

# QC file-link interface (v 3.0)

## 1. Principle of operation

QC File-link is a program designed to work with MultiQC, the clinical chemistry QC software by the same author available at [www.multiqc.com](http://www.multiqc.com). QC File-link allows a direct acquisition of QC data without having to keyboard. Data are retrieved from any third-party software thanks to shared temporary files stored in an exchange folder.

Three executable files can be downloaded at [www.multiqc.com/QCConnexion.htm](http://www.multiqc.com/QCConnexion.htm) : QCFiLnkA, QCFiLnkB and QCFiLnkC. In most of the cases you will use only one of them. But you might need two or three different interfaces if you wish to retrieve in MultiQC data from several analysers with different formats (see section 4.1).

QC File-link, A, B and C, version 3.0.0, are compatible with Windows 2000 to Windows 7.

### 1.1. Three programs are working together

#### ➤ The job of QC File-link

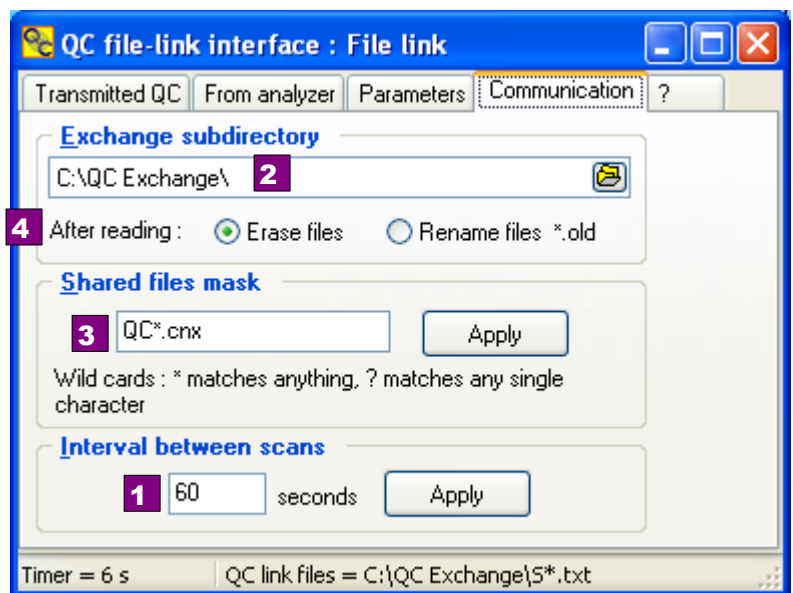
**1-** Every 60 seconds QC File-link scans the exchange folder.

**2-** The exchange folder can be located anywhere in the local network. It must be created with "modify" rights and set as shared if it is on a distant disk.

**3-** QC File-link searches for files that match a given mask (QC\*.cnx). As soon as a matching file is found, it is read and data are transmitted to MultiQC.

**4-** The temporary link file is then erased or renamed. Thus it is not read again 60 seconds later.

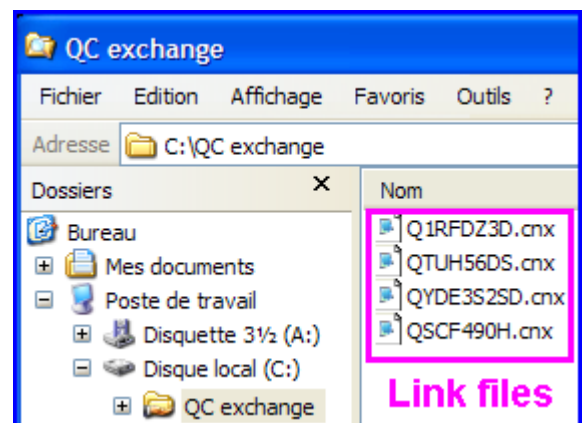
QC results are retrieved almost in real time (less than one minute) and immediately transmitted for processing to MultiQC.



#### ➤ The job of the data processing software

The LIS or a data processing software is in charge of outputting QC results to temporary link files in the exchange folder. An easy way to prevent overwriting of a pending file by a new one with the same name is to use random file names.

QC File-link can be set up to read files with a lot of different formats in the exchange folder.



## ➤ The Job of MultiQC

QC File-link works as an automation server under control of MultiQC. It is automatically started or closed when MultiQC is started or closed. If MultiQC happened to be closed while QC exchange files are created, no data will be lost because files will pile up in the exchange folder to be loaded later as soon as MultiQC is started again.

### 1.2. Naming the temporary link files

Using random file names is an easy way to prevent overwriting in the exchange folder. The number of different names with 7 random alphanumeric characters is so high ( $36^7= 78$  billions) that 2 files will never get the same name. Here is a sample of the Delphi code that can create such names :

#### Delphi function to create a random file name

```
Function QCRandomFileName: String;  
Const  
  Mask = 'Q????????.cnx';  
  S = '0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ';  
Var  
  I: Integer;  
Begin  
  Randomize;  
  Result:= Mask;  
  For I:= 2 to 8 do Result[I]:= S[Random(36) +1]  
End;
```

## 2. Installation

### 2.1. Installation of interfaces

Download MultiQC at [www.multiqc.com](http://www.multiqc.com) and install the package. The version of MultiQC must be 6.1.0.0 or later (the number of version is visible in the “About” box : main menu <? → About>).

Download the QC File-link receiver interface at [www.multiqc.com](http://www.multiqc.com) and install the package. To comply with the User Access Control of Windows 7, the program files are installed in the folder :

*C:\Program files\MultiQC6\File-link A*

and the data files are installed in a different folder that depends on the version of Windows :

Win XP = *C:\Documents and Settings\All Users\Application Data\MultiQC6\ File-link A*

Vista or Win 7 = *C:\ProgramData\MultiQC6\ File-link A*

By default, Windows hides the folders [C:\Documents and Settings\All Users\Application Data\](#) and [C:\ProgramData](#). To display these folders in the Windows Explorer you must check the box < Tool menu -> Folder options -> View tab -> Show hidden files and folders > .

Several analysers can send their QC files to a common shared folder and a common interface if all of the files have a common format. Otherwise you must download several file-link interfaces which are identified by different GUIDs in the registry of Windows. QCfiLnkB and QCfiLnkC are available for this purpose at [www.multiqc.com](http://www.multiqc.com). The three interfaces QC File-link, B and C are identical except the GUIDs (global unique identifiers) thanks to which MultiQC can recognize each one.

## 2.2. Transferring MultiQC and its file-link interface to another computer

- Install MultiQC on the new computer.
- Install QC File-link on the new computer. Two configuration files must be manually copied from the data folder of the source computer to the data folder of the destination computer :
- QC File-link.ini : the content of the tab <Parameters>.
- QC File-link.dat : the content of the tab <Communication>.

Thus the interface will immediately be ready to work without having to re-enter analytes or communication parameters.

## 3. Main Window

In routine work, the QC file-link interface stays iconized in the Windows taskbar. QC File-link has to be restored only to enter parameters or to check the transmission of data.

### 3.1. Tab Received data

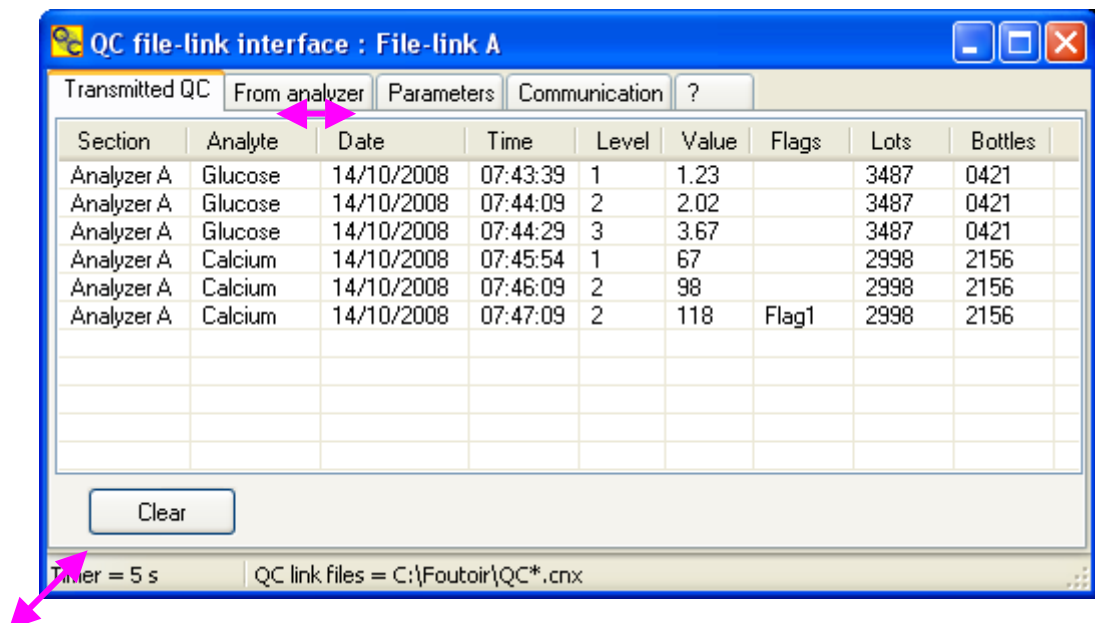
This panel shows the raw messages received from the analyser. Only the 100 latest lines are kept. The button <Clear> erases all the lines.

### 3.2. Tab Transmitted QC

This panel shows the latest 100 QC results sent to MultiQC.

↔ The window can be resized and the width of the columns adjusted.

The button <Clear> erases all the lines in the list view.



### 3.3. Tab Parameters

It is necessary to edit the parameters of the interface according to the format of the files to import. Parameters are dispatched in seven sections (between brackets). In the three first sections, you must only edit the right part of the =

➤ **[Interface]**

**Name** : Caption that is shown in the Windows taskbar and in the additional sub-menu that is created in MultiQC.

**Default section** : Name of the level 1 node of the tree view of MultiQC in which the analytes are grouped. This field is taken in account only if no section information is present in the link files.

➤ **[Fields]**

The link file is read by the interface as a table with one QC result per row. Nine fields tell the interface in which column of the table each item of information can be found.

**Analyte, QC material and Value** are mandatory.

**Section, Flag, Lot and Bottle** may be blank if not used.

**Date and Time** can have

- No argument : the current date/time of the computer is then adopted.
- One argument : It is the column number where each QC result has its own date/time.
- Two arguments : They are the coordinates of the cell (Column, Row) where to find a common date/time available in a specially dedicated row which is valid for all of the other rows containing the QC results.

It is a good practice to transmit the reagent **lot** and **bottle** numbers with every QC result. Thus MultiQC (v 6) can automatically flag the changes on the charts by a dedicated icon.

➤ **[Format]**

**Delimiter** : This is the character that separates the columns in each row of the table to import. Type in , ; / etc... If the separator is the <TAB> character, enter #9.

**Date** : Use only upper-case characters (Y for year, M for month, D for day). Some usual formats are MM/DD/YY, DD-MM-YYYY or YYYYMMDD.

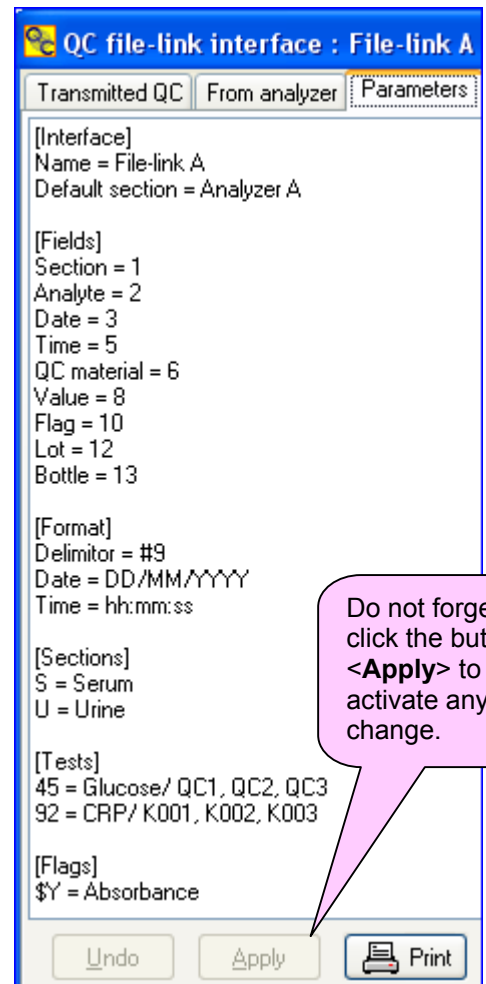
**Time** : Use only lower-case characters (h for hour, m for minutes, s for second and t for AM/PM). Some usual formats are hh:mm:ss, hh:mm (without seconds) or hh:mm:ss tt (with AM/PM).

If date and time are located in the same field, enter two same numbers as [Fields] date and time and two same strings as [Format] date and time. Some usual formats are YYYYMMDDhhmmss or DD/MM/YY hh:mm:ss tt.

➤ **[Tests]**

Each line is made of 3 items of information

- Strings before '=' are the test identifiers as written in the shared QC file.
- The first word after '=' is the name of test you wish to see in MultiQC.
- The words after the '/' is the list of the QC materials identifiers in the order of the control levels.



### ➤ [Sections]

Lists of section identifiers with their relevant “translation” to a user-friendly name. If a section identifier has no translation it is used as is in MultiQC.

### ➤ [Flags]

Lists of flags with their relevant “translation” to a user-friendly name. If the list is left blank, all of the flags are transmitted ‘as is’ to MultiQC, else only translatable flags are transmitted.

The maximum length for a section name is 12 characters.  
The maximum length for a test name is 12 characters.  
The maximum length for a comment is 40 characters.

### ➤ Buttons

**Apply** : To activate changes.

**Undo** : To cancel the latest entries.

**Print** : To keep a printed record of the connexion parameters

## 3.4. Tab Communication

Refer to the picture in section 1.1. Do not forget to click on the button <Apply> when editing is finished.

The status bar at the bottom of the window shows the current communication parameters.

## 4. Examples of shared files

QC File-link is designed to import tables with one QC assay per row and stored in “text files”. The field separator, the order of the fields, the format of date and time can be customized in the tab <Parameters> of the program. Four examples show how it works.

### 4.1. Example 1

The left hand table is made of 5 rows and 3 columns.

54, QC1, 5.7  
54, QC2, 8.9  
87, QC1, 142  
87, QC3, 167  
Blah, blah, blah

- The separator is a comma
- The test identifier is in column 1 (54 and 87)
- The QC material identifier is in column 2 (QC1, QC2 and QC3)
- The result of assays is in column 3 (5.7, 8.9 ....)

The parameters of QC File-link are set accordingly.

- [Interface] -> default section = Analyser A  
There is no section information in the QC file : the analytes will be all grouped in MultiQC under Analyser A

### Parameters

#### [Interface]

Name = Demo  
Default section = Analyser A

#### [Fields]

Section =  
Analyte = 1  
Date =  
Time =  
QC material = 2  
Value = 3  
Flag =

#### [Format]

Delimiter = ,  
Date =  
Time =

#### [Sections]

#### [Tests]

54 = Glucose/ QC1, QC2  
87 = Sodium/ QC1, QC2, QC3

#### [Flags]

- *[Fields]* -> *Analyte = 1, QC material = 2, Value = 3*  
QC File-link will search for identifiers of **analytes** and **QC materials** and for **concentrations**, respectively in columns **1, 2** and **3**.
- *[Format]* -> *Delimiter = ,*  
The delimiter of fields in a row is a **comma**.
- *[Tests]* -> *54 = Glucose/ QC1, QC2*  
The test **54** will be named **Glucose** in MultiQC and the control materials identified by **QC1** and **QC2** will be plotted respectively as QC levels **1** and **2**.
- *[Tests]* -> *87 = Sodium/ QC1, QC2, QC3*  
The test **87** will be named **Sodium** in MultiQC and the control materials identified by **QC1, QC2** and **QC3** will be plotted respectively as QC levels **1, 2** and **3**.

The fifth row of the table **blah, blah, blah** is ignored because the first **blah** is not a registered test identifier and the third **blah** is not a floating number.

Upon reception by MultiQC, data are stored in a pending queue, waiting for validation.

Section	Test	Date	Time	QC 1	QC 2	QC 3	Comment
Analyzer A	<b>Glucose</b>	01/05/2007	10:44:15	● 5,7	● 8,9		
Analyzer A	<b>Sodium</b>	01/05/2007	10:44:41	● 142		● 167	

Computer date and time

## 4.2. Example 2

This table has 2 additional columns.

U, 54, QC1, 5.7
U, 54, QC2, 8.9, \$Y
S, 87, QC1, 142
S, 87, QC3, 167

- Column 1 contains an indicator of the kind of sample which may be used to create two sections in MultiQC for serum and urine tests.
- Column 5 contains an analytical flag \$Y

The relevant parameters of QC File-link are set accordingly.

- *[Sections]* -> *U = Urine*  
The identifier **U** will be translated into **Urine** in MultiQC
- *[Sections]* -> *S = Serum*  
The identifier **S** will be translated into **Serum** in MultiQC
- *[Flags]* -> *\$Y = Reagent low*  
The flag **\$Y** will be translated into **Reagent low** in MultiQC

<b>Parameters</b>
<b>[Fields]</b>
Section = 1
Analyte = 2
Date =
Time =
QC material = 3
Value = 4
Flag = 5
<b>[Sections]</b>
U = Urine
S = Serum
<b>[Tests]</b>
54 = Glucose/ QC1, QC2
87 = Sodium/ QC1, QC2, QC3
<b>[Flags]</b>
\$Y = Reagent low

Upon reception by MultiQC, data are stored in a pending queue, waiting for validation.

Section	Test	Date	Time	QC 1	QC 2	QC 3	Comment
Serum	Sodium	01/05/2007	07:30:12	● 142		● 167	
Urine	Glucose	01/05/2007	07:30:45	● 5,7	● 8,9		Reagent low

### 4.3. Example 3

The previous examples have no time information. By default the current date and time of the computer is adopted by MultiQC. Below is an example where the actual date and time of every assay are available in columns 3 and 4. Note that each row has its own date and time.

The parameters of QC File-link are shown below

- *[Fields]* -> *Date = 3, Time = 4*  
QC File-link will search for dates and times respectively in columns 3 and 4.
- *[Format]* -> *Date = DD/MM/YYYY, Time = hh:mm:ss*

U, 54,	21/11/2004, 08:05:00,	QC1, 5.7
U, 54,	21/11/2004, 08:05:10,	QC2, 8.9
S, 87,	21/11/2004, 08:05:15,	QC1, 142
S, 87,	21/11/2004, 08:05:20,	QC3, 167



Parameters
<b>[Format]</b>
Delimiter = ,
Date = DD/MM/YYYY
Time = hh:mm:ss
<b>[Fields]</b>
Section = 1
Analyte = 2
Date = 3
Time = 4
QC material = 5
Value = 6
Flag =

### 4.4. Example 4

Sometimes the imported table has a unique cell with one date and one time which are valid for every row of QC data.

The parameters of QC File-link are set accordingly.

- *[Fields]* -> *Date = 4,1, Time = 4,1*  
The common date and the common time are found in a unique cell (column 4, row 1).
- *[Format]* -> *Date = MM/DD/YY hh:mm tt*  
*Time = MM/DD/YY hh:mm tt*

Blah, blah, blah,	6/21/07 10:34 AM
54, QC1, 5.7	
54, QC2, 8.9	
87, QC1, 142	
87, QC3, 167	
Blah, blah, bla	



Parameters
<b>[Format]</b>
Delimiter = ,
Date = MM/DD/YY hh:mm tt
Time = MM/DD/YY hh:mm tt
<b>[Fields]</b>
Section =
Analyte = 1
Date = 4, 1
Time = 4, 1
QC material = 2
Value = 3
Flag =

## 5. Receiving QC data in MultiQC

### 5.1. Starting and stopping MultiQC

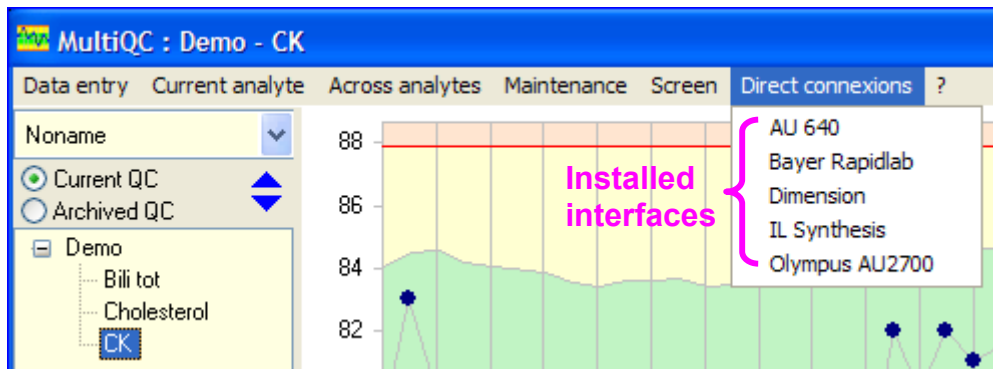
The QC file-link interface is never directly launched or closed. It works as a COM server under control of MultiQC. The interface program is automatically launched or closed when MultiQC is launched or closed. Any action that would close a normal program (click in the Windows close-box or key Alt+F4) only iconizes the file-link interface.

After launching MultiQC, you can check that the installed interfaces are running

- They are present in the Windows taskbar as icons



- New sub-menus are added to the main menu of MultiQC **Direct connexions**.

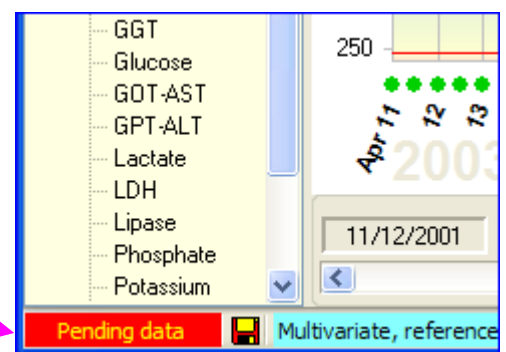


Click on the icon of the taskbar or on the relevant menu to restore the file-link interface.

### 5.2. Arrival of QC data

Received QC data are piled up in the pending queue of MultiQC waiting for validation. As soon as one result has been transmitted, warnings are activated:

- The icon in the taskbar blinks blue/orange (only Windows XP).
- When MultiQC is active, the left panel of the status bar blinks red/yellow.



### 5.3. Assembling QC vectors

In multi-level QC, materials are sequentially assayed by the analyser. For each analyte it is necessary to lump together the different QC levels in a unique vector. This is made on a time interval basis. QC levels are associated in the same QC vector if the time interval between the assays is less that the limit entered in MultiQC :

- Menu : [Configure](#)→[Miscellaneous](#)
- Tab : General
- Field : Max time interval between levels (default 5 minutes)

When rebuilding a QC vector with separate QC values, the final time is the time of the earliest QC value.

Do not start validation before all the QC levels have been received

#### **5.4. Validating QC data**

Click on the yellow/red blinking panel of MultiQC and proceed as indicated in the user manual of MultiQC.

If the name of an analyte is unknown by MultiQC, a new analyte is automatically created with default parameters. Later, you will have to enter the appropriate parameters through the main menu [Configure](#)→[Analytes](#).