Saia-Burgess Controls AG
Route Jo-Siffert 4, 1762 Givisiez, Switzerland
T +41 26 580 30 00
www.saia-pcd.com

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support@saia-pcd.com

Concern: **How to replace a MicroSD memory card on the PCB of a PCD1.M2220-C15**

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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

Contents

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 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 a industrial standard and have been tested and approved with 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.
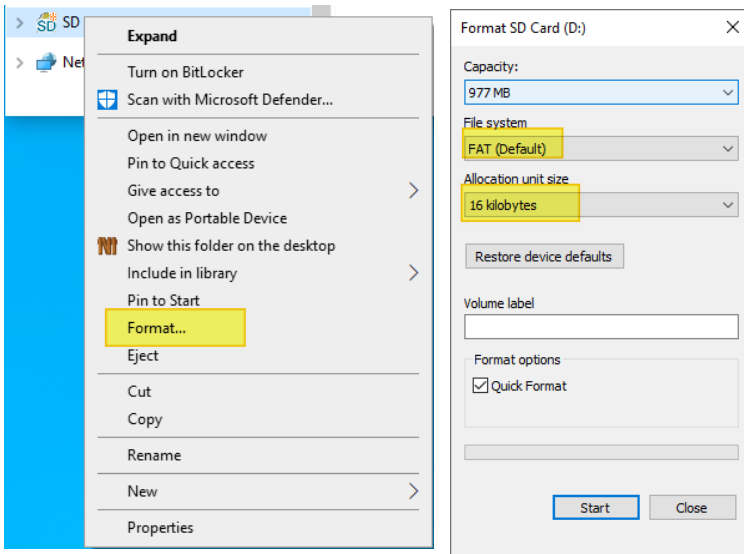

Browse with the File Explorer to the uSD card.

2.2   Check if the uSD card was formatted with FAT16

Right mouse click on Format, the properties shows the following.
- File system: FAT (Default)
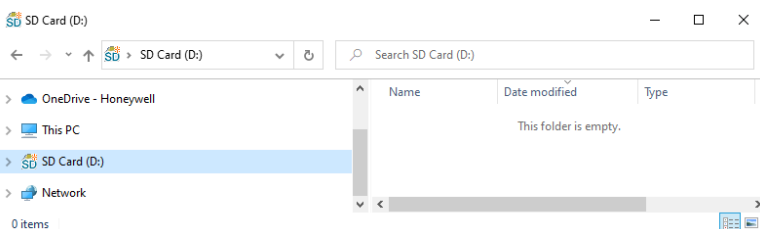- 'Allocation unit size': 16 kilobytes.

If the uSD card does not have:
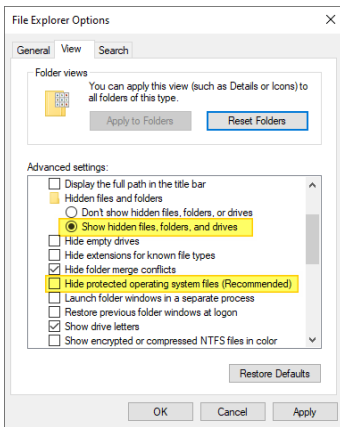- File system: FAT (Default) and
- 'Allocation unit size': 16 kilobytes

then it's needed to format the uSD card.
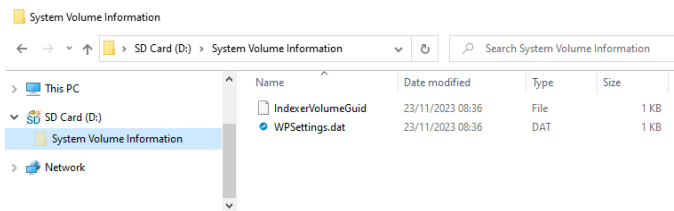
2.3   Empty uSD card

There should be no files visible on the uSD card.

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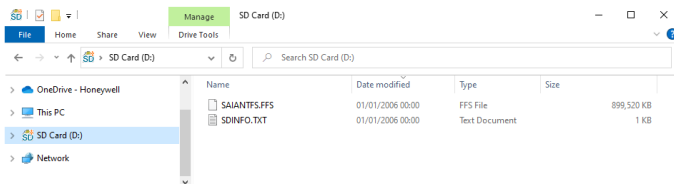

Then a 'System Volume Information' folder will be shown and there are some files on the folder.
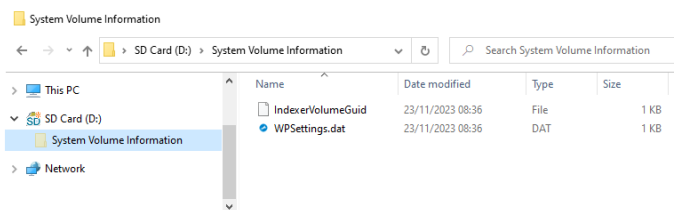

2.4   Not empty uSD card

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.
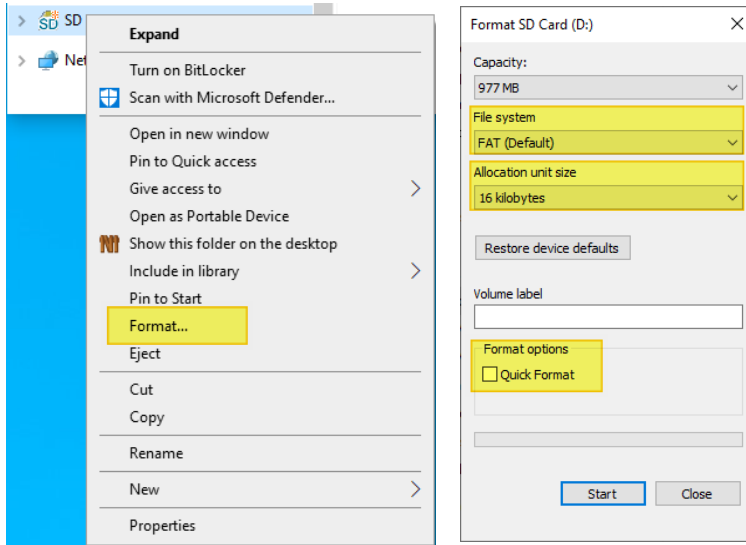The formatting of the uSD card deletes all files stored on the uSD card.
To format the uSD card, insert the uSD card in a uSD card holder and insert the uSD card holder in the PC.
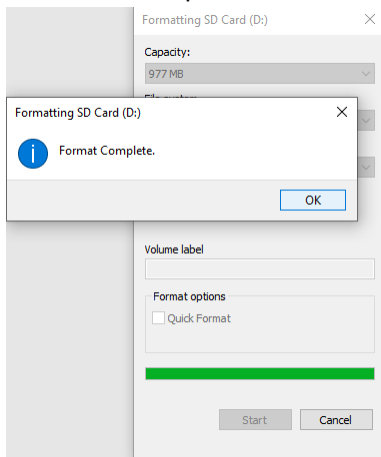Browse with the File Explorer to the uSD card.
Right mouse click on the uSD card and click on Format and select:
- File system: FAT (Default)
- 'Allocation unit size': 16 kilobytes
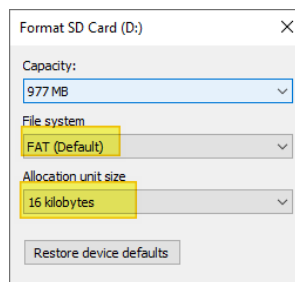- **don't check** the option 'Quick Format'

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 PCD1.M2220-C15

3.1 Needed tools

- Slotted head screwdriver 2.5 x 50
- Tweezers
- New uSD card

3.2 Localisation of the uSD card

The uSD card is located on the top right corner of the PCD1.M2220-C15, marked with the red square on the below picture.

3.3 Disassembling of the PCD1.M2220-C15

Power off the PCD.

Remove the cover located over the I/O slots 0 and 1.

Insert a slotted head screwdriver 2.5 x 50 on the approbate position on the right side of the housing and push the screwdriver for ~ 3 mm under the white upper part of the housing.
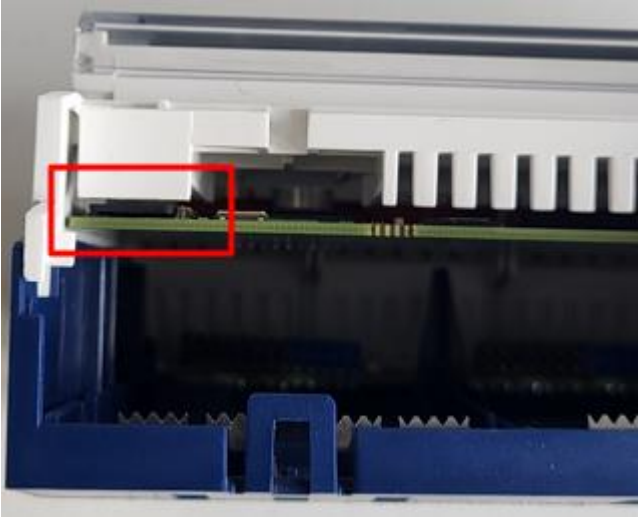

Push the screwdriver slightly upwards until the 2 holding noses located on the blue housing base are no more located on the 2 rectangle holes located on the white upper part of the housing.

Push the white upper part of the housing for about 1 cm away from the blue housing base.

3.4   Removing the uSD card from the PCB of the PCD1.M2220-C15

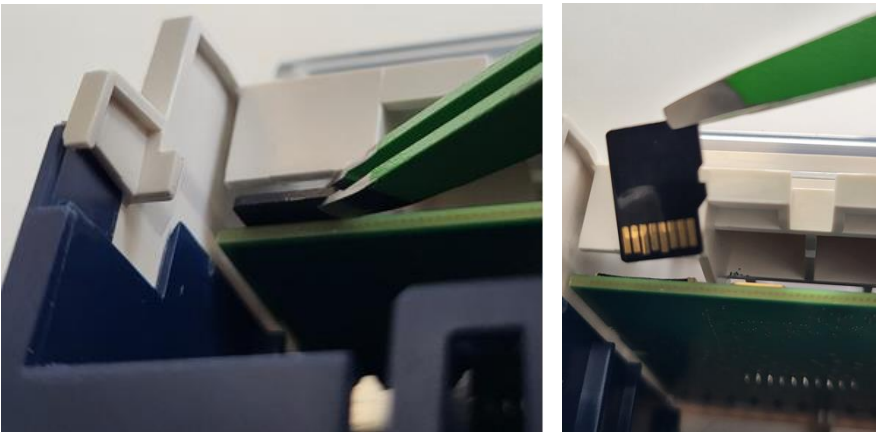The uSD card is now visible on the PCB of the PCD

Push slightly with a screwdriver the uSD card to move the uSD card for about 3 mm into the uSD card holder so that the uSD card is released from the uSD card holder.

The uSD card will then be moved for about 3 mm out of the PCB.

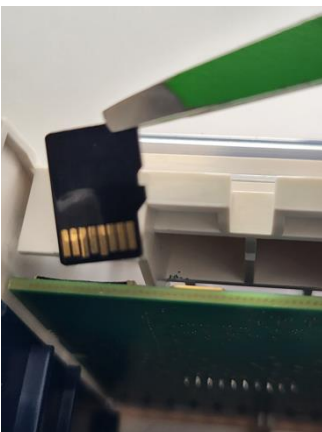Pull the uSD card out of the uSD card holder using tweezers.

4 Mount the new uSD card to the PCD1.M2220-C15

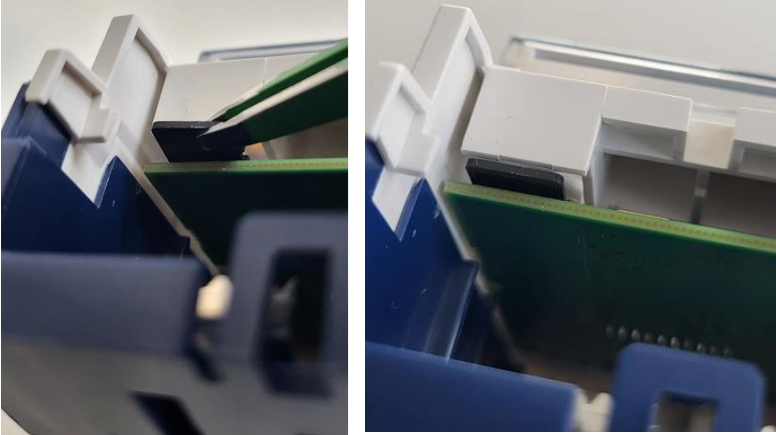### 4.1 Mounting the uSD card from to PCB of the PCD1.M2220-C15

Don't touch the contacts of the uSD card with your hands or with a tool.

Use the tweezers to insert the uSD card in to the uSD card holder.

The contacts on the uSD card must show to the PCB.

Insert slightly the uSD card in to the uSD card holder until then uSD card is in the position in which the card protrudes approx. 3 mm above the PCB

Release the tweezers

Push slightly with the screwdriver to the uSD card until the uSD card is in the position in which the uSD card protrudes approx. 3 mm below the PCB

Release the screwdriver.
The uSD card will now snap into the card holder
The uSD card and the edge of the print are at the same height.

4.2   Assembling of the PCD1.M2220-C15

Press the white upper part of the housing in direction of the blue housing base until then 2 noses of the blue housing base snap into the rectangle holes located on the white upper part of the housing.

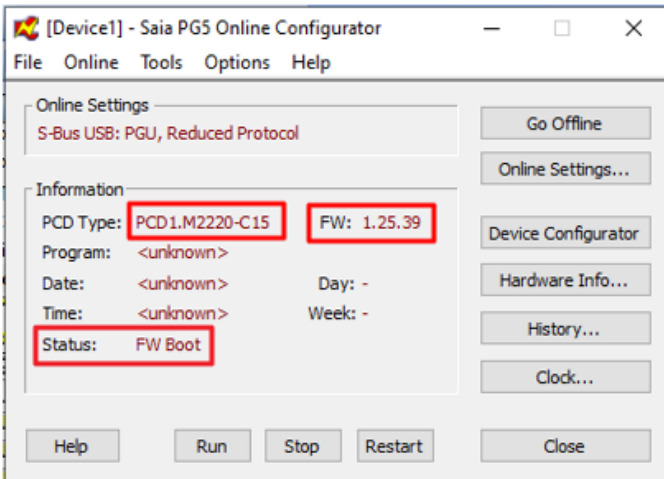Insert the cover located over the I/O slots 0 and 1.

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 indicates, if the uSD card was inserted and formatted correctly.

If the uSD card **was inserted and formatted correctly**, then the LED's 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	

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.**

If this case the LED's 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	

6   Reload the firmware to the PCD

Load the firmware to PCD with the PG5 firmware downloader by connecting with USB to the PCD.
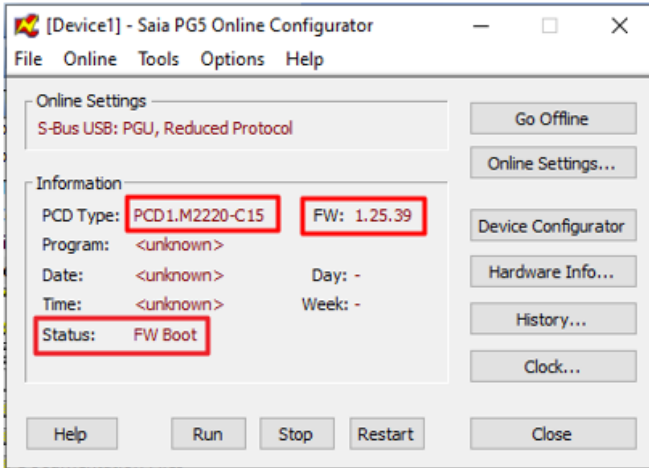The firmware can be loaded from the support page.

 Power on the PCD.
The PCD is now in the 'Firmware download mode'
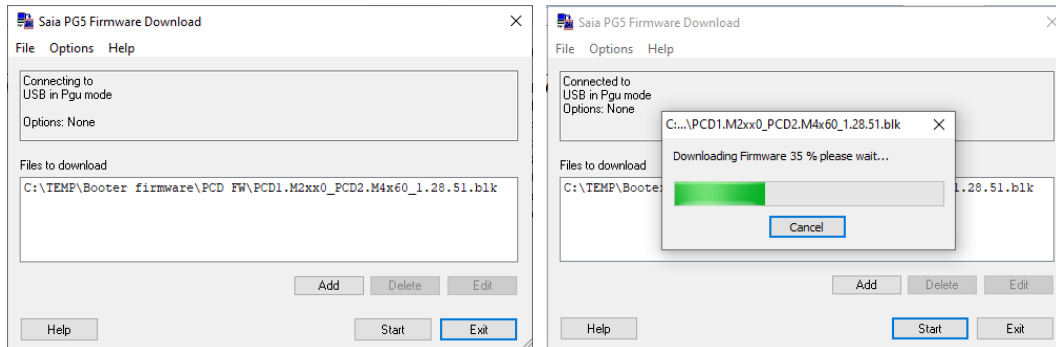This is visible when connecting with the PG5 online configurator over USB to the PCD.
The Status 'FW Boot' will be shown.
The PCD type will be displayed and the booter firmware version will be displayed on the field 'FW'
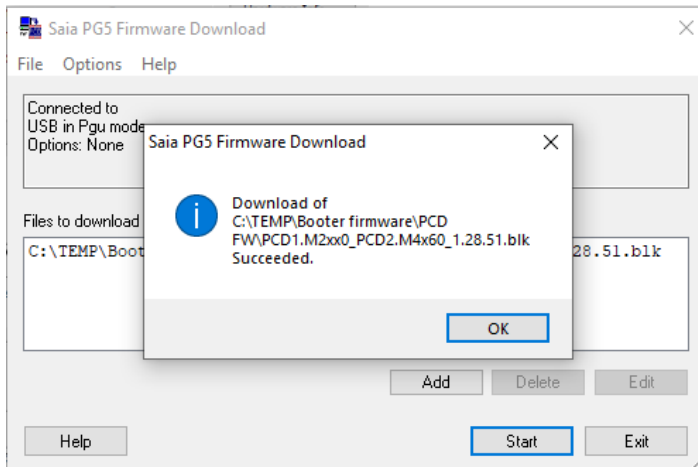

Close the PG5 Online configurator.

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

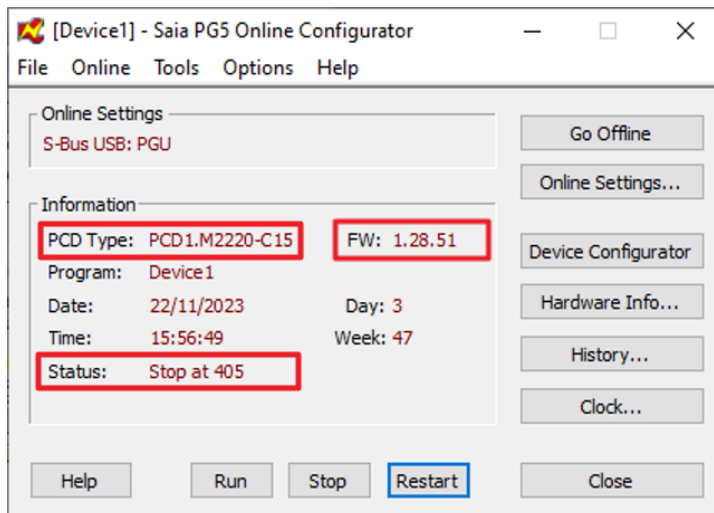During the download of the firmware the LED's are flashing in the following sequence with a frequency of 5 Hz.

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

Wait to go online 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 'Stop or Halt'.

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

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.