3 kW LLC graphical user interface (GUI): getting started sequence

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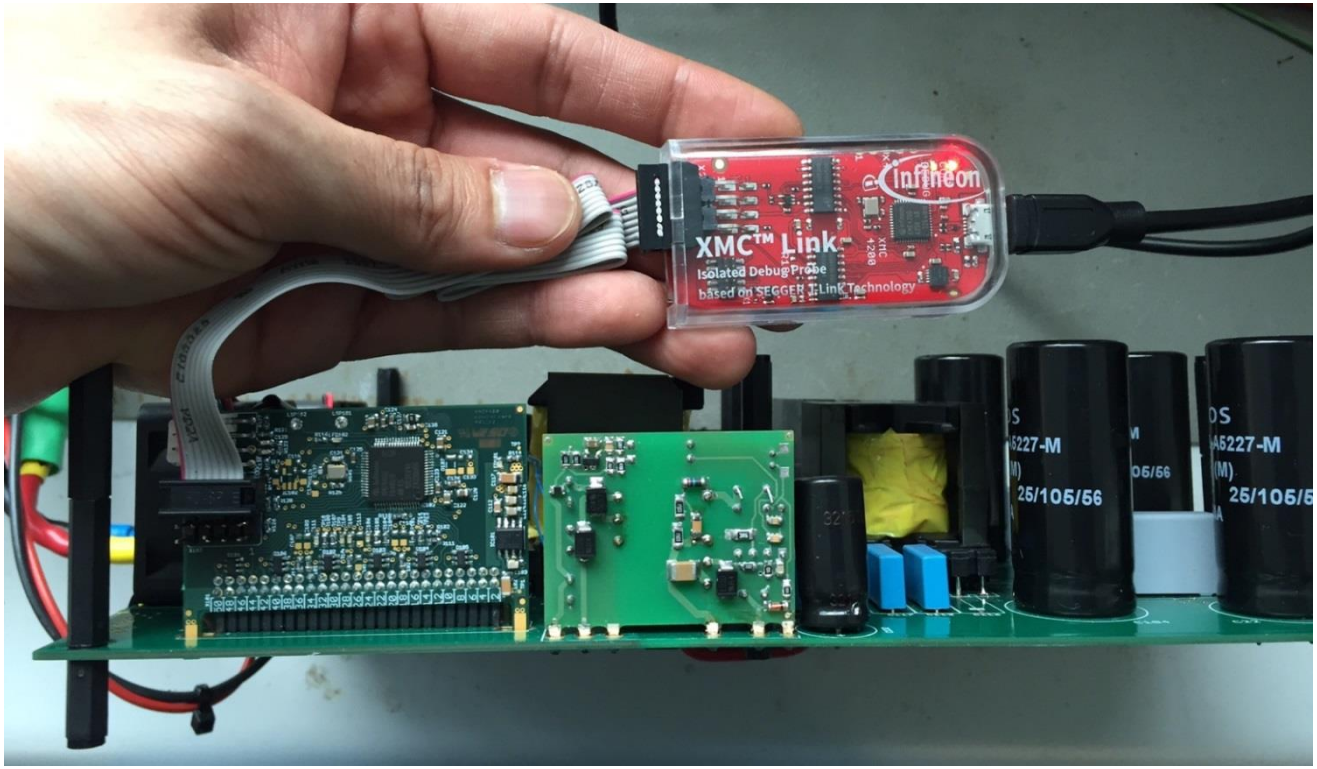
Introduction

- The 3 kW dual phase demo board is able to immediately work without connection to the graphical user interface (GUI), since a set of operating parameters is already stored in the memory of the MCU during the mass production
- The GUI provides an immediate and intuitive way to set some electrical parameters and to monitor them during the operation
- The following procedure shows:
  - How getting started with the operation when the control board is connected to the GUI
  - How to pre-set the converter parameters
  - How to measure some parameters during the converter operation
- The setting of the converter parameters via GUI shall be done in accordance with the max specified ratings of the board:
  - V_{in_nom}=380 V_{dc}; V_{in}: [350, 410] V_{dc}
  - V_{out_nom}= 54 V; V_{out}: [44, 58] V.
  - I_{out_max}=55 A, so max over current level = 62 A.

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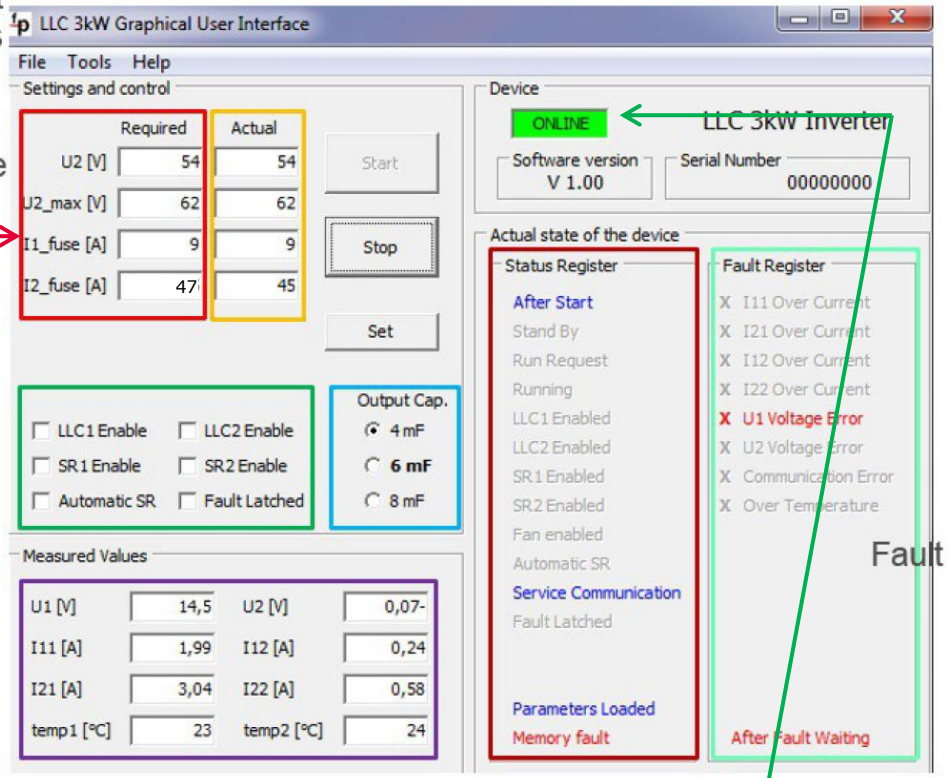
Preliminary operations with XMC™ Link

- Install on your laptop the Segger driver, which can be downloaded at the following link: https://www.segger.com/jlink-software.html
- Connect the XMC™ Link to the control card as illustrated in the picture below, then you go to the USB port of your laptop through a proper adapter cable.



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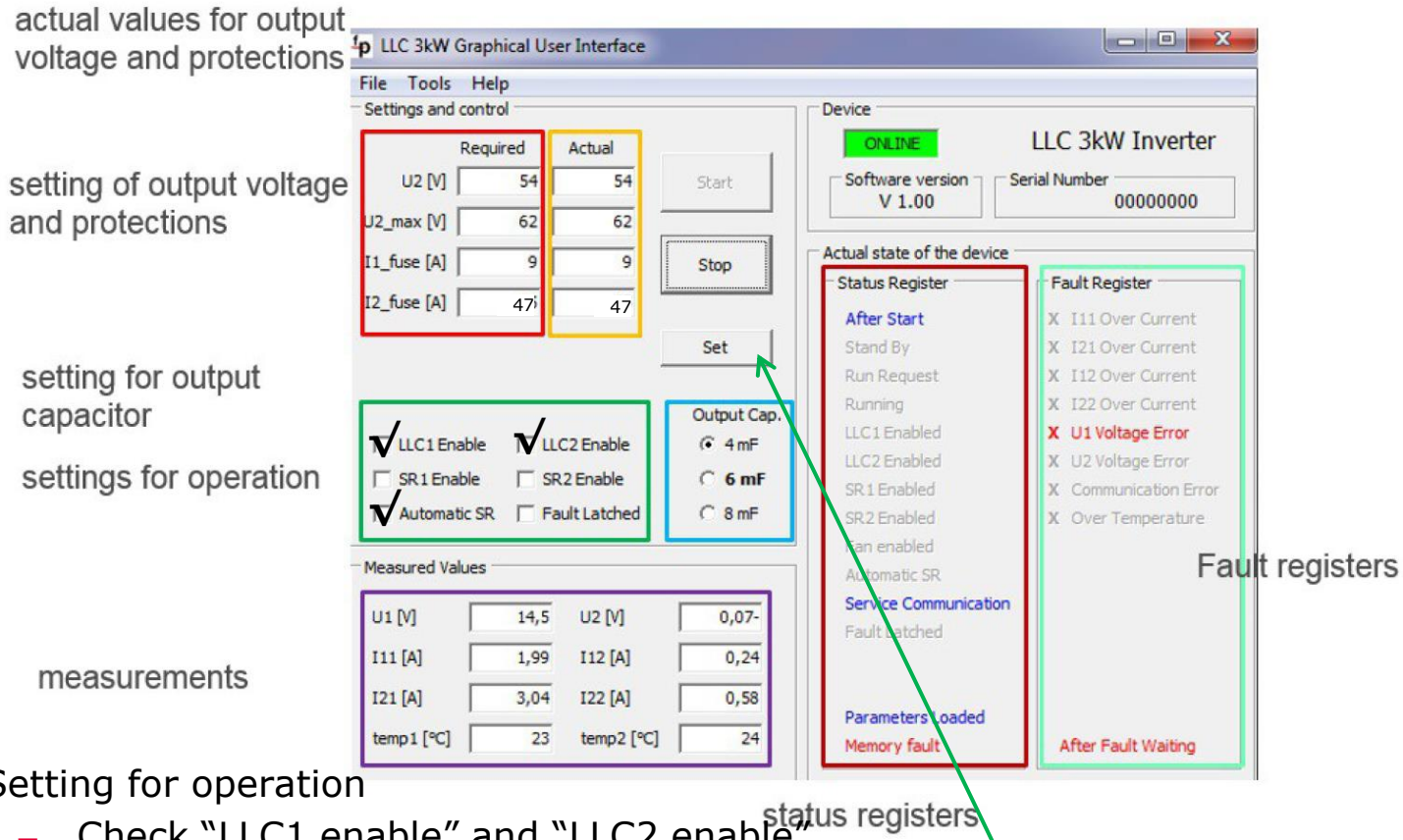
Step 1.
First Connection and initial setting



- Apply V_{in}=100 V to the power converter
- File > Setting > COM Port >select the proper port
- Press "connect" button > ON LINE is highlighted in green
- Setting of output voltage and protections:
  U2=**54**; U2_max=**62**; I1_fuse=**9**; I2_fuse=**47**

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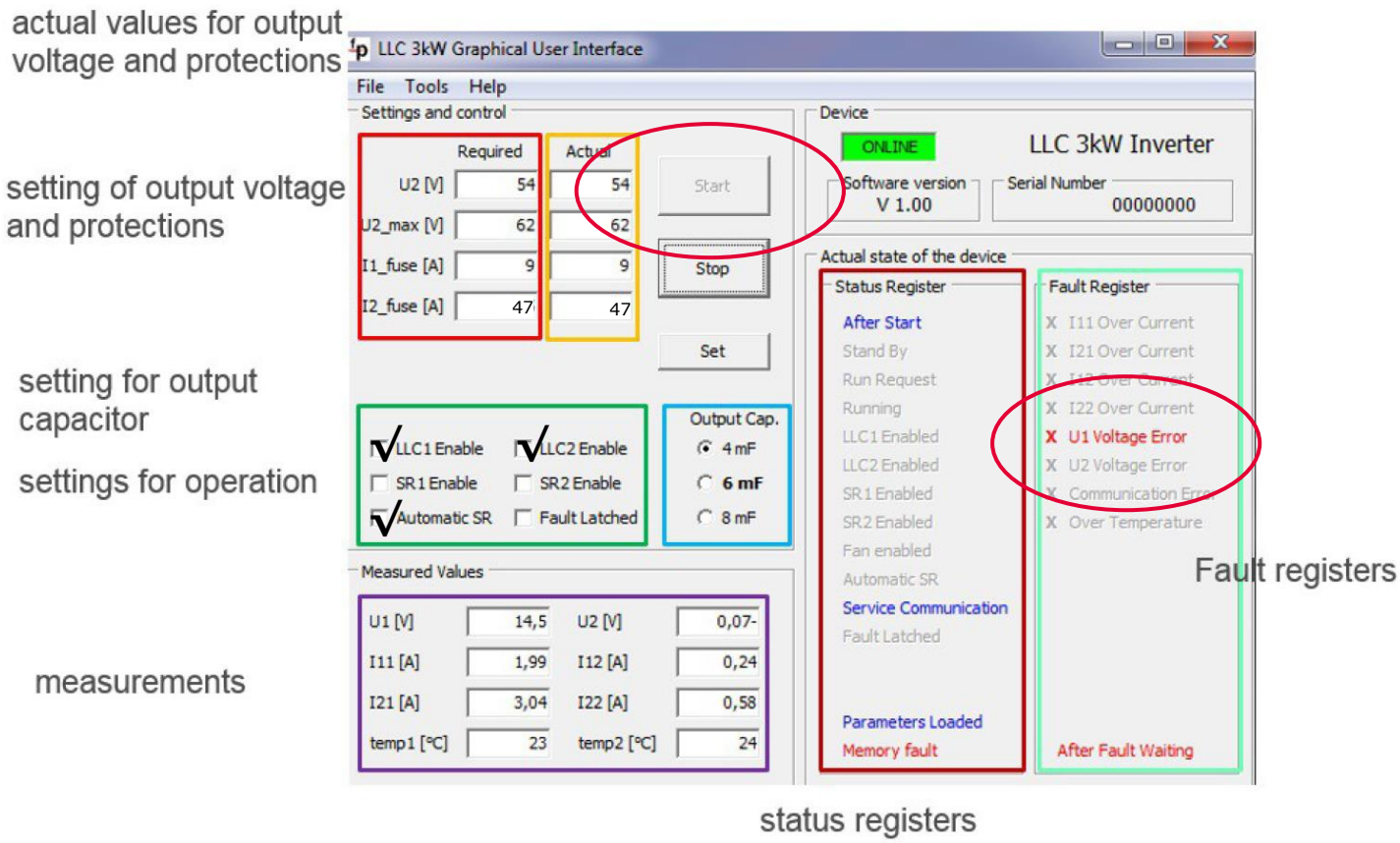
Step 2.
Setting for operation



- Setting for operation
  - Check "LLC1 enable" and "LLC2 enable"
  - Check "Automatic SR"
  - **Do not check "SR1 Enable", nor "SR2 Enable" (done by only expert users for fine tuning)**
- Press "Set" to store the settings (status register update)

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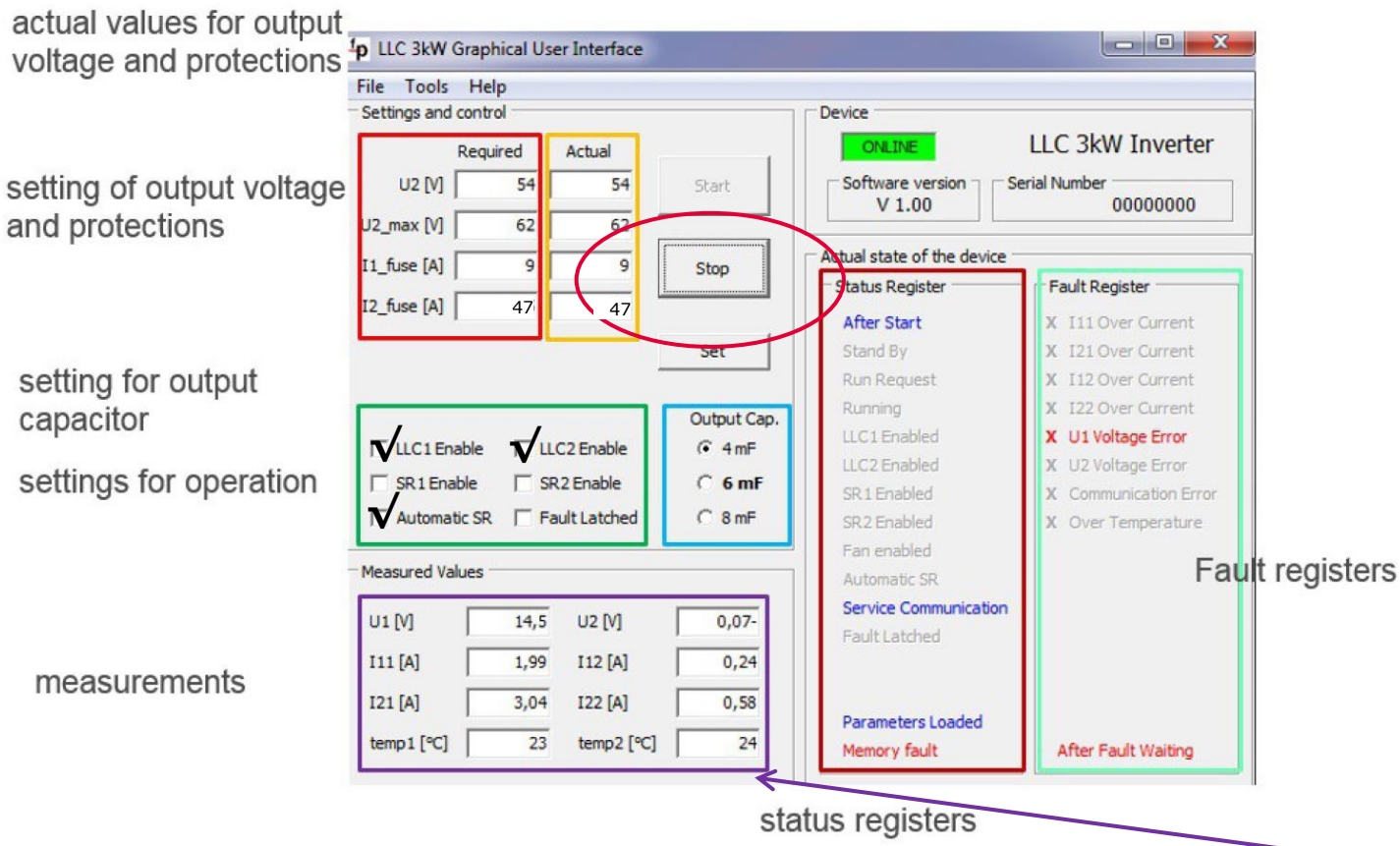
Step 3.
Start-up procedure



- Increase V_{in} of the power converter. Until V_{in}<350 V_{dc}, "U1 voltage error" is highlighted in red in the Fault Register and the START button will remain "grey"
- When V_{in} ≥360 V_{dc}, "U1 voltage error" is removed and "START" will become available for activation.
- Increase V_{in} up to **380 V_{dc}**, then press "START"

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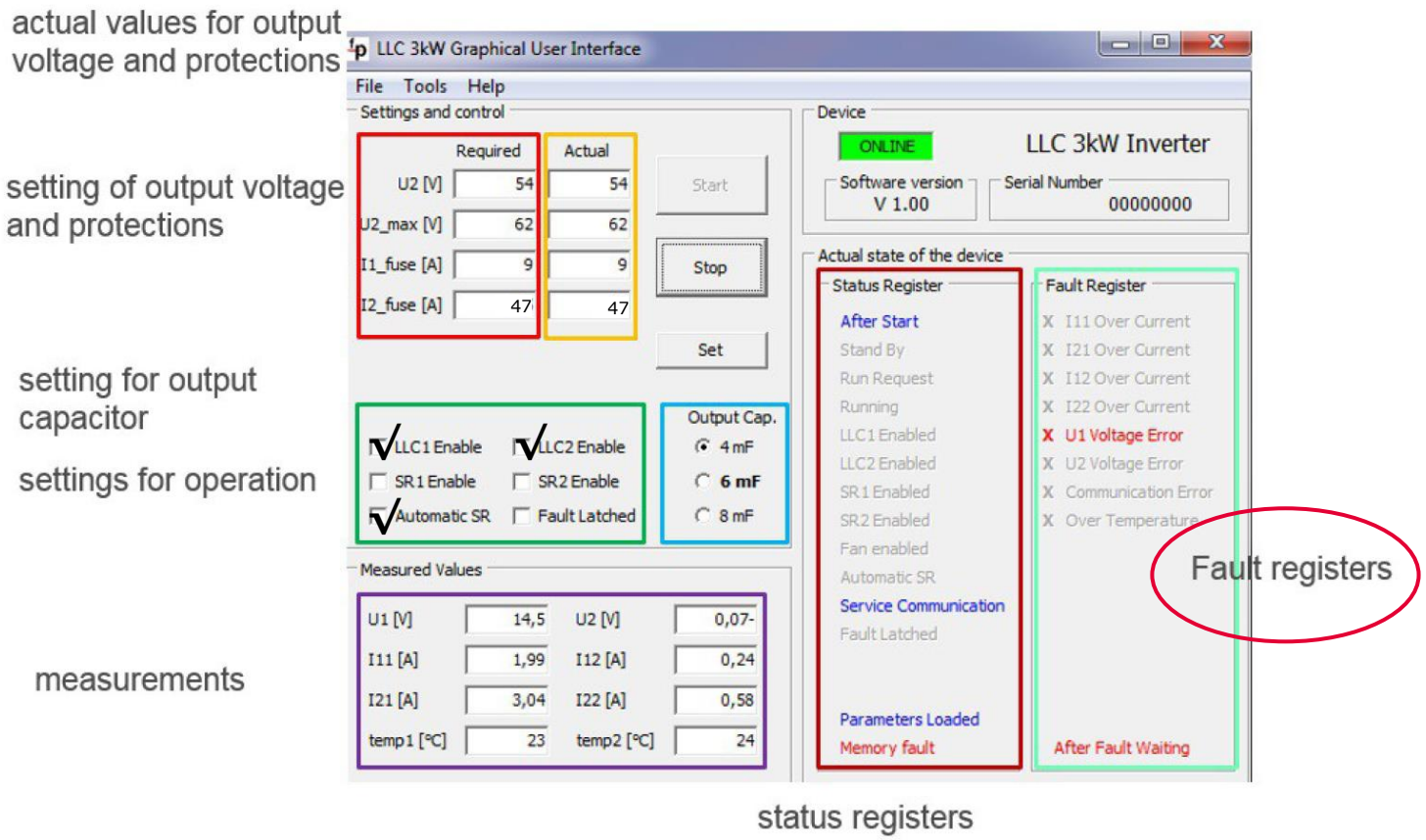
Measurements info



- Increase the output load: the measured values are visible in the dedicated box
- Press “STOP” in case you want to shut down the converter

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Example of protection mode: Input under-voltage protection



- Reduce V_{in} below 350 V_{dc} at I_{out}=25 A: the converter will be automatically shutdown and the related notification will appear in the Fault Registers panel. A red LED is lighted in the main board
- After increasing again the V_{in} up to 380 V_{dc}, the fault is removed, and you can re-start the converter by clicking on the "START" button

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GUI user manual

- For any other detail about the GUI usage and functions, you can refer to the Chapter 3 of the document **“LLC3kW_GUI_Manual_v1.01”**, which is included in the boards documentation

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Recommendations

- The XMC™ Link is a new communication tool still under debug. Unfortunately, during the power converter operation, some losses of communication have been sometimes experienced. In those cases the user needs to reset the MCU (V_{in}: 380 > 0 V_{dc}) and repeat the entire initial setting sequence before powering-up again the converter. No problem occurs during the parameter setting at V_{in}=100V_{dc}, when the power converter is OFF
- The reasons of this communication issue are under investigation. In the meantime, until further notice, it is recommended:
  - to use the board without GUI: the converter will run according to the default settings stored in the MCU memory during the mass production

  or

  - to use the GUI only for parameter setting while V_{in}=100 V_{dc}, then disconnect the XMC™ Link from the control board before the converter is powered-up (so measurements in operation via GUI will be not available)

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