

# Agilent LC Firmware

## Background information

Status: August 2017

# Overview

The following slide deck provides background information to

- Customers
- Partners
- Non-Agilent Chromatographic Data System providers

About Agilent's LC Firmware:

- What is Firmware and the Agilent Concept?
- What are firmware sets?
- Emulation Modes
- CAN port handling
- Where to get firmware
- Which tools to use for firmware updates

# When is Firmware Update/Downgrade required?

- New features are added
- Bug fixes solve problems
- Compatibility issues
  - New module added to an existing system
  - New hardware (e.g. optical unit, RFID tag)
- Control software
  - for example, ChemStation Classic Driver update to RC.NET
- Due to customer requirements
  - Regulated lab
  - All firmware must be on the same set

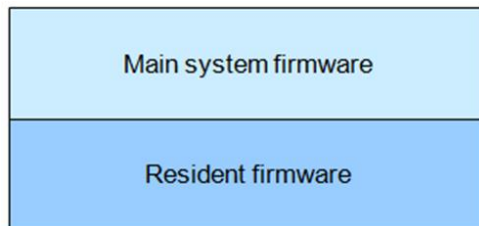
The screenshot shows the DAD/FLD software interface. At the top, there are two tabs: 'DAD' and 'FLD'. Below the tabs, there are status indicators: 'Offline' and 'EMF' with a question mark, and 'Not Ready' with a checkmark. A red box highlights a 'Firmware version mismatch' error message with a graph icon. Below the error message, there are icons for a light bulb, a lamp, a motor, and a connector. At the bottom, there is a logbook window titled 'Current Logbook File INSTR1.LOG' with the following data:

Module	#	Event Message	Date	Time
CP Macro		Loading Sequence DEF_LCS	07/15/10	12:57:50
Method		Loading Method DEF_LCM	07/15/10	12:57:48
Logbook		Welcome to ChemStation	07/15/10	12:57:40
G1321A	1	G1321A:DE92991563 - Economy mode off	07/15/10	12:57:37
G1321A	1	G1321A:DE92991563 - Lamp energy reference mode on	07/15/10	12:57:37
G1321A	1	G1321A:DE92991563 - UV lamp off	07/15/10	12:57:37
G1321A	1	G1321A:DE92991563 - No 3D-scan in progress	07/15/10	12:57:37
G1362A	1	G1362A:DE91600336 - Purge off	07/15/10	12:57:35
G1362A	1	G1362A:DE91600336 - Recycle off	07/15/10	12:57:35
G1362A	1	G1362A:DE91600336 - Heater turned off	07/15/10	12:57:35
G1315C	1	G1315C:DE60755000 - Firmware version mismatch [Required revision is B.06.30 [006], current revision is B.06.25 [003]]	07/15/10	12:57:35
G1315C	1	G1315C:DE60755000 - VIS lamp: OFF	07/15/10	12:57:35
G1315C	1	G1315C:DE60755000 - UV lamp off	07/15/10	12:57:35
G1315C	1	G1315C:DE60755000 - Detector: Idle	07/15/10	12:57:35

# Firmware – What is it?

## Required to operate LC modules

- The firmware of the instrument consists of two independent sections:
  - a non-instrument specific section, called **resident system**
  - an instrument specific section, called **main system**



→ unique functions for each module ,type‘.

→ common functions, same for all modules



→ Resident update in ‘normal’ mode.

→ Main update in ‘resident mode’ with flashing status LED

# Firmware concepts

Firmware of a module always consists of a main and a resident version. The resident version gets updated in main mode and vice-versa.

There are four platforms:

- Leonardo: „A“ firmware. Oldest platform, no LAN on-board, slot for LAN-card , (except G1316 TCC)
- Nucleus: „B“ firmware. LAN on-board, eight bit configuration switch
- Hosted modules: „C“ firmware, just two CAN connectors, two bit configuration switch
- Fusion: „D“ firmware. LAN on-board, mini USB port, ERI connector, six bit configuration switch

→ Platforms are not related to the model number in any way, e.g. G1311B is a Leonardo based module and will always have „A“ firmware. G4220A is a Nucleus based module and will always have „B“ firmware

# LAN Host

The LAN host is the module that provides the interface via LAN to the PC with the Operating and Control Software (CDS)

Rule:

- The standard recommendation is to use the detector as the LAN host, if it is part of the system (DAD/MWD, FLD, VWD, RID – in this order if multiple detectors are used).

Reason:

- Detectors have a higher data load than pumps and autosamplers.

Since the CAN communication limits are the same for Nucleus and FUSION, the above rule should be used for:

- Pure Nucleus systems
- Pure FUSION systems
- Mixed systems (including those where a G1369 LAN card is in a Leonardo detector).

If no Agilent detector is part of the system, then the pump should be used.

# Firmware sets

Set	Range
Release_A.06.02-B.01.02	Up to (theoretical) X.06.09
Release_A.06.10-B.06.10	Up to (theoretical) X.06.29
Release_A.06.30-B.06.30	Up to (theoretical) X.06.49
Release_X.06.50	Up to (theoretical) X.06.99
Release_X.07.X	Current set

Theoretically, e.g. Set 6.30 could contain FW version up to revision 6.49 for some modules. This doesn't mean that these versions exist for all modules.

# Emulation

	<b>G1315C</b>	<b>DAD SL</b>	Signal A [mAU]	114.395
	Serial #	DE60755000	UV Lamp	Lamp off
	Firmware:	B.07.10 [0004]	VIS Lamp	VIS lamp off

▼ **Controls**

▼ Control

Balance Detector

UV Lamp:  Off  On  Initializing    Vis Lamp:  Off  On

▼ **Method Parameters**

Set Data Rate [Hz] 2.5[Hz]-2[sec]     Set Data Rate [Hz] 2.5[Hz]-2[sec]


Set Signal A				Set Signal B				Set Signal C			
Wavelength	Bandwidth	Ref.	Ref. BW	Wavelength	Bandwidth	Ref.	Ref. BW	Wavelength	Bandwidth	Ref.	Ref. BW
250	100	360	100	254	16	360	100	210	8	360	100
<input type="button" value="Send"/>				<input type="button" value="Send"/>				<input type="button" value="Send"/>			

▶ **Advanced Method Parameters**

▶ **Configuration**

▶ **Special Commands**

▼ **Conversions**

	<b>G1315D</b>	<b>DAD</b>	<b>- Original Type: G1315C</b>
	Serial #	DE60755000	- No Flow Cell Info
	Firmware:	B.07.10 [0004]	- UV Lamp (Product# 2140-0820, Serial# 655139)
			- LAN Settings (IP: 134.40.120.216 '0030D30A0838', SM: 255.255.254.0, GW: 134.40.120.1, MAC: 0030D30A0838, Init Mode: Dhcp)
			...

LabAdvisor will only display valid emulations. The emulated module only simulates a different model number. Internally the so called „original type“ (= o-type) always remains, so a quaternary G1311B pump, which is emulated to G1311A, will always use G1311**B** firmware.



# Emulation / Compatibility Mode – Lab Advisor

## Original Type

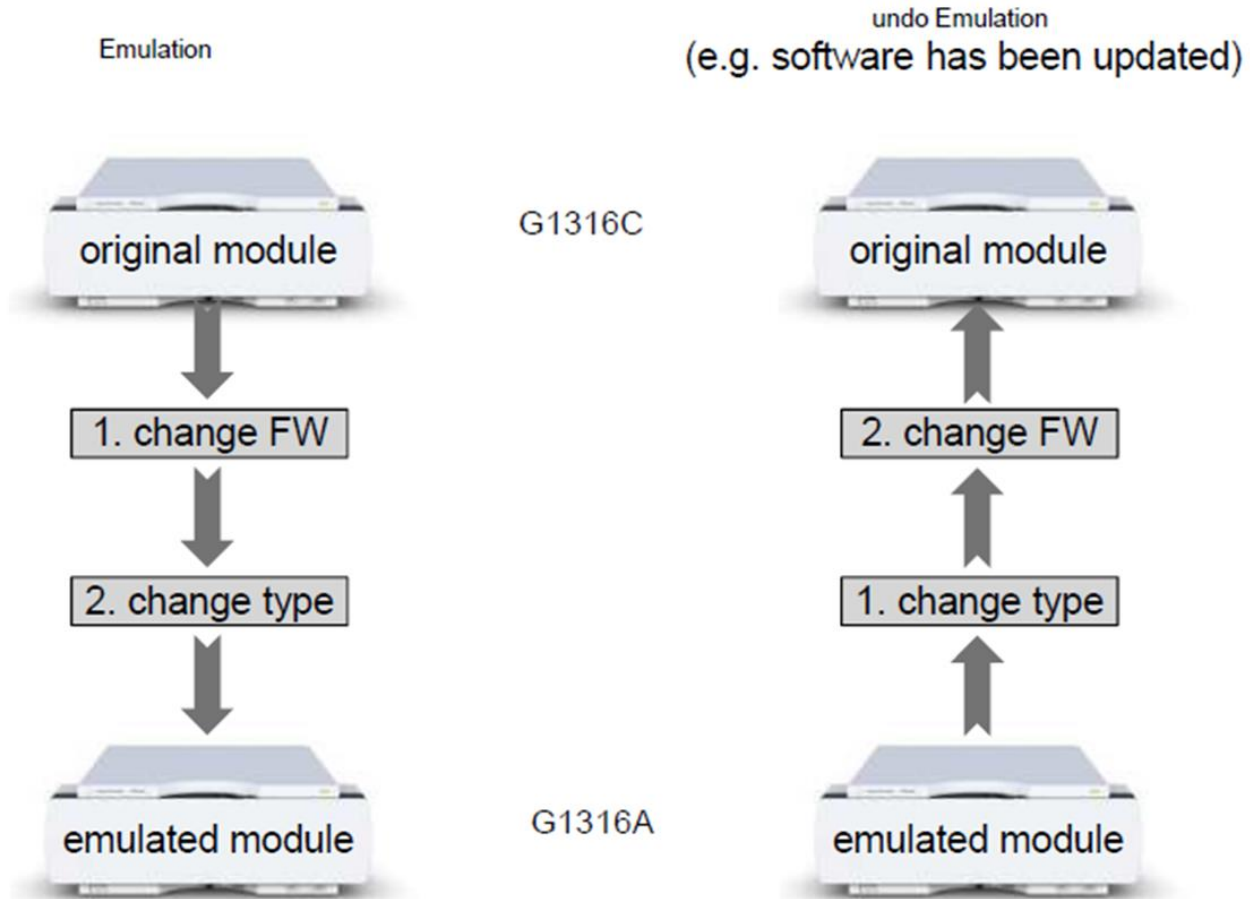
- The Original Type can not be displayed on all modules. This depends on the module type and main board.

The screenshot displays the Agilent Lab Advisor interface for 'FLD\_Training'. The 'System Overview' section shows a table of modules with the following data:

System Name	System Information	EMF	Status
FLD_Training	Agilent LC / 10.10.10.103	EMF ✓	Idle
<b>G1312B</b>	<b>BinPump SL</b> Serial # DE63057449 Firmware: A.06.32 [011] - Solvent Selection Valve - Seal Wash Pump	EMF ✓	
<b>G1367A</b>	<b>WPS</b> Serial # DE60555207 Firmware: A.06.34 [008] - Original Type: G1367C - No Tray installed - Syringe Tag (Size 100 µl)	EMF ?	
<b>G1316B</b>	<b>TCC SL</b> Serial # DE60555281 Firmware: A.06.32 [005] - 6-Port Column Switching Valve	EMF ✓	
<b>G1315C</b>	<b>DAD SL</b> Serial # DE54200422 Firmware: B.06.40 - No Flow Cell Info - UV Lamp (Product# 2140-0820, Serial# 633842) - LAN Settings (IP: 10.10.10.103 '10', SM: 255.255.255.0, GW: 0.0.0.0, MAC: 0030D30A18CF, Init Mo...	EMF ✓	

# Emulation / Compatibility Mode

## Mechanism



Note: if you need to update the firmware on an emulated module, e.g. G1316C emulated to G1316A or G1316B – you need to bring the module back to the original type to update the firmware.

# Specialty “Hosted modules”

These modules cannot exist on their own. They always require a suitable host. Without the host, they will lapse into resident mode, which very likely does not indicate a hardware fault.

Suitable modules are on Nucleus- (B-firmware) and Fusion- (D-firmware) based modules! This includes the G1369C LAN Card.

Each Nucleus/Fusion based module can host up to three hosted modules. Even though the 1120/1220 Compact LC has a Nucleus-based main board, it can only host one hosted module.

# Fabricated scenario

## G1170A installation on an existing 1100 system

Module	Platform
G1311A	Leonardo → A firmware
G1329B	Leonardo → A firmware
G1330B	No FW at all
G1316A	Leonardo → A firmware
G1321A	Leonardo → A firmware

No suitable host present – G1170A will fall into resident mode

# Fabricated scenario

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G1321A	Leonardo → A firmware
<b>→ Solution</b> G1369C (This card is compatible to G1369A and G1369B, but it's the first card with a CAN port)	Has B firmware (main and resident) and can create an artificial Nucleus host

- Firmware on the entire stack has to be on the same level; ideally the latest versions are used
- Firmware of the G1369C has to match the firmware of the rest of the system

# Fabricated scenario

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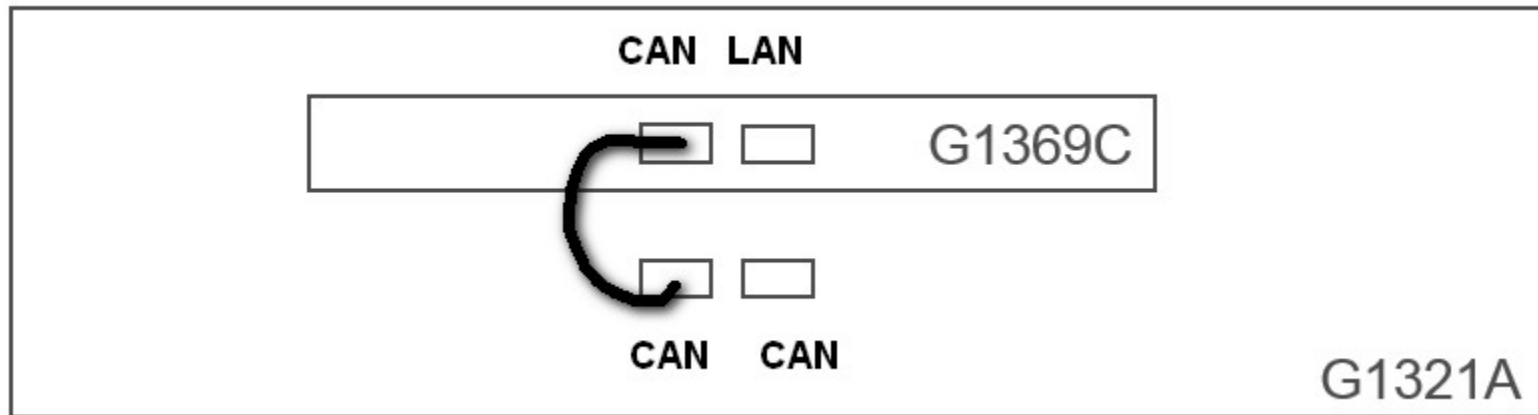
Latest firmware on the LC stack, the G1170A and on the G1369C card – and the G1170A red LED is still blinking? You may have a firmware mismatch (main and/or resident) and the CAN Slaves fall into Resident Mode.

As long as the CAN slave can be updated, a hardware defect of the Slave is unlikely.

# Fabricated scenario

## G1170A installation on an existing 1100 system

**Check the cables – there is only one correct setup!**



Note: As previously mentioned, each Nucleus/artificial Nucleus or Fusion host can host up to three hosted modules. In case there are more, more hosts are required, e.g. another G1369C card.

Note: A hosted module can be connected to any free CAN port.

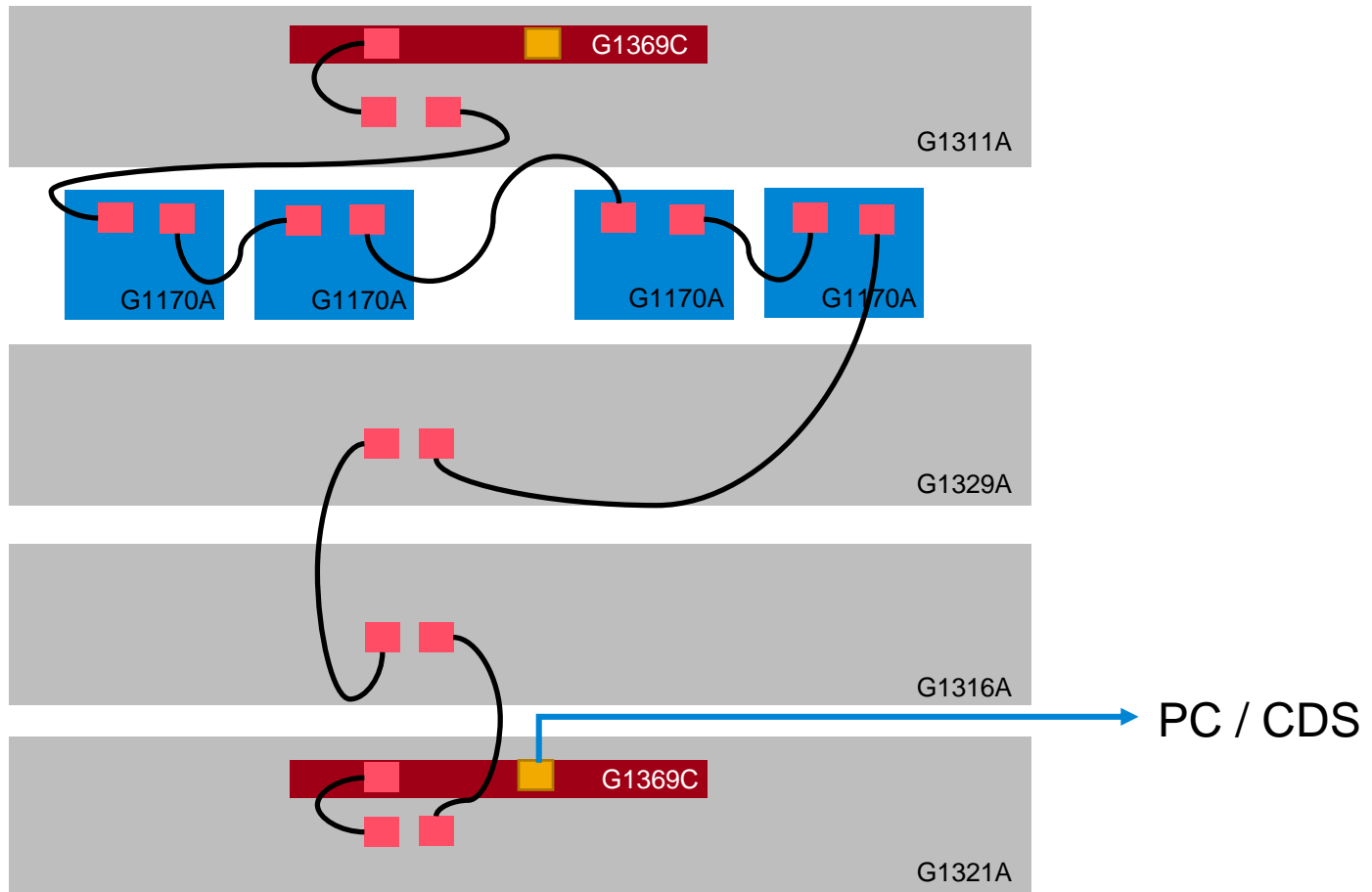
# Fabricated scenario

## G1170A installation on an existing 1100 system

More than one G1369C – running out of CAN ports?

■ CAN Ports

■ LAN Ports





# Fabricated scenario

## G1170A installation on an existing 1100 system

You don't deal with external valves, so you're not affected by hosted modules? 😊

No, sooner or later you will come across hosted modules:

- G4227A Flexcube
- G1170A Valve Drive
- G1390B Universal Interface Box II
- G7116A/B Multi Column Thermostat
- G7166A Prep Valve Fraction Collector

...and there will be more...

# Agilent LC Firmware Set Interoperability and Support Statement

- Agilent releases LC firmware updates for so-called "firmware sets".
- All Agilent LC instrument firmware sets have been designed and tested to be truly and strictly backward compatible for the installed software base (CDS).
- The latest module firmware contained in each set is fully compatible and interoperable with all other module firmware of the same set.
- Agilent always recommends using the latest module firmware revision of a firmware set in order to avoid interoperability issues.
- Generally Agilent always recommends keeping the LC instrument firmware current.
- Do not mix firmware revisions between different sets. Agilent does not guarantee operation of mixed firmware revisions from older or newer sets.
- If you have to document the firmware revision (for validation purposes) please use the term "Revision XXX or later" or "Firmware from Set XX or later". This may help in case of required updates due to malfunctions that have been corrected in later releases.

# Agilent LC Firmware Set Interoperability and Support Statement – Additional Notes

## Notes about Agilent LC instruments controlled by non-Agilent Chromatography Data Systems (CDS):

- The 3rd-party CDS software vendor is responsible for compatibility testing with the respective CDS revision.
- The 3rd-party CDS software vendor defines the minimum firmware revision required for CDS compatibility.
- The 3rd-party CDS release notes issued by the respective CDS vendor may use different terminology for the firmware requirements such as "tested firmware" "supported firmware" "firmware requirements" "minimum tested firmware" etc.
- An Agilent LC instrument running a current firmware set is fully supported as long as it meets or exceeds the minimum firmware requirements specified by the 3rd-party CDS software vendor and meets Agilent's firmware set/firmware interoperability requirements.

# Where to get firmware?

Available on Agilent web site:  
<http://www.agilent.com/en-us/firmwareDownload?whid=69761>

- Firmware for Download
- Firmware Update Guide includes instructions how to perform the firmware update
- Firmware Bulletin listing all changes

**Firmware Download**

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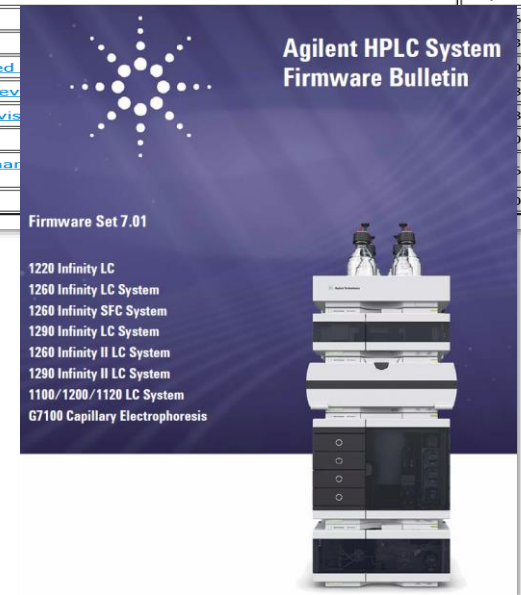
**LC/CE Firmware News and Downloads**

Topic	LC/CE Firmware News / Downloads / Procedures
Last update	June 23, 2017
Questions related to LC Firmware?	<a href="#">Ask your question</a>

**Firmware Download Section**

**NOTE: The selected files are downloaded as ZIP archive. If you get an error (e.g. error in packed file or zipped file is invalid or similar) use an actual archive program like WINZIP, WINRAR or 7-ZIP or similar to extract the files.**

Description	Modified
<a href="#">RFID Tag Information - Important for all users!</a>	02/10/2017
<a href="#">Firmware Update Tools &amp; Procedures</a>	11/30/2016
<a href="#">1200 Infinity Emulation/Special Firmware</a>	01/20/2016
<a href="#">Local Control Modules (G4208A, G1323A/B)</a>	05/2016
<a href="#">Set 7.01 (A/B/C/D.07.xx) + Patches (current revision)</a>	05/2017
<a href="#">Set 6.50 (A.06.5x and B/C/D.06.8x) + Patches (supported revisions)</a>	07/2016
<a href="#">Set 6.30 (A.06.3x and B/C.06.4x + Patches (supported revisions)</a>	08/2016
<a href="#">Binary</a>	07/2016
<a href="#">Binary</a>	05/2017
<a href="#">Binary</a>	07/2016



# Firmware – Update Tools

- **Agilent Lab Advisor** software (**recommended tool**)
  - Via LAN, RS-232, USB (Infinity II FUSION modules)
- **Instant Pilot G4208A** with USB-Flash Drive
  - Via CAN
- Available on Agilent FW Download page  
<http://www.agilent.com/en-us/firmwareDownload?whid=69761>