QDAC-II (Compact) firmware release notes

FW 14-1.70 Release date 2025-07-01

Features and changes to functionality

- DC LISTs now support up to 2^{21} = 2,097,152 points. As a consequence, it is now only possible to query the LIST data for one channel at a time, as a multi-channel query asking for 24 times 2^{21} points would overflow the internal buffers.

- The QDAC-II supports 8 simultaneous Ethernet connections. To avoid connections from being blocked by hanging or inactive clients, it is now always possible to connect, and the connection which has been used least recently will then be closed and re-used.

Bug fixes

- To prevent undefined DC LIST sequences under certain circumstances to be triggered and output unexpected values, LISTs are now always initialized with 4 zero-Volt points instead of having nominally zero points.

- Likewise, the AWG generators are now initialized with a 4-point zero-Volt trace behind the scenes (cannot be looked up by TRACe:CATalog), so that they will not output unexpected data if triggered without an associated TRACe.

- Solved issue with the *Trig In 1* trigger input not being able to trigger current sensors.

- Solved issue with output voltages sometimes becoming mixed up amongst channels, if a *RST (reset) command was sent to the instrument while DC LISTs were running or the DC generators were in DC filter mode (25-bit resolution, RENHancement = ON).

- When TRACes are deleted (TRACe:REMove:ALL) they are now also disassociated with the AWGs, and running AWGs are stopped.

- When connecting a TRACe to an AWG by SOURce:AWG: DEFINE, an error will now be reported if the referred TRACe name does not exist.

Manual

- All the above changes to functionality have been compiled into the manual.

- The command reference list (shared between QDAC-II and QDAC-II Compact) has been made into a separate document, only available online. Operation manuals for the QDAC-II (version 2.4) and QDAC-II Compact (version 1.3) are shipped with the product.

- New temperature coefficient measurements have been included in the specifications table for the QDAC-II Compact.

FW 13-1.57 Release date 2024-02-05

Bug fixes

- Fixed occasional timeout issue when reading back current sensor readings, LIST voltages, etc. over LAN.

- Fixed occasional garbling of long messages sent over USB to the instrument.

FW 13-1.54 Release date 2024-01-16

Features and changes to functionality

- SYSTem:CLOCk:EXTernal:STATus? Command added so that it can be checked if an external reference clock is being used or not.

Bug fixes

- Fixed bug causing internal triggers (TINT) to be ignored occasionally.

- Fixed problem with DC generator ANALog SWEep mode not working with CONTinuous triggering in 11-1.14, and that multiple triggering would stall the instrument.

- Solved problem (occurring in 11-1.21) related to the above that DC generators could get stuck making it impossible to set new DC values for a channel.
- Fixed bug, causing current the sensors to occasionally saturate for no obvious reason, often resulting in an out of range point when using the current sensors with 2D (virtual) sweeps in QCoDeS.
- Fixed wrong offset of the continuous averaging of current sensor readouts when *RST is executed.
- Solved timeout issue with queries (for example FETch) when two LAN connections are open.
- Improved stability (timeout issue) of reading back many (thousands) of values (current sensor readings, LIST voltages, etc.) over LAN.
- Improved reliability of USB/serial communication, especially up-stream to the instrument.
- Fixed range check for internal triggers (1-14) for TINT, and :TRIG:SOUR commands and (0-14) for :MARK:{}:TNUM.
- Fixed bug causing upload of list voltages (SOUR:DC:LIST:VOLT) in ascii format to accept only 1023 values and not 1024.
- SYSTem:CLOCk:SOURce? query now works correctly.
- SYST:BEEPer:STAT query and command now work as designed returning ON/OFF and accepting 0/1 as well as ON/OFF.
- Fixed problem with compound queries not working in version 11-1.14, for example SENSe1:NPLC?;APERture?
- Fixed issue with the TINTernal command not working in compound commands (since 11.1.14).
- Implemented missing SENSe1:TRIGger:SOURce HOLD command.
- Solved issue with slow filter switching when switching to and from DC mode. The more channels in DC mode the slower it was leading to a slowdown in speed when for example switching all channels to DC and a ramp up in speed when switching all channels to HIGH.
- Solved issue with SQUare wave and SINe generator default values not being set at startup.

Manual
- Added description for the SYSTem:CLOCk:EXTernal:STATus? command.
- Added new links to firmware update page
- Added additional advice regarding firmware updating from a Mac.

FW 11-1.21 Release date 2023-09-20

Bug fixes
- Fixed slew-rate for DC generator which had stopped working in version 11-1.15.
- Re-allowed leading zeros in channel numbers, as in for example "sour02:volt 0.2". In version 11-1.15 leading zeroes were by mistake not allowed which caused the Labber driver to stop working.

Manual
- V2.1 Added warnings that reading back large amount of data, e.g. current measurements, over the USB port, data may get garbled using the pyvisa.py backend.
- V2.1 Added warning to the known bugs list that trying in trigger mode = CONTinuous to trigger the DC sweep generator in analog mode more than twice, will stall the instrument.

FW 11-1.15 Release date 2023-08-04

Features and changes to functionality
- When changing NPLC or APERture, the read-out current sensor value will not make a big immediate change. In previous versions the new window size was applied immediately as denominator when calculating the running average, thus causing a jump which would relax back to the correct value in the time equal to the change in window size.

Bug fixes
- Fixed bug which could make the measured current sensor values go wild (indefinitely) if NPLC or APERture were changed rapidly between a long and short value, "rapidly" meaning before the current sensor had time to settle at the

new window size. This bug could potentially obscure current measurements when drivers behind the scenes would change NPLC or APERture fast.

- Re-added SYStem:SSN? Command, which fell out in version 11-1.14.

FW 11-1.14 Release date 2022-12-12

Features and changes to functionality

- Period Start and Period End markers (PSTart, PEND), generating marker events for each repetition of the DC SWEep and LIST generators have been implemented, as an addition to the Step Start and Step End markers (SSTArt, SEND). These are useful for example in 2D sweeps for generating triggers to external instruments.
- En error check for DWELl (for SWEep and LIST sequences) has been added, so that the user is informed if trying to set DWELl to a too small) < 2 µs) or to a non-multiple of the sample rate (1µs) to within a reasonable rounding tolerance.
- Minimum period check of 4 µs for the triangle generators have been added.
- Synchronization of multiple QDAC-IIs can now be done with timings better than 50 ns, often in the range of 20-30 ns using short impedance matched cables. This should compared with the output sample rate of 1 µs and minimum 1-99% rise time of about 4 µs. Synchronization has been tested with 5 QDAC-II units.
- When synchronizing multiple QDAC-II instruments Trig Out 4 and Trig In 3 can now be used for normal triggering operation after the synchronization event.
- Minimum trace length is now 4 points, and an error is reported if trying to define a shorter trace.

Bug fixes

- LIST, AW…. Minimum DWELl time for DC:SWEep and DC:LIST is now 2 µs.
- The precision of the SINe generator has been improved, so that there is no phase drift over time.
- AWGs and fast DC:LISTs and DC:SWEeps (with 2µs dwell) now works for all channels simultaneously without missing any samples or outputting any spurious trigger pulses or occasionally repeating values.
- System stall when running AWGs with traces with uneven number of points has been fixed. If traces are uploaded with an uneven number of points, an additional point is added.
- The unintended firing of trigger events when issuing the command "SOUR:DC:TRIG:SOUR <trigger source>" has been fixed. This bug would for example trigger an extra measurement point in the "virtual_sweep_2d()") in the QCoDeS driver.
- The SYSTem:CLOCk:SOURce command now works as intended, letting the user decide if an external applied 10MHz clock signal should be used or not.
- SYS:COMM:LAN:DHCP? Query will now return the correct status.
- Static IP address now works as designed.
- *RST now does not anymore mess up the LED status indication of errors (before the LED would stay green even when errors are generated, after a *RST)
- In previous firmware versions the voltage calibration offset in LOW voltage range mode has not been applied when switching from HIGH to LOW voltage mode. The error has been miniscule, but now it has been eliminated.
- Fixed range check for the Trigger Internal Trigger (TINTernal), and fixed bug when using the command without a <space> before the parameter.
- The *RST command now also stops sending a 10MHz clock signal on Trig Out 5, if this was enabled before *RST.

Manual

- Updated list of known bugs.
- Corrected minor errors.
- Expanded section on synchronizing multiple QDAC-IIs.
- Added information and recommendations regarding switching current sensor ranges and changing current sensor integration times (APERture, NPLC), especially regarding timing.
- The MAXimum length of TRACes has been corrected from 4 to 6 million points.

FW 7-0.17.5 Release date 2022-05-12

Bug fixes

- Fixed unstable USB/serial communication resulting in spurious error messages like "Undefined header" and sometimes loss of data, for example when uploading long LIST:VOLT sequences. This can also result in bad values being uploaded which may be out of the legal range for the device under test! This update also addresses rare problems with message congestion when using ethernet communication.
- Stopped reporting an error when sending empty lines to the instrument
- Sine wave bursts at all outputs during *RST or SYSTem:RESTart have now been eliminated.
- MARKer:TNUMber can now be set to 0 (zero) in order to break the connection between a waveform marker and an internal trigger.
- The designed 1:1 relationship between MARKers and INTernal TRIGgers is now established, so that a MARKer can only activate one internal trigger.
- Querying which internal trigger a MARKer is connected to now returns the actual trigger number in all cases (before, zero was returned if the generator had been running).
- Unintended 4 second limit of ANALog SWEeps have now been removed.

Features

- ABORt of DC:LIST, DC:SWEep and AWG has been re-implemented and activated.
- SLEWrates down to 0.01 V/s are now supported, except in when resolution enhancement is active (DC filter mode) where it will be clamped to 40V/s if set lower than that. A query will show the set value though.

Manual

- Updated list of known bugs
- Corrected minor errors
- Updated description in Section 3, regarding impedance of trigger outputs.
- Elaborated the explanation of current sensor offset errors, integration time and delays in section 5.3

FW 6-0.13.0 Release date 2022-02-02

Bug fixes

- Fixed aggressive trailing zeros remover, which would also remove the zero in exponentials. Only relevant for LOW range current measurements (only) example: -1.245e-10 would be read-out as -1.245e-1.

FW 6-0.12.10 Release date 2022-01-19

Features

- The LAN latency has now been reduced to a maximum of 10 milli-seconds (not including any processing, just the LAN roundtrip)
- The query number format has been adjusted so that the full resolution of voltages and measured current is reflected in the returned values, e.g., 7 decimals for voltages, 6 digits for currents.
- To warn the user that waveform generators cannot be started in DC mode (FILTer = DC) an error is now produced when trying to initiate one of the waveform generators.
- Now up to 24 traces can be uploaded for the AWGs.
- More details are included in several error messages.

Bug fixes

- Connecting the USB port to a computer does not anymore produce an error.
- Boolean queries now always return 0 / 1 (and not OFF / ON) consistent with the SCPI protocol.
- The global BUS trigger, *TRG, now respects the initialization state of the various trigger sequences.
- *rst now does not apply an undefined offset to subsequent current readings. So *rst can now safely be used (still it messes up the LED error functionality).

- DIAGnostics:CCHannel queries now returns the channel number as written on the front plate and not the number minus one.
- In the previous firmware versions, the current sensors would sometimes miss trigger events (~one out of a hundred). This has been fixed.
- Current sensors now correctly respond only to a single trigger event after INITiate:IMMEdiate.
- Setting a FIXed Immediate voltage while the DC generator is in SWEep or LIST mode now produces an error, warning the user that this is an incompatible request.
- The default frequency for fixed waveform generators is now 1 kHz as described in the manual.

Manual (version 1.0)

- The Python example in section 4.4 has been corrected (some copy-paste errors had found their way in).
- A considerable amount of benchmarking data has been added.
- Explained how the period (hence and frequency) of fixed waveform generators should be chosen in order for the most faithful waveform reproduction.
- Instructions on using a third party laboratory power supply has been added.
- The list of known bugs and issues have been updated.