
support@saia-pcd.com

Concern: **How to replace a MicroSD memory card on the PCB of a PCD3.M3 and PCD3.M5/6**

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Version 1.0

This document describes the procedure to replace the Micro SD memory card (uSD card) on the PCD. The replacement consists of the following steps:

- Disassembling of the PCD
- Localisation of the uSD card
- Removing the old uSD card
- Mounting the new uSD card
- Verification if the uSD card was inserted correctly
- Re-assembling of the PCD
- Reload the firmware to the PCD
- Reload the PG5 program to the PCD

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1 Remarks when handling with printed circuit boards (PCB)



ESD (Electrostatic Discharge):

Circuit board components are designed to operate within a specified range of voltage that is carefully calculated for their circuitry. On the other hand, static electricity can be created through a simple and unexpected action such as opening a plastic bag or rubbing articles of clothing together. If a circuit board is exposed to these unintended discharges of static electricity, the tolerance of some of the components can be exceeded, causing damage to those parts.



Physical damage: Although the circuit board is built to be tough in the application it is designed for, it can still be easily damaged if it is treated too roughly. The board can be broken if subjected to enough impact, like falling off a workbench, and soldered parts can snap off if hit with enough force. Metal traces and pads on the board can lift or crack if the board flexes too much.



Contamination: Moisture can cause a circuit board's metal traces and pads to tarnish, and even regular dirt and grime can add to the problem. These contaminants can affect the components' solderability, causing weak connections or disrupting the manufacturing process.

1.1 Rules for handling of printed circuit boards during processing



Based on the problems listed above, here are what we do recommend if you are handling the PCD's for exchanging the uSD memory cards:

ESD: Circuit boards are handled the most during PCB inspection and rework, and therefore all work must be done in properly designated work areas. These areas should be clean and neat with proper ventilation, and technicians should be grounded with a wrist strap connected to the earth-ground.

Physical handling: Workflows should be set up for lean manufacturing and strategically laid out to minimize the board's handling. Technicians should wear protective clothing and gloves, and circuit boards should be handled gingerly by their edges.

Moisture: Don't expose the PCB on moisture to avoid moisture contamination.

The following dos and don'ts will help provide the best handling protection for circuit boards:

- Protect the board from moisture by keeping it on the PCD or cabinet until needed.
- Technicians should be grounded with a wrist strap connected to the earth-ground.
- Keep your workstation clean of any materials or liquids that could contaminate the PCB.
- Make sure your workstation is designed to resist static electricity build-up.
- Handle the circuit board by its edges with a secure grip using as little pressure as possible.
- Don't touch unnecessary the components on the PCB with your hands or with tools.

2 Prerequisite for the new uSD card

The memory space on the new Micro SD card (uSD card) need to be empty and must be formatted as FAT16 to be used on the PCD.

We strongly recommend to use only uSD cards provided by SBC, since they will have an industrial standard and have been tested and approved by SBC to work on our PCD's.

2.1 How to check if the uSD card is empty and formatted as FAT16

Insert the uSD card in a uSD card holder and insert the uSD card holder into the PC.

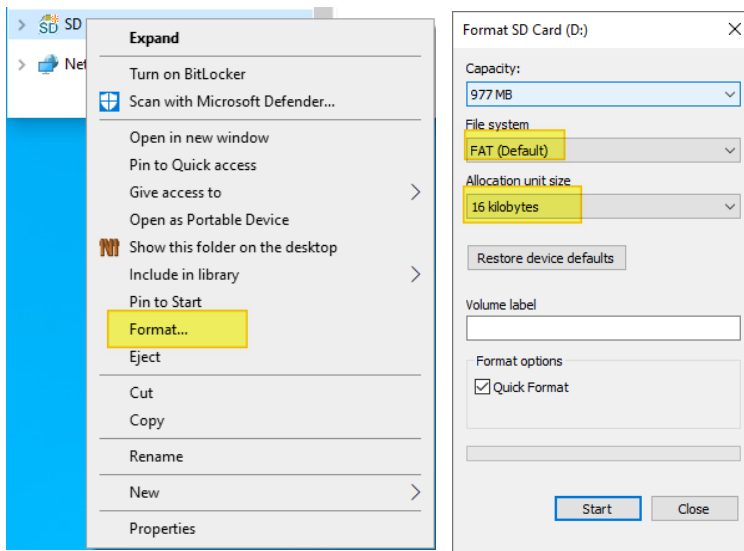


Browse with the File Explorer to the uSD card.

2.2 Check if the uSD card was formatted with FAT16

On the device, right mouse click and select Format, the properties shows the following.

- File system: FAT (Default)
- 'Allocation unit size': 16 kilobytes.



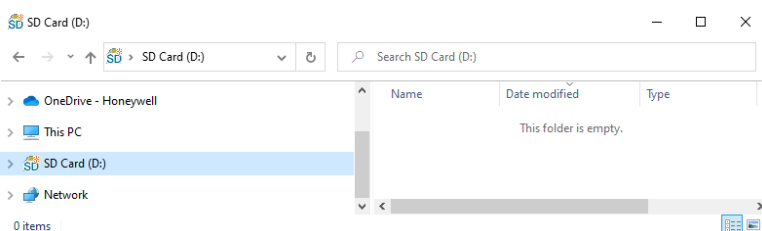
If the uSD card does not have:

- File system: FAT (Default) and
- 'Allocation unit size': 16 kilobytes

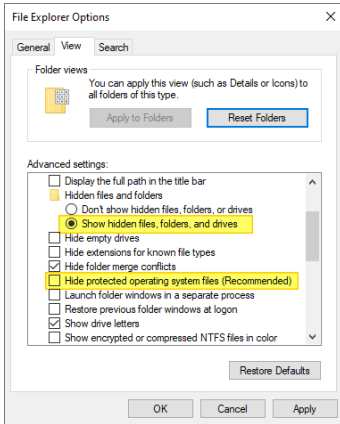
then it's needed to format the uSD card.

2.3 Empty uSD card

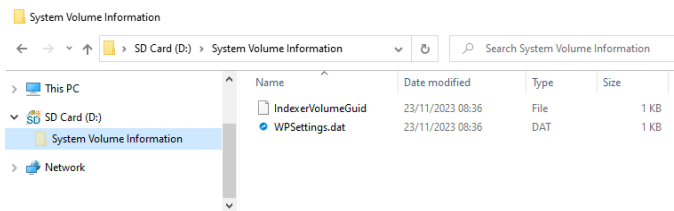
There should be no files stored on the uSD card.



Remark: In case that the hidden files are displayed on your PC with these options:

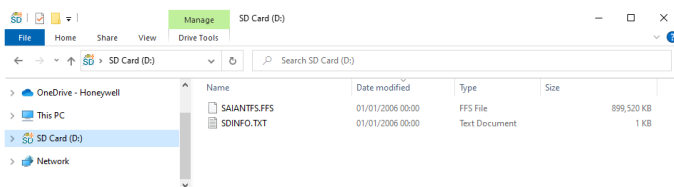


Then a 'System Volume Information' folder will be shown and there are some files on the folder.



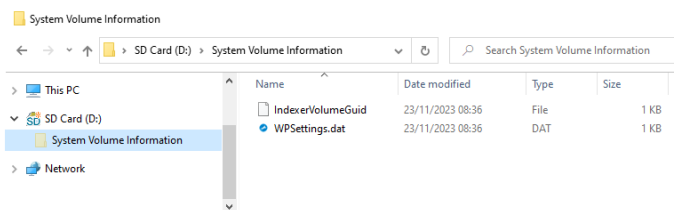
2.4 Not empty uSD card

Not empty uSD cards have some files or folders and could look like this.



If the uSD card is not empty, then it's needed to format the uSD card.

Please note that a formatting of the uSD card is not needed, if the uSD card contains only the 2 hidden files 'IndexerVolumeGuid' and 'WPSettings.dat' on the hidden folder 'System Volume Information'.

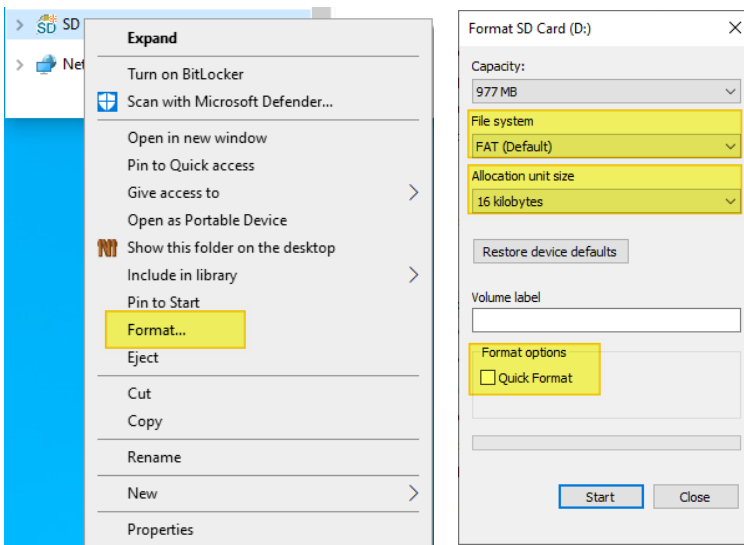


2.5 Formatting the uSD card as FAT16

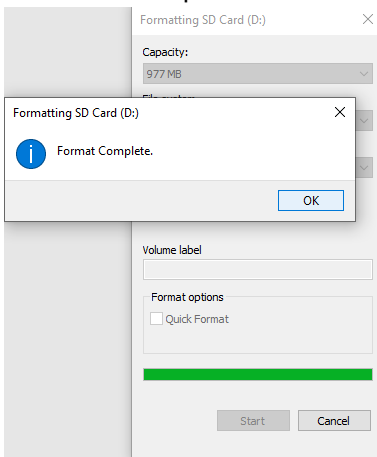
If the uSD card is not formatted as FAT16 or is not empty, then it's needed to format the uSD card. The formatting of the uSD card deletes all files stored on the uSD card, like PCD firmware, PG5 device configuration and PG5 application program, web-pages and log files created by the PG5 application program. To format the uSD card, insert the uSD card in a uSD card holder and insert the uSD card holder in the PC. Browse with the File Explorer to the uSD card.

Right mouse click on the uSD card and click on Format and select:

- File system: FAT (Default)
- 'Allocation unit size': 16 kilobytes
- **don't check** the option 'Quick Format'

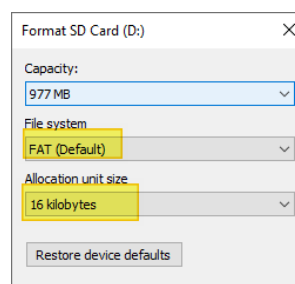


A 'Format Complete' information is shown at the end of the formatting of the uSD card



After formatting the uSD card, it's click again on the format option and then the information has to look like this:

- File system: FAT (Default)
- 'Allocation unit size': 16 kilobytes



3 Remove the old uSD card on the PCD3.M CPU

3.1 Needed tools

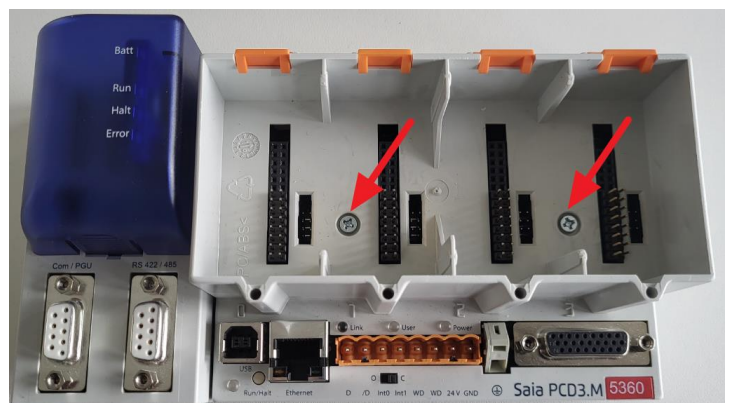
- Phillips screwdriver
- New uSD card



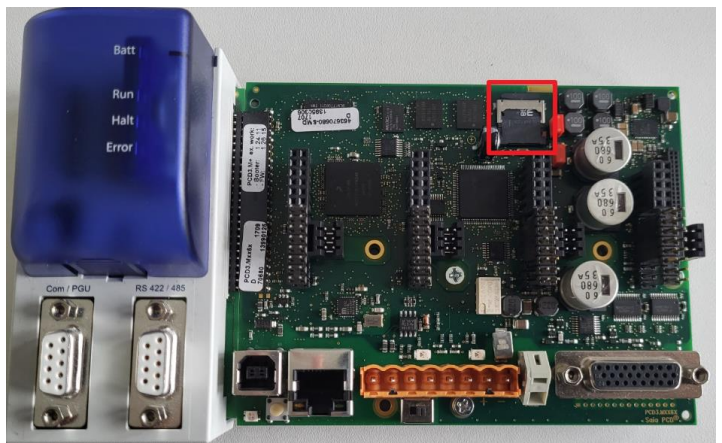
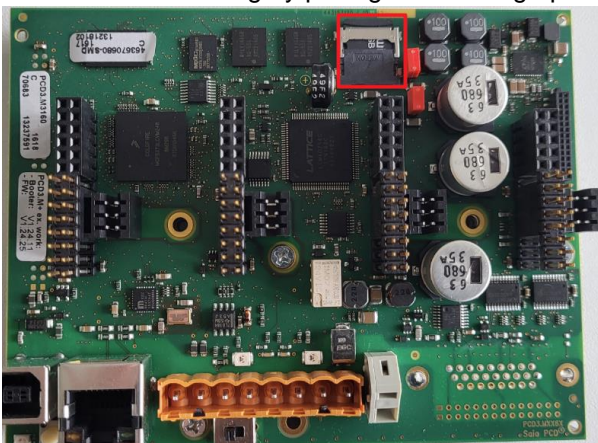
3.2 Disassembling of the PCD3.M3 or PCD3.M5/M6

Power off the PCD.

Remove all I/O modules plugged on the I/O slots 0 to 3
Unscrew the 2 Phillips head screws.

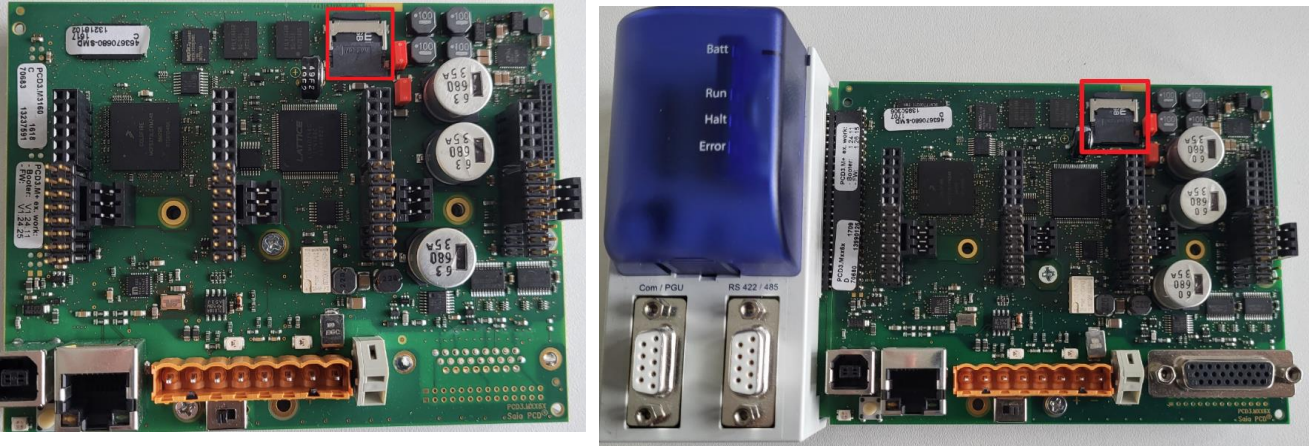


Remove the housing by pulling the housing upwards.



3.3 Localisation of the uSD card

The uSD card is located on the top right corner of the PCD3.M, marked with the red square on the below picture.



3.4 Disassembling of the PCD3.M6860 and PCD3.M6880

The PCD3.M6860 and PCD3.M6880 have 2 uSD memory card.
In addition to the uSD card shown above, there is a second uSD card on the left side of the PCD (extension)

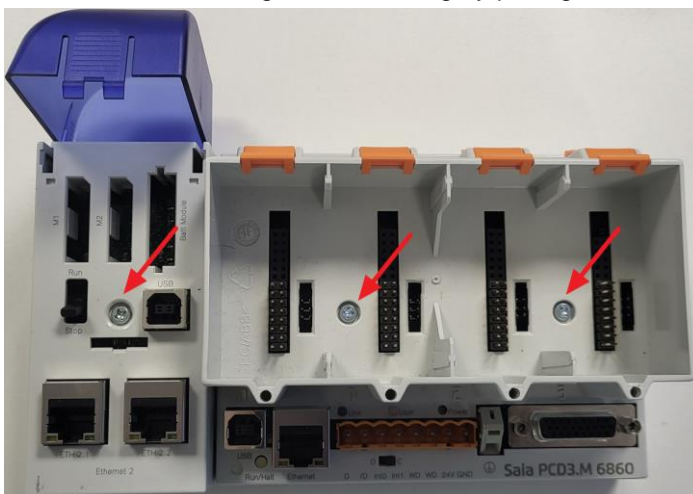
Power off the PCD.

Remove all I/O modules plugged on the I/O slots 0 to 3

Remove the memory modules on the slots M1 and M2 and the battery holder module on the left side of the PCD.

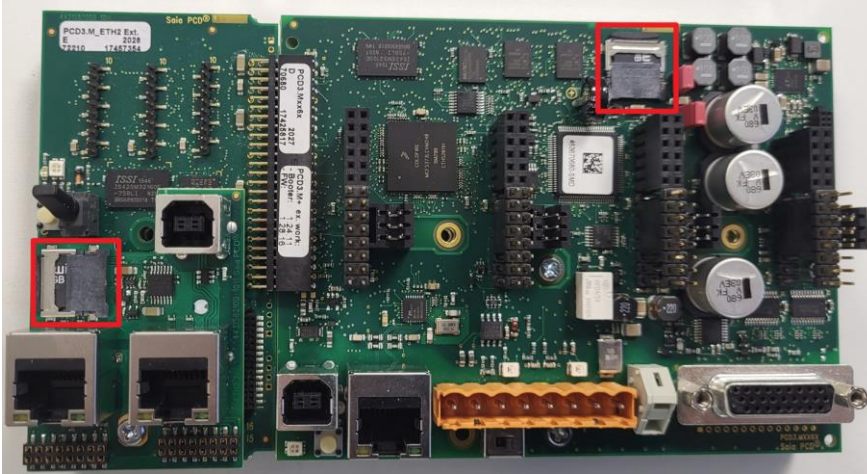
Unscrew the 2 Phillips head screws on the right side and one Phillips head screw on the left side of the PCD.

Remove the left and right side housing by pulling the housing upwards.



3.5 Localisation of the uSD cards on PCD3.M6860 and PCD3.M6880

The 2 uSD cards are located on the top right corner of the PCD3.M6860/6080 (main CPU) and on the left side (Extension CPU), marked with the red squares on the below picture



It's possible to replace both uSD cards at the same time.

For the firmware update, it's needed to update first the extension CPU (left side of the PCD) and afterwards to the main CPU (right side of the PCD). See the chapter Reload the firmware to the PCD3.M6860/M6880

The exchange for both uSD cards is the same as described on the next chapters.

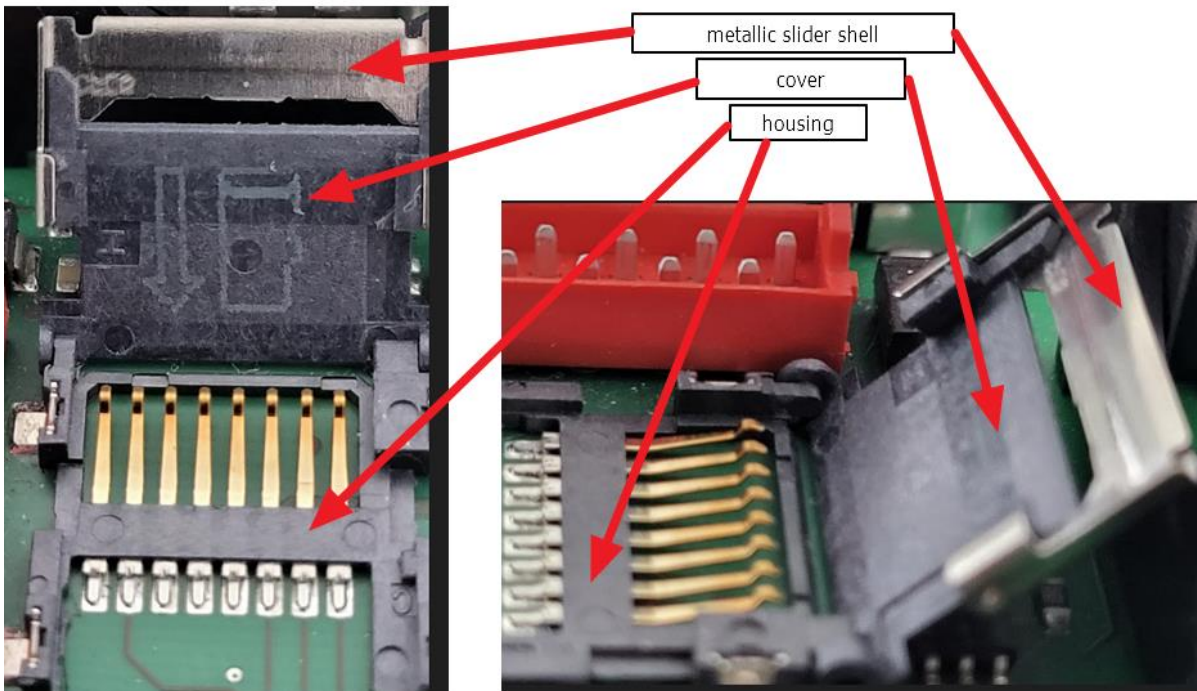
3.6 Removing the uSD card from the PCB of the PCD3.M

The uSD card is now visible on the PCB of the PCD



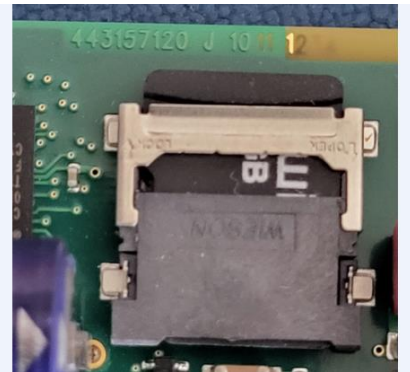
The micro-SD memory card is plugged in to a micro SD card socket of type flip-up and the micro-SD card is locked with a metallic slider shell on the SD card housing.

The flip-up type micro-SD card socket consists of the following components:



To release the micro-SD card it's necessary to slide the slider shell in direction of the plastic part of the socket, to lock the micro-SD card it's needed to slide the slider shell in the opposite direction.

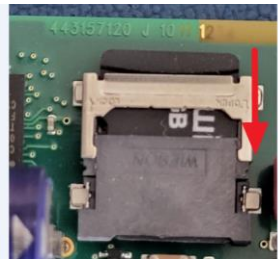
Locked micro-SD memory card.



Unlocked micro-SD memory card

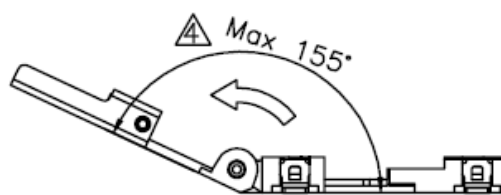
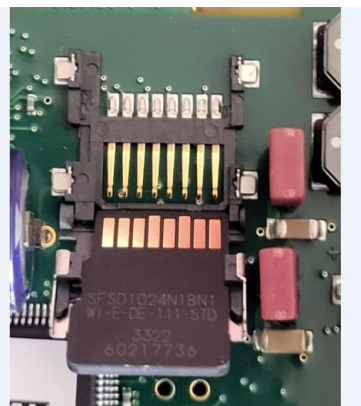


To release the uSD card, slide down the metallic slider shell of the socket

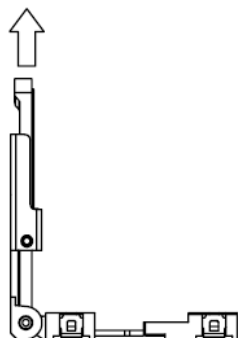


It's now possible to folding open the cover, the electronic contacts for the micro-SD card and on the housing will be visible.

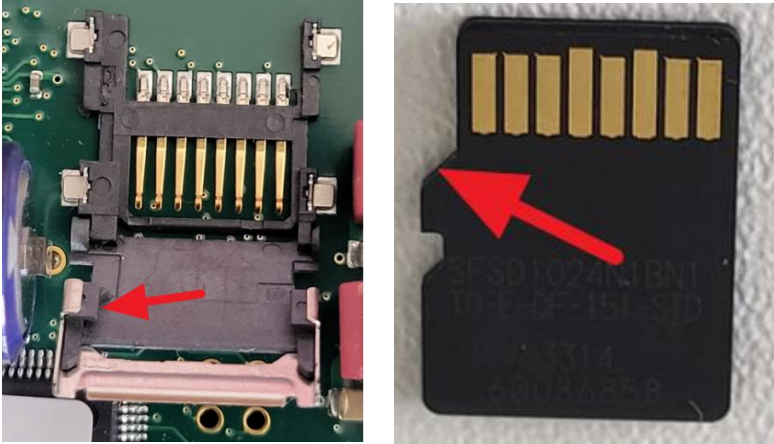
Don't touch the contacts on the micro-SD card and on the housing.



Pull out the micro-SD card upwards from the cover.



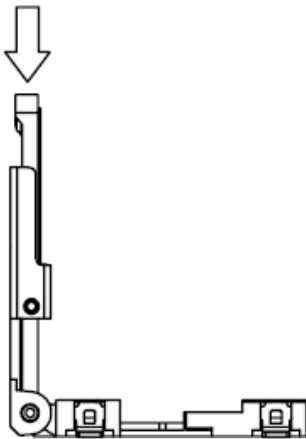
On the picture below the red arrows indicate two 'noses' on the cover of the socket and it's important that the micro-SD card is placed below these two noses and pushed to the left side so that the left bevelled side of the card fits onto the corresponding bevelled side of the cover.



4 Mount the new uSD card to the PCD3.M

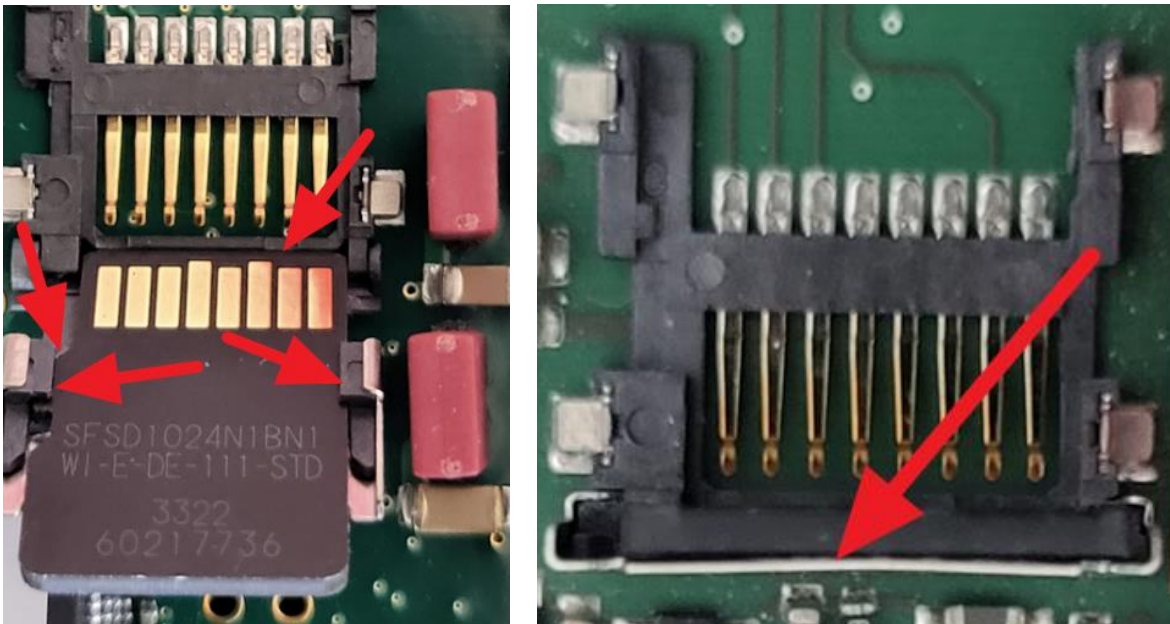
4.1 Mounting the uSD card from to PCB of the PCD3.M

Insert the new micro-SD card into the cover by sliding down the new micro-SD card into the cover. Insert the micro-SD card in that way, that the electronic contacts located on the micro-SD card and on the housing are visible when the micro-SD card is insert in the housing.

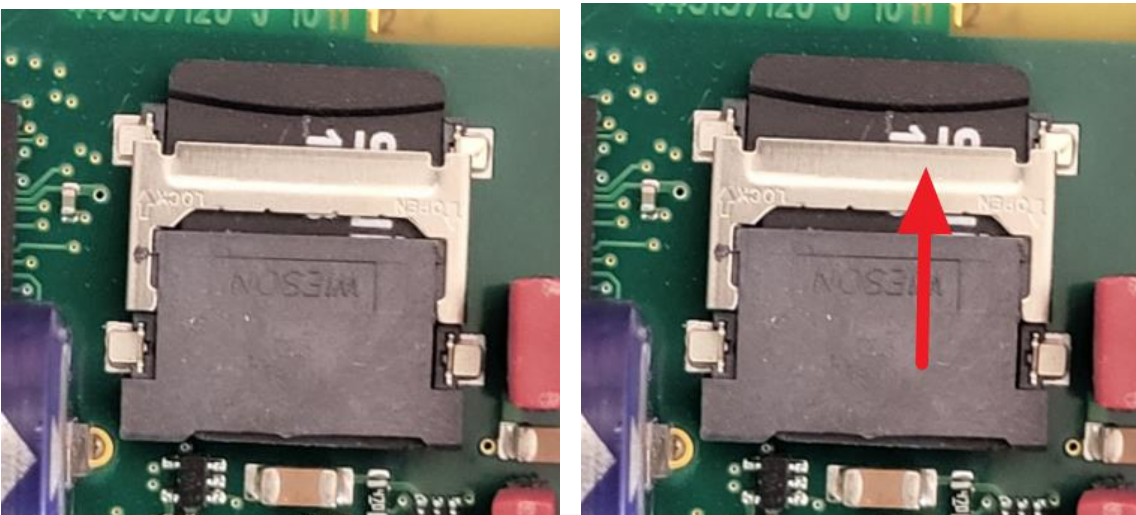


Don't touch the electronic contacts of the micro-SD card and of the housing.
The micro-SD card must be placed below the left and right noses of the cover and the left bevelled side of the card must fit onto the corresponding bevelled side of the cover.
Slide the micro-SD card until the bottom of the cover.

The right picture displays a vertical view on the socket and there it's visible that the micro-SD card is placed directly on the cover

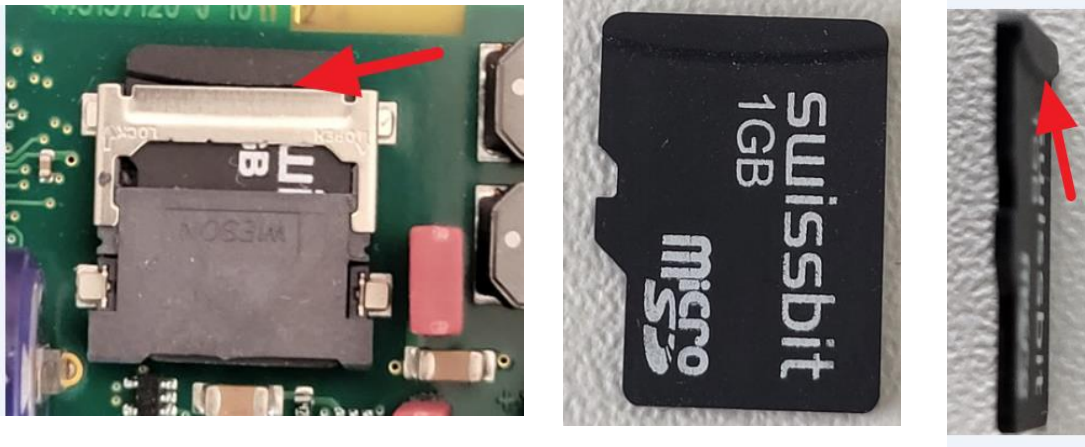


Close the cover and press the micro SD card lightly onto the housing of the socket.
If the micro-SD card is inserted correctly in to the cover then it's possible to push down finely the micro-SD card to the housing of the socket.
If it's not possible to push down the micro-SD card to the housing of the socket finely, then the micro-SD card is not inserted correctly in to the cover and it's needed to remove and insert again the card in to the cover.



Press down finely the micro-SD card and the cover into the housing with one finger and slide up the metallic slide shell with one finger to lock the micro-SD card on the housing.

The metallic slide shell is locked correctly, if there is no space between the metallic slide shell and the 'elevation' on the micro-SD card, marked with the red arrow on the right picture below.



4.2 Assembling of the PCD3.M

Refit the housing on the PCD. Tighten the 2 Phillips screws.



4.3 Assembling of the PCD3.M6860/6880

Refit the left and right housing on the PCD. Tighten the 3 Phillips screws.



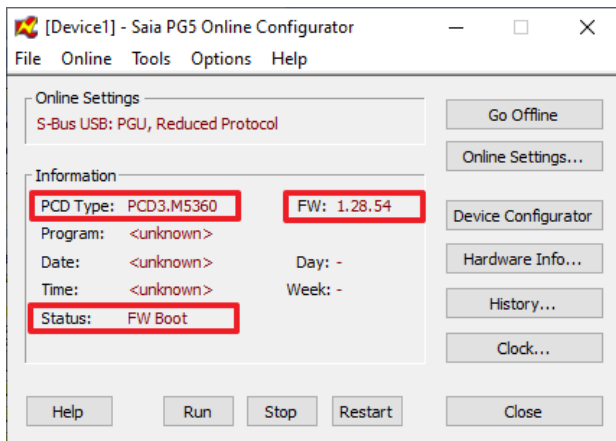
5 Verification if the uSD card was inserted correctly in to the PCD

Power on the PCD

If the uSD card **was inserted correctly** in to the uSD card holder **and the uSD card was formatted correctly**, then it's possible to go online over USB with PG5 the online configurator to the PCD.

The information on the online configurator looks like this:

- Status 'FW Boot' will be shown.
- PCD type will be displayed
- Booter firmware version will be displayed on the field 'FW'.



Close the PG5 Online configurator.

The Run, Halt, Error LED on the battery module indicates, if the uSD card was inserted and formatted correctly.

For devices which don't have a battery module, the same information is displayed on the Run/Halt LED near to the USB connector.



The LED's on the battery module of a PCD3.M5/M6 are flashing in the following sequence with a frequency of 3 Hz.

| | | | | | | | | |
|-------|--------|-----|-----|-----|-----|-----|-----|-----------|
| Led | On/off | | | | | | | |
| Run | On | Off | Off | Off | On | Off | Off | And so on |
| Halt | Off | On | Off | On | Off | On | Off | |
| Error | Off | Off | On | Off | Off | Off | On | |

The Run/Halt Led located under the USB connector on all PCD's is flashing like this:

| | | | | | | | | | |
|-----------|----------|-----|-----|-----|-----|-----|-----|-----|-----------|
| Led color | Run/Halt | | | | | | | | |
| Green | Off | On | Off | Off | Off | On | Off | Off | And so on |
| Red | On | Off | On | Off | On | Off | On | Off | |
| Off | Off | Off | Off | On | Off | Off | Off | On | |

If the uSD card was **not inserted correctly** in to the uSD card holder, or if the **uSD card was formatted wrongly then it's not possible to go online over USB with the PCD.**

In this case, the LED's on the battery module of a PCD3.M5/M6 are flashing in the following sequence with a frequency of 2 Hz.

| | | | | | |
|-------|--------|-----|-----|-----|-----------|
| Led | On/off | | | | |
| Run | On | Off | On | Off | And so on |
| Halt | Off | On | Off | On | |
| Error | On | Off | On | Off | |

The Run/Halt Led located under the USB connector on all PCD's is flashing like this:

| | | | | | |
|-----------|----------|-----|-----|-----|-----------|
| Led color | Run/Halt | | | | |
| Green | On | Off | On | Off | And so on |
| Red | Off | On | Off | On | |

6 Reload the firmware to the PCD3.M5xxx and M3xxx

Load the firmware to PCD with the PG5 firmware downloader by connecting over USB to the PCD. The firmware can be loaded from the [support page](#).

For PCD3.M6860 and PCD3.M6880, load first the firmware on the extension CPU (left side) as described on the chapter Reload the firmware to the PCD3.M6860/M6880 and afterwards update the main CPU.

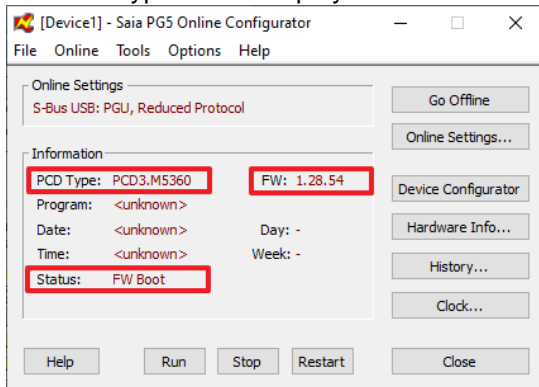
Power on the PCD.

The PCD is now in the 'Firmware download mode'

This is visible when connecting with the PG5 online configurator over USB to the PCD.

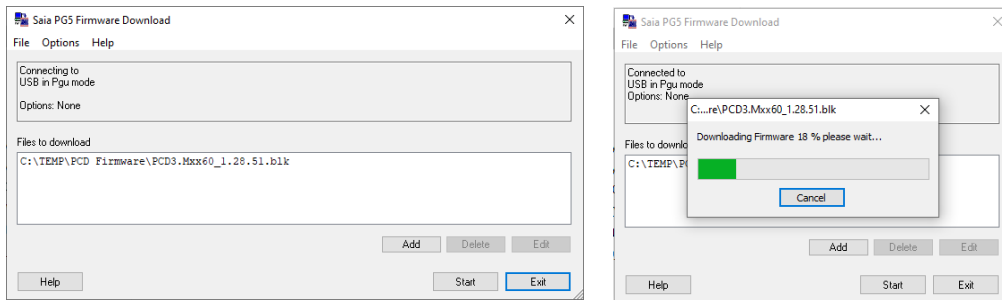
The Status 'FW Boot' will be shown.

The PCD type will be displayed and the booter firmware version will be displayed on the field 'FW'.



Close the PG5 Online configurator.

To download the firmware, use the PG5 Firmware Download tool and select the correct firmware which fits to the PCD.



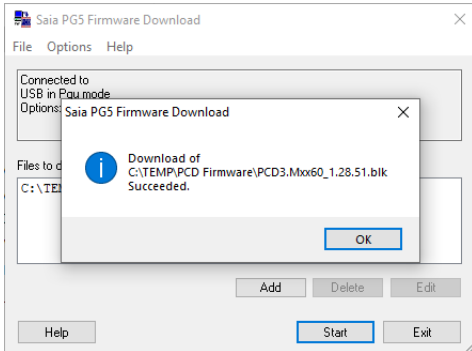
During the download of the firmware the LED's are flashing in the following sequence with a frequency of 5 Hz.

| | | | | | | | | |
|-------|--------|-----|-----|-----|-----|-----|-----|-----------|
| Led | On/off | | | | | | | |
| Run | On | Off | Off | On | Off | Off | On | And so on |
| Halt | Off | On | Off | Off | On | Off | Off | |
| Error | Off | Off | On | Off | Off | On | Off | |

The Run/Halt Led located under the USB connector on all PCD's is flashing like this:

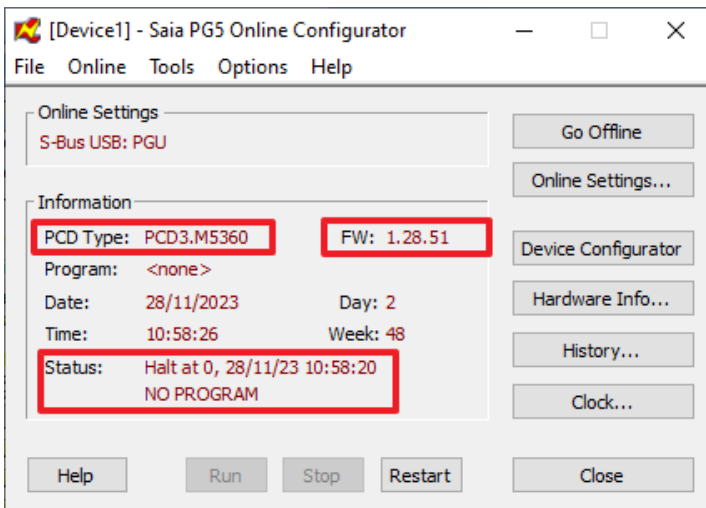
| | | | | | | | | |
|-----------|----------|-----|-----|-----|-----|-----|-----|-----------|
| Led color | Run/Halt | | | | | | | |
| Green | On | Off | Off | On | Off | Off | On | And so on |
| Red | Off | On | Off | Off | On | Off | Off | |
| Off | Off | Off | On | Off | Off | On | Off | |

The successful loading of the firmware will be displayed with an information.



Wait to go online over USB with the PCD until the Halt LED is switched on in solid red color.

The PCD type and the loaded firmware version will be displayed on the PG5 online configurator and the Status display 'Halt'.

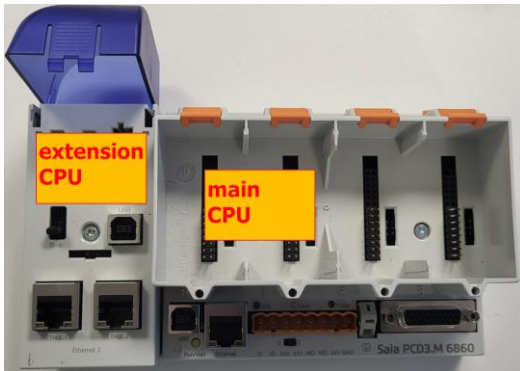


Power off the PCD and power on again the PCD before loading the PG5 device configuration and the PG5 application program.

6.1 Reload the firmware to the PCD3.M6860/M6880

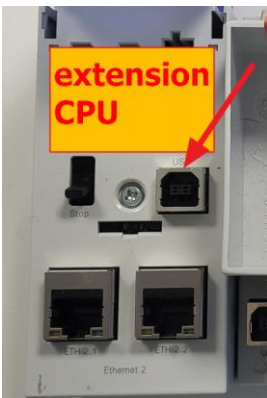
On the PCD3.M68860 and PCD3.M6880 it's needed to load the firmware in the following order:

1. Update the firmware on the extension CPU.
2. Update the firmware on the main CPU.

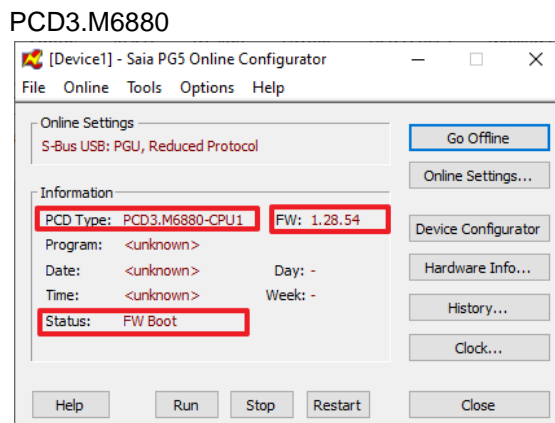
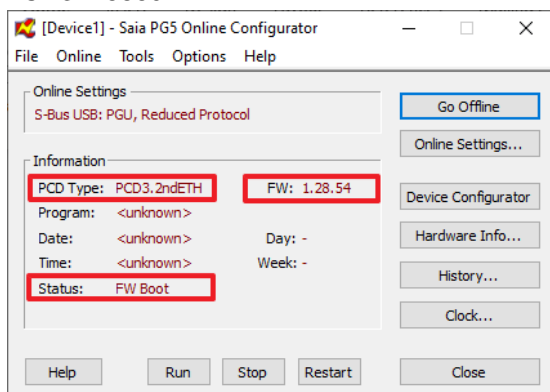


6.2 Update of the firmware of the extension CPU of the PCD3.M6860/M6880

To update the firmware on the extension CPU, connect the USB cable to the USB port of the extension CPU.



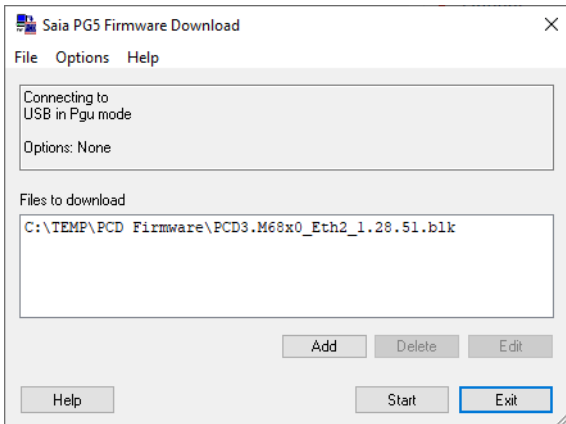
Connect with the PG5 online configurator over USB port of the extension CPU to the PCD.
 The Status 'FW Boot' will be shown and the booter firmware version will be displayed on the field 'FW'
 The PCD Type information is for the PCD3.M6860: 'PCD3.2ndETH',
 for the PCD3.M6880: 'PCD3.M6880-CPU1'



Load the FW to the PCD (for example) PCD3.M68x0_Eth2_1.28.51.blk

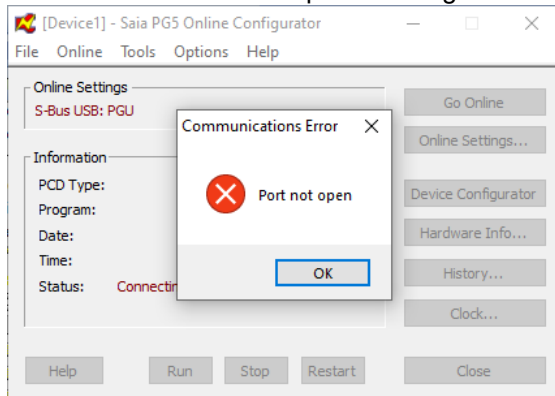
Please note, that there are two different firmwares, one for the extension CPU and one for the main CPU.

The file name of the firmware file for the extension CPU contains the name **M68x0_Eth2**

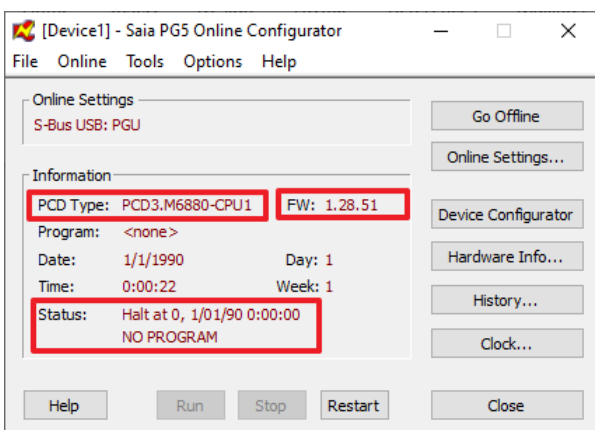


Remark:

For the PCD3.M6860, it's **not** possible to go online with PG5 over the USB port of the extension CPU. There will be a 'Port not open' message

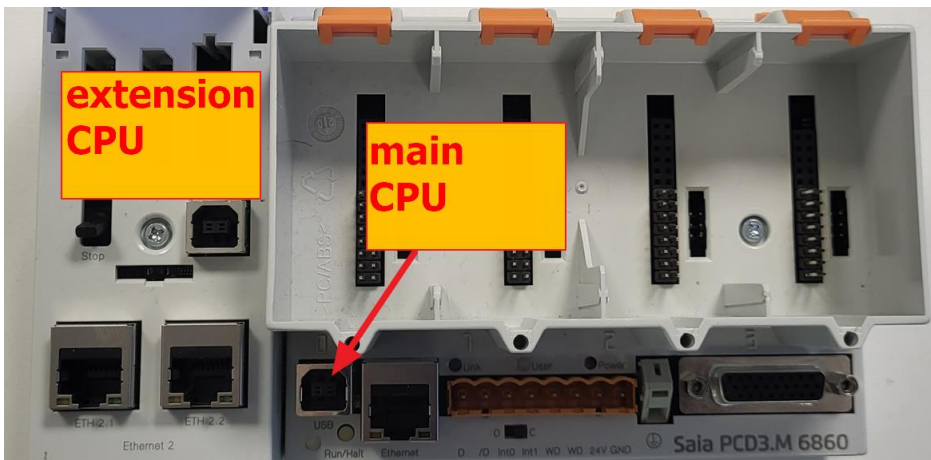


For the PCD3.M6880, it's possible to go online with PG5 over USB port of the extension CPU. The Status shows 'Halt', the PCD Type 'PCD3.M6880-CPU1' and the loaded FW is displayed.

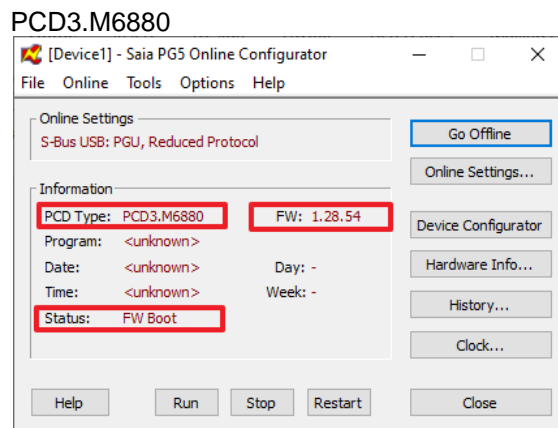
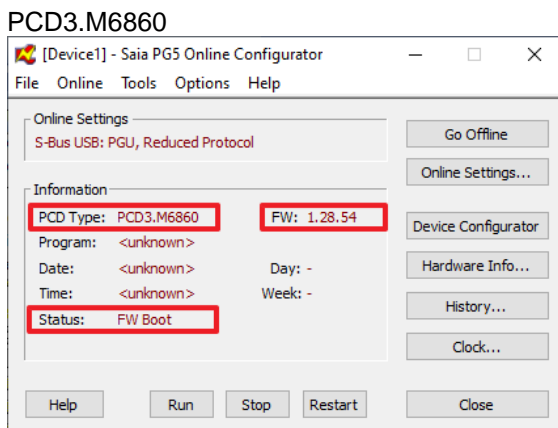


6.3 Update of the firmware of the main CPU of the PCD3.M6860/M6880

Connect the USB cable to the USB port of the Main Port.

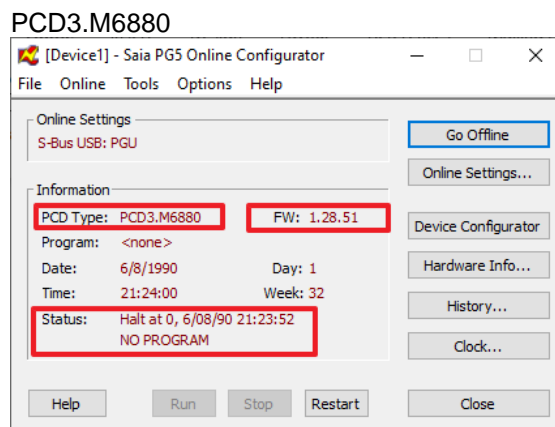
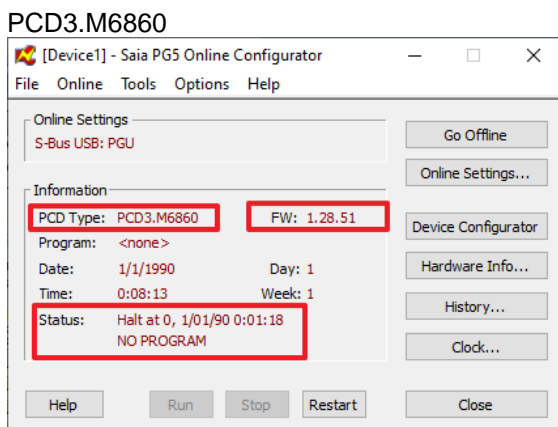


Connect with the PG5 online configurator over USB port of the main CPU of the PCD.
 The Status 'FW Boot' will be shown.
 The PCD type will be displayed and the booter firmware version will be displayed on the field 'FW'



Follow the steps as described on the chapter Reload the firmware to the PCD

After the update the information is displayed as follow:



7 Reload the PG5 device configuration and the PG5 application program to the PCD

It's needed to load the PG5 device configuration, the PG5 application program and if needed, the Web-Editor pages to the PCD.