

	<b>S.O.P. SPECIFICATION</b>
<b>ENGINEERING</b>	<b>BECKHOFF SETUP AND TEST PROCEDURE</b>

Change History				
Rev.	Date	Object	Author	Included or notified document (supplier document included)
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Every product, process or service mentioned in this specification document must meet all the requirements described.			
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**N° 4343**

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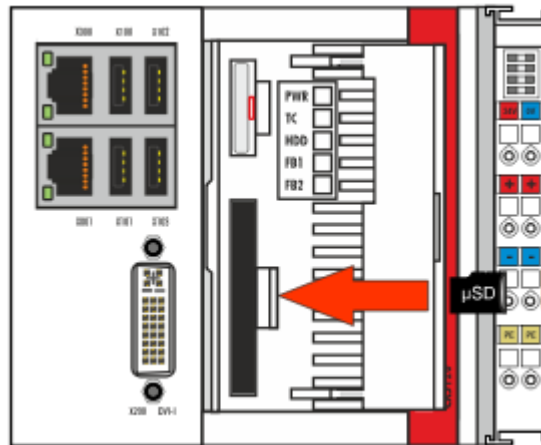
## 1. PRE-REQUISITES

- Software: launch the **Costumer** account and work on this session during all the process.
- Hardware:
  - MicroSD card of PLC CX5120
  - MicroSD adapter (card reader, SD-MicroSD adapter, USB-MicroSD adapter,...)
  - Main PC with VGA display, 1024x768 screen resolution.
  - File package CX5120
  - CX5120 with Windows CE 7

## 2. MICROSD BACKUP

In order to prevent wrong operations, it's mandatory to perform a backup of original MicroSD card content:

- Power off Beckhoff block → **Very important due to possible corruption**
- Open front panel and take the MicroSD card

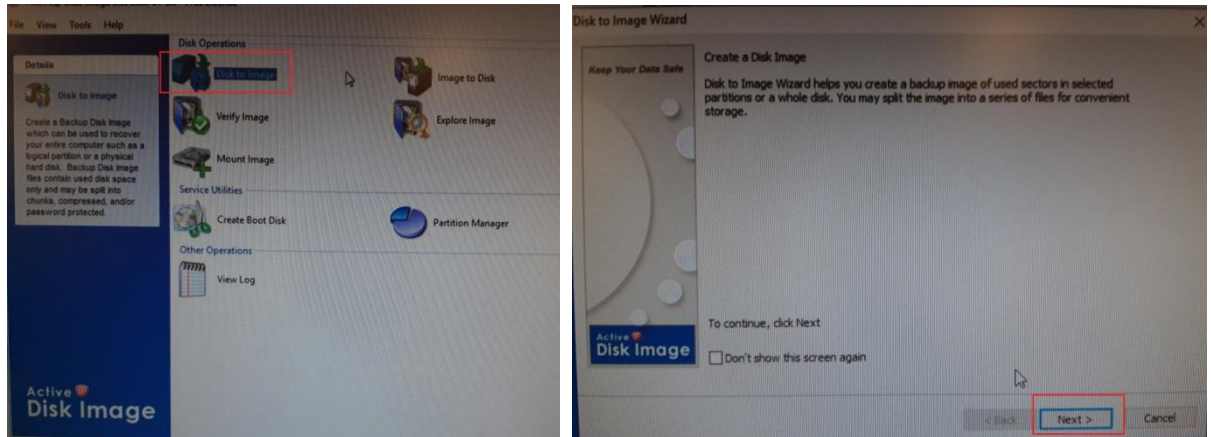


- Plug MicroSD card in adapter and connect it to main PC

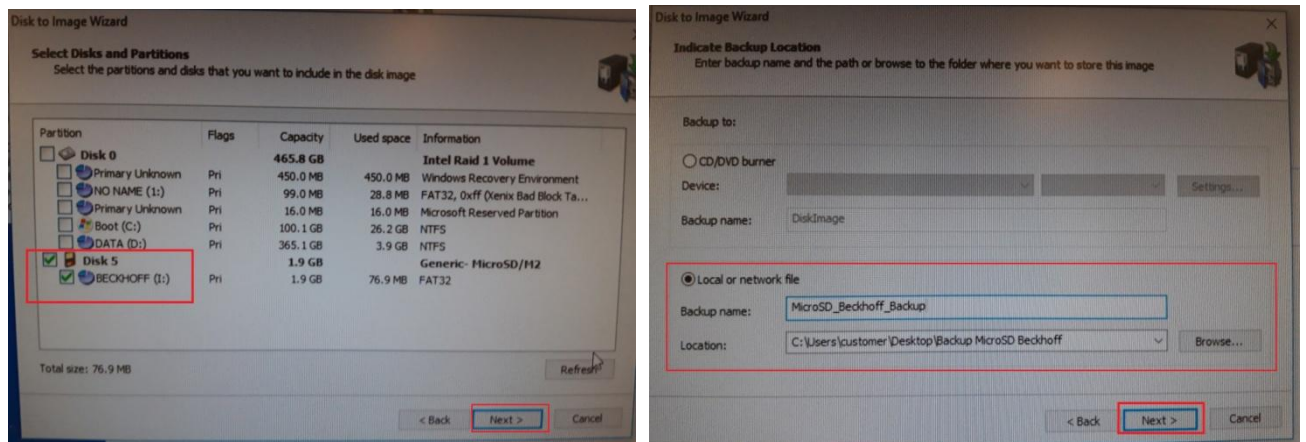
MicroSD adapter exemples:



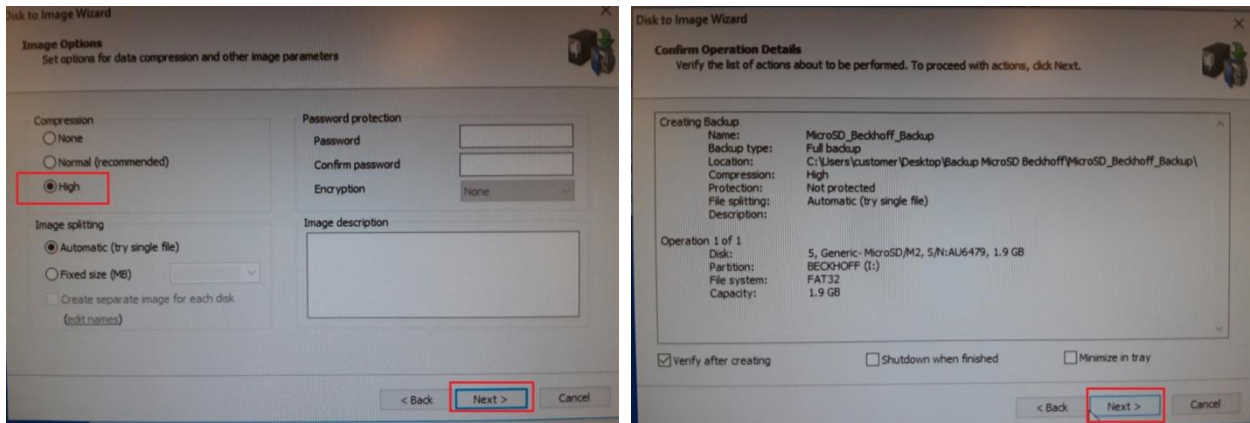
- Launch the application **Disk Image** presents on the desktop. If shortcut is not present, .exe file is on **C:\Program Files\LSoft Technologies\Active@ Disk Image Freeware\disk\_image.exe**
- Double click on **Disk to Image, Next**



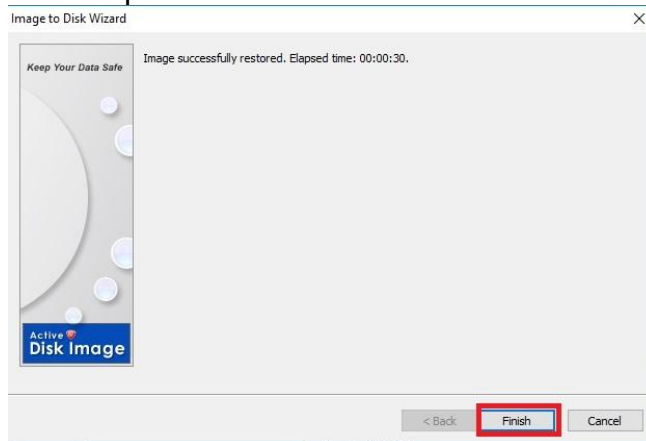
- Select the MicroSD disk and a destination folder on the desktop. In order to harmonize backup names, call image “**Asxxxx\_plc**”, where xxxx is the number of complete Detector/Analyzer system.



- Select **High** compression level, click on **Next**, select **Verify after creating** checkbox, click on **Next** and wait for the end of operation.



- Ensure that image has been successfully created. If so, click on **Finish** at the end of operation, else, redo all operations.



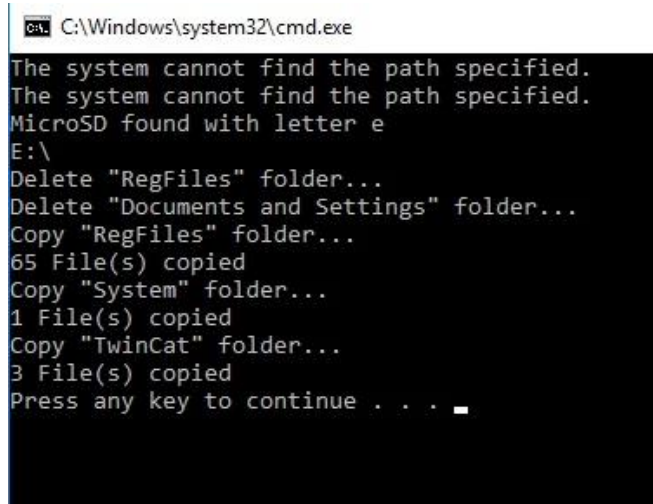
From now and at any step of procedure, if MicroSD card is corrupted or lost, apply §4 to recover MicroSD card.

### 3. SETUP

#### 3.1. Folders deletion for a fresh reboot

Launch the batch file **Beckhoff MicroSD prepare.bat** store on the Desktop and wait until **Press any key to continue...** appears without error message.

- If **no error** message appears, **go directly to §3.2 – Replace MicroSD card.**

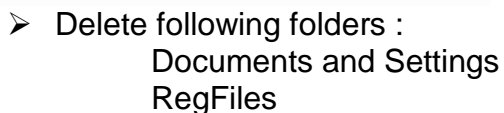


```

C:\Windows\system32\cmd.exe
The system cannot find the path specified.
The system cannot find the path specified.
MicroSD found with letter e
E:\
Delete "RegFiles" folder...
Delete "Documents and Settings" folder...
Copy "RegFiles" folder...
65 File(s) copied
Copy "System" folder...
1 File(s) copied
Copy "TwinCat" folder...
3 File(s) copied
Press any key to continue . . .
  
```

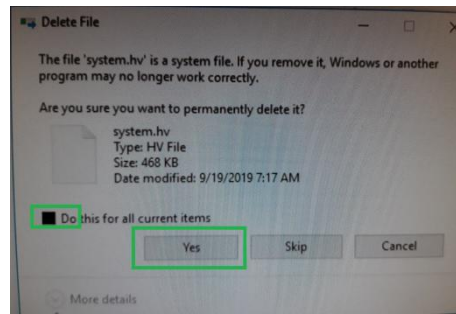
- ```
C:\Windows\system32\cmd.exe
The system cannot find the path specified.
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The system cannot find the path specified.
The system cannot find the path specified.
MicroSD not found
Press any key to continue . . .
```

- From file explorer, access to MicroSD content.



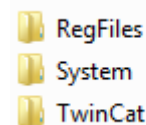
|                                                                                                                      |               |                    |             |
|----------------------------------------------------------------------------------------------------------------------|---------------|--------------------|-------------|
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| <b>SPECIFICATION</b>                                                                                                 | <b>N°4343</b> | <b>Indice : 01</b> | Page 8 / 21 |





Note : Beckhoff has implemented a system which allows to easily setup the PLC through register files calls. However, this mechanism works only at the first boot of PLC, **after it's not more possible**. In fact, when Beckhoff production creates the license file, the first boot is done at this step.

- On the desktop on main PC, go in folder : Package CX5120

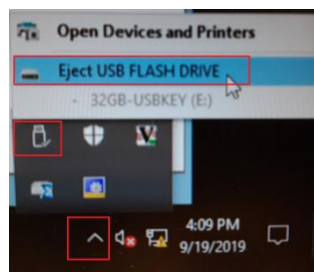


- Select the three folders **RegFiles, System** and **Twincat**
- Right click on these folders and choose **Copy**
- Go at the root of MicroSD card and paste folders
- Force replacement if requested (some files may already exist)

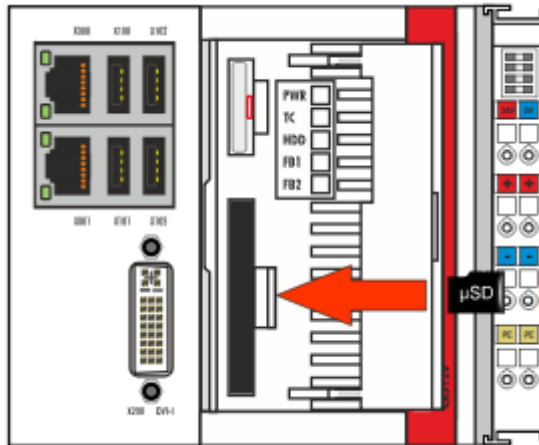
### 3.2. Replace MicroSD card

**Note: ensure that MicroSD is associated with correct Beckhoff. Due to software licenses, swap between MicroSD is not possible. One MicroSD for one Beckhoff.**

- Eject properly MicroSD card adapter from PC : close folders, right click on USB icon in notification bar and eject card

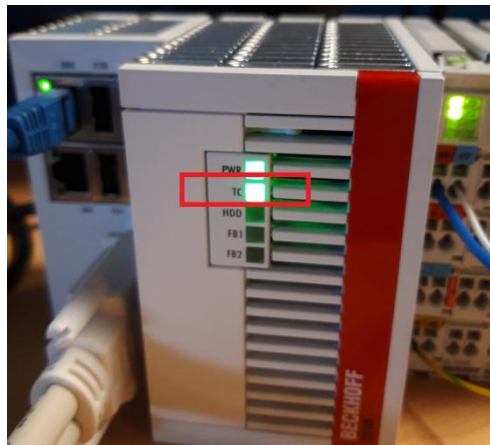


- Remove MicroSD card from adapter
- Re-installed the MicroSD card in PLC



- Power On PLC
- Wait approximately 2 minutes the PLC re-boot. Re-boot is done when TC LED on the front of PLC is light.

Note: For nominal operations, PLC boots in 40 seconds.

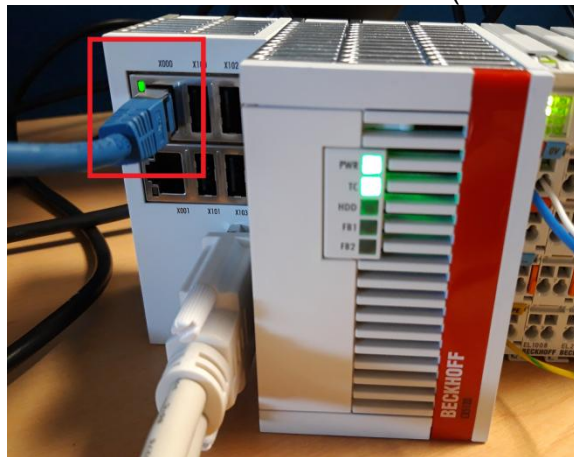


### 3.3. Network board address change (if needed)

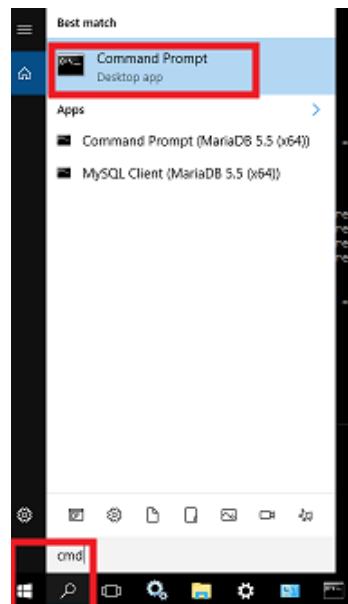
- PLC has two network boards:
  - X000 used for communication with PC (Ethernet)
  - X001 used for communication with EtherCat section

From PLC point of view both boards might be swapped. To check that point, a ping of PLC shall be done from main PC:

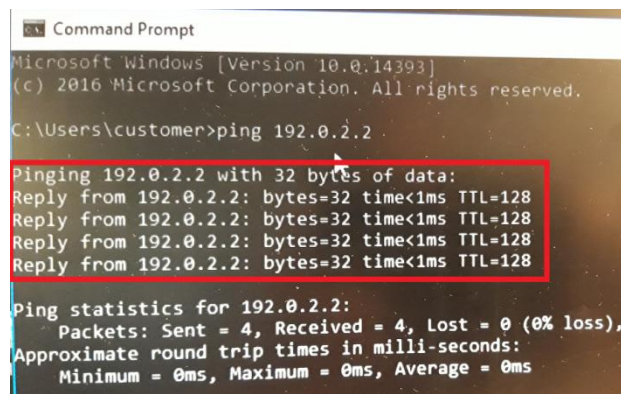
- Connect an Ethernet cable between the PLC (X000 connector) and the main PC on the Ethernet board with static IP address 192.0.2.1 (INTERNAL LAN)



- Open a command window



- Enter **ping 192.0.2.2**
- If ping is **OK** (i.e. reply received) → nothing more has to be done and directly go to §3.4.



```

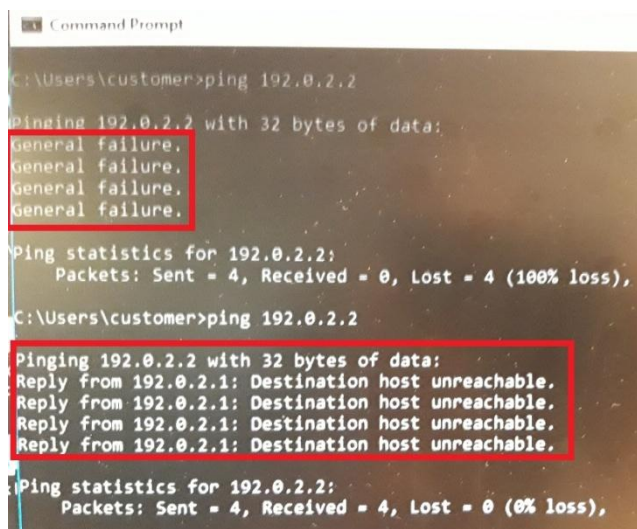
Command Prompt
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\customer>ping 192.0.2.2

Pinging 192.0.2.2 with 32 bytes of data:
Reply from 192.0.2.2: bytes=32 time<1ms TTL=128
Reply from 192.0.2.2: bytes=32 time<1ms TTL=128
Reply from 192.0.2.2: bytes=32 time<1ms TTL=128
Reply from 192.0.2.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.0.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
    
```

- If ping is **NOK** → ensure that Ethernet wiring is correct (correct cable in correct connectors),



```

Command Prompt

C:\Users\customer>ping 192.0.2.2

Pinging 192.0.2.2 with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 192.0.2.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

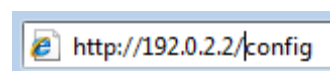
C:\Users\customer>ping 192.0.2.2

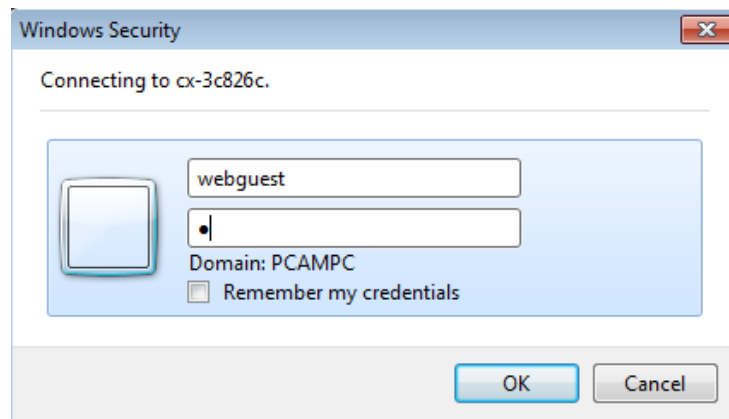
Pinging 192.0.2.2 with 32 bytes of data:
Reply from 192.0.2.1: Destination host unreachable.
Reply from 192.0.2.1: Destination host unreachable.
Reply from 192.0.2.1: Destination host unreachable.
Reply from 192.0.2.1: Destination host unreachable.

Ping statistics for 192.0.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    
```

If physical connections are correct, then swap of PLC network settings is needed to confirm. In that case, **proceed as following:**

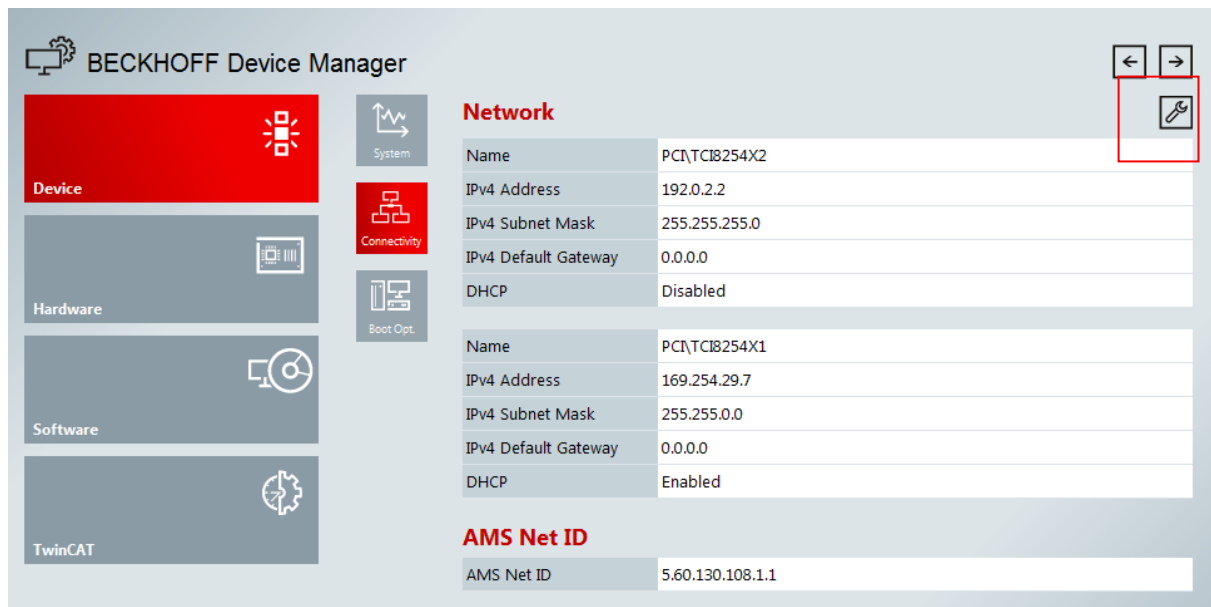
- Swap Ethernet cable on PLC (from **X000** to **X001**)
- Open Internet Explorer and write **http://192.0.2.2/config**
- When requested, enter :  
 Login = **webguest**  
 Password = **1**





On the setting web page:

- Go on **Device / Connectivity** menu
- Click on wrench icon





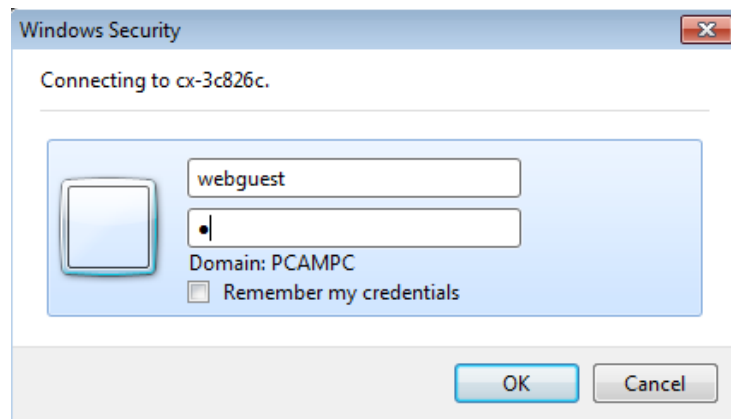
- Network IP addresses become editable and provide information like below, where one **PCI\TCI8254X** has a static IP address (**DHCP Disabled**) and the other has a dynamic IP address (**DHCP Enabled**):

| PCI\TCI8254X2 <span style="float: right;">↺ ✓ ✕</span> |                   |
|--------------------------------------------------------|-------------------|
| MAC Address                                            | 00 01 05 3c 82 6d |
| IPv4 Address                                           | 192.0.2.2         |
| IPv4 Subnet Mask                                       | 255.255.255.0     |
| IPv4 Default Gateway                                   | 0.0.0.0           |
| DHCP                                                   | Disabled ▼        |


  

| PCI\TCI8254X1 <span style="float: right;">↺ ✓ ✕</span> |                   |
|--------------------------------------------------------|-------------------|
| MAC Address                                            | 00 01 05 3c 82 6c |
| IPv4 Address                                           | 169.254.29.7      |
| IPv4 Subnet Mask                                       | 255.255.0.0       |
| IPv4 Default Gateway                                   | 0.0.0.0           |
| DHCP                                                   | Enabled ▼         |

- Change parameters from a board to another as following:
  - Change the board with IP address **192.0.2.2** to **192.0.2.23** (in order to keep connection available by giving an address inside recognized range)
  - Change the other board with **DHCP Enabled** to **Disabled** and enter **IPv4 Address: 192.0.2.2, Subnet Mask: 255.255.255.0**
- 
- Click on two ticks of each board
- Reboot PLC to apply changes and swap Ethernet cable on PLC (from **X001** to **X000**)
- Open Internet Explorer and write **http://192.0.2.2/config**
-  <http://192.0.2.2/config>
- When requested, enter :
  - Login = **webguest**
  - Password = **1**

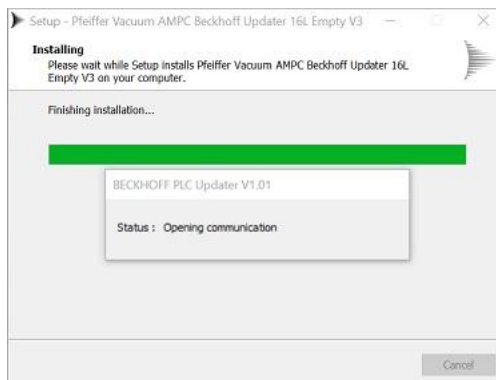
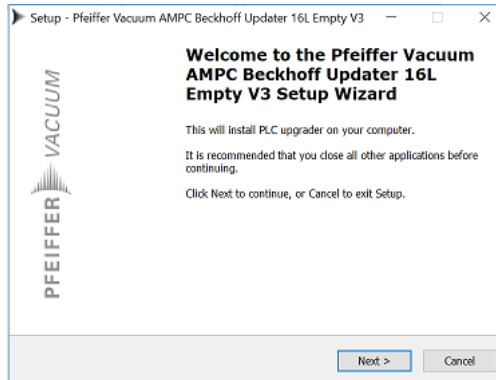


On the setting web page:

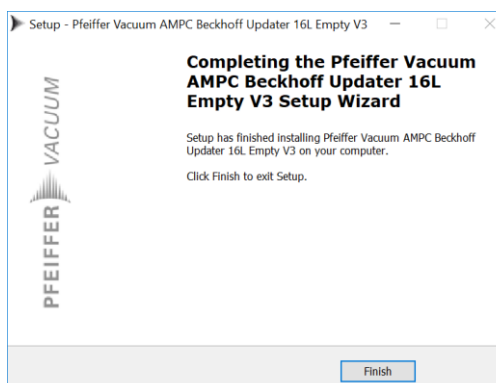
- Go on **Device / Connectivity** menu
- Click on wrench icon
- Change the board with IP address **192.0.2.23** to **DHCP Enabled**
- Click on tick of this board 
- Reboot PLC to apply changes and perform a new ping to confirm connectivity.

### 3.4. Updater installer

- Launch the application **PLC\_BH\_Updater\_APA302\_Empty.exe** located on **D:\Tools\APA\_Elec**
- Click on **Next** when requested



- Once installation is finished, click on **Finish** and perform a hard reboot of PLC (remove 24V power supply until header LED are Off and reconnect 24V)





### 3.5. Wiring tester overview

Once PLC had rebooted, launch the wiring tester **QC\_Elec.exe** located on the Desktop. If shortcut is not present, .exe file is located on **D:\Tools\APA\_Elec.**

This tester is a software support to validate the wiring between PLC and multiple devices/features in system (Inputs / Outputs, Lights, Buzzer, Sensors,...)

To perform a test on an output, go on wanted tab and click on corresponding radio button. Click again to deactivate the output.

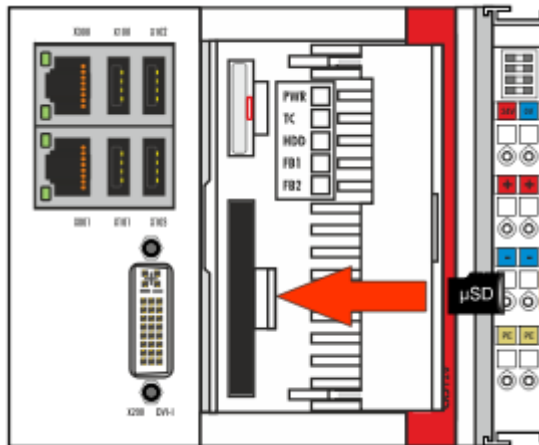
**WARNING: be very careful, especially for CLAMP outputs (Up, Down, 0° and 90°): this tester provides a “god mode” on system and some operations, badly done, can physically damage the system.**

|                                                                                                                      |               |                    |                     |
|----------------------------------------------------------------------------------------------------------------------|---------------|--------------------|---------------------|
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| <b>SPECIFICATION</b>                                                                                                 | <b>N°4343</b> | <b>Indice : 01</b> | <b>Page 17 / 21</b> |

#### 4. MICROSD RECOVERING

If MicroSD card is corrupted or lost, proceed as follow to recover it.

- Power off Beckhoff block → **Very important due to possible corruption**
- Open front panel and take the MicroSD card

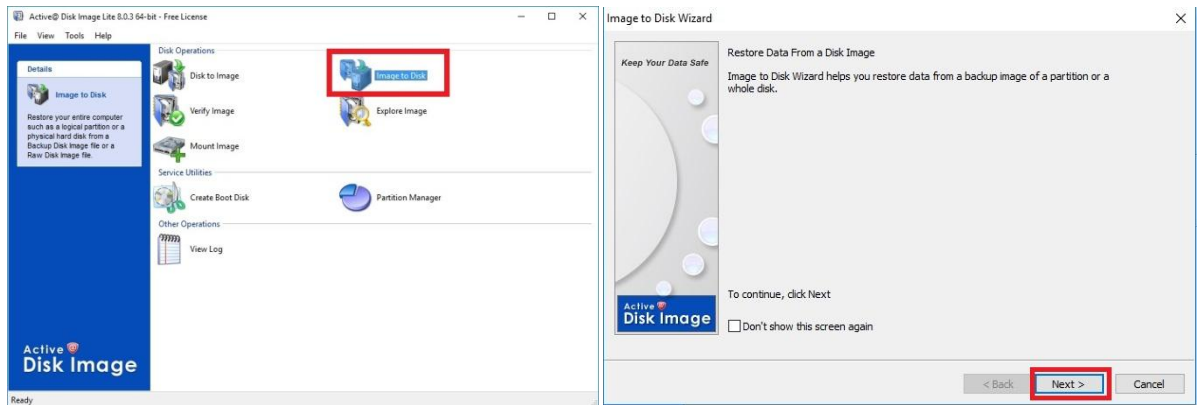


- Plug MicroSD card in adapter and connect it to PC

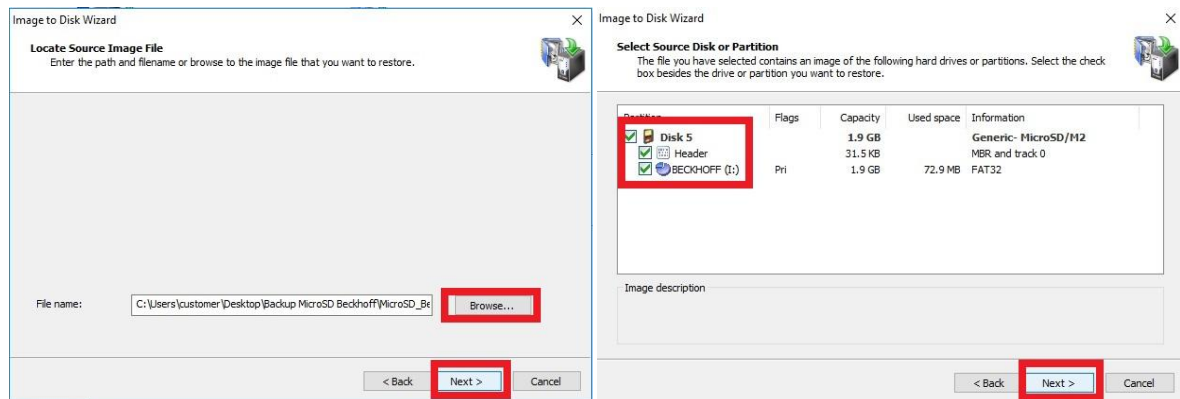
MicroSD adapter exemples:



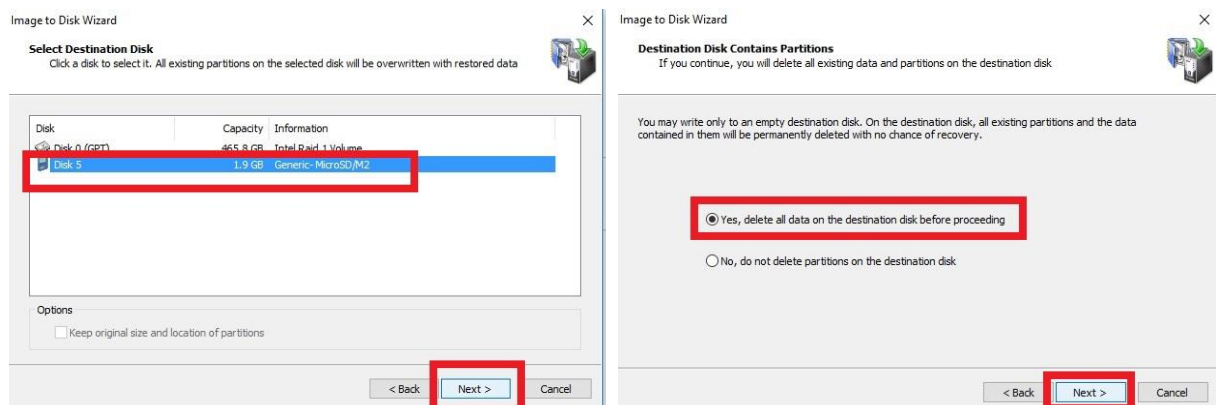
- Launch the application **Disk Image** presents on the desktop. If shortcut is not present, .exe file is on **C:\Program Files\Soft Technologies\Active@ Disk Image Freeware\disk\_image.exe**
- Double click on **Image to Disk, Next**



- Select the wanted image (.adi), **Next**, select complete folder tree of MicroSD and click on **Next**.

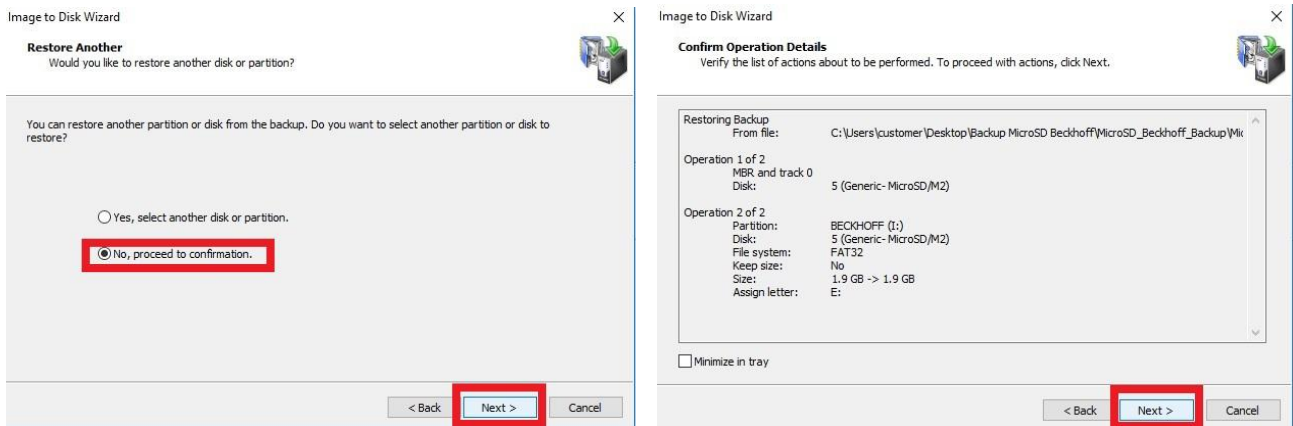


- Select the MicroSD card as destination, **Next**, ask for a format (**Yes** checkbox) and click on **Next**

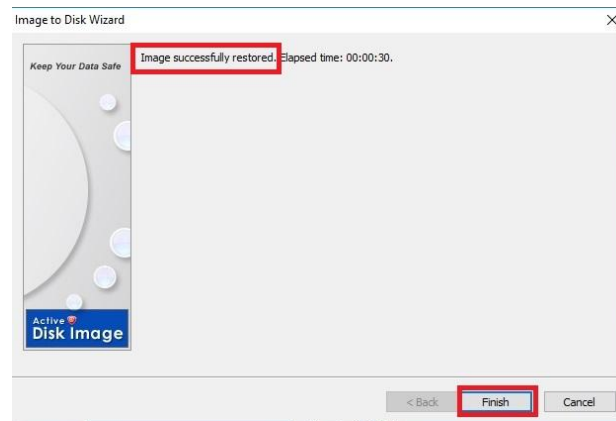


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- Confirm choices and click on **Next** twice.



- Ensure that image has been successfully restored. If so, click on **Finish** at the end of operation, else, redo all operations.



## 5. CHECKLIST

This section will be use as quality control. In case of non application of one or more point(s) listed below, please fill the comment section

### 5.1. Setup

| Operation                                                        | Checked |
|------------------------------------------------------------------|---------|
| Backup of <b>original</b> MicroSD content is done                |         |
| Setup of MicroSD has been achieved without error                 |         |
| PLC is configured and communication with it has been established |         |
| PLC is updated for wiring tests and tester available             |         |

### 5.2. Output tests with Software

Click on radio button and ensure that actuators, lights or other component link to output react.

| Operation                                                            | Checked |
|----------------------------------------------------------------------|---------|
| All available and usable outputs have been tested and results are OK |         |

### 5.3. Inputs tests with Software

Apply changes on sensors, buttons or other component linked to input and check that returns are set as expected.

| Operation                                                           | Checked |
|---------------------------------------------------------------------|---------|
| All available and usable inputs have been tested and results are OK |         |