

TECH NOTE :: Data Integrity of CF-CARDS

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Abstract

This Tech Note deals with data integrity when working with an exchangeable CompactFlash Card (CF Cards) for data storage.



Information

CompactFlash is a mass storage device format, with a capacity of up to 128 GByte, developed by SanDisk, formerly known as PCMCIA.

QuantumX Data Recorder uses two different CF Cards

1. **Internal CF-CARD (8 GB):** Windows Embedded operating system working in protected mode with an Enhanced Write Filter (EWF) eliminating unnecessary permanent writing to flash memory
2. **Exchangeable CF-CARD (up to 128 GB, delivered with 8 GB):** storage of measured data in BIN or FastStream format.

Why we use CF-CARD?

CompactFlash Cards still have benefits compared to SD cards which are dominant in consumer industry:

- rugged solid state – shock prove
- robust metal housing when working in harsh environment
- wide industrial like operating temperature
- fast read / write cycles

On the other hand SD or μ SD memory cards have some advantageous:

- small, compact, widely available, cheap
- mechanical write protection switch
- modern notebooks come with integrated reader

Recommended CF-CARDS:

- Up-to-date, high quality type CF-CARD, at least 8 GBytes, version 4.1 minimum to achieve high data transfer
- Recommended: swissbit C-320 SMART
- Category: write / read cycle optimized to “performance” and not on “fast remove”
- NTFS file format (further down: how to format CF-CARD to NTFS ?)

Reliability

- maximum data rates are reached only with a new card
- limited number of write cycles because of aging (with NAND flash typically 1.000.000 writes per block)
- do not remove the card during operation – only when power is off (same like USB stick)
- do not switch off power during write cycle – loss of data is possible

Service intervals

- **Regularly check** data integrity of all CF-CARDS with the supplied tools. Windows Embedded delivers these tools. Exchange the CF-CARD when necessary – otherwise loss of data is possible
- when formatting to NTFS use **quick format** method, as this method does not write every block on the CF-CARD and minimizes write cycles

- exchange the CF-CARD regularly when working daily (recommendation: every 12 months)

catmanEASY Data Storage

Please calculate the maximum data rate of the overall system. QuantumX Data Recorder CX22-W can store a maximum amount of data of 800.000 samples per second under optimum circumstances - higher sum data rates can lead to loss of data. Also maximum possible data throughput depends on CF-CARD specific issues – mainly type and age. You can calculate with 4 bytes per sample.

catmanEASY is pre-installed on QuantumX Data Recorder CX22-W. The default catmanEASY data storage format is binary (BIN). The software buffers all measurement data temporarily and when as soon as the “DAQ job” is finished, transfers and stores the data to BIN format. We recommend the temporary data to be buffered on the exchangeable CF-CARD.

Fast Stream is a special recording method which is intended for high sample rates (20,000 Hz and more) and/or many channels. With this format all data is directly written to a file. However, this leads to a few restrictions:

- pre-trigger not possible but starting the measurement directly via trigger is possible
- data acquired in this mode cannot be displayed in an overview graph
- data needs to be converted to other formats on your PC (for larger files this may take a few minutes)

We do not recommend other formats as data storage format when using the Recorder.

Formatting CF-CARDS to NTFS

CX22-W shall use CF-CARD formatted to NTFS to get the best read / write performance. The following chapter describes how to format the exchangeable CF-CARD format from FAT to NTFS.

Warning !

Formatting the Compact Flash Card to NTFS means that **all the data on the CF-Card will be deleted**. Before formatting the CF-Card, make sure to copy all important data on a safe location.

Step by Step Workflow

1. Log in to the CX22-W then click on “Exit to Windows” to open the standard Windows Explorer.
2. Open a Windows Explorer window (e.g. by double-clicking on “My Computer”).
3. Open the context menu of the CF-Card drive with a right mouse click and select **Properties**.

4. Select the **Hardware** tab.

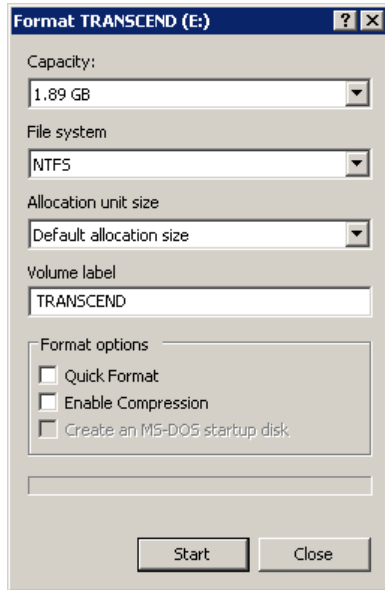


5. Select the CF-Card ("Generic Flash HS-CF USB Device") and click on **Properties**.
6. Select the **Policies** tab.



7. Select the **Optimize for performance** policy and validate by clicking on **OK**.
8. A system dialog should pop up to ask if you want to restart the computer now. Select **No**.
9. Open the context menu of the CF-Card drive with a right mouse click and select **Format...**

10. In the dialogue “File system” select **NTFS**.



11. [Optional] Select **Quick Format**.

12. Click **Start**.