

## Upgrading an XL4 RTU to an XL4 *Plus* RTU

Document version 1.2

Upgrading an XL4 RTU to an XL4 Plus RTU involves upgrading the Q04 processor firmware to Q04 Plus. Q04 Plus is a major release of firmware incorporating a RTOS real-time operating system. Firmware upgrades are performed using QTech Workbench software. Q04 *Plus* uses a new configuration file paradigm which is only compatible with Workbench version 2.0 or later.

The upgrade process preserves critical settings such as calibration data of analogue I/O and the electronic serial number (ESN) of the RTU. However, all RTU logged data is lost so please download that before starting.

The Q04 *Plus* can perform self-tests when the RTU is powered up or rebooted. In this document, we provide an overview of the optional tests that can be performed to check the operation of your RTU.

Workbench is downloaded from the QTech website: <https://qtech.co.nz/product/workbench/>

If you do not have Microsoft .NET framework installed on your PC, we recommend you download and install the bundled version of Workbench.

It is assumed that readers are familiar with the operation and installation of the XL4 and Workbench software. If you are new to the XL4 product range please read the user manual first.

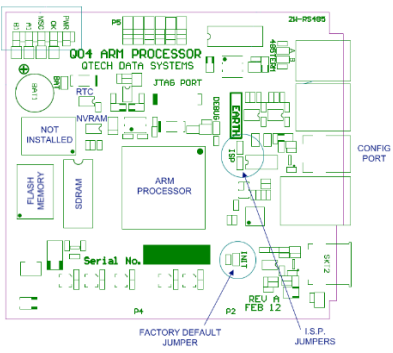
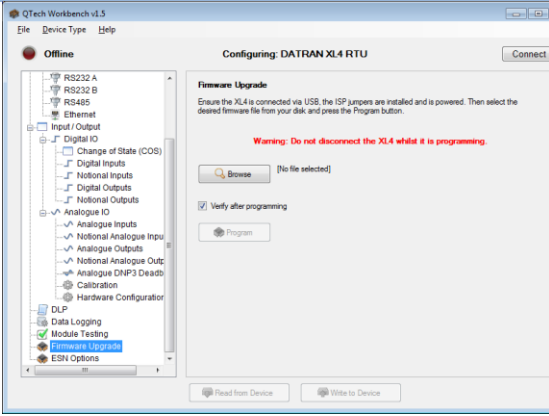
Once the XL4 RTU has been updated to Q04 Plus, subsequent firmware updates are via a USB drive.

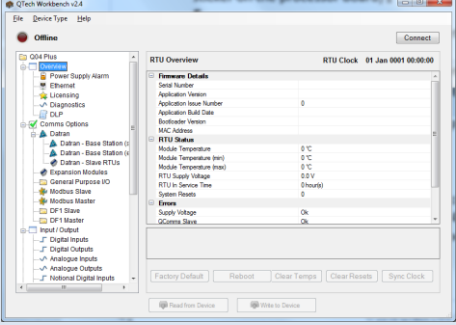
### Equipment required:

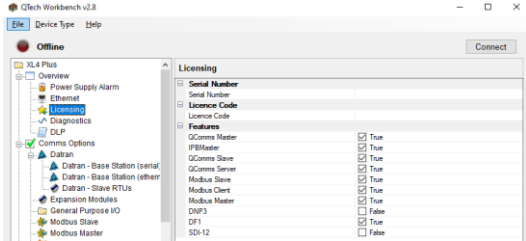
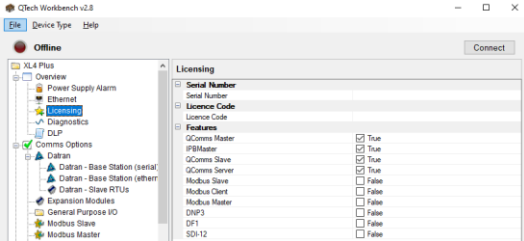
- ❖ QTech Workbench Software
- ❖ XL4 RTU
- ❖ USB Cable (type A-B)
- ❖ DC Power supply and cable
- ❖ Q04 *Plus* Bootloader firmware (.hex) file located in a folder on your PC
- ❖ USB drive (formatted as FAT32) containing both the Q04 *Plus* Application firmware (.elf file) and MD5 validation file (.md5). The files must be in the root folder of the USB drive.
- ❖ Optional - DIP switch jig for setting digital inputs on and off (not supplied)
- ❖ Optional - LAN patch cable if access to a LAN running DHCP services is available

The firmware application, bootloader and message validation files are distributed by QTech.

# Upgrade Procedure

Step	Procedure	Note
1	Power up the XL4 RTU. Open Workbench. Connect Workbench to RTU with USB cable. Click <b>Connect</b> to connect to the RTU.	If necessary, from the <b>Device Type</b> menu select <b>DATRAN XL4 RTU</b> .
2	Ensure any RTU Datalogging data has been retrieved, as it will be erased by this process.	
3	Check a valid RTU serial number has been read from the RTU and is displayed in Workbench.	The 4 ASCII numbers are one of the ways the Bootloader detects that the RTU was previously running the old Q04 firmware.
4	Close Workbench and disconnect USB cable. Remove power from the RTU. Unscrew and remove the RTU case cover. <b><u>Insert the two ISP jumpers.</u></b>	
5	Power up the RTU and run Workbench. From the <b>Device Type</b> menu select <b>DATRAN XL4 RTU</b> .	Note: There is no need to “connect” to the RTU.
6	Click the <b>Firmware Upgrade</b> section of Workbench. Click <b>Browse</b> and navigate to the Bootloader firmware file on your PC. Select the file. Click <b>Program</b> to flash the RTU with the selected file.  If successful, Workbench will display a success message and the RTU’s ERR LED will flash rapidly to indicate the Bootloader cannot yet find the application to boot.  If the process fails at this step, then: Remove the ISP jumpers. Cycle the power on the RTU. Close then reopen Workbench. From the <b>Device Type</b> menu select <b>DATRAN XL4 RTU</b> . Click <b>Connect</b> . Insert the ISP jumpers. Repeat the instructions from the start of step 6.	
7	Close Workbench. <b><u>Remove the two ISP jumpers.</u></b>	
8	<b>Optional - memory integrity check</b> At this point the Bootloader can check the FLASH and SDRAM integrity. Refer to the instruction at the end of the document.	

Step	Procedure	Note
9	<p>Insert the USB drive containing the application firmware into the USB port on the RTU.</p> <p>Power up the RTU and programming commences.</p> <p>The Status LEDs will flash in a sequence to indicate programming is in progress.</p> <p>Note. The Bootloader can take approx. 10s to reformat the FLASH and there is no LED activity during this time. Be patient and don't repower the RTU during this time.</p>	<p><b>IMPORTANT: DO NOT REMOVE POWER DURING THE PROGRAMMING PROCESS.</b></p> <p>Note. If you have trouble upgrading the application with a large USB drive (e.g. 32 GB or more) try using a smaller 8GB USB 2.0 drive or similar, formatted FAT32.</p> <p>Note. After reprogramming it is normal to see the error LED flash a number of times</p>
10	<p>Visually check LED operation.</p> <p>The CPU OK LED will fade on/off. The MU LED will be on. The ERR LED indicates any additional fault codes. NOTE. This is normal because for example, at this stage a DLP will not be loaded so this will be the most likely error code being shown.</p> <p><b>IMPORTANT.</b> If the ERR LED flashes rapidly this indicates the RTU does not have a valid license. It does not mean the upgrade has failed. Contact QTech support to be issued a licence and follow step 15 to install the new licence. Repower the RTU to remove the error condition.</p>	<p>If successfully flashed the Application should boot – the indication of this is the CPU OK LED fades on/off (instead of blinking as per Q04 firmware). If there was a fault the CPU LED will be off, and the ERR LED indicates an error code.</p> <p>The licencing system for the Q04 <i>Plus</i> differs to the Q04. It is normal for the license error code to be displayed. It does not indicate a hardware fault but indicates an additional process to follow to update the RTU license.</p>
11	Remove the USB Drive.	<b>Do not leave the USB drive in</b> or next time the RTU reboots it will attempt to re-flash the firmware.
12	<p>Record the name of the XL4. This is in the form “Q04-1234” or “XL4-1234”. Usually printed on a sticker on the processor board.</p> <p>Replace the XL4 case cover and screw together.</p>	The name can be used for additional checks.
13	<p>Connect the USB cable to the RTU. Power up the RTU. Open Workbench.</p> <p>By default, Workbench selects <b>DATRAN XL4 Plus RTU</b> device type to configure. If it does not, from the <b>Device Type</b> menu select “<b>DATRAN XL4 Plus RTU</b>”.</p> <p>Click <b>Connect</b>.</p> <p>Select the <b>Overview</b> category. Verify the serial number of the RTU is displayed.</p>	 <p>The screenshot shows the QTech Workbench v2.4 interface. On the left is a tree view of device categories, with 'DATRAN XL4 Plus RTU' selected. The main window displays the 'RTU Overview' for a device with 'RTU Clock: 01 Jan 0001 00:00:00'. The 'Overview Details' section includes fields for Serial Number, Application Version, Application Issue Number, Application Build Date, and Bootloader Version. The 'RTU Status' section shows Module Temperature (0°C) and RTU Supply Voltage (0.0V). The 'Errors' section shows System Resets (0) and Supply Voltage (Ok). At the bottom, there are buttons for 'Factory Default', 'Reboot', 'Clear Temps', 'Clear Resets', and 'Sync Clock', along with 'Refresh Device' and 'Write to Device' buttons.</p>

Step	Procedure	Note
	<p>If the RTU serial number is not displayed it needs to be reprogrammed. Contact QTech for assistance.</p>	
<p><b>14</b></p>	<p>If the RTU requires a new license to enable features contact QTech to be issued a licence.</p> <p>Click the <b>Licensing</b> category and <b>Read from Device</b>  Enter the new licence code supplied by QTech.  Click <b>Write to Device</b> to update the RTU.</p> <p>The licensed feature options are shown below:</p>  <p><i>XL4 Plus – Licenses (fully featured)</i></p>	<p>For assistance, please contact QTech</p> <p>Rebooting the RTU will stop the ERR LED flashing.</p>  <p><i>XL4 Plus Legacy - Licenses</i></p>
<p><b>15</b></p>	<p><b>The XL4 RTU upgrade to Q04 Plus is now complete.</b></p> <p>The RTU will now perform as an XL4 Plus RTU and is now ready for the usual configuration.</p>	<p>Refer to the user manual and application notes for further configuration details.</p>

### Optional - memory integrity check

At step 8 you can use the Bootloader to check the FLASH and SDRAM integrity.

The tests are triggered by inserting the INIT jumper and then turning on a digital input.

### ALWAYS REMOVE THE INIT JUMPER AFTER CONDUCTING SELF TESTS.

Activating a test will illuminate the corresponding digital input LED on the RTU.

If the test/action "Passed" then the corresponding digital output LED will be lit after the test/action.

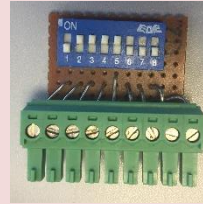
When tests are executing the RTU status LEDs will flash in sequence to show the test is in progress.

Grounding the input (assert low) selects the test.

- a. RDI1 – Test SDRAM
- b. RDI2 – Test FLASH
- c. RDI3 – Test USB Memory Stick
- d. RDI7 – Erase FLASH
- e. RDI8 – Erase NVRAM

- **Insert the INIT jumper** (factory default jumper)
- Set the desired switch for the test.
- Repower the RTU to initiate tests.
- When tests are complete the ERR LED will flash.
- Execute the SDRAM and FLASH tests
- Do not erase the FLASH at this point as it will be reformatted anyway.
- Do not erase the NVRAM. This makes the RTU lose its serial number and calibration factors. This is not advised unless those values are found to be corrupted.
- Turn off all digital inputs and remove switch jig.
- **Remove the INIT jumper**

This optional step is now complete, return to step 10.



Switch jig

A switch jig is not required if you simply wire a RDI to the ground pin (G) on the RTU.

Always remove the INIT jumper after performing self-tests otherwise self-test functions may be inadvertently conducted when the digital input harness is reconnected and the device repowered.

For more information contact QTech [techsupport@qtech.co.nz](mailto:techsupport@qtech.co.nz)