

Instructions for the Unified Write Filter UWF

Disk write protection for Windows

General

Windows® 10/11 IoT Enterprise operating systems are delivered by default with UWF protection On/enabled. This so-called Unified Write Filter is developed by Microsoft Windows to protect a partition against write accesses and therefore unintentional system changes (blue screens, viruses, user errors, etc.). All changes are not written directly to disk, but to a reserved area called overlay.

Note:

The UWF is not suitable for continuous operation (24/7). The overlay will grow continually up to the maximum preset size even in excluded areas. If the overlay run full the system will automatically be restarted by Windows.
The behavior of the UWF should be tested by the customer before switching it on continuously in the field.

In the following is illustrated how the UWF is configured by Christ Electronic Systems GmH and what alternative settings are possible. The settings must **always** be tested by the customer, if it is suitable to the operation purpose of the device.

- The "C:\\" partition is UWF protected by default
- The "D:\\" partition is not UWF protected by default
- Benefits: clean, fast system without viruses and blue screens

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1 UWF Filter

1.1 Overview

On the desktop of your touch panel with Windows® 10/11 IoT Enterprise you will find four icons for the Unified Write Filter control.



„C Filter state“:

View information about the UWF settings

„double – click“

```
Administrator: C Filter state
C:\Windows\system32>uwfmgr get-config
Unified Write Filter Configuration Utility version 10.0.19044
Copyright (C) Microsoft Corporation. All rights reserved.

Current Session Settings

FILTER SETTINGS
Filter state: ON
Commit pending: NO
Shutdown pending: NO
HORM mode: OFF
```

Delivery state: On

„C Filter on“:

Write protection for partition C:
Turn on, effective only after restarting the touch panel

„Filter off“:

Write protection for partition C:
Turn off, effective only after restarting the touch panel

„Filter availablespace“:

Show how much space is available for writes to
partition C:

„double – click“

```
Administrator: C Filter availablespace
C:\Windows\system32>uwfmgr overlay get-availablespace
Unified Write Filter Configuration Utility version 10.0.19044
Copyright (C) Microsoft Corporation. All rights reserved.

The overlay has 1504 MB available space.
```

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1.2 Settings

UWF interrupts all write attempts to a protected volume and redirects it to a virtual overlay. After a reboot of the system all changes made to the protected partition are lost. The overlay is actually stored in RAM. But it can be also configured to store the overlay on disc (<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/uwfoverlay>).

Run cmd as Admin and type: `uwfmgr overlay set-type DISK`

The type and size of the overlay is shown when you double click on „C Filter state“.

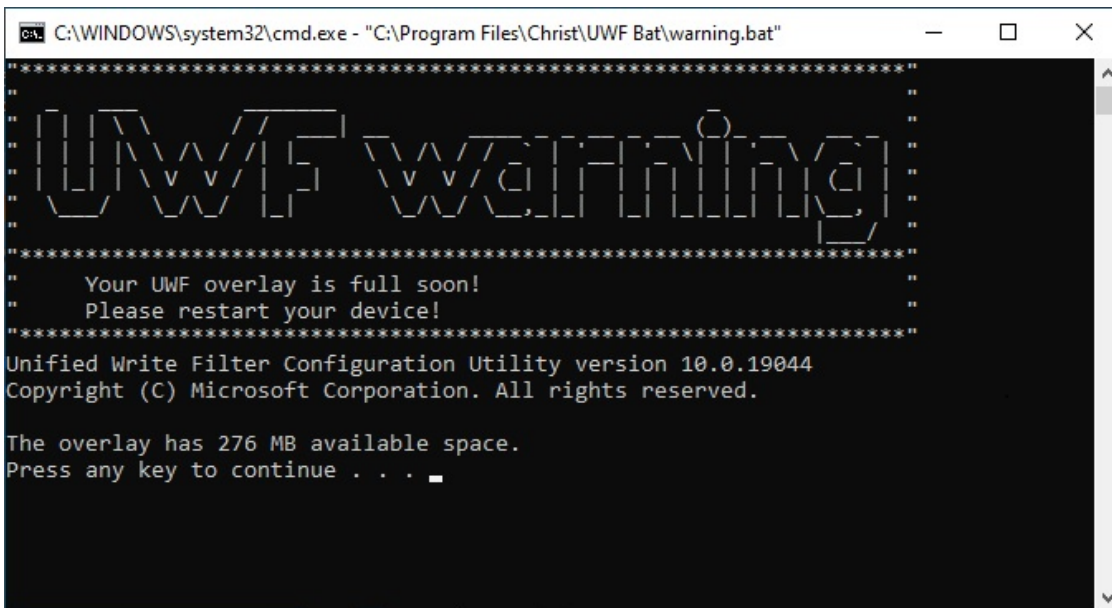
```
OVERLAY SETTINGS
Type:                RAM
Maximum size:        1536 MB
Warning Threshold:   1200 MB
Critical Threshold:  1400 MB
```

The settings can be changed with following commands:

```
uwfmgr overlay set-size <size in MB>
uwfmgr overlay set-warningthreshold <size in MB>
uwfmgr overlay set-criticalthreshold <size in MB>
```

<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/uwfoverlay>

When the warning threshold or critical threshold is reached an event log is written in the Windows log and a command window is displayed with the recommendation to restart the device. The left available space on the overlay is also displayed.



The command window message is started through the two Tasks in the Task Scheduler *UWFCritical* and *UWFWarning*. The displayed text could be changed in the two files *critical.bat* and *warning.bat*. These files are located under *C:\Program Files\Christ\UWF Bat*

Note:

If a new user account is added to the device, these two tasks must also be added to the new account. If not, the command window isn't displayed, if the overlay reaches the warning or critical threshold.

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If you want to exclude files, folders or registry keys from being filtered, it can be added to an exclusion list. With following commands:

```
uwfmgr file add-exclusion <file path>
```

```
uwfmgr registry add-exclusion <registry key>
```

<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/uwfxclusions>

Actually the winevt folder to save windows logs, the timezone registry keys to allow daylight saving time changes and folder and registry keys to save the defender updates are in the exclusion list.

<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/uwf-antimalware-support>

The file and registry exclusions are displayed when you double click on **C Filter state**.

```
File Exclusions:
Next Session Exclusions for Volume 74ee2ca0-a14c-4ca8-972b-5cfbb37f4264 [C:]
C:\Windows\System32\winevt
C:\Program Files\Windows Defender
C:\ProgramData\Microsoft\Windows Defender
C:\Windows\WindowsUpdate.log
C:\Windows\Temp\MpCmdRun.log

REGISTRY EXCLUSIONS
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Time Zones
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\TimeZoneInformation
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows Defender
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\WdBoot
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\WdFilter
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\WdNisSvc
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\WdNisDrv
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\WinDefend
```

Note:

Writes to the excluded files and folders will also decrease the available overlay space.

Writes to the registry exclusions are saved in the registry, when the device normally shutdown or restarts.

The Windows Defender updates are the main reason that the overlay available space decreases fast. When the device is connected to the internet Windows Defender installs daily the definition updates.

If the UWF Filter are enabled with the **C Filter on** icon on the desktop not only the filter enabled after reboot but there also are some services/tasks disabled and registry keys set to minimize the writes to the overlay.

How this is done can be found in C:\Program Files\Christ\UWF Bat\on.bat

When the **C Filter off** icon on the desktop is clicked the setting are set back to the original values after reboot. See C:\Program Files\Christ\UWF Bat\off.bat

If something didn't work, when the Filter is enabled you can check, if it is because of any setting in the on.bat

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Links

Useful UWF Links:

Unified Write Filter (UWF) feature

<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/unified-write-filter>

Overlay for Unified Write Filter (UWF)

<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/uwfoverlay>

Overview and Explanation over all UWF commands

<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/uwfmgrexe>

To allow Windows Defender Updates you can follow these instructions:

<https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/uwf-wes7-ewf-to-win10-uwf>

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