# smartctl Disk health check

**START HERE**

**`sudo smartctl --scan`**
List drives to check

**`sudo smartctl -t short <dev>`**
Start a quick self-test

**`sudo smartctl -i <dev>`**
Model, serial, SMART on?

**`sudo smartctl -l selftest <dev>`**
Read the test result

**`sudo smartctl -H <dev>`**
Overall health verdict

**`sudo smartctl -x <dev>`**
Everything the drive reports

**`sudo smartctl -A <dev>`**
Attribute table

**Find drive** --scan, lsblk → `-i / -H` **Check health** verdict + attributes → `-t short|long` **Self-test** runs inside the drive → `-l selftest` **Read the log** pass or first bad LBA

## CONCEPTS

Run as root. Without it most commands fail with a permission error on the device node.

PASSED only means no attribute has crossed its failure threshold. A drive can still be dying: watch reallocated, pending and uncorrectable sectors.

Device is the whole disk, such as /dev/sda or /dev/nvme0, not a partition like /dev/sda1.

## INFORMATION AND HEALTH

**`smartctl --scan`**
List devices smartctl can see

**`smartctl -i <dev>`**
Model, serial, firmware, capacity

**`smartctl -H <dev>`**
Overall health: PASSED or FAILED

**`smartctl -A <dev>`**
Vendor attributes (NVMe: health log)

**`smartctl -a <dev>`**
Info, health, attributes, error and test logs
*For ATA this adds -c and the selective self-test log too.*

**`smartctl -x <dev>`**
Extended: all of -a plus device stats, SCT data

**`smartctl -c <dev>`**
Drive SMART capabilities

**`smartctl -H -q errorsonly <dev>`**
Print only on problems (for scripts)

**`smartctl -j -a <dev>`**
JSON output for tools like jq

**`smartctl -a -q noserial <dev>`**
Hide serial number before sharing output

**`smartctl -s on <dev>`**
Enable SMART on the drive

## SELF-TESTS

**`smartctl -t short <dev>`**
Quick test, usually a few minutes

## SELF-TESTS (cont.)

**`smartctl -t long <dev>`**
Full surface test, minutes to hours

**`smartctl -l selftest <dev>`**
Show self-test results

**`smartctl -t conveyance <dev>`**
Check for shipping damage (ATA)

**`smartctl -t offline <dev>`**
Run offline data collection (ATA)

**`smartctl -t select,<start>-<end> <dev>`**
Test one LBA range (ATA)

**`smartctl -X <dev>`**
Abort a running self-test

Self-tests run on the drive itself and are non-captive by default, so the disk stays usable. Check back with -l selftest after the estimated time.

## LOGS AND ERRORS

**`smartctl -l error <dev>`**
Drive error log

**`smartctl -l xerror <dev>`**
Extended error log, more entries (ATA)

**`smartctl -l xselftest <dev>`**
Extended self-test log (ATA)

**`smartctl -l scterc <dev>`**
Show error recovery timeouts (ATA)

**`smartctl -l scterc,70,70 <dev>`**
Set read/write timeout to 7.0 s
*Units are 100 ms. Usually resets at power cycle; useful for RAID members.*

## DEVICES AND NVME

**`smartctl -d <type> <dev>`**
Force the device type

**`smartctl -d sat <dev>`**
USB or SATA bridge (SCSI-to-ATA)
*If auto-detect fails on a USB enclosure, try sat first, then usbjmicron, usbcypress or usbprolific.*

**`smartctl -d scsi <dev>`**
Treat as SCSI/SAS drive

**`smartctl -d ata <dev>`**
Treat as ATA/SATA drive

**`smartctl -d nvme <dev>`**
NVMe device explicitly

## DEVICES AND NVME (cont.)

**`smartctl -a /dev/nvme0`**
NVMe health log: spare, wear, temperature

**`smartctl -d megaraid,<n> /dev/sda`**
Disk n behind a MegaRAID controller

NVMe paths: /dev/nvme0 is the controller, /dev/nvme0n1 a namespace. Both normally work with -a.

## READING ATTRIBUTES

**Attributes worth watching (ATA)**

| ID / name | Concern when |
|---|---|
| 5 Reallocated_Sector_Ct | raw above 0 and rising |
| 187 Reported_Uncorrect | raw above 0 |
| 197 Current_Pending_Sector | raw above 0 (unreadable sectors) |
| 198 Offline_Uncorrectable | raw above 0 |
| 199 UDMA_CRC_Error_Count | rising: suspect cable or port |
| 194 Temperature_Celsius | sustained above ~55 C |

**Health log fields (NVMe)**

| Field | Concern when |
|---|---|
| Critical Warning | not 0x00 |
| Available Spare | near Threshold |
| Percentage Used | approaching 100% |
| Media and Data Integrity Errors | above 0 |
| Temperature | sustained above ~70 C |

In the -A table, a normalized VALUE falling to its THRESH means failing; the RAW column is vendor-specific and often counts something other than you expect.

A rising pending-sector count that later turns into reallocations is the classic sign of a failing disk. Back up first, test later.

## SCRIPTING AND OPTIONS

**`smartctl -n standby <dev>`**
Skip the check if the drive is asleep
*Prevents spinning up a sleeping drive; exits with status 2.*

**`smartctl -o on <dev>`**
Enable automatic offline testing (ATA)

**`smartctl -V`**
Show version

**Exit status bits (add up)**

| Bit | Value | Meaning |
|---|---|---|
| 0 | 1 | Command line did not parse |
| 1 | 2 | Device open failed or in low-power mode |
| 2 | 4 | SMART command failed or bad checksum |
| 3 | 8 | Disk failing |
| 4 | 16 | Prefail attribute at/below threshold |
| 5 | 32 | Attribute was below threshold in the past |
| 6 | 64 | Error log has entries |
| 7 | 128 | Self-test log has errors |

Test one bit in a script with shell arithmetic, for example $(( $? & 8 )) for a failing disk.

## RECIPES

**Quick health check of all drives**

```
for d in $(sudo smartctl --scan | awk '{print $1}'); do
  echo "== $d"
  sudo smartctl -H -q errorsonly "$d"
done
```

**Run a long test and read the verdict**

```
sudo smartctl -t long /dev/sda
# note the estimated finish time, then wait
sudo smartctl -l selftest /dev/sda
sudo smartctl -a /dev/sda | less
```

**Check a USB disk**

```
lsblk -o NAME,MODEL,SIZE,TRAN
sudo smartctl -d sat -a /dev/sdb
# if rejected, try -d usbjmicron / usbcypress / usbprolific
```

**Extract fields as JSON**

```
sudo smartctl -j -a /dev/nvme0 \
  | jq .
nvme_smart_health_information_log
```