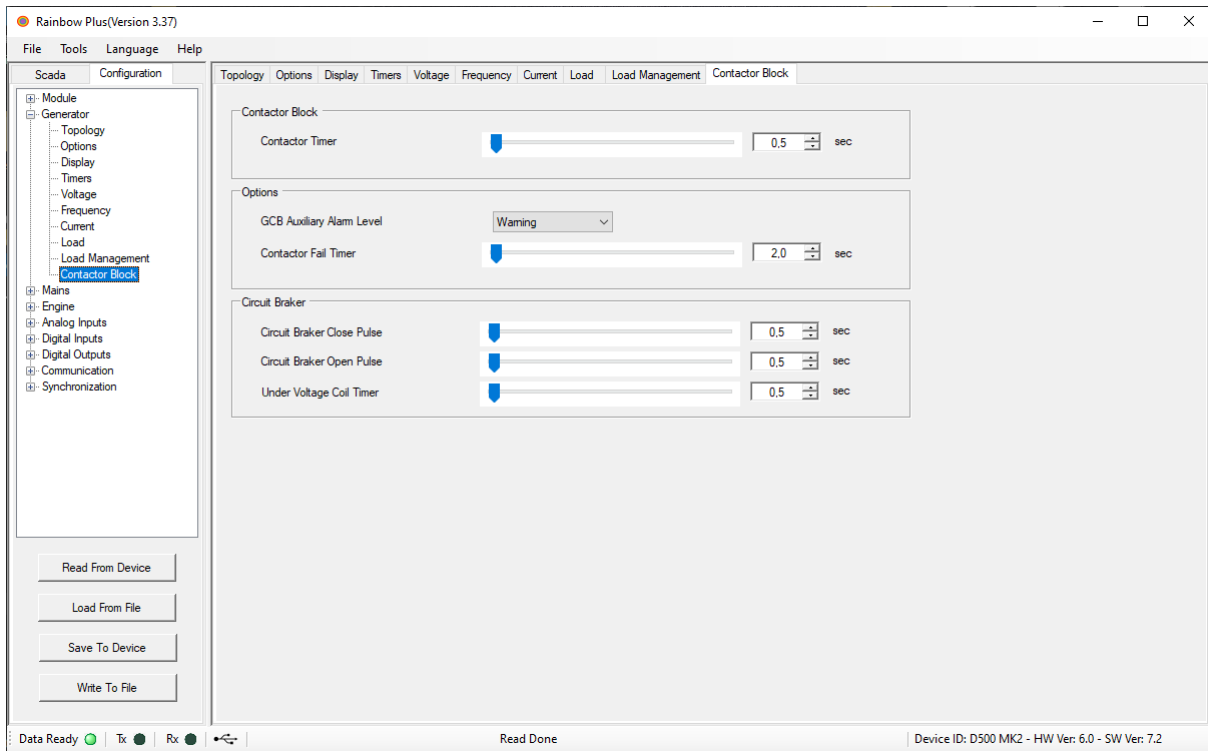
This is the minimum period between two load subtract operations.

Load Management > Multi Load Management > Multi Load Add Start

If the load stays below the **Multi Load Add Power Level** parameter during this timer, then 1 step of load is added.

Load Management > Multi Load Management > Multi Load Add Wait

This is the minimum period between two load add operations.



Contactor Block > Contactor Block > Contactor Timer

This is the period after the mains contactor has been deactivated and before the genset contactor has been activated.

Contactor Block > Options > GCB Auxiliary Alarm Level

Select between Load Dump and Warning.

Contactor Block > Options > Contactor Fail Timer

If a genset MCB feedback input is defined and if the genset MCB fails to change position before the expiration of this timer, then a fault condition occurs.

Contactor Block > Circuit Breaker > Circuit Breaker Close Pulse

After the genset MCB_undervoltage coil is energized and genset MCB_undervoltage coil timer is elapsed, the genset MCB_close relay will be activated during this period.

Review chapter “Motorized Circuit Breaker Control” for more details.

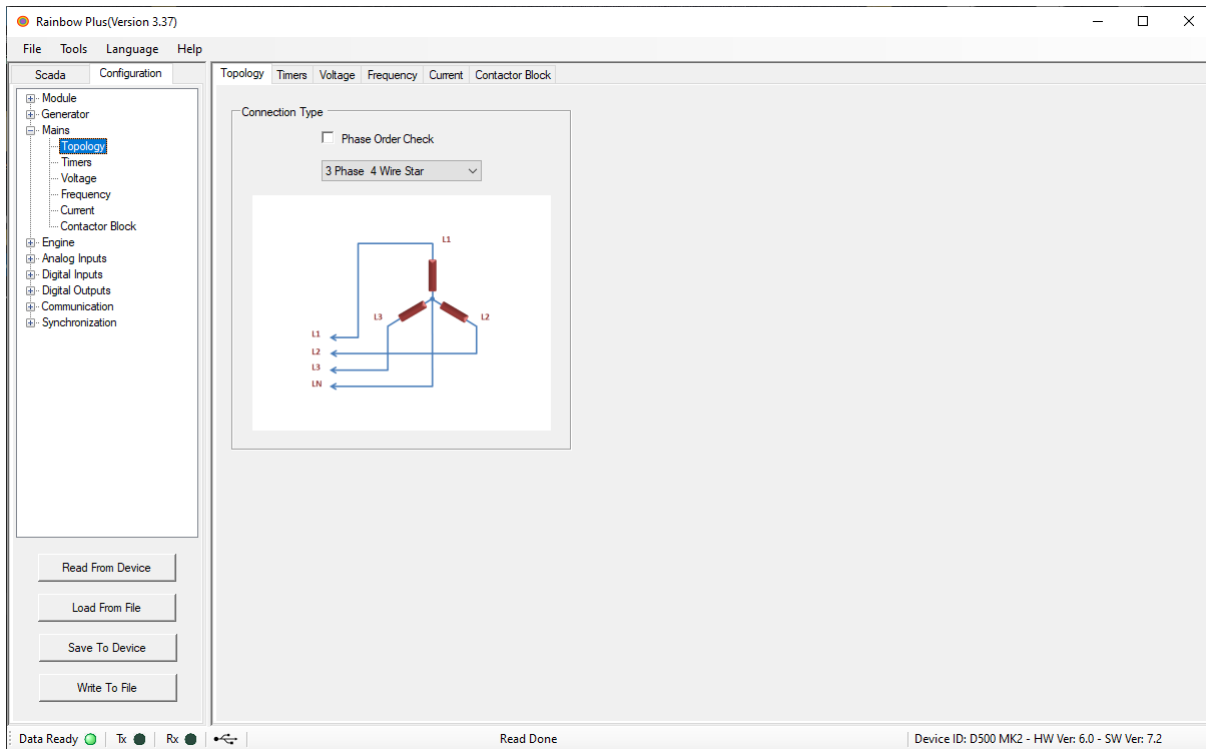
Contactor Block > Circuit Breaker > Circuit Breaker Open Pulse

The genset MCB_open relay will be activated during this period.

Contactor Block > Circuit Breaker > Under Voltage Coil Timer

The genset MCB_undervoltage coil is energized during this period before the genset MCB_close relay is activated.

8.3. MAINS



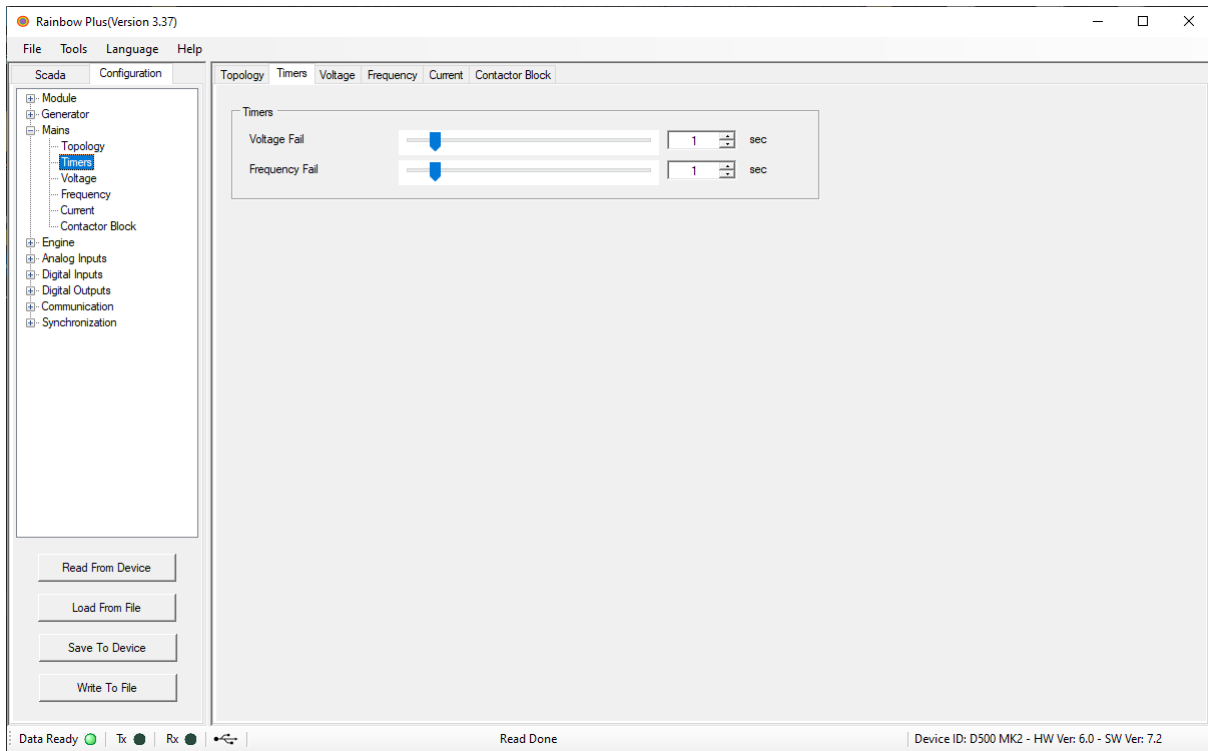
Topology > Connection Type > Phase Order Check

If selected, genset phase order fail load dump alarm is given in case genset phase order is faulty. If not selected, phase order checking is disabled.

Topology > Connection Type > Connection Topology

Can be selected from:

- 2 phase, 3 wire L1-L2,
- 2 phase, 3 wire L1-L3,
- 3 phase, 3 wire,
- 3 phase, 3 wire, 2CTs L1-L2,
- 3 phase, 3 wire, 2CTs L1-L3,
- 3 phase, 4 wire star,
- 3 phase, 4 wire delta,
- single phase, 2 wire.

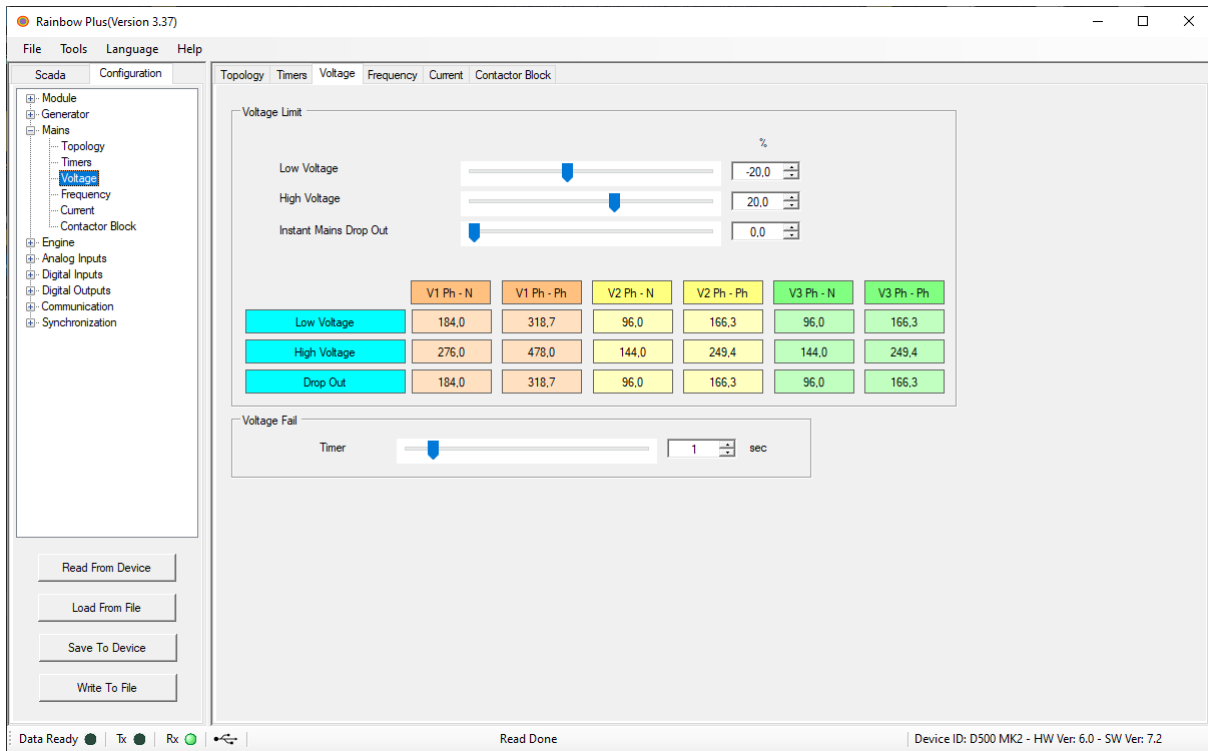


Timers > Voltage Fail

If at least one of the mains phase voltages is outside the limits for the duration of this timer, it means that the mains are off. In AUTO mode, the controller starts the genset and transfers the load.

Timers > Frequency Fail

If the mains frequency goes outside of the limits during this timer, it means that the mains are off and starts the transfer to the genset in AUTO mode.



Voltage > Voltage Limit > Low Voltage

If one of the mains phases goes under this limit, it means that the mains are off and starts the transfer to the genset in AUTO mode. The value is defined with reference to Nominal Voltage.

Voltage > Voltage Limit > High Voltage

If one of the mains phases goes over this limit, it means that the mains are off and starts the transfer to the genset in AUTO mode. The value is defined with reference to Nominal Voltage.

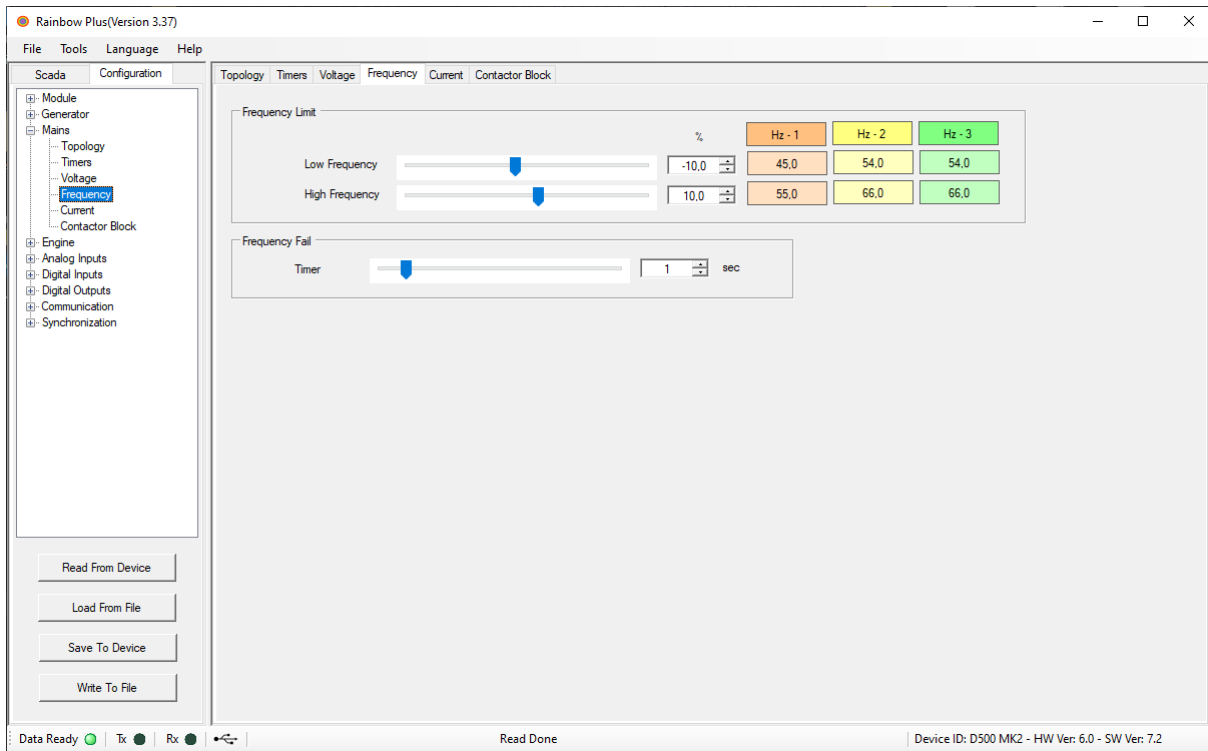
Voltage > Voltage Limit > Instant Mains Drop Out

If the mains phase voltages are outside limits, but not more than this parameter (with reference to nominal voltage), then the genset will run without releasing the mains contactor. When the genset is ready to take the load, the load will be transferred.

If this parameter is set to zero then the mains contactor is immediately released at mains failure.

Voltage > Voltage Fail > Timer

If at least one of the mains phase voltages goes outside of the limits for the duration of this timer, it means that the mains are off and it starts the transfer to the genset in AUTO mode.



Frequency > Frequency Limit > Low Frequency

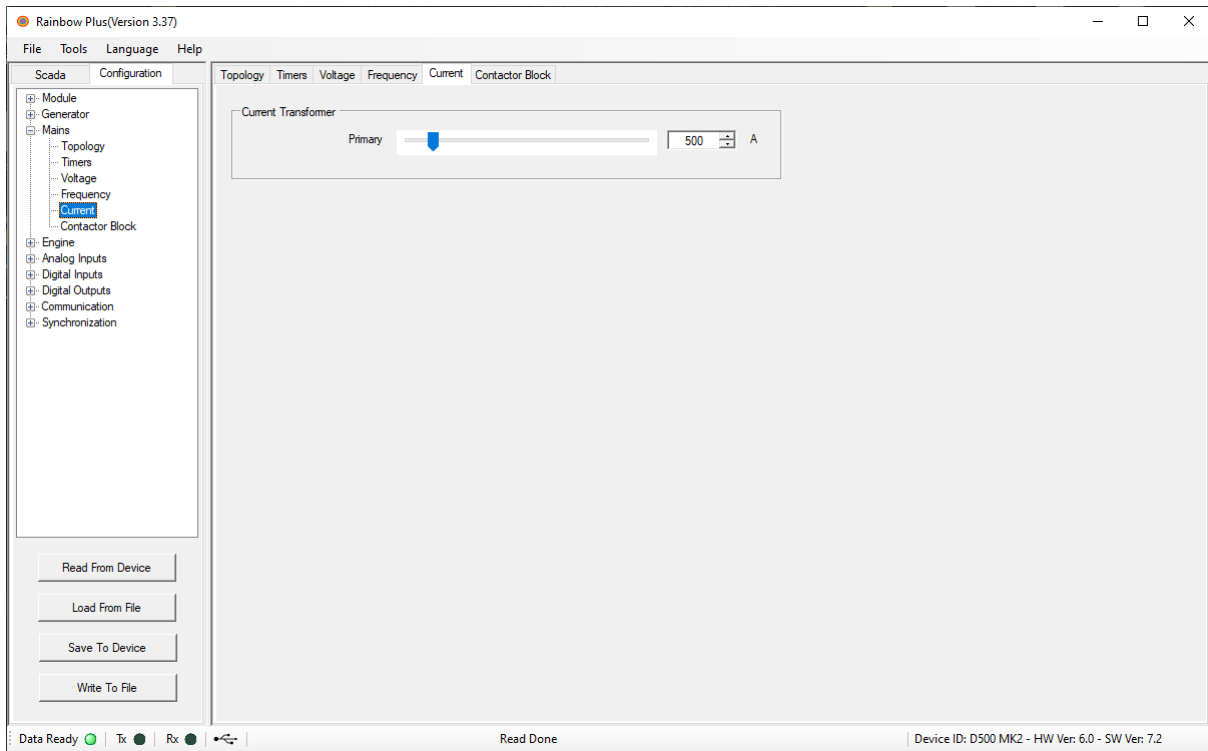
If the mains frequency goes under this limit, it means that the mains are off and starts the transfer to the genset in AUTO mode. The value is defined with reference to Nominal Frequency.

Frequency > Frequency Limit > High Frequency

If the mains frequency goes over this limit, it means that the mains are off and starts the transfer to the genset in AUTO mode. The value is defined with reference to Nominal Frequency.

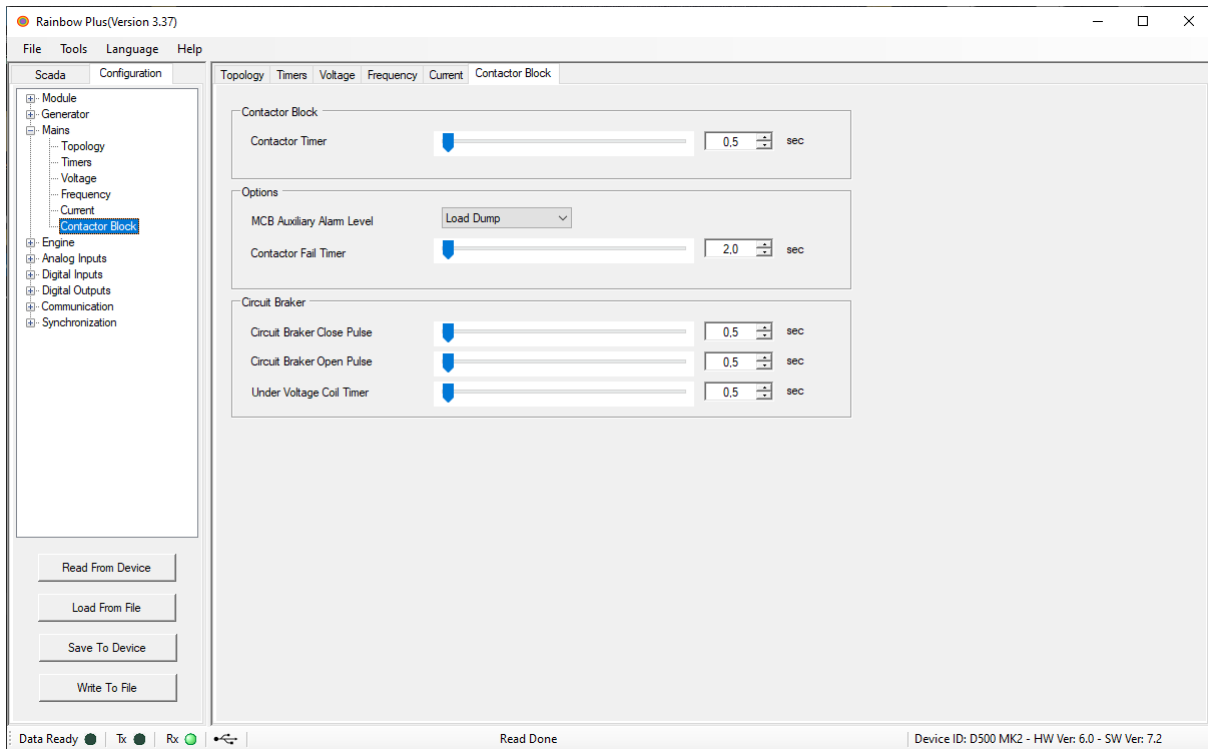
Frequency > Frequency Fail > Timer

If the mains frequency goes outside of the limits for the duration of this timer, it means that the mains are off and starts the transfer to the genset in AUTO mode.



Current > Current Transformer > Primary

This is the rated value of current transformers at the mains CT inputs. All transformers must have the same rating. The secondary of the transformer will be 5 Amps.



Contactor Block > Contactor Block > Contactor Timer

This is the period after the genset contactor has been deactivated and before the mains contactor has been activated.

Contactor Block > Options > MCB Auxiliary Alarm Level

Select between Load Dump and Warning.

Contactor Block > Options > Contactor Fail Timer

If a mains MCB feedback input is defined and if the mains MCB fails to change position before the expiration of this timer, then a fault condition occurs.

Contactor Block > Circuit Breaker > Circuit Breaker Close Pulse

After the mains MCB_undervoltage coil is energized and mains MCB_undervoltage coil timer is elapsed, the mains MCB_close relay will be activated during this period. Review “Motorized Circuit Breaker Control” for more details.

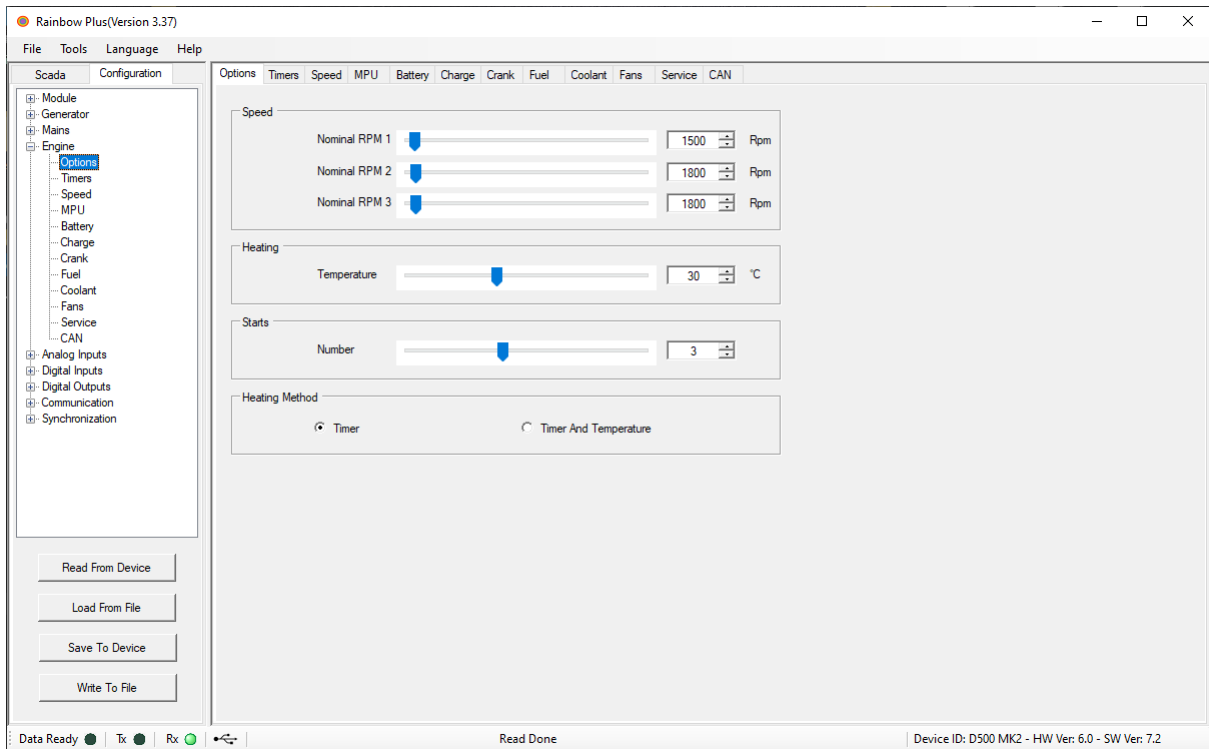
Contactor Block > Circuit Breaker > Circuit Breaker Open Pulse

The mains MCB_open relay will be activated during this period. Review chapter “Motorized Circuit Breaker Control” for more details.

Contactor Block > Circuit Breaker > Under Voltage Coil Timer

The mains MCB_undervoltage coil is energized during this period before the mains MCB_close relay is activated. Review chapter “Motorized Circuit Breaker Control” for more details.

8.4. ENGINE



Options > Speed > Nominal RPM 1

The nominal value of engine rpm. Low-high rpm limits are defined by reference to this value.

Options > Speed > Nominal RPM 2

When secondary frequency is selected, this is the nominal value of engine rpm. Low-high rpm limits are defined by reference to this value.

Options > Speed > Nominal RPM 3

When tertiary frequency is selected, this is the nominal value of engine rpm. Low-high rpm limits are defined by reference to this value.

Options > Heating > Temperature

If it is requested that the engine runs without load until reaching a certain temperature, this parameter defines the temperature.

Options > Starts > Number

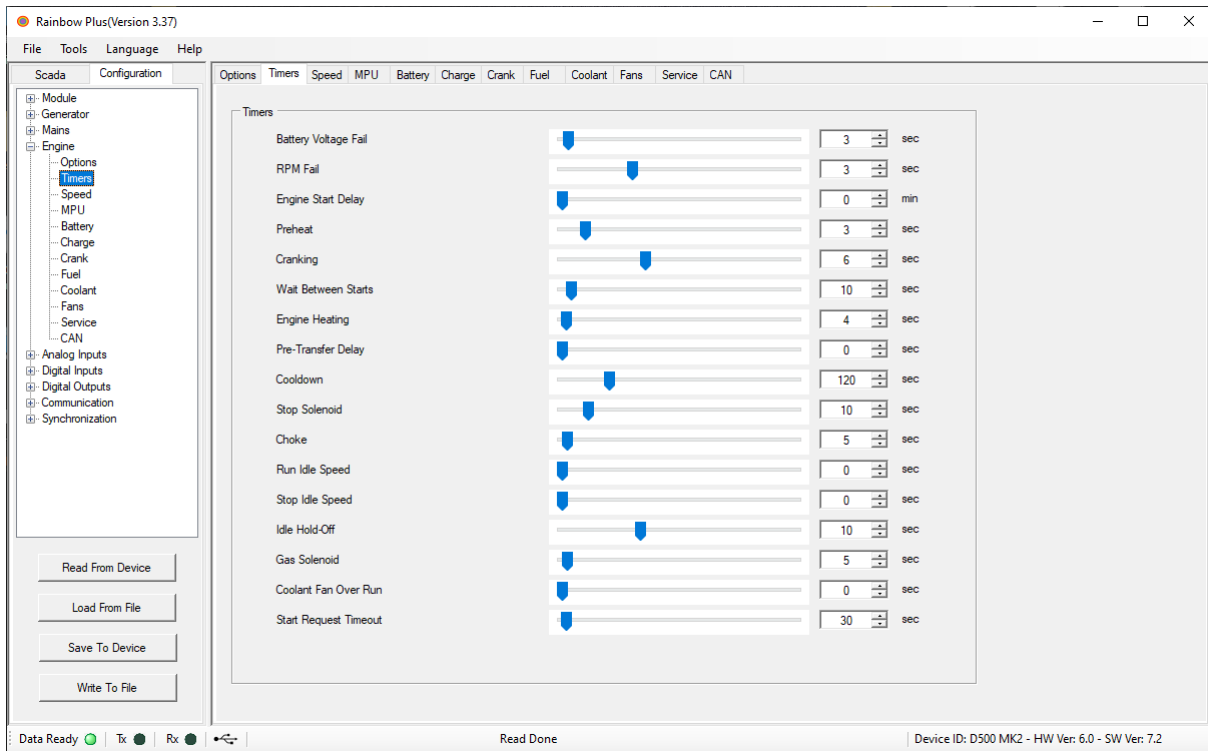
Number of engine start attempts.

Options > Heating Method > Timer

The genset will not take the load before engine heating is completed. Engine is heated for the duration of Engine Heating Timer.

Options > Heating Method > Timer and Temperature

Engine is heated until the coolant temperature reaches the Engine Heating Temperature and at least for the duration of Engine Heating Timer.



Timers > Battery Voltage Fail

If the battery voltage goes outside of the limits for the duration of this timer, a battery voltage fault will occur.

Timers > RPM Fail

If the engine rpm goes outside of the limits for the duration of this timer, an engine speed fault will occur.

Timers > Engine Start Delay

This is the time between the mains fails and the fuel solenoid turns on before starting the genset. It prevents unwanted genset operation in battery backed-up loads.

Timers > Preheat

This is the time after the fuel solenoid is energized and before the genset is started. During this period the PREHEAT relay output is energized (if assigned by Relay Definitions).

Timers > Cranking

This is the maximum start period. Starting will be automatically cancelled if the genset fires before the timer.

Timers > Wait Between Starts

This is the waiting period between two start attempts.

Timers > Engine Heating

This is the period used for engine heating before load transfer.

Timers > Pre-Transfer Delay

If this parameter is not zero, the unit will activate the Wait Before Transfer output function during this timer, before initiating a load transfer.

This function is designed for elevator systems, in order to bring the cabin to a floor and open doors before transfer.

Timers > Cooldown

This is the period that the generator runs for cooling purpose after the load is transferred to mains.

Timers > Stop Solenoid

This is the maximum time duration for the engine to stop. During this period the STOP relay output is energized (if assigned by Relay Definitions). If the genset has not stopped after this period, a FAIL TO STOP warning occurs.

Timers > Choke

This is the control delay of CHOKE output.

The choke output is activated together with the crank output. It is released after this delay or when engine runs (whichever occurs first).

Timers > Run Idle Speed

When the engine runs, the Idle output relay function will be active during this timer. While the IDLE output is active, low voltage, low frequency and low rpm checks are disabled.

Timers > Stop Idle Speed

Before the engine stops, the Idle output relay function will be active during this timer. While the IDLE output is active, low voltage, low frequency and low rpm checks are disabled.

Timers > Idle Hold-Off

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Timers > Gas Solenoid

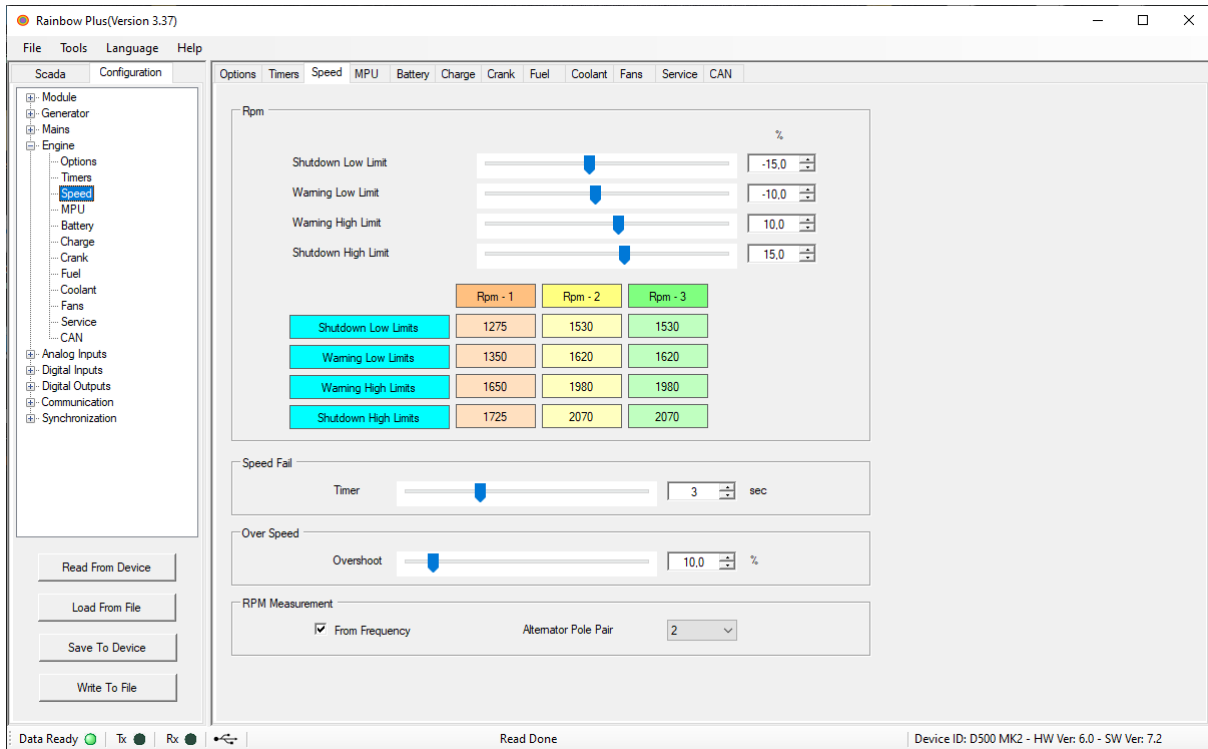
The gas solenoid of the gas engine (if assigned by Relay Definitions) will be opened after this delay during cranking.

Timers > Coolant Fan Over Run

The cooler relay will stay active during this timer after the coolant temp is below "Coolant Cooler Off" limit.

Timers > Start Request Timeout

If genset voltage cannot be detected before the expiration of this timer in ATS mode, start fail alarm occurs.



Speed > RPM > Idle Hold-Off

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Speed > RPM > Idle Hold-Off

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Speed > RPM > Idle Hold-Off

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Speed > RPM > Idle Hold-Off

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Speed > Speed Fail > Timer

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Speed > Over Speed > Overshoot

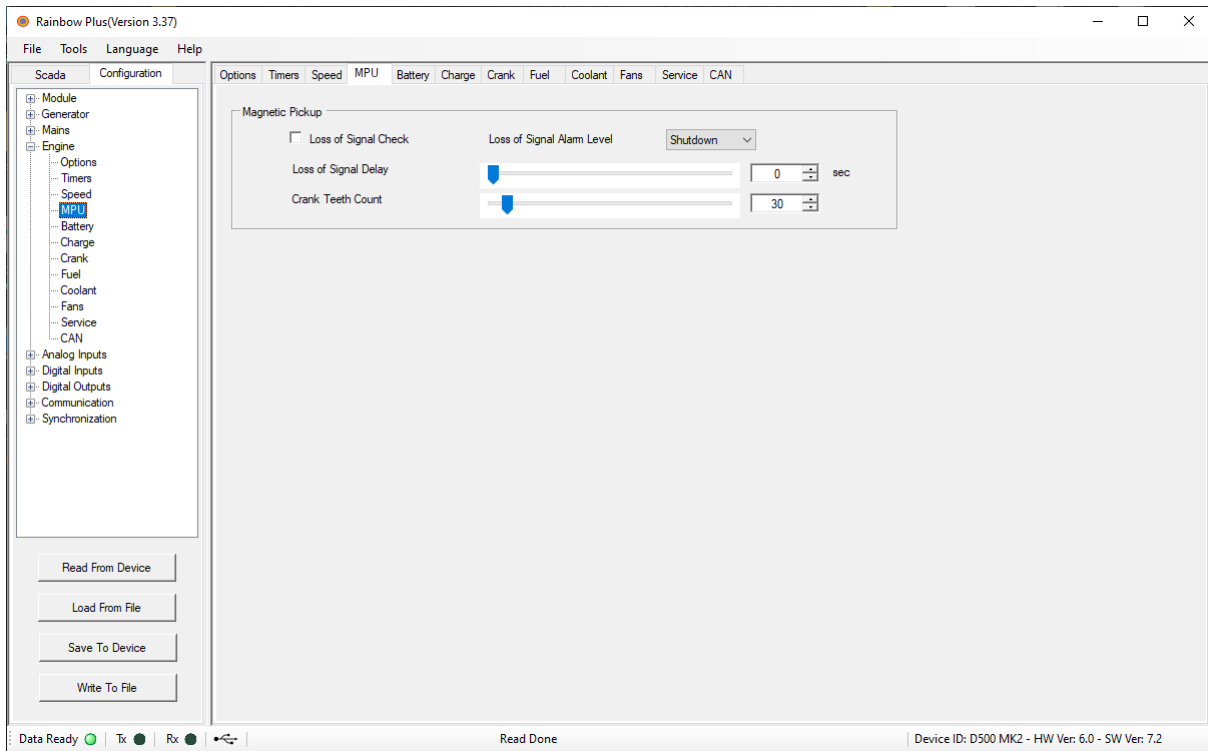
While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Speed > RPM Measurement > From Frequency

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.

Speed > RPM Measurement > Alternator Pole Pair

While the IDLE period is over, low voltage, low frequency and low speed checks are enabled after the expiration of this timer.



MPU > Loss of Signal Check

If not selected, speed signal existence is not checked. If selected, losing the speed signal will generate a Speed Signal Lost fault condition. The action taken upon fault condition is programmable.

MPU > Loss of Signal Alarm Level

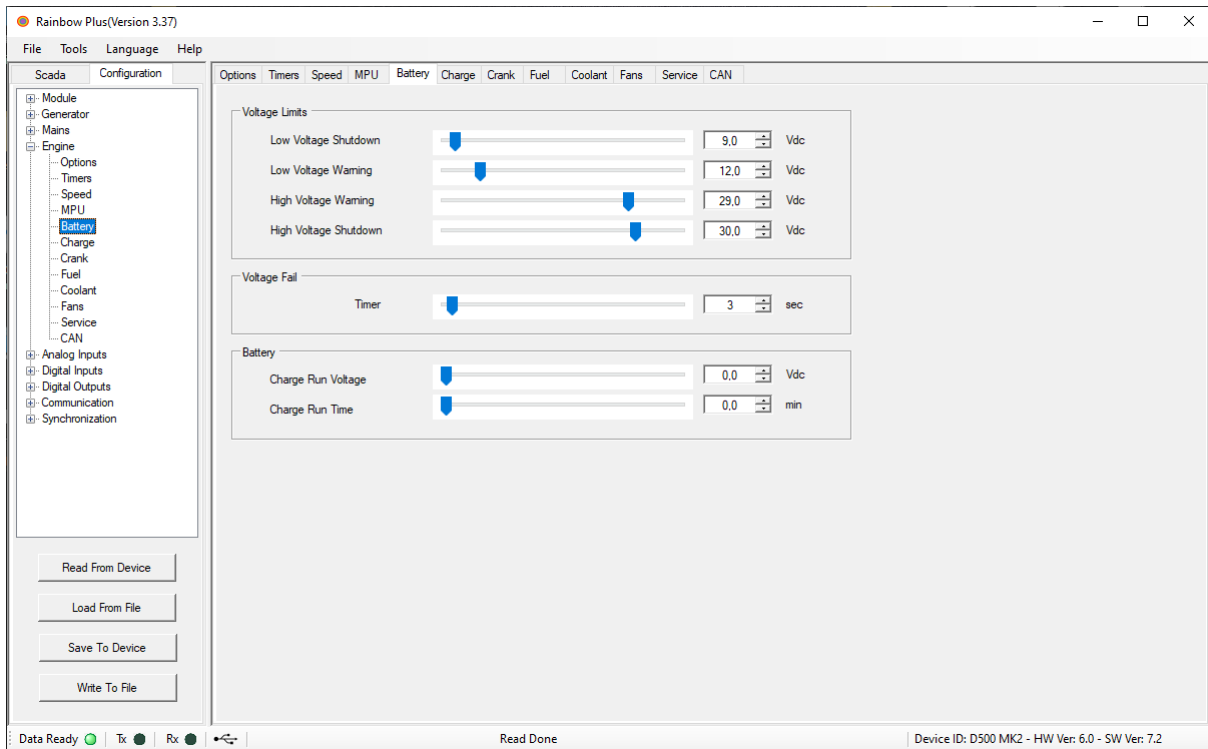
Select among shutdown, load dump, or warning.

MPU > Loss of Signal Delay

If the speed signal is lost during this timer, a Speed Signal Lost fault will occur.

MPU > Crank Teeth Count

This is the number of pulses generated by the magnetic pickup sensing unit in one turn of the flywheel.



Battery > Voltage Limits > Low Voltage Shutdown

If the battery voltage falls below this limit, this will generate a LOW BATTERY shutdown alarm and the engine will stop.

Battery > Voltage Limits > Low Voltage Warning

If the battery voltage falls below this limit, this will generate a LOW BATTERY warning.

Battery > Voltage Limits > High Voltage Warning

If the battery voltage goes over this limit, this will generate a HIGH BATTERY warning.

Battery > Voltage Limits > High Voltage Shutdown

If the battery voltage goes over this limit, this will generate a HIGH BATTERY shutdown alarm and the engine will stop.

Battery > Voltage Fail > Timer

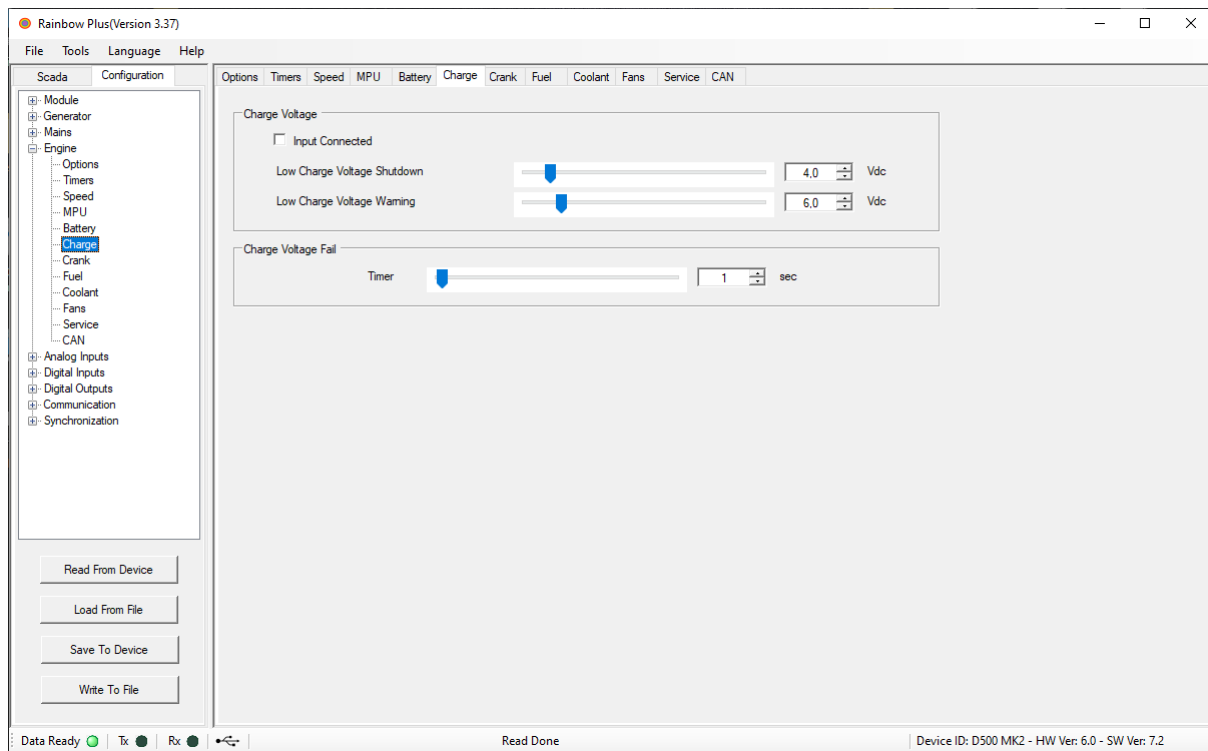
If the battery voltage goes outside of the limits during this timer, a battery voltage fault will occur.

Battery > Battery > Charge Run Voltage

If the battery voltage goes below this limit the engine will be automatically started in order to charge the battery using the charge alternator.

Battery > Battery > Charge Run Time

If the battery voltage goes below the Battery Charge Run Voltage limit, the engine will be automatically run for this period in order to charge the battery using the charge alternator.



Charge > Charge Voltage > Input Connected

If selected, crank cutting with charge input is enabled.

Charge > Charge Voltage > Low Charge Voltage Shutdown

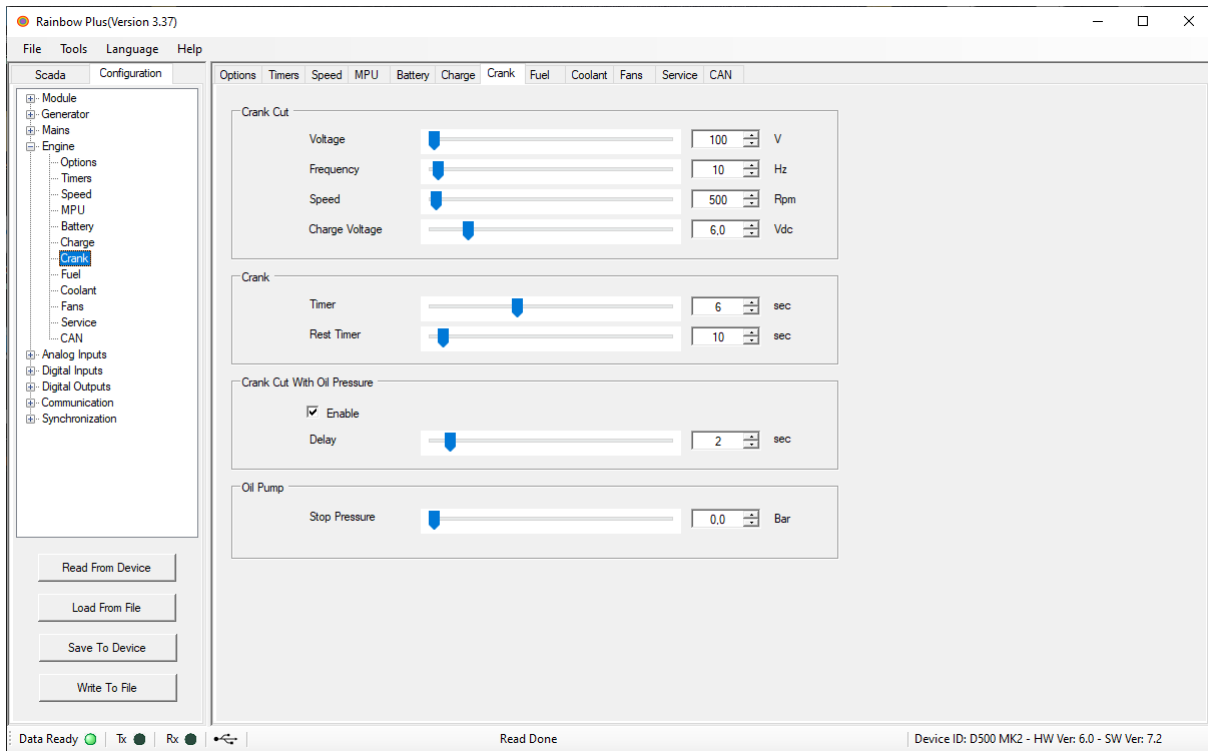
If the charge alternator voltage goes under this limit, a charge alternator voltage shutdown will occur and the engine will stop.

Charge > Charge Voltage > Low Charge Voltage Warning

If the charge alternator voltage goes under this limit, a charge alternator voltage warning will occur.

Charge > Charge Voltage Fail > Timer

If the charge alternator voltage goes under limits during this timer, a charge alternator voltage fault will occur.



Crank > Crank Cut > Voltage

The crank relay output is deenergized when the genset phase L1 voltage reaches this limit.

Crank > Crank Cut > Frequency

The crank relay output is deenergized when the genset frequency reaches this limit.

Crank > Crank Cut > Speed

The crank relay output is deenergized when the engine rpm reaches this limit.

Crank > Crank Cut > Charge Voltage

The crank relay output is deenergized when the charge alternator voltage reaches this limit.

Crank > Crank > Timer

This is the maximum start period. Starting will be automatically cancelled if the genset fires before the timer.

Crank > Crank > Rest Timer

This is the waiting period between two start attempts.

Crank > Crank Cut With Oil Pressure > Enable

If selected, cranking is cut when oil pressure switch is open or the oil pressure measured is above shutdown limit.

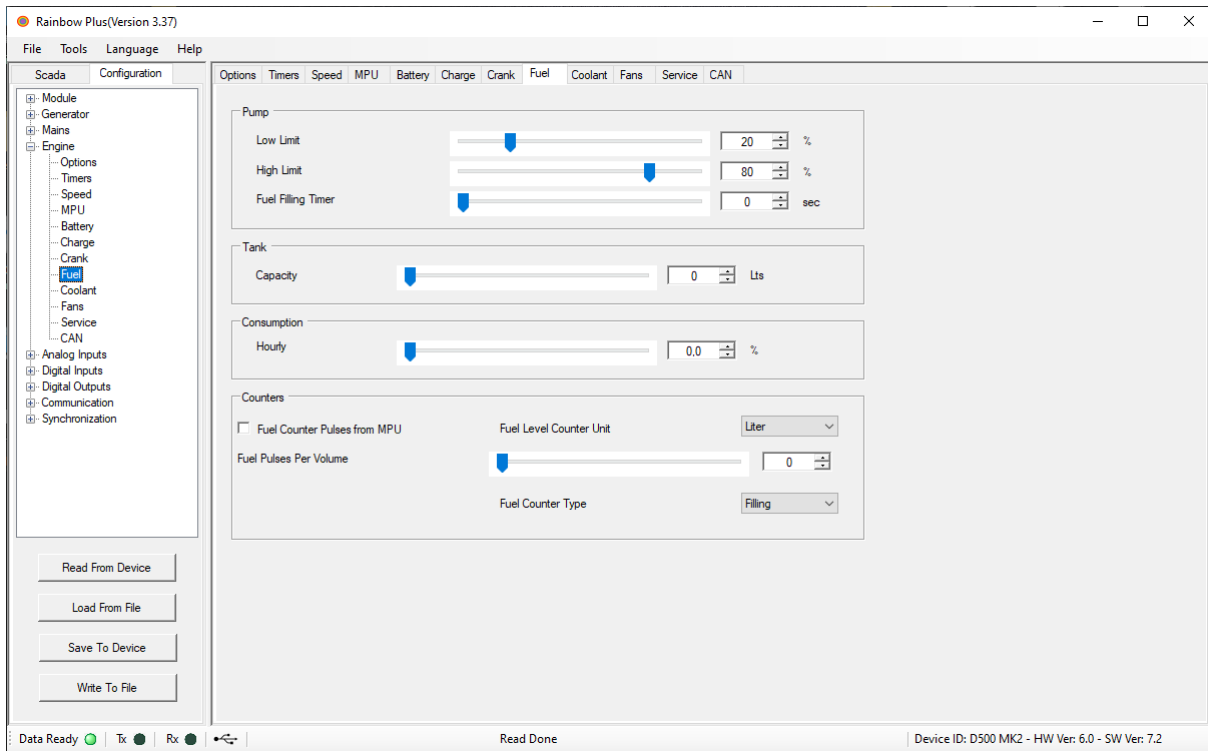
Crank > Crank Cut With Oil Pressure > Delay

If crank cutting with oil pressure is enabled, cranking is cut after this delay when oil pressure switch is open or the oil pressure measured is above shutdown limit.

Crank > Oil Pump > Stop Pressure

The oil pump is activated prior to the crank cycle and stopped when this pressure level is reached.

If this value is set to zero, then the oil pump is not activated.



Fuel > Pump > Low Limit

If the fuel level measured from the sender input falls below this level, then the FUEL PUMP function will become active.

Fuel > Pump > High Limit

If the fuel level measured from the sender input goes above this level, then the FUEL PUMP function will become passive.

Fuel > Pump > Fuel Filling Timer

After activation of the fuel pump function, if the Fuel Pump High Limit level is not reached, the fuel pump will stop for safety. If this parameter is set to zero, the timer is unlimited.

Fuel > Tank > Capacity

The full capacity of the fuel tank. If this parameter is zero, the fuel quantity in the tank is not displayed.

Fuel > Consumption > Hourly

This parameter is the threshold for sending FUEL THEFT and FUELLING SMS messages. If set to 0, no fuel-related SMS messages will be sent. If SMS is required, set this parameter to a value above the hourly fuel consumption of the genset.

Fuel > Counters > Fuel Counter Pulses from MPU

If selected, MPU input is used for reading the flowmeter pulses during fuel filling.

Fuel > Counters > Fuel Level Counter Unit

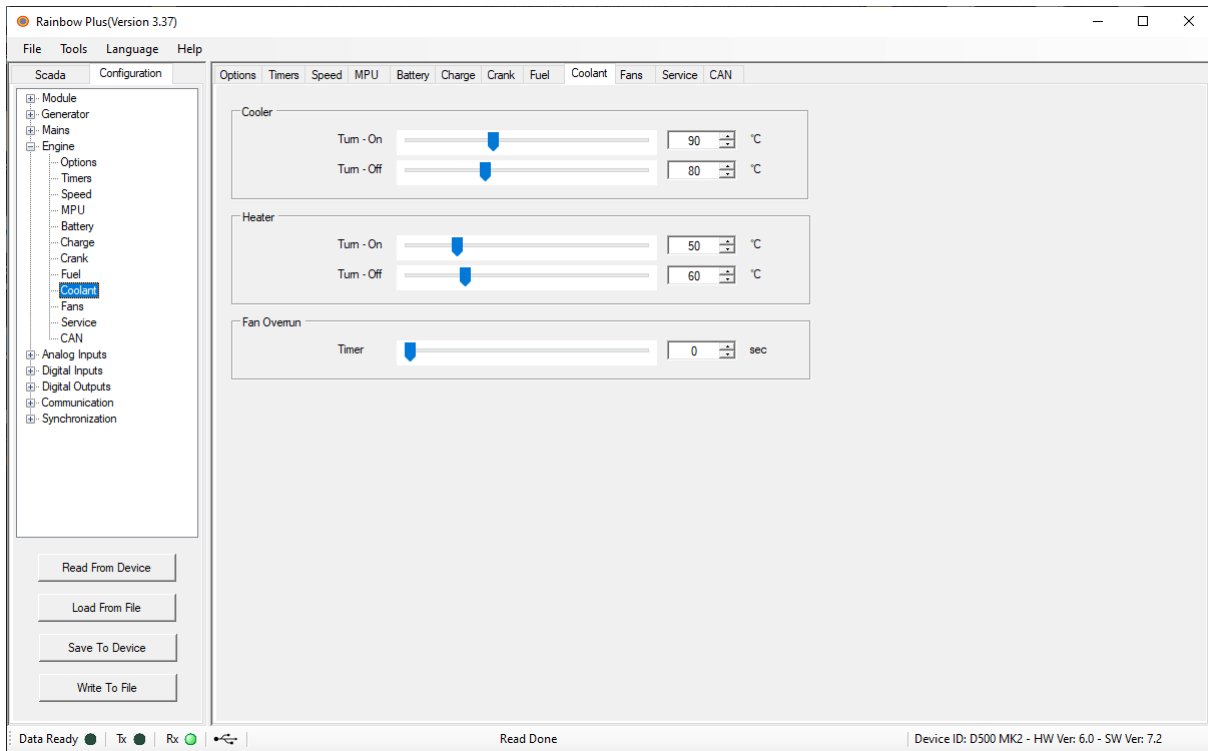
This is the unit for the fuel counter. (Liters / gallons)

Fuel > Counters > Fuel Pulses per Volume

This is the number of pulses produced by the flowmeter for the unit volume. This parameter is characteristic of the flowmeter used and should be set according to the flowmeter data.

Fuel > Counters > Fuel Counter Type

If selected, displays fuel consumption pulses. If not selected, displays fuel filling pulses, increments fuel counter.



Coolant > Cooler > Turn ON

If the coolant temp is above this limit then the cooler relay function will become active.

Coolant > Cooler > Turn OFF

If the coolant temp is below this limit then the cooler relay function will become inactive.

Coolant > Heater > Turn ON

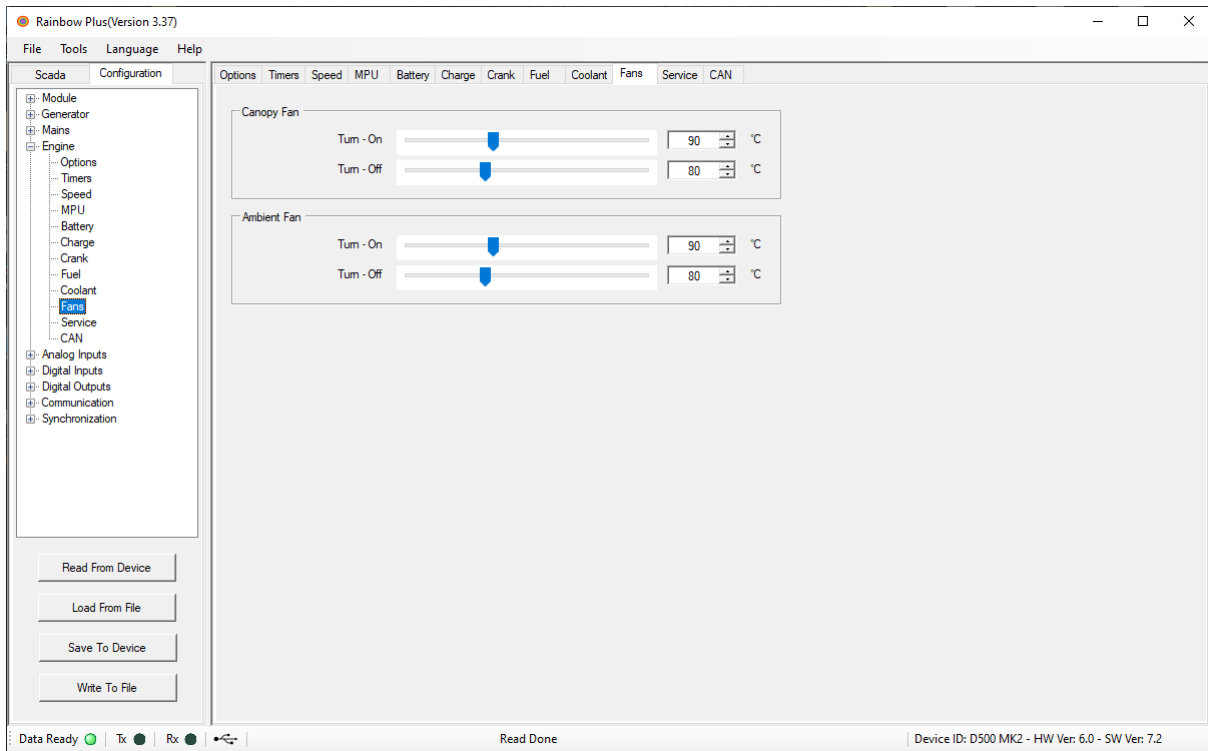
If the coolant temp is below this limit then the heater relay function will become active.

Coolant > Heater > Turn OFF

If the coolant temp is above this limit then the heater relay function will become inactive.

Coolant > Fan Overrun > Timer

The cooler relay will stay active during this timer after the coolant temp is below “Coolant Cooler Off” limit.



Fans > Canopy Fan > Turn ON

If the canopy temp is above this limit then the canopy fan relay function will become active.

Fans > Canopy Fan > Turn OFF

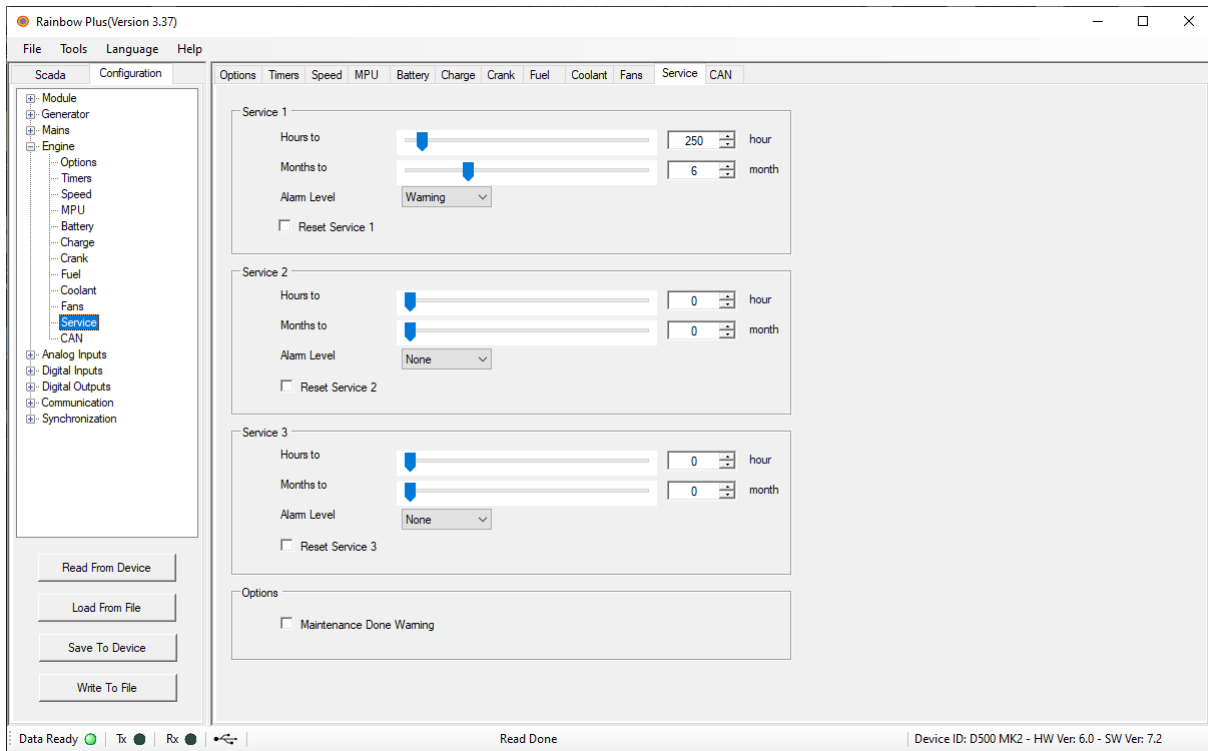
If the canopy temp is below this limit then the canopy fan relay function will become inactive.

Fans > Ambient Fan > Turn ON

If the ambient temp is above this limit then the ambient fan relay function will become active.

Fans > Ambient Fan > Turn OFF

If the ambient temp is below this limit then the ambient fan relay function will become inactive.



Service > Service 1 > Hours to

The SERVICE REQUEST led indicator will turn on after this quantity of engine hours from the last service. If the period is set to '0' no SERVICE REQUEST will be generated depending on service-1 engine hours.

Service > Service 1 > Months to

The SERVICE REQUEST led indicator will turn on after this amount of time from the last service. If the period is set to '0' no SERVICE REQUEST will be indicated depending on Service-1 Period.

Service > Service 1 > Alarm Level

Select among no action, shutdown alarm, load dump alarm, warning.

Service > Service 1 > Reset Service 1

If selected, resets the service 1 counters.

Service > Service 2 > Hours to

The SERVICE REQUEST led indicator will turn on after this quantity of engine hours from the last service. If the period is set to '0' no SERVICE REQUEST will be generated depending on service-2 engine hours.

Service > Service 2 > Months to

The SERVICE REQUEST led indicator will turn on after this amount of time from the last service. If the period is set to '0' no SERVICE REQUEST will be indicated depending on Service-2 Period.

Service > Service 2 > Alarm Level

Select among no action, shutdown alarm, load dump alarm, warning.

Service > Service 2 > Reset Service 2

If selected, resets the service 2 counters.

Service > Service 3 > Hours to

The SERVICE REQUEST led indicator will turn on after this quantity of engine hours from the last service. If the period is set to '0' no SERVICE REQUEST will be generated depending on service-3 engine hours.

Service > Service 3 > Months to

The SERVICE REQUEST led indicator will turn on after this amount of time from the last service. If the period is set to '0' no SERVICE REQUEST will be indicated depending on Service-3 Period.

Service > Service 3 > Alarm Level

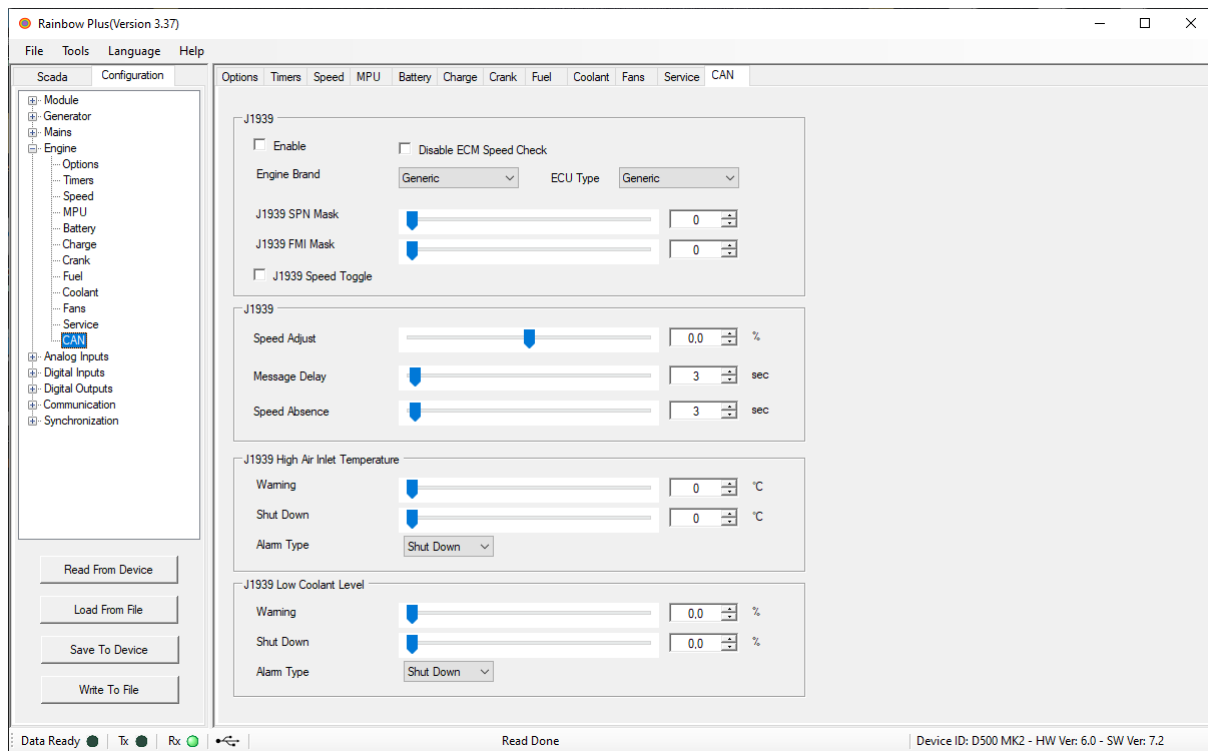
Select among no action, shutdown alarm, load dump alarm, warning.

Service > Service 3 > Reset Service 3

If selected, resets the service 3 counters.

Service > Options > Maintenance Done Warning

If the canopy temp is above this limit then the canopy fan relay function will become active.



CAN > J1939 > Enable

If selected, the analog measurements (oil, temp, and rpm) are received from the ECU. If communication is lost, then the engine will be stopped. If not selected, J1939 port is inactive.

CAN > J1939 > Disable ECM Speed Check

If selected, the RPM information coming from the engine ECU unit is not used for engine speed checking.

CAN > J1939 > Engine Brand

Select among GENERIC, CUMMINS, DETROIT DIESEL, DEUTZ, JOHN DEERE, PERKINS, VOLVO, CATERPILLAR, SCANIA, IVECO, MTU-MDEC, BOSCH, BAUDOQUIN.

CAN > J1939 > ECU Type

Select among the following:

GENERIC ENGINE BRAND

0: Generic

CUMMINS ENGINE

0: CM850

1: CM570

DETROIT DIESEL ENGINE

0: Generic

DEUTZ ENGINE

0: Generic

1: EMR2

2: EMR3

JOHN DEERE ENGINE

0: Generic

PERKINS ENGINE

0: Generic

1: ADEM3

2: ADEM 1.3

VOLVO ENGINE

- 0: Generic
- 1: without CIU unit
- 2: EDC4

CATERPILLAR ENGINE

- 0: Generic

SCANIA ENGINE

- 0: Generic
- 1: S6 (Single Speed)
- 2: S8 (All Speed)

IVECO ENGINE

- 0: Generic
- 1: Vector
- 2: NEF/CURSOR

MTU-MDEC ENGINE

- 0: MDEC 302
- 1: MDEC 201
- 2: MDEC 303
- 3: MDEC 304
- 4: MDEC 506

BOSCH INJECTION SYSTEM

- 0: Generic
- 1: EDC 731
- 2: EDC 9.3

BAUDOUIIN

- 0: Generic
- 1: WISE10
- 2: WISE15

CAN > J1939 > J1939 SPN Mask

The SPN number written to this parameter is excluded from engine ECU alarm list.

CAN > J1939 > J1939 FMI Mask

The FMI number written to this parameter is excluded from engine ECU alarm list.

CAN > J1939 > J1939 Speed Toggle

This program parameter is not stored, but only used in order to activate the primary or secondary speed selection operation of engine with ECU.

CAN > J1939 > Speed Adjust

This parameter adjusts the speed of an ECU controlled engine by +/- 8%.

CAN > J1939 > Message Delay

If canbus message is not received during this timer, J1939 ECU Fail Alarm occurs.

CAN > J1939 > Speed Absence

If speed message is not received during this timer, J1939 ECU Fail Alarm occurs.

CAN > J1939 High Air Inlet Temperature > Warning

If the air inlet temperature measured through ECU is over this limit, then a high air inlet temperature warning will occur.

CAN > J1939 High Air Inlet Temperature > Shut Down

If the air inlet temperature measured through ECU is over this limit, then a high air inlet temperature shutdown/load dump alarm will occur.

CAN > J1939 High Air Inlet Temperature > Alarm Type

Select between shutdown and load dump.

CAN > J1939 Low Coolant Level > Warning

If the coolant level measured through ECU is below this limit, then a low coolant level warning will occur.

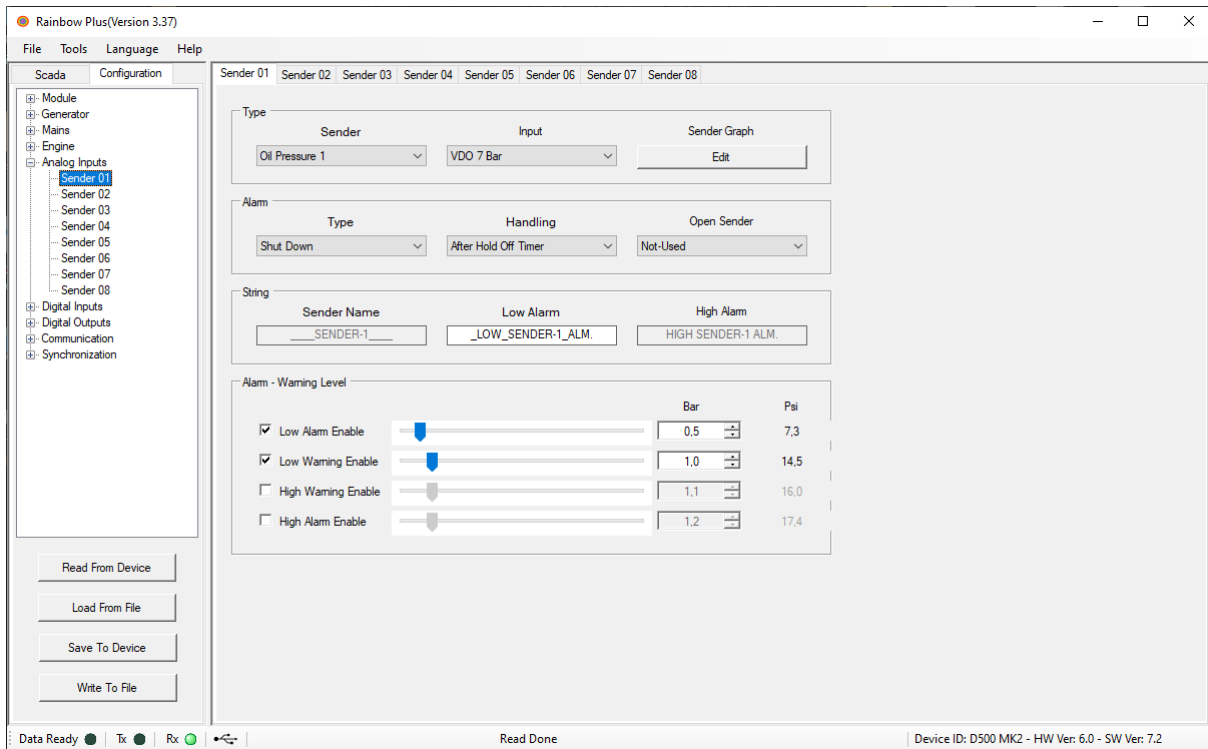
CAN > J1939 Low Coolant Level > Shut Down

If the coolant level measured through ECU is below this limit, then a low coolant level shutdown/load dump alarm will occur.

CAN > J1939 Low Coolant Level > Alarm Type

Select between shutdown and load dump.

8.5. ANALOG INPUTS



Sender 01-08 > Type > Sender

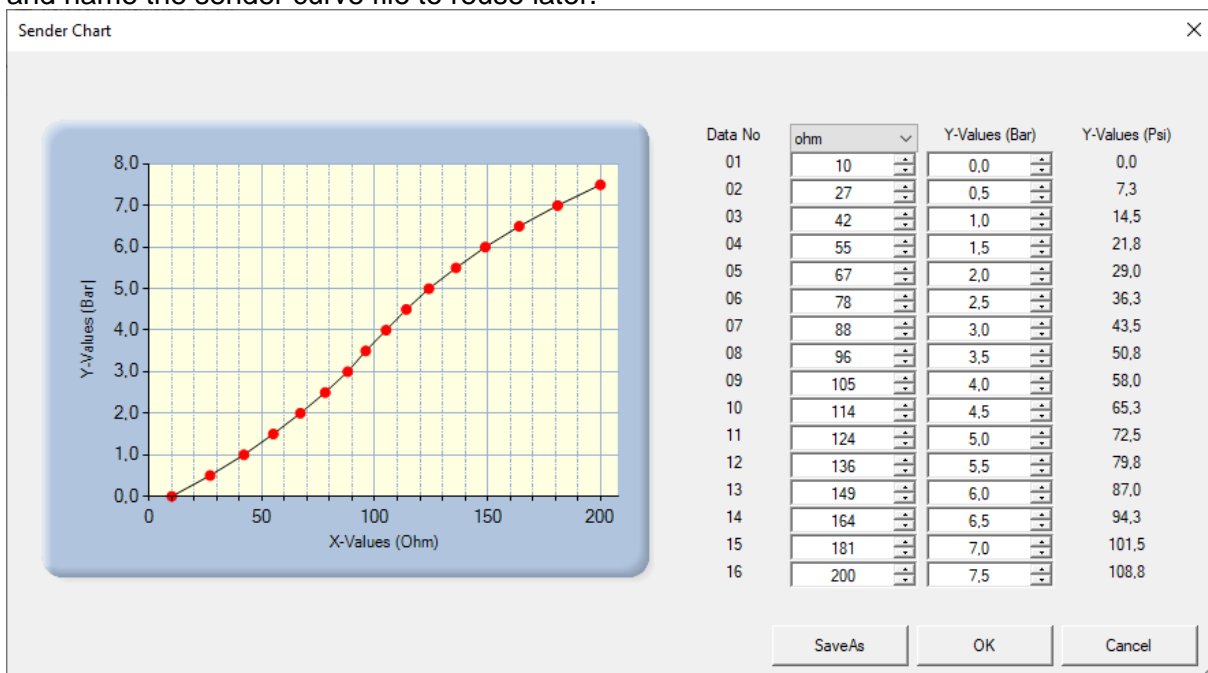
Selects between predefined sender functions. If this parameter is set to Pressure, Temperature or Percentage (13-14-15), the sender name string can be freely entered.

Sender 01-08 > Type > Input

Select one of the predefined senders from the drop-down menu.

Sender 01-08 > Type > Sender Graph

If your sender type is not present in the input menu, click **Edit** to manually enter the custom sender curve, and edit the sender curve's data points in the following screen. Click **Save As** and name the sender curve file to reuse later.



Sender 01-08 > Alarm > Type

Select between shutdown or load dump.

Sender 01-08 > Alarm > Handling

Select among always, on engine running, after hold-off timer, reserved.

Sender 01-08 > Alarm > Open Sender

Select among no alarm, shutdown, load dump, warning.

Sender 01-08 > String > Sender Name

Type custom name for the relevant sender.

Sender 01-08 > String > Low Alarm

Type custom alarm string for the relevant sender. The alarms will be generated according to the low limits set below.

Sender 01-08 > String > High Alarm

Type custom alarm string for the relevant sender. The alarms will be generated according to the high limits set below.

Sender 01-08 > Alarm – Warning Level > Low Alarm Enable

If selected, low sender measurement alarm is enabled.

Sender 01-08 > Alarm – Warning Level > Low Warning Enable

If selected, low sender measurement warning is enabled.

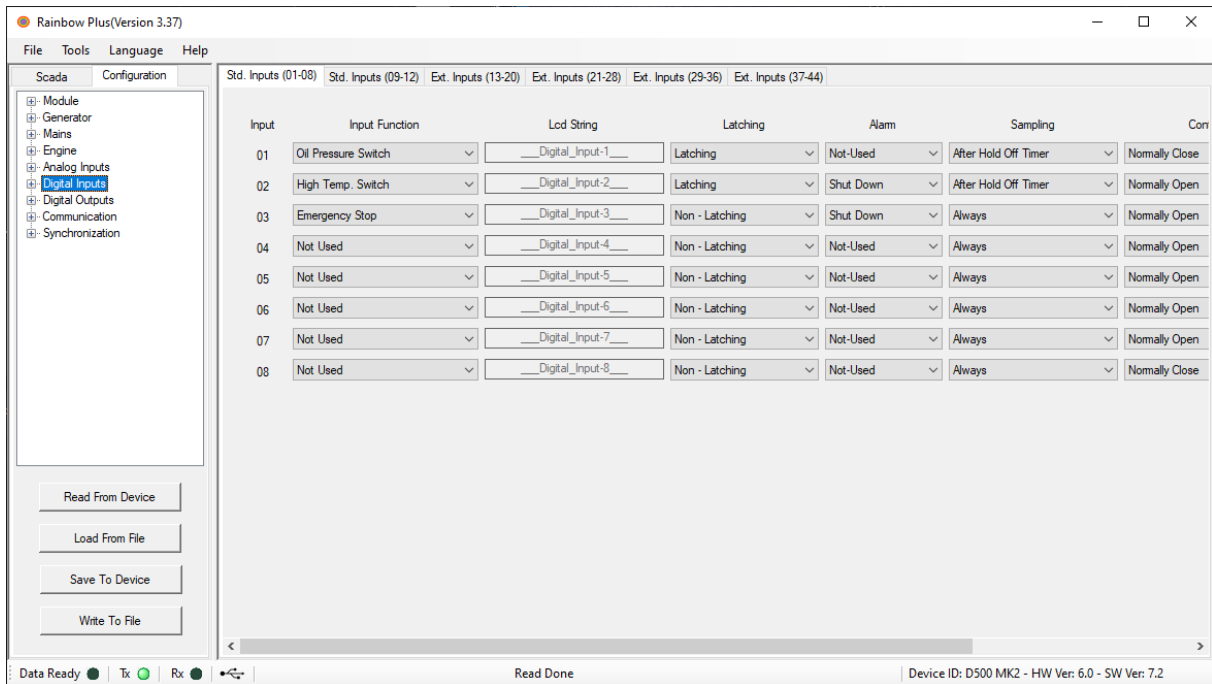
Sender 01-08 > Alarm – Warning Level > High Warning Enable

If selected, high sender measurement warning is enabled.

Sender 01-08 > Alarm – Warning Level > High Alarm Enable

If selected, high sender measurement alarm is enabled.

8.6. DIGITAL INPUTS



Std. Inputs 01-08 > Input 01-08 > Input Function

This input has programmable function. Refer to the device's user manual for a detailed list of functions.

Std. Inputs 01-08 > Input 01-08 > LCD String

If **User Function** is selected, the desired function name can be entered here. This name will be displayed on the screen for the given input's warnings and alarms.

Std. Inputs 01-08 > Input 01-08 > Latching

The alarms can be latching or non-latching. If latching is selected, the fault is displayed even if the fault cause is removed. Requires manually dismissing the fault pop-up from alarms screen. If non- latching, removing the fault cause removes the warning or alarm automatically.

Std. Inputs 01-08 > Input 01-08 > Alarm

Select among shut down, load dump, warning, not used.

Std. Inputs 01-08 > Input 01-08 > Sampling

Select when the controller will look for faults. It can be always, on engine running, after hold-off timer, or reserved.

Std. Inputs 01-08 > Input 01-08 > Contact

Select contact type; normally open or normally closed.

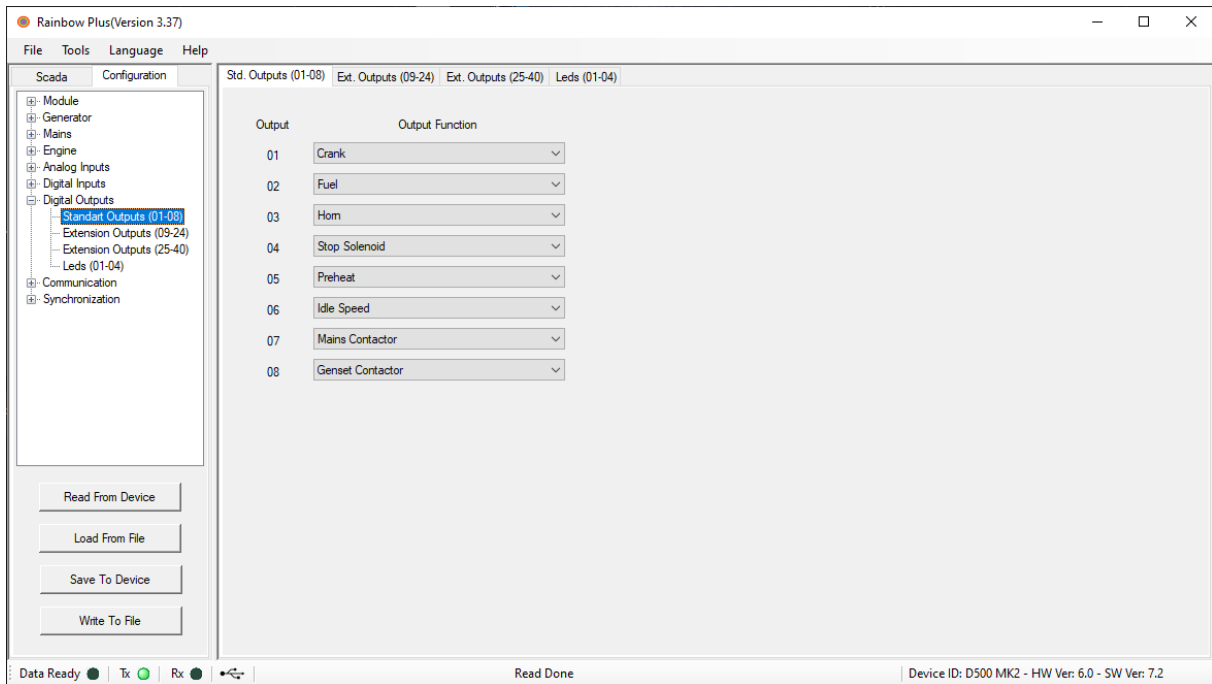
Std. Inputs 01-08 > Input 01-08 > Switch

Select switching; battery positive or battery negative.

Std. Inputs 01-08 > Input 01-08 > Input Delay

The action related to the digital input is executed following this delay. It can be selected among no delay, 1s delay, 10s delay, 30min delay.

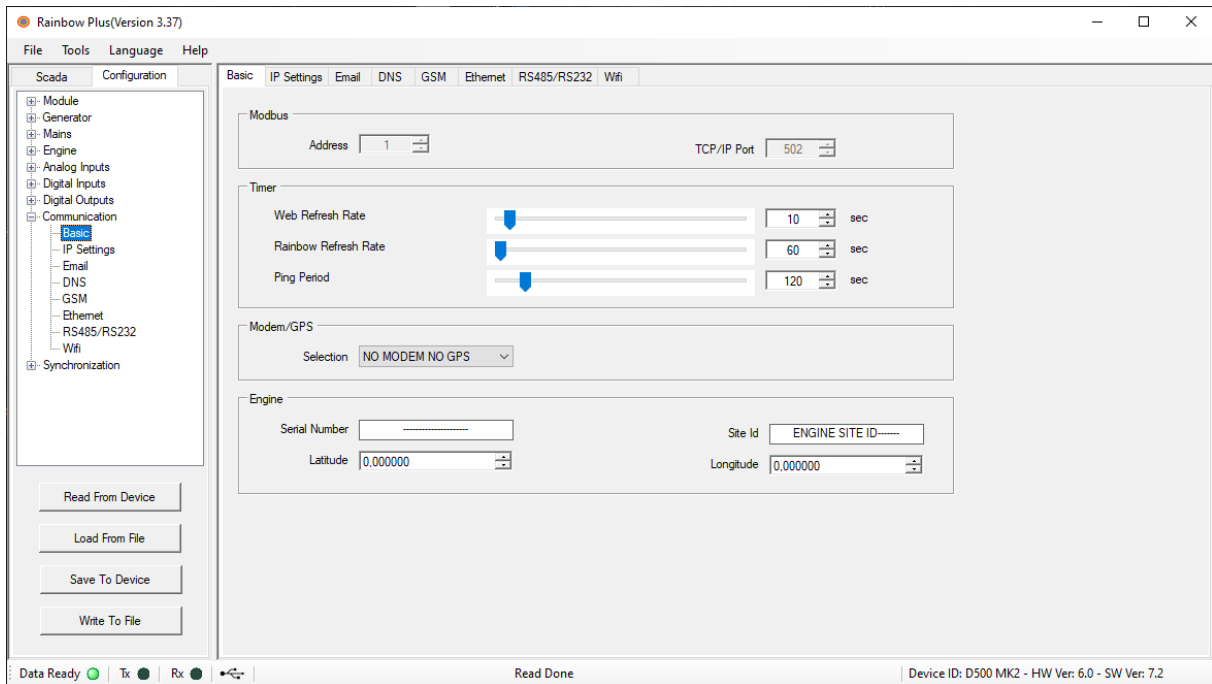
8.7. DIGITAL OUTPUTS



Std. Outputs 01-08 > Output 01-08 > Output Function

Select the functions of relay outputs. Relays have programmable functions, selected from a list. Mains contactor and genset contactor outputs are not configurable. Refer to the controller's user manual for detailed description of output functions.

8.8. COMMUNICATION



Basic > Modbus > Address

This is the Modbus controller identity used in Modbus communication.

Basic > Modbus > TCP/IP Port

Internal Modbus TCP/IP server's port number. The unit responds to Modbus requests to this port only.

Basic > Timer > Web Refresh Rate

The unit will refresh the web page with this interval.

Basic > Timer > Rainbow Refresh Rate

The unit will update the remote monitoring terminal with this rate.

Basic > Timer > Ping Period

The unit will check the availability of the internet connection at this interval.

Basic > Modem/GPS > Selection

Select among no MODEM / no GPS; Internal MODEM, no GPS; External MODEM, no GPS; External generic MODEM, no GPS; MODEM, RS-232 GPS; Internal MODEM, RS-232 GPS.

Basic > Engine > Serial Number

The engine serial number is added to GSM-SMS messages, e-mails, web page headers etc.

Basic > Engine > Site ID

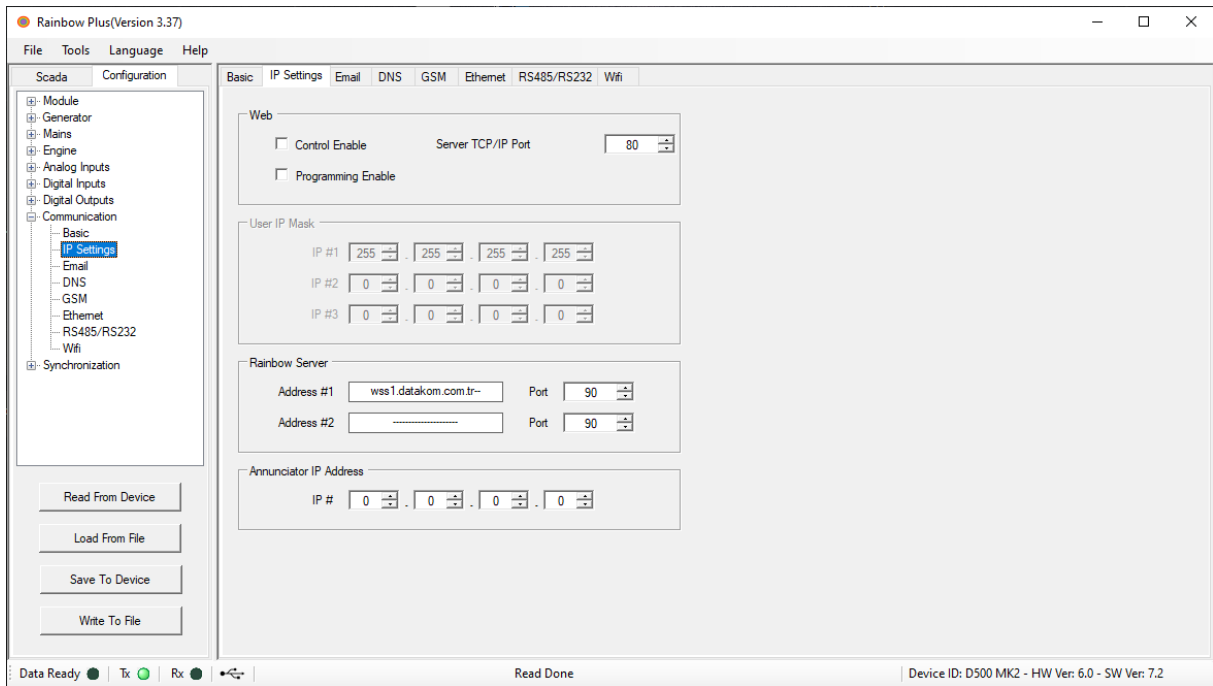
The site ID string is sent at the beginning of SMS messages, e-mails and web page headers to distinguish the genset sending the message. Any 20-character long string may be entered.

Basic > Engine > Latitude

Manually enter the latitude of the genset.

Basic > Engine > Longitude

Manually enter the longitude of the genset.



IP Settings > Web > Control Enable

Select this parameter to enable Web control.

IP Settings > Web > Server TCP/IP Port

Port number of the internal web server. The unit will respond to queries to this port only.

IP Settings > Web > Programming Enable

Select this parameter to enable Web programming.

IP Settings > User IP Mask > IP #1 & #2 & #3

These 3 registers control the IPv4 access to the unit. Logical AND operation is performed on the remote IPv4 address is with these IP addresses. If the result gives the remote IP address, access is enabled. Thus, access may be limited to the same LAN members (x.x.x.255) or strictly to predefined IPv4 addresses.

IP Settings > Rainbow Server > Address #1

These parameters accept both internet addresses and IPv4 addresses. Information for remote monitoring is sent to these addresses.

IP Settings > Rainbow Server > Port

This is the port number of the first monitoring terminal address.

IP Settings > Rainbow Server > Address #2

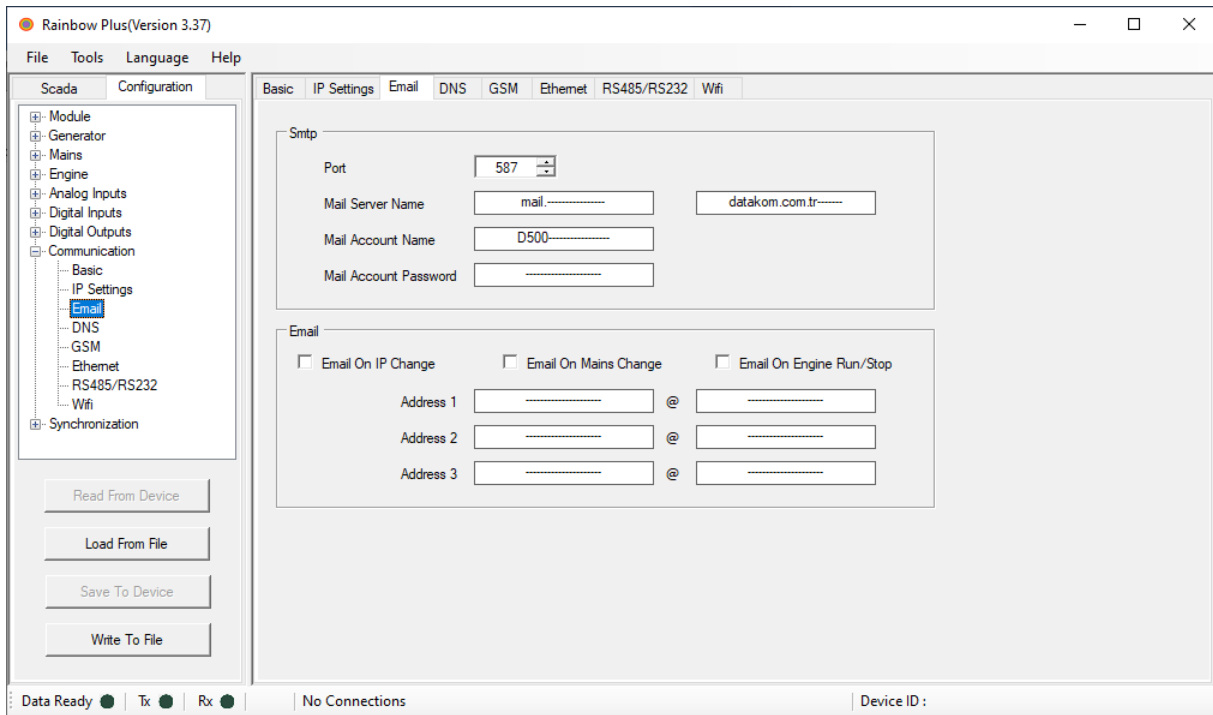
These parameters accept both internet addresses and IPv4 addresses. Information for remote monitoring is sent to these addresses.

IP Settings > Rainbow Server > Port

This is the port number of the second monitoring terminal address.

IP Settings > Annunciator IP Address > IP #

This is the IP address of main controller to communicate through Ethernet in remote panel mode.



Email > SMTP > Port

This is the port number used for e-mail sending.

Email > SMTP > Mail Server Name

This is the Outgoing Mail Server Address of the e-mail account (ex: smtp.gmail.com)

Email > SMTP > Mail Account Name

This is the account name appearing in the “from” tab of the e-mail recipient. (ex: D500@gmail.com)

Email > SMTP > Mail Account Password

This is the e-mail password of above e-mail account.

Email > Email > Email on IP Change

This parameter controls e-mail sending when IP address of GPRS or ethernet connection is changed. No warnings generated. If selected, email is sent on IP change.

Email > Email > Email on Mains Change

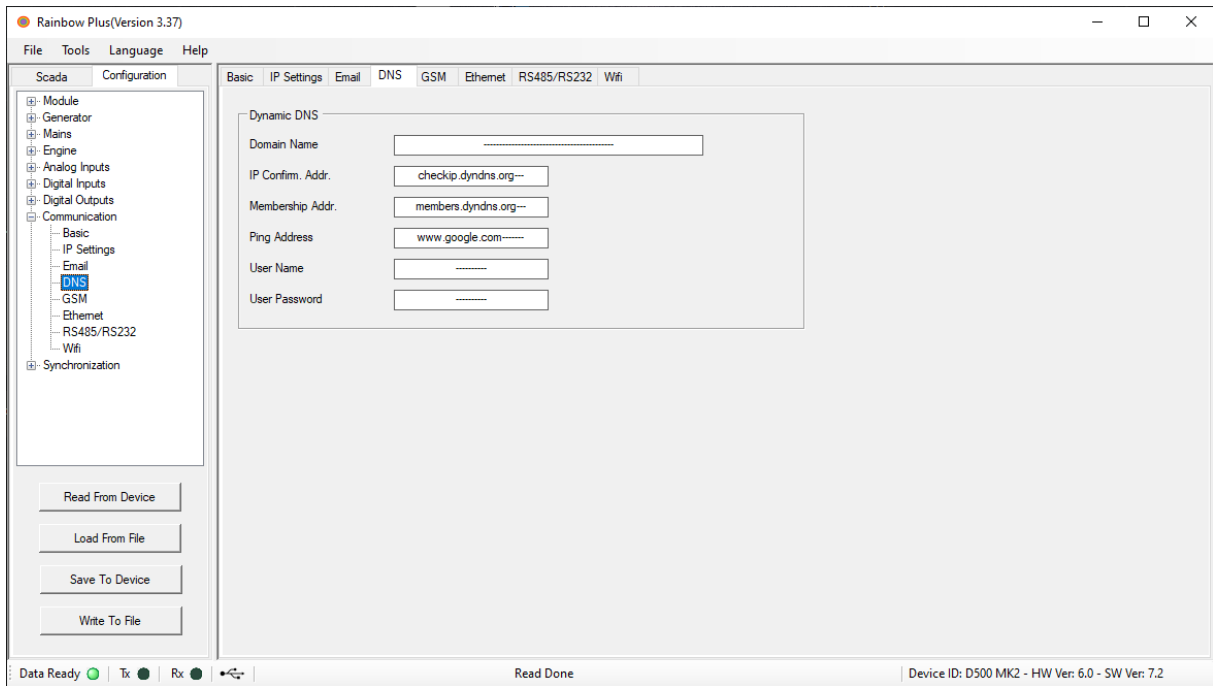
E-mails sent at mains status change.

Email > Email > Email on Engine Run/Stop

This parameter controls e-mail sending when the engine runs or stops. No warnings generated. If selected, email is sent on engine run/stop.

Email > Email > Address 1 & 2 & 3

These are e-mail recipient addresses where the unit is intended to send e-mail messages. Up to 3 e-mails can be sent at once.



DNS > Domain Name

This string is used in “Dynamic DNS” feature. The unit will register itself to the dynamic DNS server under this name. For more detailed information please review chapter on “Dynamic DNS Feature” and the document “Dynamic DNS Account Setting”.

DNS > IP Confirmation Address

This internet address is regularly accessed in order to read the IPv4 address of the unit.

DNS > Membership Address

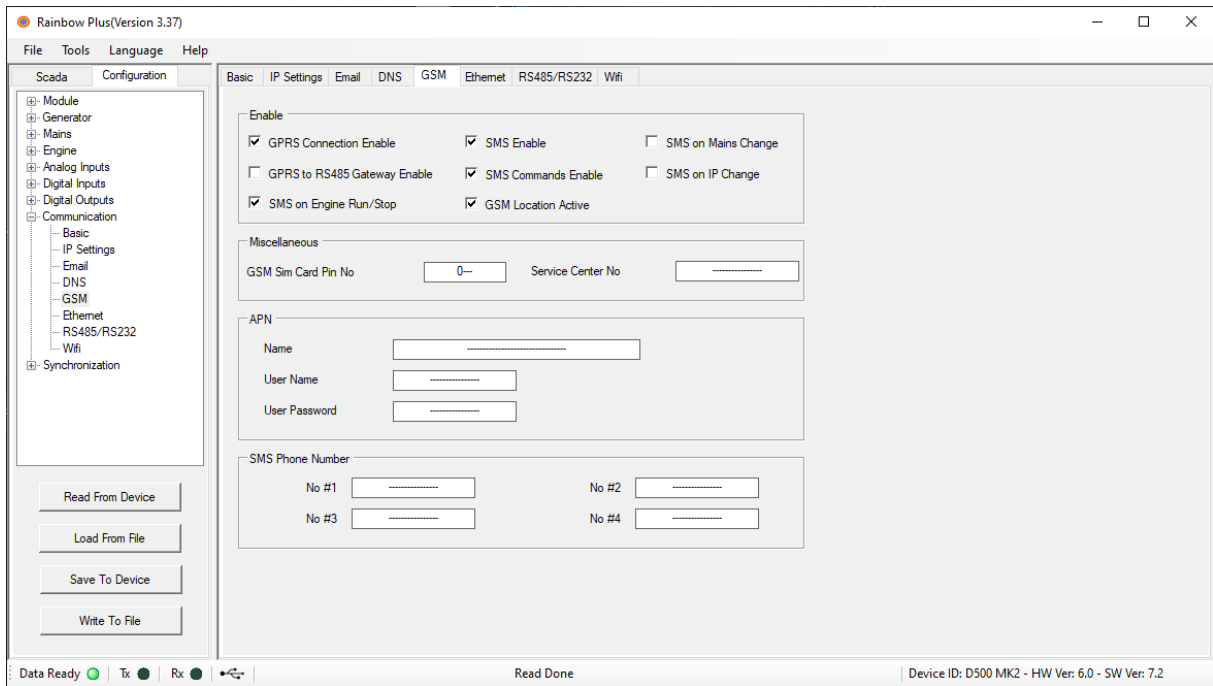
This string is used in “Dynamic DNS” feature. This is the address used in registering to the dynamic DNS server. For more detailed information please review chapter on “Dynamic DNS Feature” and the document “Dynamic DNS Account Setting”.

DNS > Ping Address

This internet address is regularly accessed in order to check the availability of internet access.

DNS > User Name / Password

These strings are used in “Dynamic DNS” feature while registering to the dynamic DNS server. For more detailed information please review chapter on “Dynamic DNS Feature” and the document “Dynamic DNS Account Setting”.



GSM > Enable > GPRS Connection Enable

Select this parameter to enable GPRS.

GSM > Enable > SMS Enable

Select this parameter to enable SMS messages.

GSM > Enable > SMS on Mains Change

This parameter controls SMS sending when mains voltages status is changed. No warnings generated. Check to enable.

GSM > Enable > GPRS to RS-485 Gateway Enable

If selected, the unit will redirect Modbus requests from GPRS to the RS-485 port.

GSM > Enable > SMS Commands Enable

Select to enable SMS commands. Commands are accepted from listed telephone numbers only.

GSM > Enable > SMS on IP Change

This parameter controls SMS sending when IP address of GPRS connection is changed. No warnings generated. Check to enable.

GSM > Enable > SMS on Engine Run/Stop

This parameter controls SMS sending when the engine runs or stops. No warnings generated. Check to enable.

GSM > Enable > GSM Location Active

If selected, location information is received from GSM operator.

GSM > Miscellaneous > GSM Sim Card Pin No

The SIM card should have no PIN number.

GSM > Miscellaneous > Service Center No

The SMS service center number may be required by the GSM operator. However, some GSM operators may allow SMS sending without SMS service center number. The exact information should be obtained from the GSM operator. Please search “SMS service center” on the GSM operator’s website.

GSM > APN > Name

The APN (access point name) is always required by the GSM operator. The exact information should be obtained from the GSM operator. Please search "APN" on the GSM operator's website.

GSM > APN > User Name

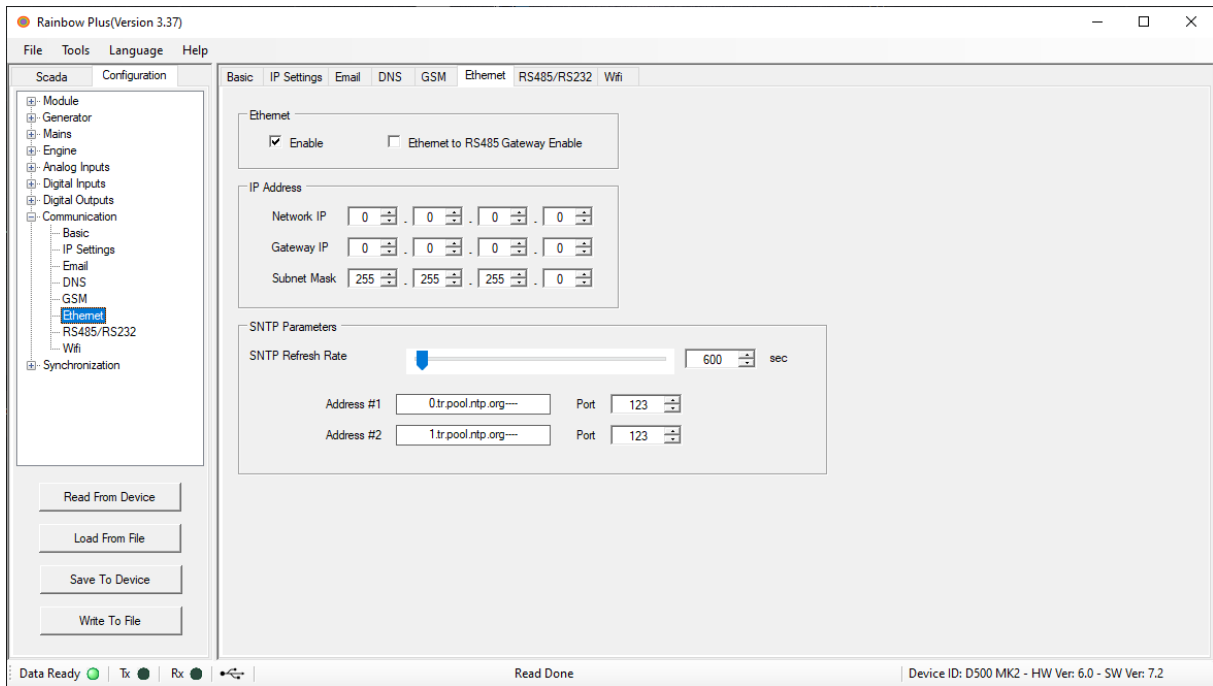
The APN (access point name) username may be required by the GSM operator. However, some GSM operators may allow access without username. The exact information should be obtained from the GSM operator. Please search "APN" on the GSM operator's website.

GSM > APN > User Password

If the APN (access point name) username is required by the GSM operator, most probably the APN password will also be required. However, some GSM operators may allow access without password. The exact information should be obtained from the GSM operator. Please search "APN" on the GSM operator's website.

GSM > SMS Phone Number > No #1-4

Enter the phone number(s) that will receive the SMS messages if SMS sending is enabled beginning with +(country code).



Ethernet > Enable

The APN (access point name) is always required by the GSM operator. The exact information should be obtained from the GSM operator. Please search “APN” on the GSM operator’s website.

Ethernet > Ethernet to RS-485 Gateway Enable

If selected, the unit will redirect Modbus requests from ethernet to the RS-485 port.

Ethernet > IP Address > Network IP

This is the IPv4 address that the unit will require from the DHCP server. If this parameter is set to 0.0.0.0 then the unit will require any IPv4 address from the DHCP server. If you are not an IP professional please leave this address as “0.0.0.0”.

Ethernet > IP Address > Gateway IP

This is the router IPv4 address, If the Network IP address and Gateway IP Address are set to “0.0.0.0” then the unit will get the gateway address automatically. If you are not an IP professional please leave this address as “0.0.0.0”.

Ethernet > IP Address > Subnet Mask

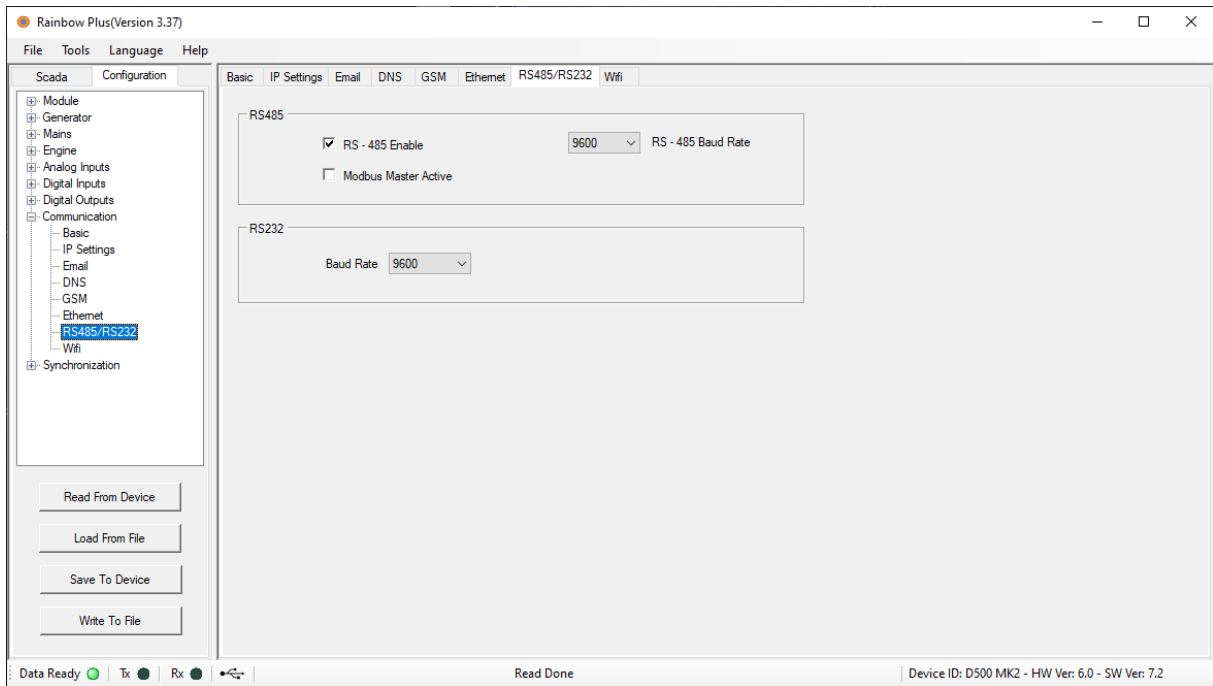
Reserved for IP professionals. If you are not an IP professional please leave this address as “255.255.255.0”.

Ethernet > SNTP Parameters > SNTP Refresh Rate

This is the wait period between two SNTP requests of the unit in order to update its internal real time clock from the servers.

Ethernet > SNTP Parameters > Address #1 & 2 / Port

These are the IP addresses and port numbers of the SNTP servers.



RS845/RS232 > RS485 > RS-485 Enable

Select to enable RS-485 communication.

RS845/RS232 > RS485 > RS-485 Baud Rate

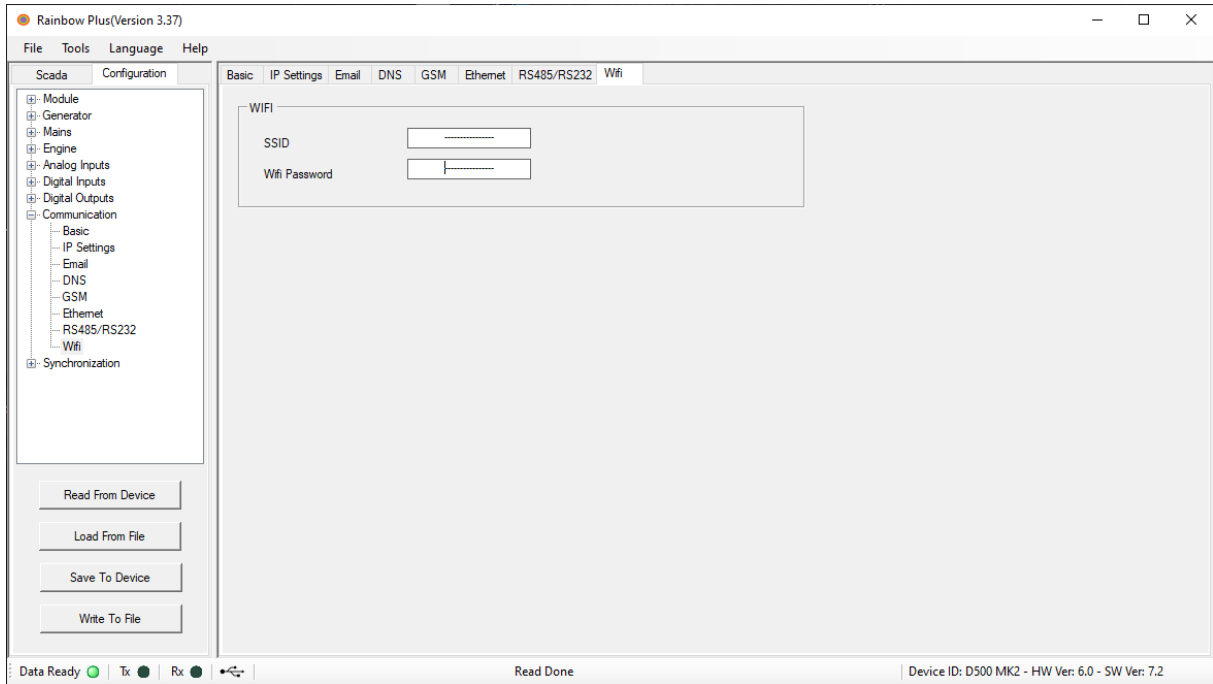
This is the data rate of the RS-485 Modbus port.

RS845/RS232 > RS485 > Modbus Master Active

This is the parameter in order to establish connection between controller and 3rd party device through RS-485 port.

RS845/RS232 > RS232 > Baud Rate

This is the data rate of the RS-232 Modbus port.



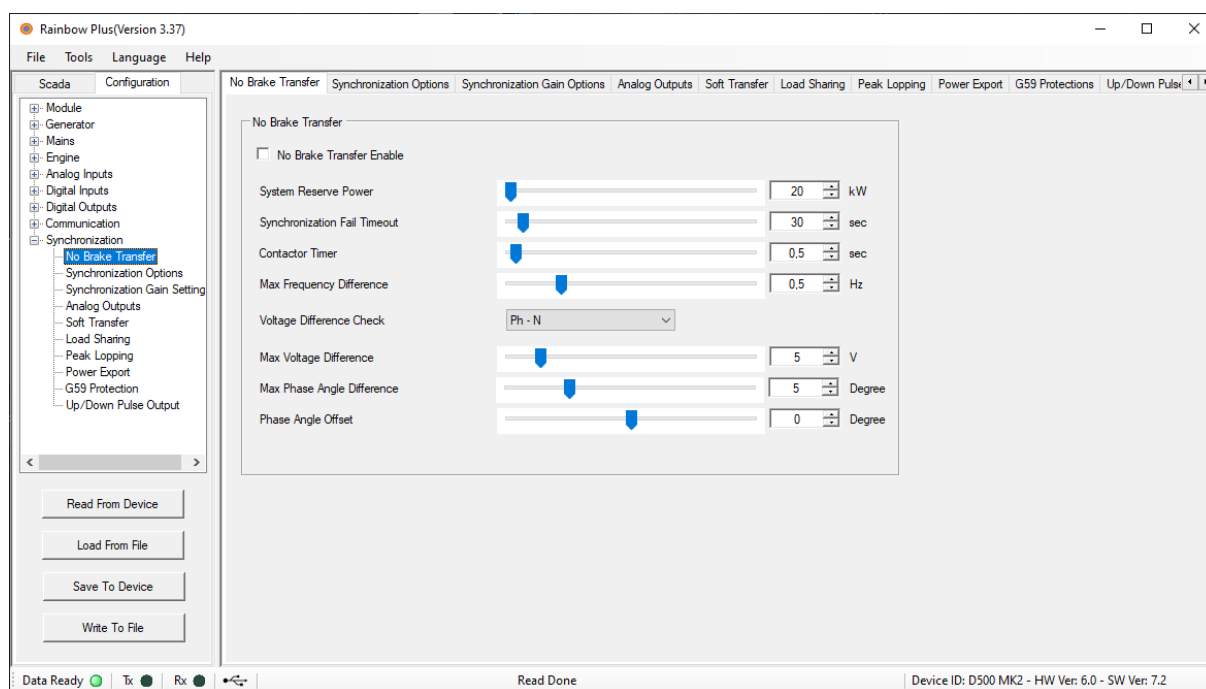
Wifi > SSID

Enter the name of wireless network that you want to connect.

Wifi > WiFi Password

Enter the password of wireless network that you want to connect.

8.9. SYNCHRONIZATION



No Break Transfer > No Break Transfer Enable

If selected, no break transfer is enabled. In this mode, the transfer from genset to mains will be made without power interruption.

No Break Transfer > System Reserve Power

The master keeps this amount of extra power available during whole operation under load as a safety against a sudden load surge.

No Break Transfer > Synchronization Fail Timeout

If the phase and voltage synchronization is not successful before the expiration of this timer, then a Synchronization Fail warning is given and the transfer will be performed with interruption.

No Break Transfer > Contactor Timer

When synchronization is detected, both contactors will stay closed during this timer.

No Break Transfer > Max Frequency Difference

This is the maximum difference between mains and genset frequencies to close both contactors.

No Break Transfer > Voltage Difference Check

Select between Phase-Phase or Phase-Neutral.

No Break Transfer > Max Voltage Difference

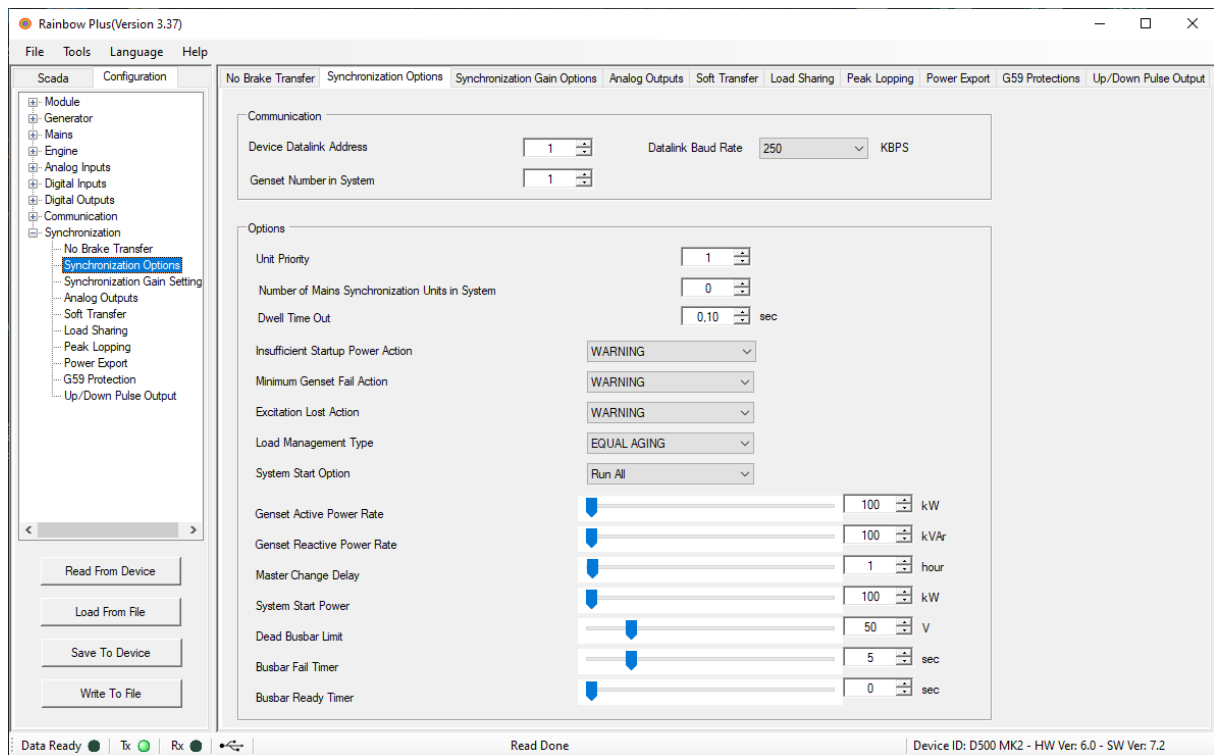
This is the maximum difference between the mains phase-L1 and the genset phase-L1 voltages to close both contactors. If voltage transformer is used, this quantity is multiplied with voltage transformer ratio.

No Break Transfer > Max Phase Angle Difference

This is the maximum phase angle between the mains phase-L1 and the genset phase-L1 voltages to close both contactors.

No Break Transfer > Phase Angle Offset

This parameter is used to compensate the phase angle introduced by voltage transformers in case of MV synchronization. This angle value is added to the phase differential during phase matching process.



Synchronization Options > Communication > Device Datalink Address

This parameter is used in order to force data link addresses for fault free operation with broken communication wires.

Synchronization Options > Communication > Datalink Baud Rate

Select from 50, 100, 125, 250, 500 kbps.

Synchronization Options > Communication > Genset Number in System

This is the number of synchronizing gensets to the busbar.

Synchronization Options > Options > Unit Priority

This parameter defines the priority level of the device on the same data link.

Synchronization Options > Options > Number of Mains Synch. Units in System

Enter the number of Mains Synchronizing units in the system.

Synchronization Options > Options > Dwell Time Out

The synchronization conditions must remain satisfied during this timeout for the controller to decide to close its contactor.

Synchronization Options > Options > Insufficient Startup Power Action

Select from no alarm, shutdown, load dump, warning

Synchronization Options > Options > Minimum Genset Fail Action

Select from no alarm, shutdown, load dump, warning. This is action to be taken if the number of available gensets is less than Genset Number in Multi Genset Systems.

Synchronization Options > Options > Excitation Lost Action

Select from no alarm, shutdown, load dump, warning. This warning is given if the AVR control output has gone to the low or high limit when the genset is on load.

Synchronization Options > Options > Load Management Type

Select from Equal Aging or Smart.

Synchronization Options > Options > System Start Option

Select from run with start power, run with mains power, run all. This parameter determines the number of gensets to start, when there is a REMOTE START signal.

Synchronization Options > Options > Genset Active Power Rate

Enter the genset active power rating

Synchronization Options > Options > Genset Reactive Power Rate

Enter the genset reactive power rating

Synchronization Options > Options > Master Change Delay

This parameter defines the minimum time period difference between two master change operations in equal aging.

Synchronization Options > Options > System Start Power

This parameter defines start power parameter to start sufficient generators when remote start signal arrives.

Synchronization Options > Options > Dead Busbar Limit

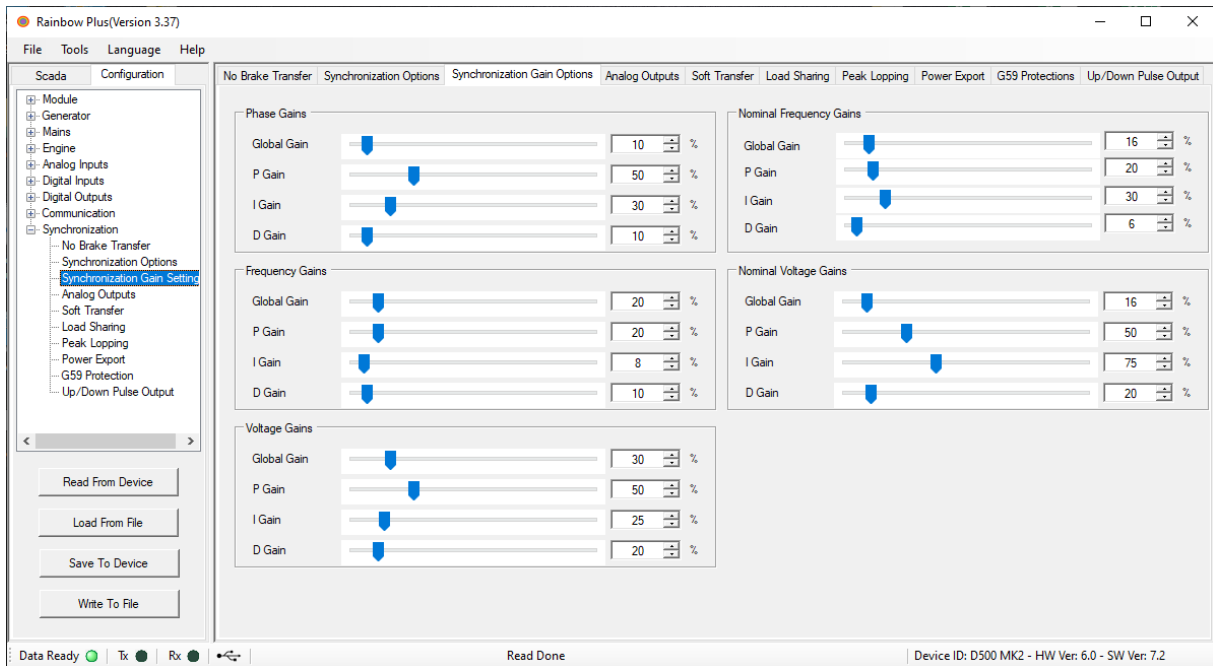
This parameter defines the minimum voltage for the detection of a live busbar.

Synchronization Options > Options > Busbar Fail Timer

When a genset closes to the Busbar, if the master genset controller does not detect the busbar voltage at the expiration of this period, a "BUSBAR FAIL" fault condition will occur.

Synchronization Options > Options > Busbar Ready Timer

This is the delay after all generators close to the busbar and before the master genset controller acknowledges "Busbar ready" signal.



Synchronization Gain Options > Phase Gains > Global Gain

This parameter governs the phase synchronization speed. If this parameter is increased, the synchronization will be faster but unstable. If it is decreased, the synchronization will be slower but more stable. The best setting is the fastest stable synchronization.

Synchronization Gain Options > Phase Gains > P Gain

Proportionality gain of the phase synchronization PID control.

Synchronization Gain Options > Phase Gains > I Gain

Integral gain of the phase synchronization PID control.

Synchronization Gain Options > Phase Gains > D Gain

Derivative gain of the phase synchronization PID control.

Synchronization Gain Options > Nominal Frequency Gains > Global Gain

This parameter governs the nominal frequency catching of the master unit. If this parameter is increased, the operation will be faster but unstable. If it is decreased, the operation will be slower but more stable. The best setting is the fastest stable operation.

Synchronization Gain Options > Nominal Frequency Gains > P Gain

Proportionality gain of the nominal frequency synchronization PID control.

Synchronization Gain Options > Nominal Frequency Gains > I Gain

Integral gain of the nominal frequency synchronization PID control.

Synchronization Gain Options > Nominal Frequency Gains > D Gain

Derivative gain of the nominal frequency synchronization PID control.

Synchronization Gain Options > Frequency Gains > Global Gain

This parameter governs the frequency synchronization speed. If this parameter is increased, the synchronization will be faster but unstable. If it is decreased, the synchronization will be slower but more stable. The best setting is the fastest stable synchronization.

Synchronization Gain Options > Frequency Gains > P Gain

Proportionality gain of the frequency synchronization PID control.

Synchronization Gain Options > Frequency Gains > I Gain

Integral gain of the nominal frequency synchronization PID control.

Synchronization Gain Options > Frequency Gains > D Gain

Derivative gain of the nominal frequency synchronization PID control.

Synchronization Gain Options > Nominal Voltage Gains > Global Gain

This parameter governs the nominal voltage catching of the master unit. If this parameter is increased, the operation will be faster but unstable. If it is decreased, the operation will be slower but more stable. The best setting is the fastest stable operation.

Synchronization Gain Options > Nominal Voltage Gains > P Gain

Proportionality gain of the nominal voltage synchronization PID control.

Synchronization Gain Options > Nominal Voltage Gains > I Gain

Integral gain of the nominal voltage synchronization PID control.

Synchronization Gain Options > Nominal Voltage Gains > D Gain

Derivative gain of the nominal voltage synchronization PID control.

Synchronization Gain Options > Voltage Gains > Global Gain

This parameter governs the voltage synchronization speed. If this parameter is increased, the synchronization will be faster but unstable. If it is decreased, the synchronization will be slower but more stable. The best setting is the fastest stable synchronization.

Synchronization Gain Options > Voltage Gains > P Gain

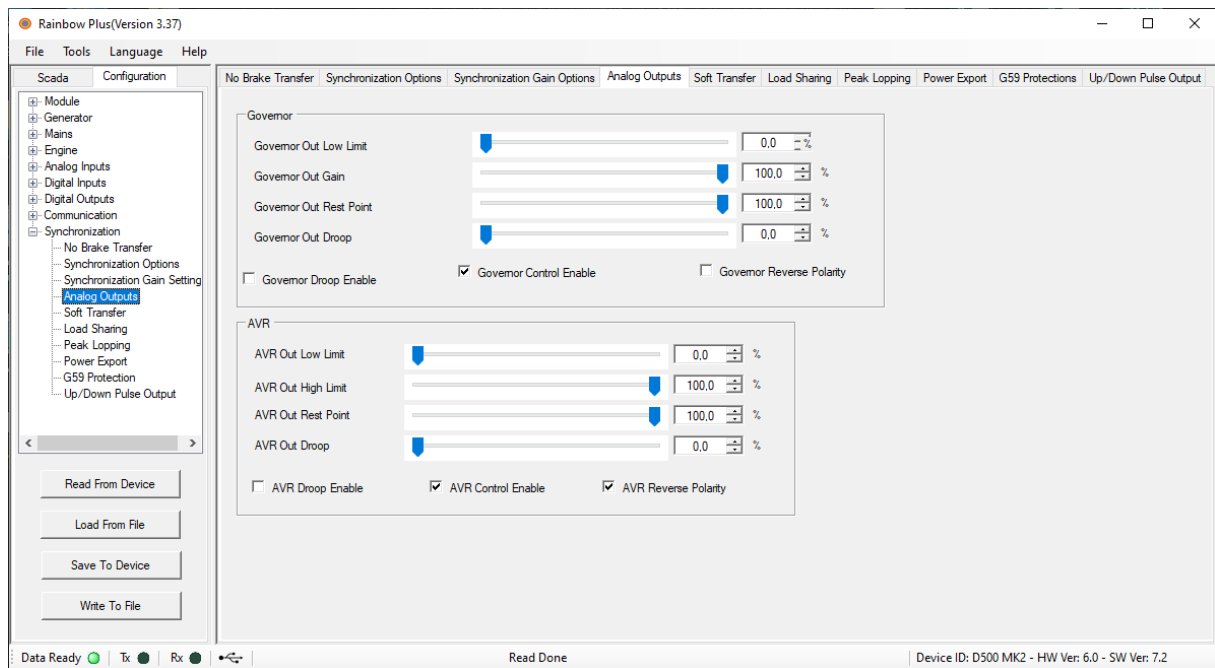
Proportionality gain of the voltage synchronization PID control.

Synchronization Gain Options > Voltage Gains > I Gain

Integral gain of the voltage synchronization PID control.

Synchronization Gain Options > Voltage Gains > D Gain

Derivative gain of the voltage synchronization PID control.



Analog Outputs > Governor > Governor Out Low Limit

This parameter defines governor control output low limit. Limits from 0V to 10V can be set by this parameter.

Analog Outputs > Governor > Governor Out Gain

This parameter defines governor control output gain.

Analog Outputs > Governor > Governor Out Rest Point

This is the rest value of the governor control output at no load.

Analog Outputs > Governor > Governor Out Droop

The controller will inject this quantity of droop at the genset rpm at 100% active power load.

Analog Outputs > Governor > Governor Droop Enable

If selected, droop mode is enabled.

Analog Outputs > Governor > Governor Control Enable

If selected, enables the control of the governor by the control panel.

Analog Outputs > Governor > Governor Reverse Polarity

If selected, governor control has reverse polarity (speed decreases with voltage increase). If not selected, governor control has normal polarity (speed increases with voltage increase).

Analog Outputs > AVR > AVR Out Low Limit

This parameter defines AVR output low limit. Limits from -3.0V to +3.0V can be set by this parameter.

Analog Outputs > AVR > AVR Out High Limit

This parameter defines AVR output high limit. Limits from -3.0V to +3.0V can be set by this parameter.

Analog Outputs > AVR > AVR Out Rest Point

This is the rest value of the AVR control output at no load.

Analog Outputs > AVR > AVR Out Droop

The controller will inject this quantity of droop at the genset voltage at 100% reactive power load.

Analog Outputs > AVR > AVR Droop Enable

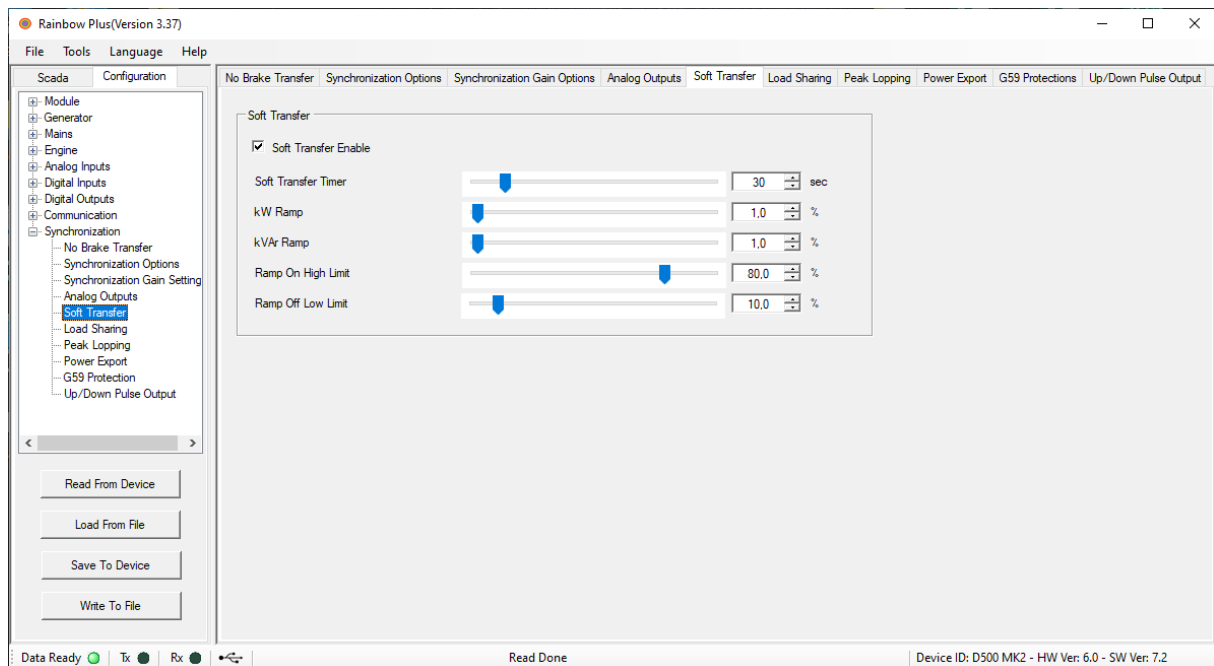
If selected, droop mode is enabled.

Analog Outputs > AVR > AVR Control Enable

If selected, enables the control of the AVR by the control panel.

Analog Outputs > AVR > AVR Reverse Polarity

If selected, AVR control has reverse polarity (voltage decreases with value increase). If not selected, AVR control has normal polarity (voltage increases with value increase).



Soft Transfer > Soft Transfer Enable

In soft transfer mode, the transfer will be made without interruption like the Uninterrupted Transfer mode. However, the load will be gradually transferred under active and reactive power control. If selected, soft transfer mode is enabled.

Soft Transfer > Soft Transfer Timer

This is the time duration of the Soft Transfer. At the end of this timer one of the contactors will release to terminate the parallel operation.

Soft Transfer > kW Ramp

In case of a soft transfer, the load's active power (kW) will be transferred to the mains at this rate.

Soft Transfer > kVAr Ramp

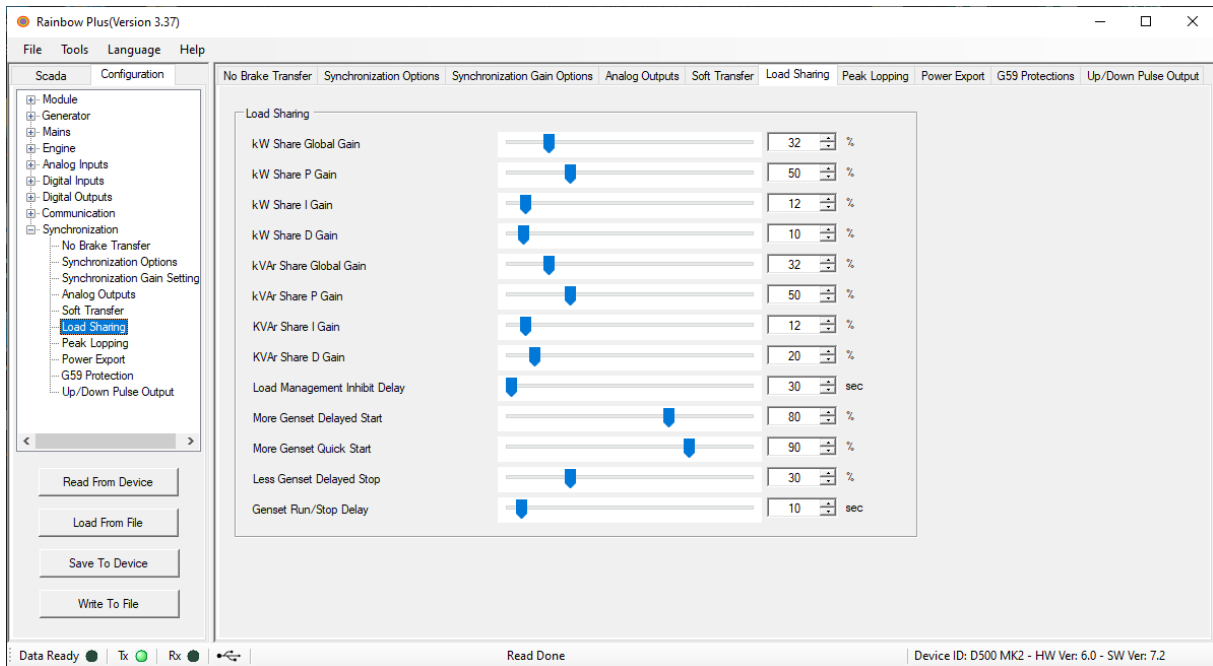
In case of a soft transfer, the load's reactive power (kVAr) will be transferred to the mains at this rate.

Soft Transfer > Ramp On High Limit

If multi genset system total active power goes over this limit while soft transferring to mains load contactor will be de-energized.

Soft Transfer > Ramp Off Low Limit

If multi genset system total active power goes under this limit while soft transferring to mains load contactor will be de-energized.



Load Sharing > kW Share Global Gain

This parameter defines the reaction speed of the kW control during soft loading. The standard value for this parameter is %20, but it must be readjusted for the genset during manufacturing. If this parameter is too high, a kW oscillation may occur. If it is too low, the kW transfer will be slower.

Load Sharing > kW Share P Gain

Proportionality gain of the kW Share PID control.

Load Sharing > kW Share I Gain

Integral gain of the kW Share PID control.

Load Sharing > kW Share D Gain

Derivative gain of the kW Share PID control.

Load Sharing > kVAr Share Global Gain

This parameter defines the reaction speed of the kVAr control during soft loading. The standard value for this parameter is %20, but it must be readjusted for the genset during manufacturing. If this parameter is too high, a kVAr oscillation may occur. If it is too low, the kVAr transfer will be slower.

Load Sharing > kVAr Share P Gain

Proportionality gain of the kVAr Share PID control.

Load Sharing > kVAr Share I Gain

Integral gain of the kVAr Share PID control.

Load Sharing > kVAr Share D Gain

Derivative gain of the kVAr Share PID control.

Load Sharing > Load Management Inhibit Delay

This is the period after all gensets closed to busbar and before the load management function is put in service.

Load Sharing > More Genset Delayed Start

If the total active load is above this level for the period defined in Multi Genset Run/Stop Delay, the slave genset will start, synchronize and share the load. This parameter is defined as a percentage of the Genset Power Rating parameter.

Load Sharing > More Genset Quick Start

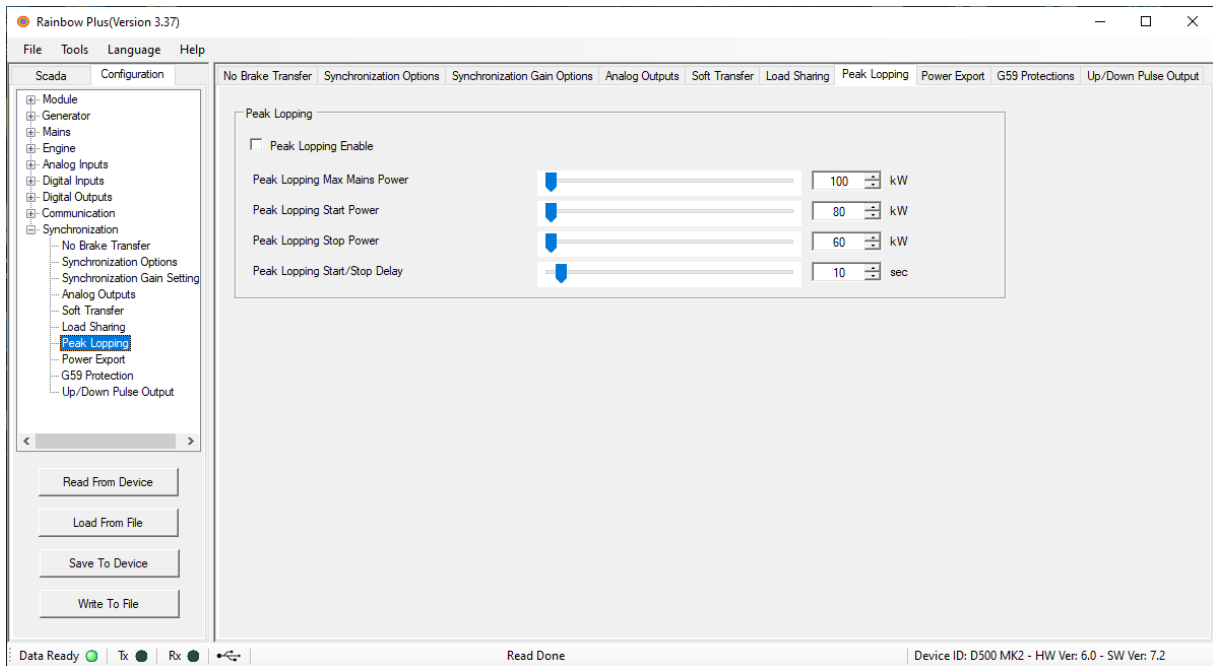
If the total active load is above this level, the slave genset will start, synchronize and share the load without delay. This parameter is defined as a percentage of the Genset Power Rating parameter.

Load Sharing > Less Genset Delayed Stop

If the total active load is below this level during the period defined in Genset Start Power parameter, the slave genset will stop.

Load Sharing > Genset Run/Stop Delay

This is the time delay used for starting and stopping of the slave genset. Related starting and stopping power levels are defined in parameters Multi Genset Delayed Start and Multi Genset Delayed Stop.



Peak Lopping > Peak Lopping Enable

If selected, in AUTO mode, the multi genset system will start and share the load if the mains power exceeds Peak Lopping Start Power parameter. If not selected, in AUTO mode the unit will start multi genset system only if a mains failure occurs.

Peak Lopping > Peak Lopping Max Mains Power

In peak lopping mode, the unit will not allow the mains to deliver to the load a power higher than this limit in order to protect the mains.

Peak Lopping > Peak Lopping Start Power

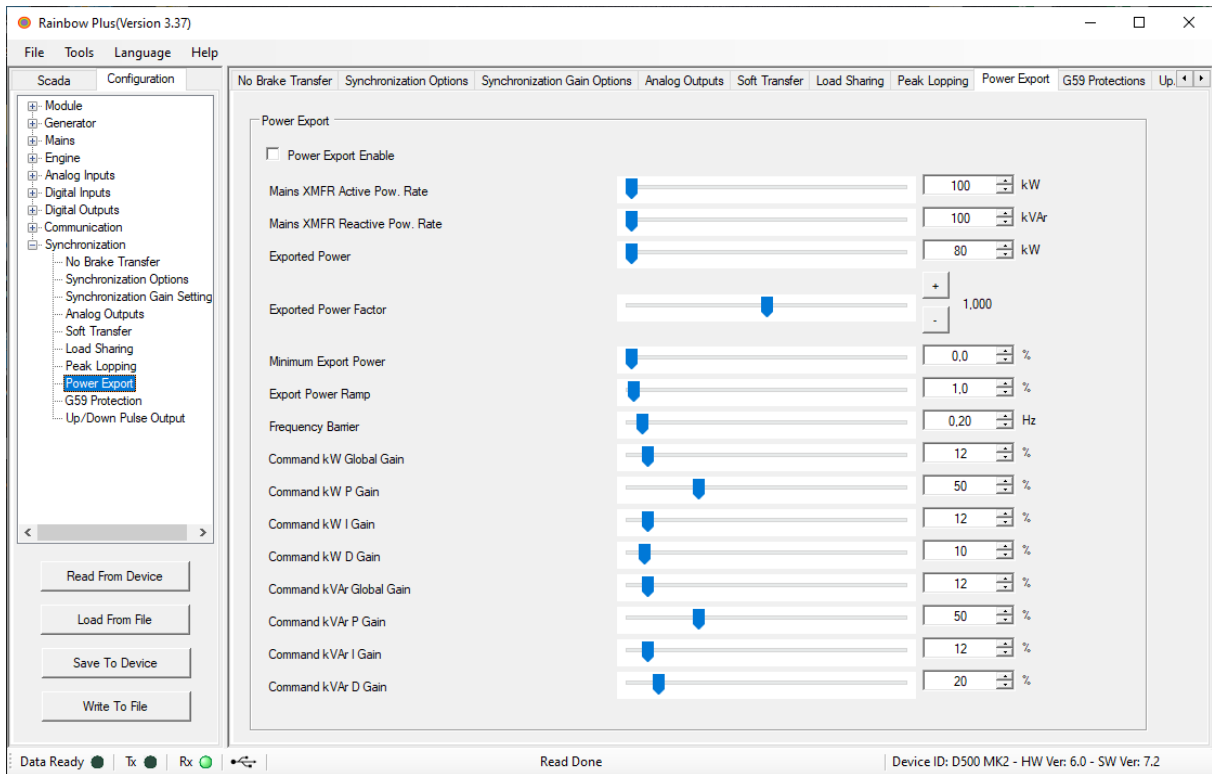
In peak lopping mode the multi genset system will start and enter in parallel with the mains only if the mains power exceeds this limit. However, it will supply power to the load only if the load power exceeds Peak Lopping Maximum Mains Power parameter. This parameter should be set lower than Peak Lopping Maximum Mains Power parameter.

Peak Lopping > Peak Lopping Stop Power

In peak lopping mode the multi genset system will stop only when the total load power falls below this limit. This parameter should be set lower than Peak Lopping Start Power parameter.

Peak Lopping > Peak Lopping Start/Stop Delay

In peak lopping mode, this is the delay between starting and stopping the genset system.



Power Export > Power Export Enable

If selected, Power Export to Mains is enabled.

Power Export > Mains Transformer Active Power Rate

Enter the mains transformer active power rating here.

Power Export > Mains Transformer Reactive Power Rate

Enter the mains transformer reactive power rating here.

Power Export > Exported Power

This is the active power to be exported to the mains in Power Export to Mains operation mode.

Power Export > Exported Power Factor

This is the power factor of the power exported to the mains in Power Export to Mains operation mode.

Power Export > Minimum Export Power

In the Distributed Power Export to Mains mode, the exported power will not fall below this limit.

Power Export > Export Power Ramp

In the Distributed Power Export to Mains mode, the genset active export power (KW) will be increased/decreased with this rate.

Power Export > Frequency Barrier

In the Distributed Power Export to Mains mode, this is the minimum variation from the nominal frequency causing an active power rump-up or ramp-down.

Power Export > Command kW Global Gain

This parameter governs the active power catching speed of the synchronization unit. If this parameter is increased, the operation will be faster but unstable. If it is decreased, the operation will be slower but more stable. The best setting is the fastest stable operation.

Power Export > Command kW P Gain

Proportional gain of Command kW PID control.

Power Export > Command I Gain

Integral gain of Command kW PID control.

Power Export > Command D Gain

Derivative gain of Command kW PID control.

Power Export > Command kVAr Global Gain

In peak lopping mode, this is the delay between starting and stopping the genset system.

Power Export > Command kVAr P Gain

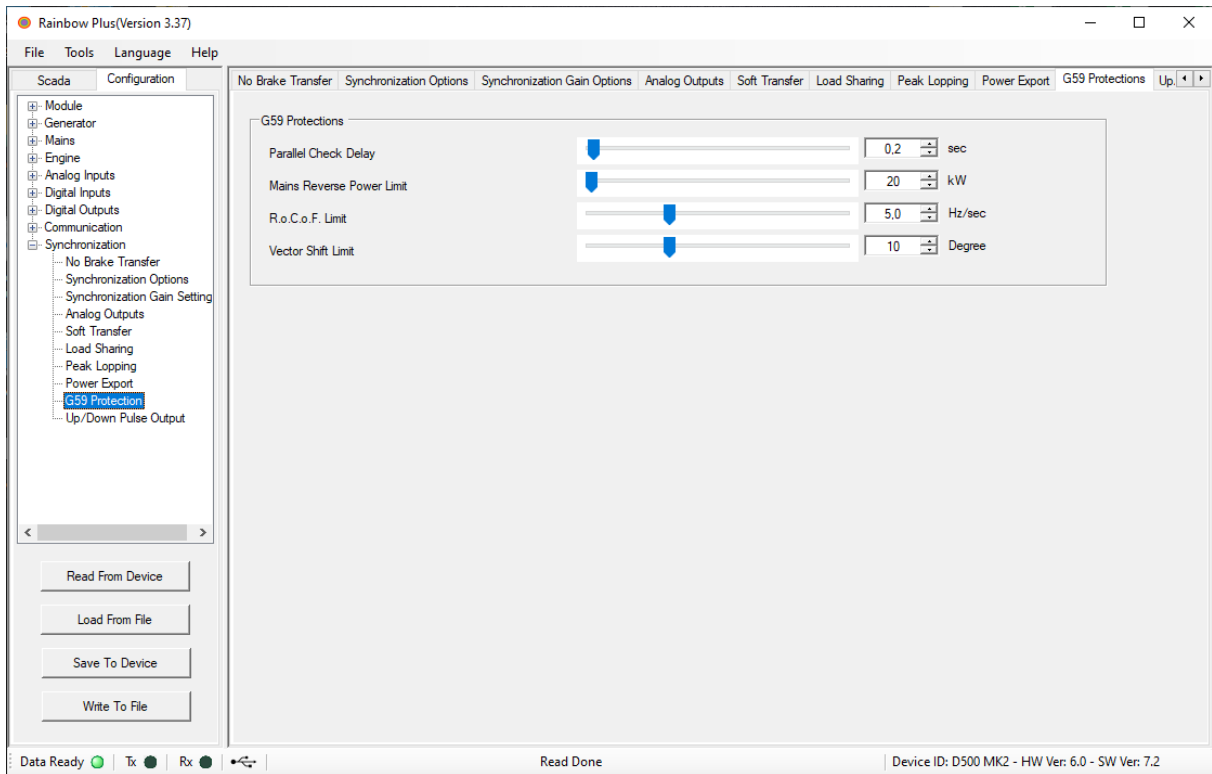
Proportional gain of Command kVAr PID control.

Power Export > Command kVAr I Gain

Integral gain of Command kVAr PID control.

Power Export > Command kVAr D Gain

Derivative gain of Command kVAr PID control.



G59 Protections > Parallel Check Delay

This is the delay after the mains contactor is energized (for parallel to mains) and before the protections for mains failure are enabled.

G59 Protections > Mains Reverse Power Limit

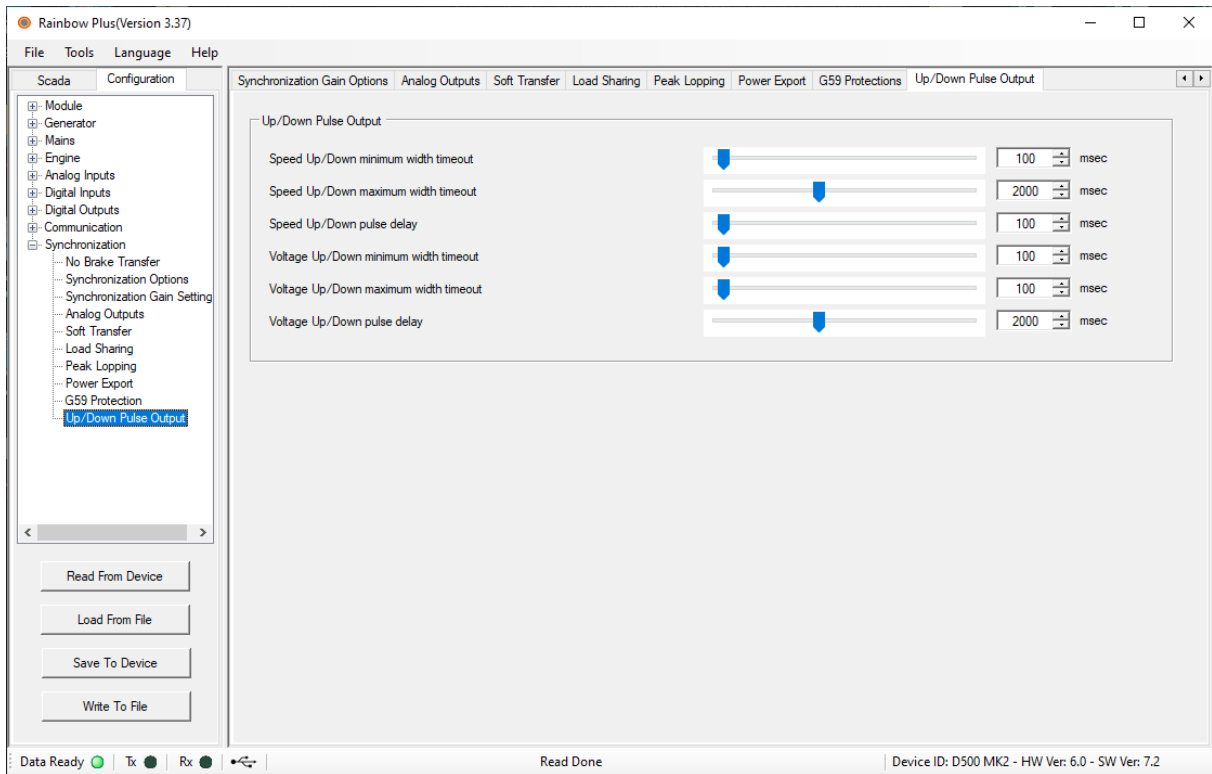
The mains active power is measured for each period. If the power supplied to mains by the genset system exceeds this limit, this will mean a mains failure. The mains reverse power detector has a variable response time. For a power not exceeding 2 times the predefined limit the response time is 8 cycles. The response time is reduced with larger reverse powers. It is approximately 1 cycle with a reverse power of 8 times the predefined limit.

G59 Protections > ROCOF Limit

This parameter defines the sensitivity of the ROCOF (rate of change of frequency) protection while operating in parallel with mains. When the parallel protections are enabled, if the mains frequency change exceeds this limit for 4 consecutive periods, the mains contactor will be de-energized and a warning will be generated.

G59 Protections > Vector Shift Limit

This parameter defines the sensitivity of the vector shift protection while operating in parallel with mains. When the parallel protections are enabled, if the phase of the mains measured on last 2 cycles jumps over this limit on the phase measured on last 4th and 5th period, the mains contactor will be de-energized and a warning will be generated. It is advised to set this parameter to 10 degrees.



Up/Down Pulse Output > Speed Up/Down min width timeout

This parameter defines the minimum pulse width in speed pulse control mode.

Up/Down Pulse Output > Speed Up/Down max width timeout

This parameter defines the maximum pulse width in speed pulse control mode. If this parameter is set to zero then no maximum pulse width is used.

Up/Down Pulse Output > Speed Up/Down Pulse Delay

This parameter defines the minimum pulse delay between two speed up/down control pulses.

Up/Down Pulse Output > Voltage Up/Down min width timeout

This parameter defines the minimum pulse width in voltage pulse control mode.

Up/Down Pulse Output > Voltage Up/Down max width timeout

This parameter defines the maximum pulse width in voltage pulse control mode. If this parameter is set to zero then no maximum pulse width is used.

Up/Down Pulse Output > Voltage Up/Down Pulse Delay

This parameter defines the minimum pulse delay between two of voltage up/down control pulses.