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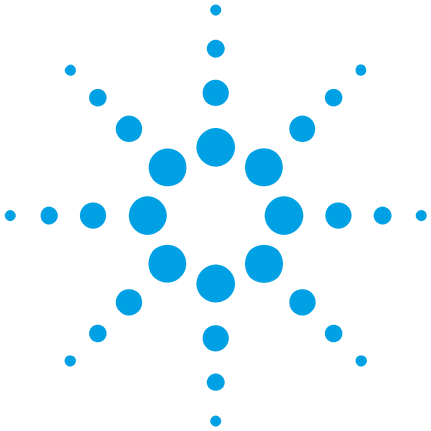
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User Manual

Agilent Acqiris

12-bit Digitizers

Models covered:

DC440, DC438, DC436 U1066A

DP310, DP308, and DP306 U1070A



Agilent Technologies

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KEYSIGHT TECHNOLOGIES

Manual Part Number

U1092-90005

Edition

C-Rev N, May 2012

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1. Out of the Box

1.1. Message to the User

Congratulations on having purchased an Agilent Technologies Acqiris data conversion product. Acqiris digitizers are high-speed data acquisition modules designed for capturing high frequency electronic signals. To get the most out of the products we recommend that you read this manual carefully. We trust the product you have purchased will meet with your expectations and provide you with a high quality solution to your data conversion applications.

1.2. Using this Manual

This guide assumes you are familiar with the operation of a personal computer (PC) running a Windows 2000/XP/Vista/7 (32/64) or other supported operating system. It also assumes you have a basic understanding of the principles of data acquisition using either a waveform digitizer or a digital oscilloscope.

The manual is divided into 5 separate sections. To understand the elements of operation for the module it is essential that you read them all.

Chapter 1 ***OUT OF THE BOX,*** describes what to do when you first receive your new Acqiris product. Special attention should be paid to sections on safety, packaging and product handling. Before installing your product please ensure that your system configuration matches or exceeds the requirements specified.

Chapter 2 ***INSTALLATION***, covers all elements of installation and performance verification. Before attempting to use your Acqiris product for actual measurements we strongly recommend that you read all sections of this chapter.

Chapter 3 ***PRODUCT DESCRIPTION***, provides a full description of all the functional elements of the digitizer.

Chapter 4 ***RUNNING THE AGILENT Soft Front Panel applications***, describes the usage of the MD1 SFP applications.

For information necessary for writing your own software to control Acqiris products you should refer to the **Programmer's Guide** and the **Programmer's Reference Manual**.

1.3. Conventions Used in This Manual

The following conventions are used in this manual:

⚠ This icon to the left of text warns that an important point must be observed.

WARNING Denotes a warning, which advises you of precautions to take to avoid being electrically shocked.

CAUTION Denotes a caution, which advises you of precautions to take to avoid electrical, mechanical, or operational damages.

NOTE Denotes a note, which alerts you to important information.

Italic text denotes a warning, caution, or note.

Bold Italic text is used to emphasize an important point in the text or a note

`mono` text is used for sections of code, programming examples and operating system commands.

B,KB,MB,GB is for Byte, KiloByte = 1024 bytes, MegaByte = 1024*1024 bytes, GigaByte = 1024*1024*1024 bytes

1.4. Model Names

Agilent Technologies Inc. acquired Acqiris SA and its product lines in December 2006. Use the tables below to cross reference the legacy model name and new Agilent numbers. The legacy model name is what is used in the Acqiris applications and the API.

Agilent Model Number	Acqiris Model Name
N.A.	DC436
U1066A-002	DC438
U1066A-001	DC440
U1070A-003	DP306
U1070A-002	DP308
U1070A-001	DP310

1.5. Disclaimer and Safety

The DP Series 12-bit PCI digitizer cards have been designed to operate in a standard PCI slot found inside most personal computers. The DC Series 12-bit CompactPCI/PXI digitizers have been designed to operate inside a CompactPCI/PXI crate. The crate provides the modules with all needed power. Agilent does not recommend operation of the DC modules outside of a CompactPCI/PXI crate.

⚠ ***CAUTION:*** ***Do not exceed the maximum input voltage rating! The maximum input voltage for the BNC channel inputs is ±10 V. The maximum input for the SMA channel inputs is ±15 V (dc) + 2 V rms (ac) and the trigger BNC is ±5 V (dc + ac).***

1.6. Warning Regarding Medical Use

The Digitizer cards are not designed with components and testing procedures that would ensure a level of reliability suitable for use in treatment and diagnosis of humans. Applications of these cards involving medical or clinical treatment can create a potential for accidental injury caused by product failure, or by errors on the part of the user. These cards are ***not*** intended to be a substitute for any form of established process or equipment used to monitor or safeguard human health and safety in medical treatment.

⚠ ***WARNING:*** ***The modules discussed in this manual have not been designed for making direct measurements on the human body. Users who connect an Acqiris module to a human body do so at their own risk.***

1.7. Packaging and Handling

Your Digitizer is shipped with the following components:

- A compact disc in an Agilent Technologies paper CD envelope that includes
  - 10 product User Manuals in electronic form (8-bit Digitizers, 10-bit Digitizers, 12-bit Digitizers, Averagers, Analyzers, Signal Analyzers, Streamer Analyzers, Time-to-Digital Converters, 3-, 5-, and 8-slot CompactPCI Crates, and the 21-slot CompactPCI Crate),
  - 1 Programmer's Guide and 1 Programmer's Reference Manual,
  - device drivers with sample software for different operating systems, environments and languages,
  - the Analyzer Demo application, a demonstration program for the AC/SC Analyzer products,
  - the AcqirisLive application, a demonstration program for our digitizer and averager products,
  - the SSR Demo application, a demonstration program for the Acqiris AP235/AP240 Analyzers,
  - the APX01 Demo application, a demonstration program for the Acqiris AP101/AP201 Analyzers,
  - the TC Demo application, a demonstration program for the Acqiris TC840/TC842/TC890 Time-to-Digital Converters,
  - full installation procedures for use with Microsoft Windows, National Instruments LabVIEW RT, Wind River VxWorks, IVI-COM/C, and Linux software.

- A declaration of conformity
- Optional documentation such as a model-dependent document giving Specifications & Characteristics, a Calibration Certificate, or a Performance Verification

After carefully unpacking all items, inspect each to ensure there are no signs of visible damage. Also check that all the components received match those listed on the enclosed packing list. Agilent cannot accept responsibility for missing items unless we are notified promptly of any discrepancies. If any items are found to be missing or are received in a damaged condition please contact the Agilent service center or your local supplier immediately. Retain the box and packing materials for possible inspection and/or reshipment.

1.8. Warranty

All Agilent Acqiris Digitizer products are warranted to operate within specification, assuming normal use, for a period of at least one year from the date of shipment. Units sold before April 2008 had three year warranties, as do some more recent ones; in case of doubt examine your invoice. It is recommended that yearly factory calibration be made in order to verify product performance. All repairs, replacement and spare parts are warranted for a period of 3 months. Warranty extensions are available as an option.

Agilent endeavors to provide leading edge technology that includes the latest concepts in hardware and software design. As such software and firmware used with the products is under continual refinement and improvement. All software and instrument firmware is supplied “as is” with no warranty of any kind. Software and firmware is thoroughly tested and thought to be functional at the time of shipment. At Agilent’s discretion software and firmware may be revised if a significant operational malfunction is detected.

In exercising this warranty, Agilent will repair or replace any product returned to the Agilent service center, within the warranty period. The warranty covers all defects that are a result of workmanship or materials. This excludes defects that are caused by accident, misuse, neglect, or abnormal operation.

The purchaser is responsible for returning the goods to the nearest Agilent service center. This includes transportation costs and insurance. Agilent will return all warranty repairs with transportation prepaid.

1.9. Warranty and Repair Return Procedure, Assistance and Support

Agilent acquired Acqiris SA and its product lines in December 2006. Please contact your nearest Agilent Service Center before returning any product for repair.

You can find information about technical and professional services, product support, and equipment repair and service on the Web, see http://www.agilent.com/find/service (or http://www.agilent.com/ and after selecting your country click on **Contact Us**). The service center will ask for your name, company, phone number and address, the model and serial numbers of the unit to be repaired, and a brief description of the problem.

Before issuing a Service Order the service center may ask you to communicate with us by phone or eMail so that we can learn as much as needed about the problems observed. If a unit returned under guarantee is found to be working normally and this procedure was not followed we reserve the right to charge you for the work done.

For your nearest customer support center please contact Acqiris Technical Support (ACQIRIS_SUPPORT@agilent.com) or come visit our web site at http://www.agilent.com/find/acqiris. Alternatively, contact Acqiris at 1-800 829-4444 in the USA, +41 22 884 32 90 in Europe or +61 3 9210 2890 in the Asia-Pacific region. The Agilent Support Centers can also help redirect you for any questions concerning the installation and operation of your equipment.

1.10. Transport & Shipping

CAUTION: ***Cards can be safely transported in their original shipping packages. DC cards can be transported when properly mounted in a CompactPCI crate. The transport of DP cards mounted in a PC is a more delicate issue. Because of their mass the cards can vibrate loose unless they are properly secured and braced. DP cards held only in the front and on the bottom should not be shipped in their PC. However, properly mounted DP cards with XP103 or XP105 fans can be sufficiently well held; the Adjustable retainer must be used so as to hold the card in place.***

To package the instrument for shipping:

Step	Notes
1. Place the instrument in its original packaging materials.	• If the original packaging materials are not available, use a professional packaging service. Contact your Agilent Service Center for more information.
2. Surround the instrument with at least 3 to 4 inches (8 to 10 cm) of its original packing material or bubble-pack to prevent the instrument from moving in its shipping container.	
3. After wrapping it with packing material, place the instrument in its original shipping container or a strong shipping container that is made of double-walled corrugated cardboard with 159 kg (350 lb) bursting strength.	• The shipping container must be large and strong enough to accommodate your instrument and allow at least 3 to 4 inches (8 to 10 cm) on all sides for packing material.
4. Seal the shipping container securely with strong nylon adhesive tape.	
5. Mark the shipping container "FRAGILE, HANDLE WITH CARE" to help ensure careful handling.	
6. Use the address obtained from your Agilent Service Center.	
7. Retain copies of all shipping papers.	

CAUTION: ***Damage can result if the original packaging materials are not used. Packaging materials should be anti-static and cushion the instrument on all sides. NEVER USE STYRENE PELLETS IN ANY SHAPE AS PACKAGING MATERIALS. They do not adequately cushion the instrument or prevent it from moving in the shipping container. Styrene pellets can also cause equipment damage by generating static electricity or by lodging in fan motors.***

1.11. Maintenance

The cards do not require any maintenance. There are no user serviceable parts inside. A periodic factory calibration can be obtained on request.

1.12. Cleaning

Cleaning procedures consist only of exterior cleaning.

Clean the exterior surfaces of the module with a dry lint-free cloth or a soft-bristle brush. If any dirt remains, wipe with a cloth moistened in a mild soap solution. Remove any soap residue by wiping with a cloth moistened with clear water. Do not use abrasive compounds on any parts.



1.13. Disposal and Recycling

Electronic equipment should be properly disposed of. Acqiris digitizers and their accessories must not be thrown out as normal waste. Separate collection is appropriate and may be required by law.

2. Installation

This chapter describes how to install the hardware and software for Windows and Linux.

⚠ ***NOTE:*** *For a first time installation we strongly recommend installing the software* ***before*** *inserting the hardware into the PC.*

2.1. System Requirements

The following table lists the system configurations that Agilent have tested, and are therefore guaranteed to work. In general, any x86 or x64 (except Itanium) processor should work, but there may be a decrease in performance.

Topic	System Requirements		
	Windows XP SP3	**Windows Vista®** SP1 and SP2, **Windows 7®** (32 or 64-bit), All versions.	**Linux** kernel 2.6 or higher (32 or 64-bit), Debian 6.0, CentOS 5
Processor speed	600 MHz or higher required 800 MHz recommended	1 GHz 32-bit (x86) or 64-bit (x64), no support for Itanium64	As per the minimum requirements of the chosen distribution.
Available memory	256 MB minimum (1 GB or greater recommended)	1 GB minimum	As per the minimum requirements of the chosen distribution.
Available disk space [1]	1.5 GB storage space, which includes: 1 GB available for Microsoft .NET Framework 3.5 SP1 [2]		100 MB
Video	SuperVGA (800x600) 256 colors or greater	Support for DirectX 9 graphics with 128 MB graphics memory recommended (SuperVGA graphics is supported)	Does not require graphics (headless system). X Windows with 1280x1024recommended for SFP
Browser	Microsoft Internet Explorer 6.0 or later	Microsoft Internet Explorer 7 or later	Distribution supplied browser

LabVIEW: Full driver implementations are available for National Instruments LabVIEW versions 8.5, 8.2.1, and 8.0. LabVIEW 7.1 is frozen at the level of Acqiris Software 3.2 with support for all instruments.

MATLAB: The MEX interface can be used with MathWorks MATLAB 7.3 or a newer version.

Visual C++: The interface files, projects and examples are available for Microsoft Visual Studio 2008 / C++.

2.2. Installing the Software under Windows

The software is located on the Agilent MD1 High-Speed Digitizer Software and Product Information CD (M9210-90007).This software is also available for download at the Agilent website www.agilent.com/find/Digitizers

For a first time installation on your computer Agilent recommends that you install the software BEFORE installing the hardware on your system. When upgrading to a new version, you should leave your modules installed and powered during installation. Administrator privileges will be needed for software and hardware installation. This includes the case of first-time installation of a module in a different crate slot.

It is good practice to remove any previously installed version of the same Agilent software. However if the installation program finds that there is a conflict with software already installed on your machine a warning panel will appear.

[1] Note: Less storage space may be required for operation than is required for installation due to the process.

[2] Note: .NET Framework Runtime components are installed by default with Windows Vista. Therefore, you may not need this amount of available storage space.

Installation procedure:

1. From the Agilent MD1 High-Speed Digitizer Software and Product Information CD (M9210-90007) launch the installer.



2. The ‘U1084A Installation’ button provides the option to install the U10xx Digitizer products package to your PC. This includes Device drivers, Soft Front Panel applications and documentation for the Agilent Acqiris 8-Bit digitizer products which are covered by this manual.
3. After installation is complete, re-start the PC and install the hardware, or the chassis and the host PC if you are using a remote controller.

2.2.1. U10xx Digitizer Products Support

If the ‘U1084A Installation’ option has been selected during the installation process the following items will have been installed to your PC:

- **Drivers :** IVI-C, IVI-COM, and LabVIEW G for all modules.
- **Documentation** : A folder **..\Program Files\Agilent\U10xx_Digitizers\manuals** will be created.
- **Agilent MD1 Soft Front Panel 1.7** : This version specifically supports the U10xx Digitizer products and replaces the previous ‘AcqirisLive’ application, its functions and operation are virtually identical.
- **Examples :** For MatLab, C++, LabVIEW will be placed into the **..\Program Files\Agilent\U10xx_Digitizers** folder in the appropriate sub-folder.

2.3. Installing the Software for Linux

Please refer to the README file in the **/Linux** folder of the Software CD-ROM for detailed instructions on how to install the software for Linux systems.

2.4. Installing the Hardware

1. Turn off the power of the PC and the crate in the case of a CompactPCI module.

⚠ ***CAUTION:*** ***For PCI modules the PC may have to be unplugged to ensure that the PCI bus has no power available. However, CompactPCI crates can be left plugged in since this ensures proper grounding.***

⚠ ***CAUTION:*** ***Touch the antistatic package to a grounded object before removing the card from the package. Electrostatic discharge may damage the card.***

Be sure to ground yourself by touching the grounded frame and avoid touching any components on the card.

2. Module in a PC: open the PC, identify a free PCI slot and carefully insert the card into it. Make sure that the grounding of the card's mounting bracket to the back panel rail of the computer is done correctly. If present make sure that the fan's adjustable retainer is correctly positioned and tightened for mechanical support. Close the PC.

   Module in a CompactPCI crate: Follow the instructions of the crate manufacturer to insert the card into a free CompactPCI peripheral slot. Be sure to tighten both front panel mounting screws to lock the module into place and insure proper grounding of the frame.

⚠ ***NOTE:*** *To ensure the best possible performance, users of Agilent CC121 Crates with AS bus systems should respect the module placement rules to be found in the Agilent Acqiris 21-slot CompactPCI Crate User Manual.*

   PCI Bus extension module in a PC: Consult the manufacturer's documentation for any special instructions. Open the PC, identify a free PCI slot and carefully insert the card into it. Make sure that the grounding of the card's mounting bracket to the back panel rail of the computer is done correctly. Close the PC. Connect the module to the CompactPCI crate controller.

3. Turn on the power of the crate(s), if present, and then the PC and start the operating system.

⚠ ***NOTE:*** *Agilent Acqiris digitizers are equipped with a LED. If this LED is not glowing orange or red when the power is applied there is a severe problem. Either the module is broken or the necessary voltages for its use are not available.*

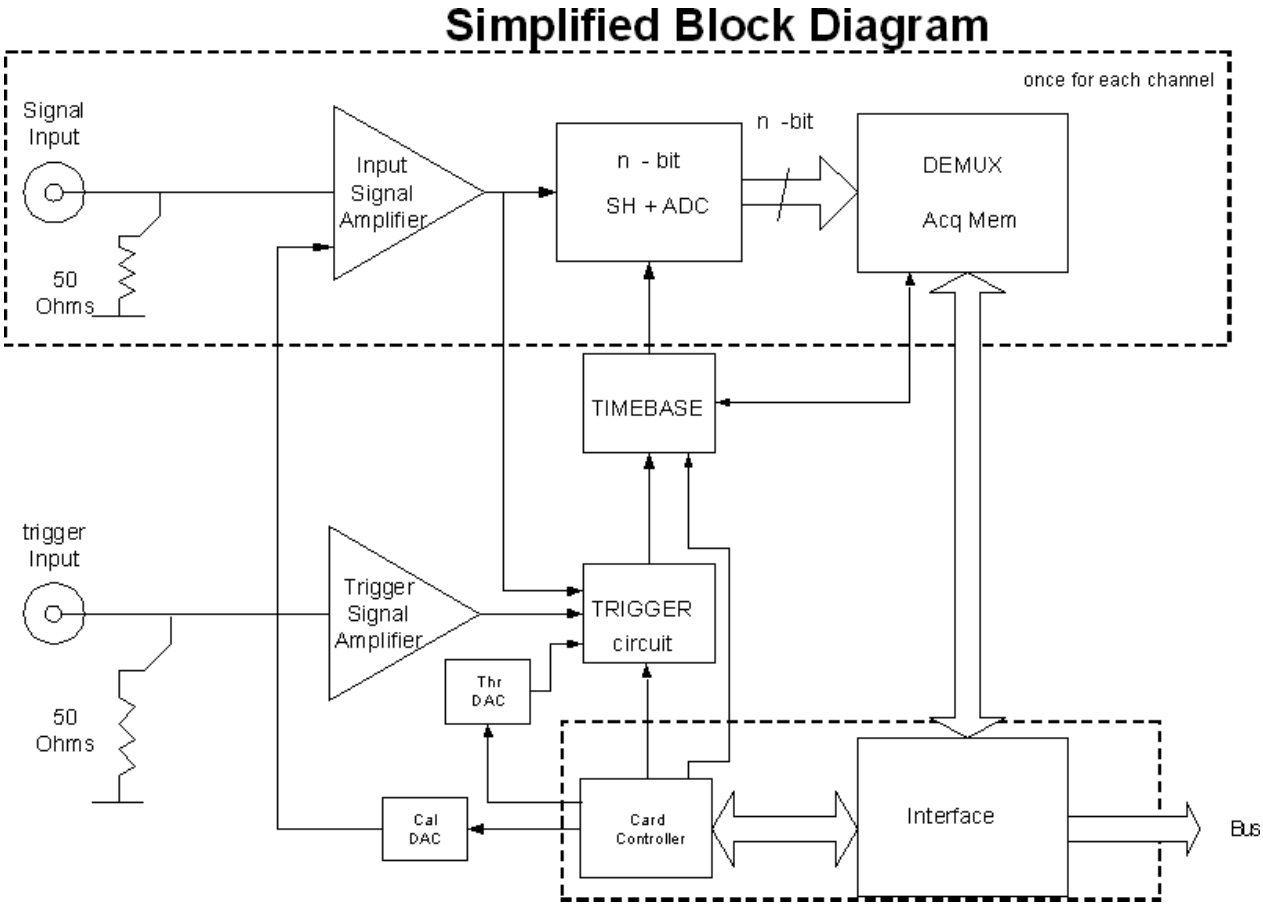
⚠ ***NOTE:*** *For proper system operation when using the IC200, IC414, or other PCI extension interface to connect a CC10X crate to a remote PC, the crate* ***must*** *be powered on before the PC in order for the PC BIOS to recognize the presence of the CompactPCI crate.*

2.5. Uninstalling devices under Windows

In the Device Manager, select the instrument to be uninstalled. Choose "Uninstall" from the "Action" menu. After all desired instruments have been uninstalled select "Scan for hardware changes" from the "Action" menu, or reboot the computer. Note that only those devices that are actually physically present are visible in the Device Manager.

3. Product Description

3.1. Overview



The Acqiris DC4xx digitizer cards ((DC440, DC438, and DC436) are CompactPCI/PXI compliant and require an appropriate CompactPCI crate. The DP3xx digitizers (DP310, DP308, and DP306) are PCI modules that plug directly into a vacant PCI slot in a PC. The PCI Bus is a well-defined industry standard with a 32-bit bus operating at 33 MHz. The digitizers are fully programmable over the PCI bus and deliver oscilloscope-like performance. Data captured by the digitizers can be transferred to a host processor, either in the PC, in the crate, or interfaced to the crate, over the PCI bus, at speeds up to 100 Mbytes/s.

DC4xx digitizers occupy a single slot of a 6U CompactPCI crate and they comply with the 6U CompactPCI standard (PXI compliant).

Acqiris digitizers are designed to provide superior measurement precision and accuracy. Key acquisition specifications (such as DC accuracy, integral and differential non-linearity) have been optimized to deliver maximum measurement fidelity. Careful circuit layout, custom IC's and special packaging techniques have all been employed to reduce overall system noise. The use of custom IC's also dramatically reduces the total number of discrete components required. This has tremendous benefits on reliability and also allows the modules to use a minimal amount of power.

For complete technical specifications concerning your particular digitizer please refer to the product's Specifications & Characteristics. In addition, we maintain up-to-date versions of all product data sheets on our web site (http://www.agilent.com/find/acqiris). The data sheets are available in pdf format and are best viewed using Adobe Acrobat software. If you have trouble accessing our web site, or viewing the data sheets, please contact your nearest sales office.

3.2. Channel Input

3.2.1. Coupling & Impedance

The normal BNC input channels of all of the 12-bit digitizers provide a high quality DC coupled 50 Ω input impedance with better than ± 1% precision. They are ideally suited for use with 50 Ω transmission lines (coax), high bandwidth low impedance (typically 500 Ω) probes or active probes.

The Direct HF SMA inputs of the DC440 and DP310 are AC coupled at 50 Ω input impedance. The AC cutoff frequency is 1 MHz.

3.2.2. Input Protection

For the normal BNC inputs the amplifiers are protected against over-voltage signals. Input signals up to ±10 V DC or 2.0 W RMS can be input without damaging the front-end electronics.

The Direct HF inputs accept signals up to ±15 V DC with an AC component limited to 2.0 V RMS without damaging the circuitry.

3.2.3. Mezzanine Front-end

The front-end electronics are all mounted on a removable mezzanine card. In the event of accidental damage, or as components fatigue over time (e.g. relays in high duty cycle automated testing applications), the mezzanine card allows for fast and efficient replacement.

3.2.4. Bandwidth and Rise Time

The bandwidth specification indicates the frequency at which an input signal will be attenuated by 3 dB (approximately 30% loss of amplitude). The bandwidth also affects the minimum rise and fall times that can be passed through the front-end electronics. A pulse with a very sharp edge will be observed to have a minimum rise time (τ_{min}) determined by the front-end electronics. In general a pulse with a given 10-90% rise time ($\tau_{10\text{-}90real}$) will be observed with a slower value given by:

$$\tau_{10\text{-}90}^{\ 2} = \tau_{10\text{-}90real}^{\ 2} + \tau_{min}^{\ 2}$$

The following table indicates the bandwidth and rise time performance of 12-bit digitizers.

Model # Agilent	**Bandwidth into 50 Ω**	**Minimum Rise Time**	**BW Limiter selections**	**Other particularities**
DC440 U1066A-001	100 MHz	3.5 ns	35 MHz 2 pole Bessel	300 MHz Direct HF Input
DC438 U1066A-002	100 MHz	3.5 ns	35 MHz 2 pole Bessel	
DC436	50 MHz	7.0 ns	NA	
DP310 U1070A-001	100 MHz	3.5 ns	35 MHz 2 pole Bessel	300 MHz Direct HF Input
DP308 U1070A-002	100 MHz	3.5 ns	35 MHz 2 pole Bessel	
DP306 U1070A-003	50 MHz	7.0 ns	NA	

3.2.5. Input Voltage and Offset

The Standard Input provides a fully programmable amplifier with variable input voltage and offset. Full Scale (FS) input voltages are selectable from 250 mV to 10 V in a 1, 2, 5 sequence. Care should be taken to select an input voltage range that will allow the signal to be recorded using as much dynamic range of the digitizer as possible. The Variable Offset is programmable in the range of ±1 V for FS ≤ 1 V, increasing to ± FS Voltage for less sensitive settings. The raw 12-bit ADC data values are read as 16-bit integers in the range [–32768, +32752] with steps of 16 LSB's between allowed values. The first and last values are reserved for underflow and overflow respectively. The midpoint value, 0, of the range corresponds to the negative of the offset voltage. Thus the Full Scale Range (FSR) goes from

–Offset Voltage **– (FS/2)** to –Offset Voltage **+ (FS/2)**

Signals going outside of the FSR will be clipped and data values for the clipped portion of a signal should be regarded as erroneous.

3.2.6. Vertical Resolution

The digitizers described in this manual use an ADC system with 12 bits of vertical resolution (4096 levels). The dynamic range of the ADC covers the Full Scale Range (FSR) of the Input Voltage setting. For example, if the FS Input Voltage is set to 1 V then the ADC resolution is equivalent to 0.2441 mV. However, the corresponding LSB gain is 1/16 of this value. To obtain the best dynamic range from the ADC care should be taken to ensure that the input signal varies over more than 50% of the Input Voltage FSR setting.

As a function of sampling rate and model, the two ADC's of each channel can be used to sample the signal simultaneously and their results will be averaged. This gives 13 bits of vertical resolution, which means that for FS = 1 V the smallest difference between 2 data samples will be 0.122 mV. (The DC4xx RevB and DP3xx RevA units show their revision number in the string returned by using the AcqrsD1_getInstrumentInfo (id, "Options",string) function call. DC440's with serial numbers below 18800 and DP310's with SN < 21500 fall in this class).

Model	**Maximum Sampling Rate for 13-bit operation**
DC440 U1066A-001	200 MS/s
DC438 U1066A-002	NA
DP310 U1070A-001	200 MS/s
DP308 U1070A-002	NA
DP306 U1070A-003	NA
DC440 RevB	110 MS/s
DC438 RevB	110 MS/s
DC436	NA
DP310 RevA	110 MS/s
DP308 RevA	110 MS/s

3.2.7. DC Accuracy and Linearity

All of the 12-bit digitizers use low noise front-end electronics in order to ensure voltage measurement is made with accuracy and precision. DC voltage accuracy, at 0 V offset, is better than ±0.5% of the input voltage full scale for FS ≥ 1 V and ±1% FS for the more sensitive ranges. The differential linearity is in the range [-0.9,0.5] LSB.

3.3. Data Acquisition

The table below summarizes the characteristics discussed in the sections that follow:

Model	Max. Sampling Rate	Max. Converters / channel	Default Memory points/ channel	Default Maximum Segments	Maximum Optional Memory/ channel	Maximum Segments	SR Adjustment Granularity	Minimum Deadtime
DC440	420 MS/s	2	64K	100	8M	8000	< 0.25 %	1 µs
DC438	200 MS/s	2	64K	100	4M	8000	< 10 %	1 µs
DC436	100 MS/s	1	64K	100	4M	8000	< 50 %	2 µs
DP310	420 MS/s	2	64K	100	4M	8000	< 0.25 %	1 µs
DP308	200 MS/s	2	32K	100	4M	8000	< 10 %	1 µs
DP306	100 MS/s	1	32K	100	4M	8000	< 50 %	2 µs

Some of these products are now offered with additional Optional Memory as standard.

3.3.1. High Resolution Sample Rate

The high-end Acqiris 12-bit digitizers (DC440 and DP310) contain an analog-to-digital conversion (ADC) system that can sample waveforms, in a real time sampling mode, at rates from 420 MS/s down to 100 S/s (10 ms per point). The sampling rate can be programmed and is adjustable with a very fine granularity as partially shown in the table below:

Sampling Rate (MS/s)	SR resolution (kS/s)
200-420	500
100-200	250
50-100	125
25-50	62.5
20-25	31.25

Sampling Rate (MS/s)	SR resolution (kS/s)
10-20	25.0
5-10	12.5
2.5-5	6.25
2-2.5	3.125

Sampling Rate (MS/s)	SR resolution (kS/s)
1-2	2.5
0.5-1	1.25
0.25-0.5	0.625
0.2-0.25	0.3125

There are 1360 allowed values for each decade. The same pattern continues as one goes to the right beyond the table above. The last entry would be for SR = 100-200 S/s and a resolution of 250 mS/s.

For the DC438 and DP308 the sampling rate resolution is given by:

Sampling Rate (MS/s)	SR resolution (kS/s)
100-200	10000
50-100	5000
25-50	2500
20-25	1250

Sampling Rate (MS/s)	SR resolution (kS/s)
10-20	1000
5-10	500
2.5-5	250
2-2.5	125

Sampling Rate (MS/s)	SR resolution (kS/s)
1-2	100
0.5-1	50
0.25-0.5	25
0.2-0.25	12.5

There are 34 allowed values for each decade. The same pattern continues as one goes to the right beyond the table above. The last entry would be for SR = 100-200 S/s and a resolution of 10 S/s.

For the DC436 and DP306 the sampling rates available are:

Sampling Rate (MS/s)
100
75
50
37.5
25
20
15

Sampling Rate (MS/s)
10
7.5
5
3.75
2.5
2.0
1.5

Sampling Rate (MS/s)
1
0.75
0.5
0.375
0.25
0.2
0.15

Sampling Rate (kS/s)
100
75
50
37.5
25
20
15

The same pattern continues down to 100 S/s.

3.3.2. Acquisition Memory

Data from the ADC is stored in on-board acquisition memory. The amount of memory in use for acquisition can be programmed and is selectable from 1 point to the full amount of acquisition memory available.

For technical reasons, a certain memory "overhead" (approximately 200 points) is required for each waveform, reducing the available memory by a small amount. In order to simplify programming, an interface function recommends the best sampling rate and the maximum possible number of data points, taking into account the available memory, the requested time window, the number of segments (in Sequence mode), as well as the required memory overhead.

To ensure maximum sampling rate and high timing resolution, we strongly recommend the use of long acquisition memories whenever possible. For example, the DC440 with 4 Mpoints of memory can record a signal over a 10 ms period with a sampling rate of 400 MS/s (2.5 ns per point). The fast sampling rate ensures that all high frequency signal components, up to the full 100 MHz bandwidth of the digitizer, are accurately recorded. If the memory were reduced to just 20 Kpoints then the sampling rate would need to be reduced to just 2 MS/s (20,000/10 ms) to record the same 10 ms period. All frequencies above 1 MHz would then be incorrectly digitized and important signal characteristics may be distorted or even completely missed.

3.3.3. Single and Sequence Acquisition Modes

Digitizers acquire waveforms in association with triggers. Each waveform is made of a series of measured voltage values (sample points) that are made by the ADC at a uniform clock rate. To maximize sampling rates and utilize memory as efficiently as possible, the digitizers include both Single and Sequential storage modes. For both of these modes the data of all of the active channels is acquired synchronously; all of the ADC's are acquiring data at the same time, to within a small fraction of the maximum sampling rate.

The Single Acquisition mode is the normal operation of most digitizer products. In this mode an acquisition consists of a waveform recorded with a single trigger. The user selects the sampling rate and acquisition memory size and set the number of segments to 1 (default value).

The Sequence Acquisition mode allows the capture and storage of consecutive "single" waveforms. Sequence Acquisition mode is useful as it can optimize the digitizer's sampling rate and memory requirements for applications where only portions of the signal being analyzed are important. The mode is extremely useful in almost all impulse-response type applications (RADAR, SONAR, LIDAR, Time-of-Flight, Ultrasonics, Medical and Biomedical Research, etc.).

In Sequence Acquisition mode the acquisition memory is divided into a pre-selected number of segments. Waveforms are stored in successive memory segments as they arrive. Each waveform requires its own individual trigger. The memory can be divided into any number of segments between 2 and 100 (up to 8000 segments with options M4M or M8M). In Sequence Acquisition mode the user needs to specify the sampling rate, the total acquisition memory, and the number of segments. Note that the Single Acquisition mode is just a special case of the Sequence Acquisition mode with the number of segments set to 1.

Sequence acquisition enables successive events, which can occur within a very short time, to be captured and stored without loss. A crucial feature of Sequence Acquisition mode is that it has a very fast trigger rearm time. A fast trigger rearm helps produce very low "dead time" between the segments of a sequence acquisition. The "dead time"

is the period after the end of an event when the card cannot digitize data for a new trigger event. To complement this mode of operation the digitizer can also measure and store the arrival time of each trigger using the information from the on board TTI (Trigger Time Interpolator). Readout of the individual trigger time stamps makes it possible to determine the time from one trigger to any other trigger in the sequential acquisition. The TTI resolution sets the resolution of the trigger time stamps (see section 3.3.4 **Timing**).

3.3.4. Timing

A crystal-controlled timebase is used to clock the ADC system of the digitizers. The timebase accuracy is guaranteed to be better than ± 2 ppm. The digitizers also include a built-in Trigger Time Interpolator (TTI) that measures the time from the trigger point to the first sample point. This information is essential for determining the relation between the trigger or other event of interest and the digitized samples of the signal. The TTI resolution is ~5 ps for a sampling interval of 2.5 ns (SR = 400 MS/s). As the SR decreases the TTI resolution is kept at 0.2% of the sampling interval. However, there is a jitter of up to ±60 ps in the positioning of the data with respect to the trigger point.

3.3.5. Timebase Range

The timebase range defines the time period over which data is being acquired. For example, the DC440 has a standard acquisition memory of 64 Kpoints and maximum warranted sampling rate of 400 MS/s. Therefore, at this sampling rate, the digitizer can record a signal over a timebase range of up to 160 μs (approx. 64,000 points * 2.5 ns/point). The timebase range can be adjusted by varying the amount of acquisition memory or the sampling rate of the digitizer.

3.3.6. Sparkle code rate

The high-end Acqiris 12-bit digitizers (DC440 and DP310) contain an analog-to-digital conversion (ADC) system that can sample waveforms at rates up to 420 MS/s. This makes them ideally suited to frequency domain observations. On the other hand, real time single shot waveforms are used in other applications and one of their important specifications is the sparkle code rate. This is the probability that a sampled data point differs from its true value by more than a specified deviation. For the purposes of this discussion we take the allowed deviation to be 3.1% FS (128 ADC counts). At lower sampling rates (<200 MS/s) all of the 12-bit digitizers show a low occurrence of sparkle codes. The sparkle code rate is 10^{-12} typical at 200 MS/s. However, at sampling rates above 200 MS/s the chances of a sparkle code occurring increase with the sampling rate. The sparkle code rate reaches 10^{-7} typical at 400 MS/s.

3.4. Trigger

The trigger settings applied to the digitizer are used to determine the time at which the device will stop acquiring data. The various trigger settings are outlined below.

3.4.1. Trigger Source

The trigger source can be a signal applied to either a Standard Input Channel (internal triggering) or the External Trigger Input. Signals on the HF inputs cannot be used.

The digitizers provide a front panel BNC External Trigger Input. The External Input provides a fully functional trigger circuit with selectable impedance (50 Ω or 1 MΩ), coupling, level and slope as for the Internal Triggering source. In addition, the External Trigger Input can be used to generate a TV trigger.

The circuitry provides an overload protection that will automatically switch the coupling from 50 Ω to 1 MΩ if the signal is greater than ±5 V DC. A ±5 V limit on trigger signals should be respected, although somewhat higher voltages for short time periods will not damage the unit. For 1 MΩ input signals up to ±100 V (DC + peak AC < 10 KHz) are allowed.

3.4.2. Trigger Coupling

Trigger coupling is used to select the coupling mode applied to the input of the trigger circuitry. Modes available include AC LF Reject and DC. The AC LF Reject mode couples signals capacitively and removes the input signal's DC component and signals below 50 KHz. DC mode allows all signal components to be passed through to the trigger circuit.

3.4.3. Trigger Level

The trigger level specifies the voltage at which the selected trigger source will produce a valid trigger. The trigger level is defined as a set voltage. Using the internal trigger, the level is set with respect to the midpoint voltage (V_m= – Offset voltage) of the digitizer's vertical scale. Internal trigger level settings (expressed in %) must be within V_m ± 0.6 FS, where FS is the channel Full Scale. All trigger circuits have sensitivity levels that must be exceeded in order for reliable triggering to occur.

The AC coupled mode is implemented with an auto-level trigger.

The external trigger level can be set to values in the range ± 3 V. Input signals up to ±5 V DC can be input without damaging the circuitry. The external trigger 3 dB bandwidth is 400 MHz.

The digitizer will trigger on signals with a peak-peak amplitude > 10% FS from DC to their bandwidth limit.

3.4.4. Edge Trigger Slope

The trigger slope defines which one of the two possible transitions will be used to initiate the trigger when it passes through the specified trigger level. Positive slope indicates that the signal is transitioning from a lower voltage to a higher voltage. Negative slope indicates the signal is transitioning from a higher voltage to a lower voltage.

3.4.5. Pre- and Post-Trigger Delay

To increase trigger flexibility a pre- or post-trigger delay can be applied to the trigger position.

The amount of pre-trigger delay can be adjusted between 0 and 100% of the acquisition time window (i.e. sampling interval x number of samples), whereas the post-trigger delay can be adjusted between 0 and 100 million samples.

Pre- or post-trigger delays are just different aspects of the same trigger positioning parameter:

- The condition of 100% pre-trigger indicates that all data points are acquired prior to the trigger, i.e. the trigger point is at the **end** of the acquired waveform.
- The condition of 0% pre-trigger (which is identical to a post-trigger of 0) indicates that all data points are acquired immediately after the trigger, i.e. the trigger point is at the **beginning** of the acquired waveform.
- The condition of a non-zero post-trigger delay indicates that the data points are acquired after the trigger occurs, at a time that corresponds to the post-trigger delay, i.e. the trigger point is **before** the acquired waveform.

The digitizer hardware accepts pre- and post-trigger adjustments in increments of 16 samples. By definition post-trigger settings are a positive number and pre-trigger settings are a negative number.

Thus it is only natural that the software drivers provided treat pre- and post-trigger delays as a single parameter in seconds that can vary between *–nbrSamples * samplingInterval* (100% pre-trigger) and *+maxPostTrigSamples * samplingInterval* (max post-trigger). Since the Acqiris software drivers provide very accurate trigger position information upon waveform readout, the accepted resolution of the user-requested pre-/post-trigger delay is much better than 16 samples. For more details, refer to the **Programmer's Guide.**

3.4.6. TV Trigger

The TV trigger mode can be used for a composite video signal with negative/going synch (positive modulation) on the External Trigger Input. The TV trigger mode implements line number and odd/even field selection for 625/50/2:1 (PAL/SECAM, B/G/L Standards) and 525/60/2:1 (NTSC, M Standard) signals. The TV trigger is AC coupled and a minimum synch pulse amplitude of 0.3 V pk-pk is required.

3.4.7. Trigger Status

The front panel includes a tri-color LED indicator to show the status of the trigger. When the LED is green it indicates the trigger is armed and waiting for a valid trigger to occur. Red indicates that the trigger has occurred, the acquisition is complete and the data is waiting to be readout. The user can override the default functions and program the LED color in an application-specific manner.

3.5. External Clock and Reference

For applications where the user wants to replace the internal clock of the digitizer and drive the ADC with an external source, either an External Clock or an External Reference signal can be used. The Clock or Reference signals can be entered into the digitizer by the dedicated MMCX CLK IN.

When using a continuous External Clock, the user must ensure that the input signal has a frequency > 100 MHz. The upper limit will depend on the model and can be found in the **Programmer's Guide**. The input signal must have minimum amplitude of 1 V peak to peak into 50 Ω at the front of the digitizer. The transitions of the clock are defined with the aid of a threshold that is user selectable in the range [-2.0 V, 2.0 V]. The signals should not exceed ±5 V amplitude. For a detailed discussion on the programmed use of the external clock, refer to the **Programmer's Guide**.

For applications that require greater timing precision and long-term stability than is obtainable from the internal clock, a 10 MHz Reference signal can be used. The External Reference is nominally at 10 MHz. However, frequencies in the range [9.0 MHz, 11.0 MHz] will be accepted. If you do this you may need to correct for the difference in your application since the digitizer and the driver have no way to know about such deviations. The amplitude and threshold conditions, for an External Reference, are the same as for the External Clock. If synchronization between several digitizers is required, the reference signal should be applied to all of them.

3.6. Internal Calibration

The software drivers supplied include calibration functions for the timing, gain and offset settings, which can be executed upon user request. The digitizers are never calibrated in an "automatic" way, i.e. as a side effect of another operation. This ensures programmers have full control of all calibrations performed through software in order to maintain proper event synchronization within automated test applications.

The digitizer includes a high precision voltage source and a 16-bit DAC, used to determine the input voltage and offset calibration.

For accurate time and voltage measurements it is recommended to perform a calibration once the module has attained a stable operating temperature (usually reached with a few minutes of digitizer operation after power on). It should also be already set to the desired timebase settings. Further calibration should not be necessary unless temperature variations occur.

A full internal calibration of a digitizer can be time consuming. Therefore, several other options are available. They are documented in the **Programmer's Reference Manual**. A program can always be started with the digitizer in an uncalibrated state and data taken can be used for many kinds of testing. However, as soon as good data respecting the specifications of the instrument is required a calibration of at least the current acquisition state is needed. The full internal calibration has the advantage that it generates the calibration constants needed for any possible configuration of the instrument; its disadvantage is the time taken. If a more selective calibration is done it will allow the generation of good data in the current acquisition state. This calibration will remain useable whenever that acquisition state is used again for as long as the temperature of the instrument does not change significantly. A fast calibration of a channel in a configuration can be done in around a second. Many applications can save time by only performing calibration for the configurations that will actually be used. Calibration can usually be performed with signals present at the channel, external, and clock inputs. However, if the calibration is found to be unreliable, as shown by a calibration failure status, it may be necessary to remove such signals.

3.7. Factory Calibration

Whilst the Internal Calibration function will provide a good degree of confidence that your instrument is operating within its specifications on a day-to-day basis, Agilent recommends that each instrument undergoes a Factory Calibration at least annually to ensure that it remains within the specified performances.

Factory Calibration is the process of measuring the actual performance of an instrument-under-test using lab instruments that in turn have significantly better performance than the instrument-under-test. Lab instrument performance must be traceable to the International System (SI) Units via a national metrology institute (NIST, NPL, NRC, PTB, CENAM, INMETRO, BIPM, etc.)

The measured performance is then compared to published data sheet specifications. Agilent Technologies tests the performance corresponding to all data sheet specifications, for all installed options, every time. If we observe your instrument to be out-of-specification, we always adjust it and re-test before we return it to you.

For more information, or to return your instrument to Agilent for calibration please see www.agilent.com/find/calibration

3.8. AS bus

The digitizers may be used in applications that require many data acquisition channels. In such cases it is possible to use more than one digitizer in a standard CompactPCI/PXI crate. Each DC Series digitizer includes AS bus, a proprietary high bandwidth auto-synchronous bus system that allows multiple digitizers to work together synchronously.

The AS bus distributes both the clock and trigger signals along a plug-in front panel bus, between all the digitizers that participate in the system. It allows any digitizer to act as the trigger source and any other digitizer to act as the clock source (acquisition master), enabling all the digitizers to be clocked at the same time. Synchronizing the clock signals between the devices improves the accuracy of cross-channel measurements and is essential for accurate time correlation between signals on different channels.

The AS bus is intended to connect modules of the ***same type***, i.e. of the same model number, although some exceptions to this rule might be possible. If modules with the same model number, but different memory length options, are connected only the shortest memory length can be used.

The AS bus connector is located on the front panel of each module. Bridges are used to connect adjacent modules for synchronization, which is then activated through software by defining a master module and the trigger source. Up to 7 modules may be synchronized with the AS bus. More detailed information and the commands required to set up the AS bus clock and trigger distribution are included in the **Programmer's Guide** and **Programmer's Reference Manual**.

3.9. Special Front Panel Inputs and Controls

Connector	Function
MMCX CLK IN	50 Ω External Reference or External Clock Input
MMCX I/O A	User configurable (see below)
MMCX TR OUT	Signal occurs after an accepted TRIGGER.
MMCX I/O B	User configurable (see below)

3.9.1. Multi-Purpose Input and Outputs (I/O A, B)

The I/O A or I/O B may be used as any of the functions shown in the table below:

Function	Direction	Description
Enable Trigger	Input	
10 MHz Ref Clock	Output	To ensure good rise time characteristics the output impedance is 50 Ω This signal can be used as an input to 1 (or 2 using a T split) CLK IN connectors. Note: This signal is the internal 10 MHz and is not available if the External Reference Clock is in use.
Acquisition skipping to next segment	Output	
Acquisition is active	Output	Indicates that the acquisition is currently running.
Trigger is armed	Output	Indicates that the trigger is armed and waiting for a valid trigger event.

To ensure proper operation of the segment recording of hardware markers, the logical state of MCX I/O A, MCX I/O B, and MCX I/O C inputs, the input must be stable for a time interval starting 30 ns before the trigger and continuing until 30 ns after it. This implies that the HF Reject trigger coupling should not be used. If the individual inputs are not in the disable state the corresponding bits will be useless.

The I/O A, I/O B,and I/O C signals are 3.3 V CMOS compatible, with the following levels:

Direction	Low Level	High Level
Input	<0.8 V	>2.0 to 3.45 V
Output	0 to 0.8 V	1.7 to 3.3 V

An unconnected input will be pulled high. The high level output will typically give 0.8 V into 50 Ω.

3.9.2. TR OUT

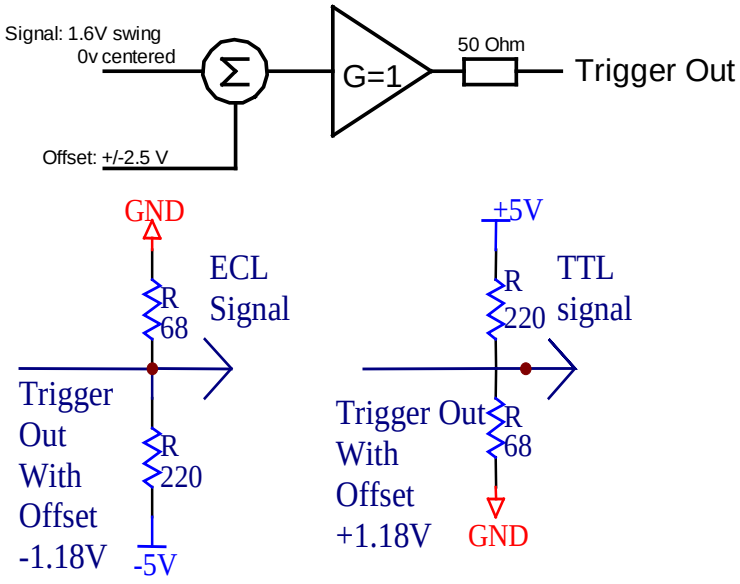
The TR OUT Signal occurs after an accepted TRIGGER. It can be chosen to be either synchronous to the Trigger IN or synchronous to the acquisition Clock and, in this case, can be used to trigger events synchronously to the acquisition clock.

3.10. External Trigger Output

When the digitizer is ready to be triggered and a valid trigger signal occurs, a trigger output is generated for external use. It is always available on the Front Panel Trigger Out MMCX connector. The pulse ends when the data acquisition for the trigger in question is complete.

⚠ ***NOTE:*** *The External Trigger Output functionality is implemented in the hardware. No Trigger Out signal occurs for software-generated triggers such as those of the AUTO mode of AcqirisLive or through the use of the function* ***AcqrsD1_forceTrigger***. However, ***AcqrsD1_forceTriggerEx*** does generate the signal.

Trigger Output Block diagram:



The output swing is 1.6 V (± 0.8 V) when unloaded and 0.8 V when terminated on 50 Ω. The rise and fall times are 2.5 ns typical. The offset can be adjusted, by software control in the range [–2.5 V, +2.5 V] unloaded, or [-1.25 V, +1.25 V] into 50 Ω. The maximum output current capability is ± 15 mA. As the output is retro-terminated, it is possible to drive a 50 Ω line unterminated (HiZ) without loss of performance.

For a TTL compatible signal, set the offset to 1.0 V and the swing at destination will be +0.2 to +1.8 V.

For an ECL compatible signal, terminated on 50 Ω to –1.2 V, set the offset to –1.2 V and the output will be in the range [–0.8 V, –1.6 V]).

Alternatively, to reduce the current drawn from the digitizer, the terminations shown here can be used:

3.11. Electrical, Environmental and Physical Specifications

3.11.1. Electrical

	Max. Power Consumption (W)		Current Requirements (A) (with Memory option)			
Model	**Default**	**with Memory option**	**+12 V**	**+5 V**	**+3.3 V**	**-12 V**
DC440	24.6	26.8	0.6	1.5	1.6 (2.2)	0.2
DC438	24.6	26.8	0.6	1.5	1.6 (2.2)	0.2
DC436	24.6	26.8	0.6	1.5	1.6 (2.2)	0.2
DP310	16.0	17.8	0.5	0.8	1.0 (1.5)	0.1
DP308	16.0	17.8	0.5	0.8	1.0 (1.5)	0.1
DP306	13.8	15.6	0.5	0.4	1.0 (1.5)	0.1

The Maximum Power Consumption has been increased by 10% over the value calculated with the currents shown to take into account higher allowed values of the crate or PCI voltages.

All modules conform to Revision 2.2 of the PCI Local Bus Specification. They all use the PCI Bus at 33 MHz. The CompactPCI modules are compatible for either V I/O = 3.3 V or 5 V. All of these modules are capable of DMA transfers at rates ~100 MB/s.

3.11.2. Environmental and Physical

The modules have a Declaration of Conformity according to ISO/IEC Guide 22 and EN45014 and **CE** Marks of Compliance.

The front panels of the CompactPCI modules are in compliance with the IEEE 1101.10 standard.

Operating Temperature

0° to 40°C

For the DCxxx compactPCI modules the above values are for the ambient temperature of the room (or equivalent) where the CompactPCI crate is located. For DPxxx PCI modules, located in a PC (or equivalent), it is the cooling air temperature inside the box that is of interest. This can be significantly higher than the ambient air temperature of the room. In both cases the temperature as measured on the board may well be significantly higher. On-board temperatures above 60°C should be avoided.

Relative Humidity

5 to 95% (non-condensing)

Dimensions

DC modules conform to the 6U CompactPCI standard (233 mm × 160 mm × 20 mm). DP modules (107 mm × 210 mm) require a long card slot. If used with the XP103 fan they can be adjusted to conform to the full 342 mm length. An XP100 fan will add 45 mm to the length of any card.

EMC Immunity & Emissions

Complies with European EMC Directive
• IEC/EN 61326-1
• CISPR Pub 11 Group 1, class A
• AS/NZS CISPR 11
• ICES/NMB-001

This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Required Airflow

> 2 m/s in situ

4. Soft Front Panel (SFP) Applications

The Agilent SFP Applications (previously called AcqirisLive) are intended to verify the functionality of the card and to serve as an easy to use and convenient program for capturing, displaying, and archiving captured data.

This program uses the AgMD1 and other associated drivers to control any supported digitizers. It is installed at the same time as those drivers.

4.1. SFP Versions

There are currently two versions of the SFP application.

The SFP 1.x version is gradually being phased out by the introduction of the SFP version 5. However at this point in time the SFP 5 application does not fully support all products, modes of operation or features that are supported by the SFP 1.x, and so the user must decide which SFP to use depending on their application.

4.1.1. SFP 5.x

This newer version of the SFP application supports all products which are covered by the MD1 driver. New features, and replication of features which currently exist in the older SFP 1.x will be introduced progressively into the 5.x version.

This version supports:

- All Agilent U10xx (8, 10 & 12-bit Digitizers).
- All Agilent Mxxxx series Digitizers. (Except M9202A in DDC mode)
- DGS, DCT, SAR/SSR, Peak TDC modes of operation.

4.1.2. SFP 1.x

This application which was previously known as 'AcqirisLive' contains some features which have not yet been implemented in the SFP 5 application. Users who prefer this application or wish to use one of the features below may continue to do so.

This version is required currently if you wish to use any of the following instruments, or features:

- Using M9202A in DDC mode.
- U1082A, AP100 or AP200 Averagers.
- Using multiple modules at the same time.

4.2. SFP Documentation

Information on the operation of both of the above SFP versions may be found in the ‘AgMD1 Digitizers – User Guide & Soft Front Panel Help’. This is an HTML Help system (.chm) which may be found on the CD supplied with your product, or from the windows ‘Start Menu’ after you have installed your product software. Look under – ***Start > All Programs > Agilent > MD1 > ‘MD1 Help’***

5. Appendix A: U1093A (U1056A) AS bus for CompactPCI/PXI Digitizers

Specification and User Instructions for AS1, AS2, AS3, AS4

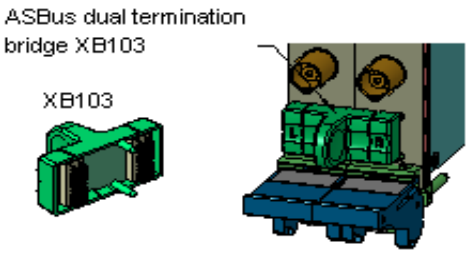
SPECIFICATIONS :

ASBus Bridges allowthe connection and synchronization of up to 7 DC series digitizers (up to 28 channels).
Acqiris recommends having the master digitizer in the center of the group in order to obtain the best performance possible.
Clock synchronization accuracy : ±100ps.

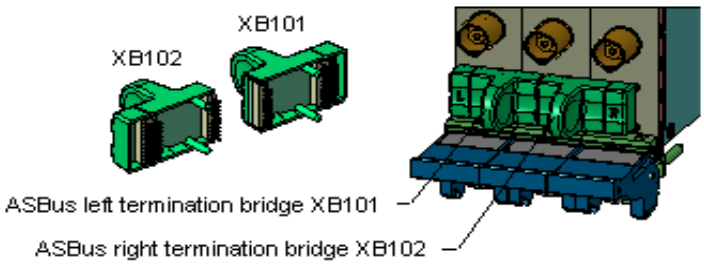
Install/Remove the *ASBus* Bridges as follows :

- Make sure that the screws securing each of the modules to the crate are not completely tightened.
- Before inserting the ASBus bridge, manually adjust any difference in the module separation, such that the distance between the center of the connnectors corresponds to that of the ASBus bridge.
- Carefully insert/remove the ASBus bridges between each pair of modules. Force should not be required.
- Tighten the screws of each of the modules.
- If desired, add an XB104 Retainer on each handle to secure the ASBus bridge against vibration. It clicks into place when fully inserted. It can be easily removed by pulling on the lower half of the Retainer while sliding it off.

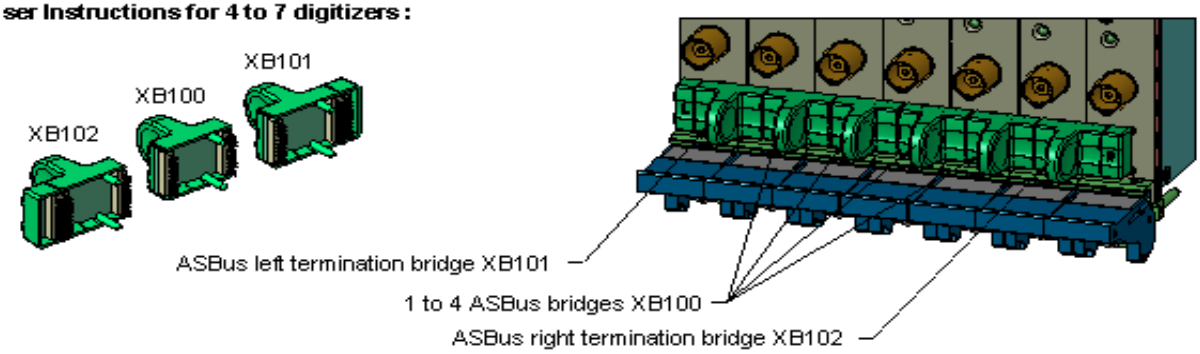
User Instructions for 2 digitizers :

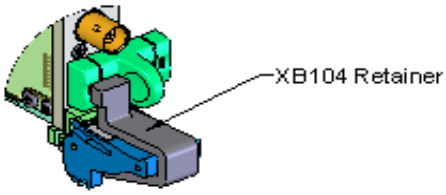


User Instructions for 3 digitizers :



User Instructions for 4 to 7 digitizers :





6. Appendix B: -BB1 Battery Backup for CompactPCI Digitizers

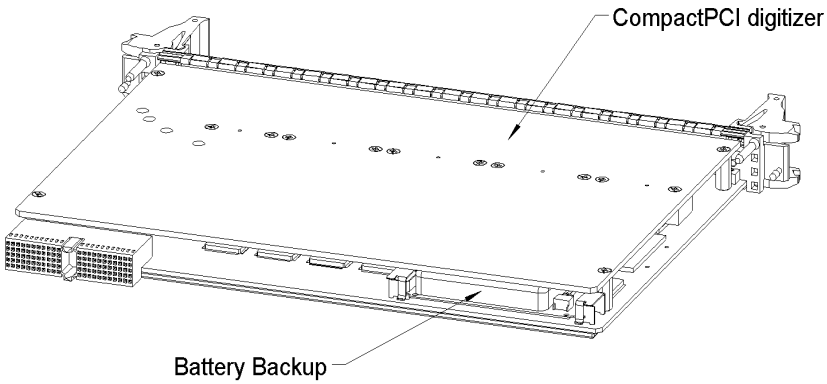
Specification and Assembly Instructions - BB1 Option

SPECIFICATIONS :

Time to charge the battery : <2.5 h (digitizer powered)
Backup duration time : without long memory option : >120 h
with long memory option : >12 h
Lifetime : 75% of battery capacity after 500 cycles

Note: This option is available for U1063A, U1064A, U1065A, and U1066A series digitizers.
It was formerly known as XA001

Please refer to the Programmer's Guide for more detailed information on the use of the battery backup.



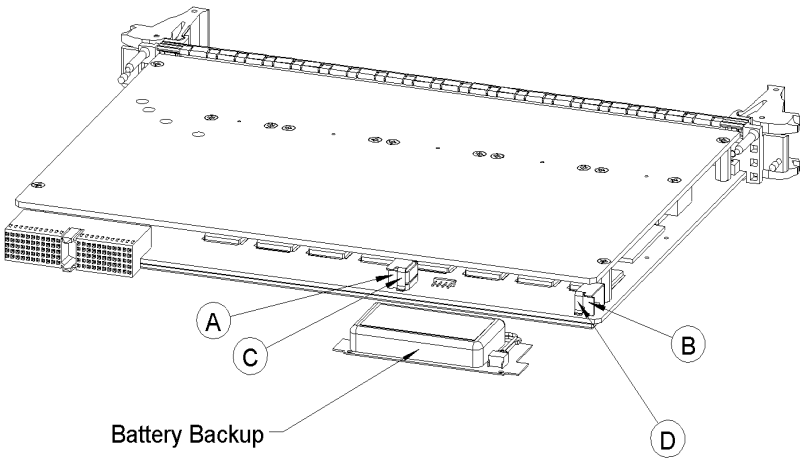
⚠ *CAUTION:* ***The CompactPCI digitizer must always be powered off before either introducing or removing the battery backup and care must be taken in order to avoid electrostatic discharges.***

INSTALLATION AND REMOVAL OF THE BATTERY BACKUP

The following steps are necessary to install the battery backup into a CompactPCI digitizer :

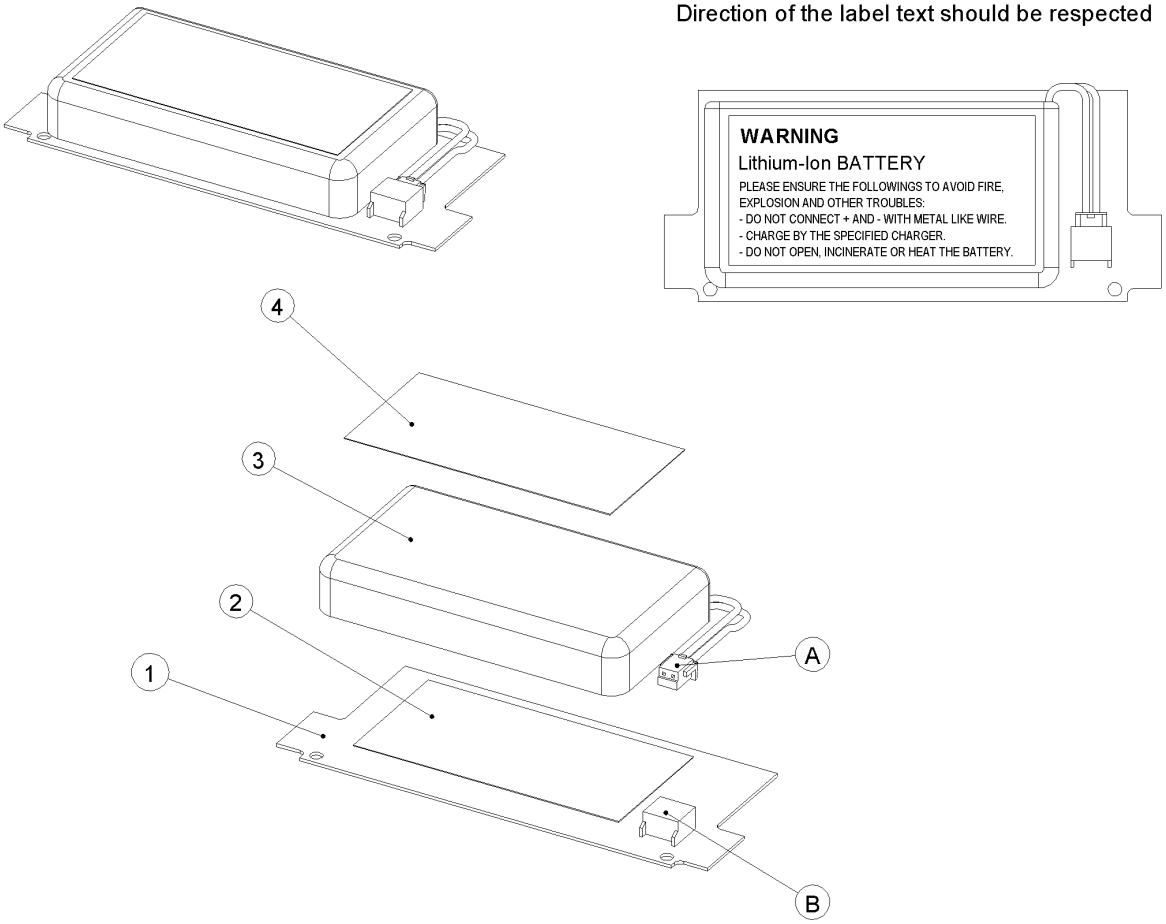
1. Position the battery backup between the guides "A" and "B" ensuring that the orientation matches the figure below.
2. Lift the two strips "C" and "D" in order to introduce the circuit board of the battery backup into the guides "A" and "B".
3. Push the battery backup in the direction of the card until it hits the stop blocks and ensure that the strips "C" and "D" are correctly and securely attached.

Proceed in the reverse order to remove the battery backup.



PROCEDURE FOR REPLACING THE BATTERY:

1. Disconnect the battery connector A from the PCB connector B.
2. Remove the battery 3.
3. Remove the label 4.
4. Reglue this label on the new battery, respecting the direction of the text.
5. Change the adhesive film 2.
6. Reconnect the new battery. connector A to connector B on the PCB.
7. Restick the new battery by pressing it onto the PCB; ensure that it holds well.



Pos	Supplier	Description	Manufacturer N°
1	Agilent	PCB battery back-up	A01-MP030040A
2	3M	Adhesive transfer tape 5mil 22mmx45mm	468MP
3	Sanyo	LithiumIon 3.7V 650mAH 4.2V 27.3x50.5x8.6mm	UF311/C
4	Agilent	45x22mm polycarbonate red, A4 sheet, 52 labels	A01-GL010002A

7. Appendix C: U1092A-HVB XA100 BNC Input Overvoltage Protection

Specifications and User Instructions

The XA100 Acqiris option contain two elements :
- 3dB BNC Attenuator
- 90V BNC Spark Gap

The XA100 overvoltage protection kit allows the digitizers with 50 Ohm only input (without high impedance input) to withstand a high voltage surge of up to 5 kV.

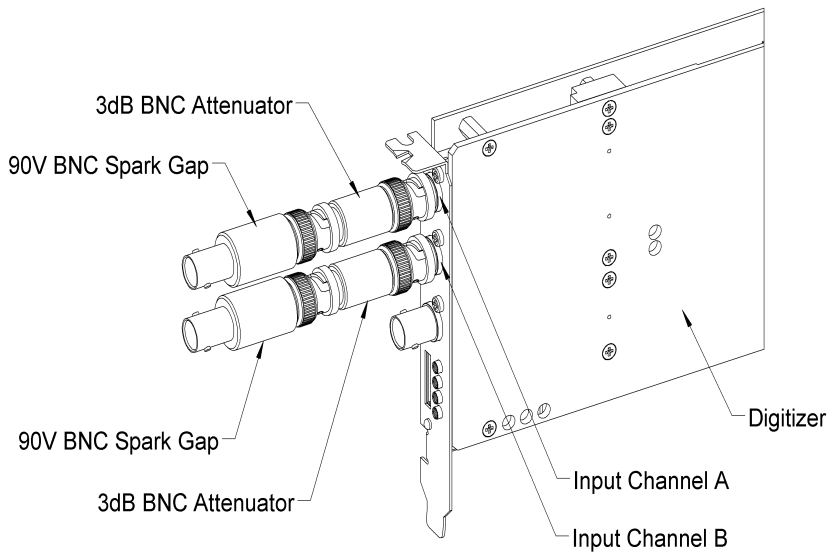
XA100 SPECIFICATIONS :

- Frequency range : DC to 1GHz
- Input impedance : 50 Ohm
- Attenuation : 3 dB
- VSWR, DC to 1GHz : < 1.25
- Impulse discharge current (8/20 us pulse) : 10 kA
- Weight : 60 g
- Length : 85 mm

ATTENTION :

- BOTH the 90V spark gap and the 3dB attenuator MUST be used in order to absorb very high current.

- In order to limit the input current, the attenuator MUST be inserted between the spark gap and the input of the module, as shown in the figure below.



8. Appendix D: U1091AX01 XP100 Fan Unit for the DP Digitizer Family

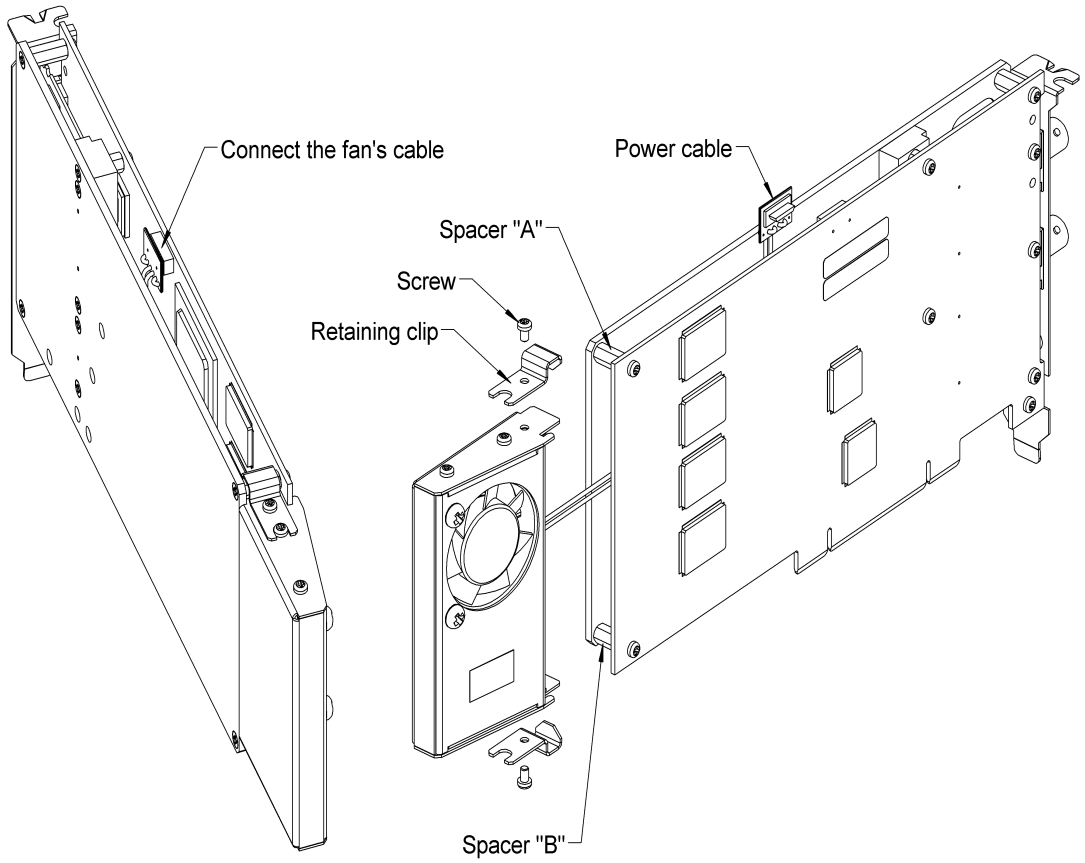
Specifications and User Instructions - XP1 Option

SPECIFICATIONS :

Airflow : 6 m3/h, typical speed 6000 rpm, maximal noise 35 dB(A).
Nominal Voltage : 5 VDC.
Power input : 0.8 W.
With electronic protection against reverse polarity, impedance-protected against blocking and overloading.
Operating temperature : 0 °C to 70 °C.
Life expectancy (at 25 °C) : 45000 hours.
Safety approvals : CE, VDE, UL, and CSA.
Materials : Box of stainless steel and fan of fiberglass reinforced plastic, PBT housing, PA impeller.

HOW TO INSTALL/REMOVE THE FAN UNIT ON A DIGITIZER :

1. Remove the digitizer from the PC, prior to installing or removing the fan unit.
2. Unscrew the screw of the retaining clips on each side of the fan unit.
3. Twist the fan's cable a few times in order for the 2 wires to stay together.
4. Introduce the cable between the spacers "A" and "B" at the back of the digitizer.
5. Push the fan unit into the back of the digitizer until the fan's box is in contact with the digitizer cover.
6. Place the two retaining clips on the spacers "A" and "B" and screw again the two screws. Insure that the fan unit is safely attached on the two spacers.
7. Connect the fan's cable as shown in the figure below. The position of the power connector can vary for different model of digitizers.
8. To remove the fan unit, first unplug its power cable and next unscrew and remove the two retaining clips. Pull the fan unit away from the digitizer.



9. Appendix E: U1091AX03 XP103 Fan Unit for the DP Family of Modules

Specification and Assembly Instructions - XP3 Option

SPECIFICATIONS :

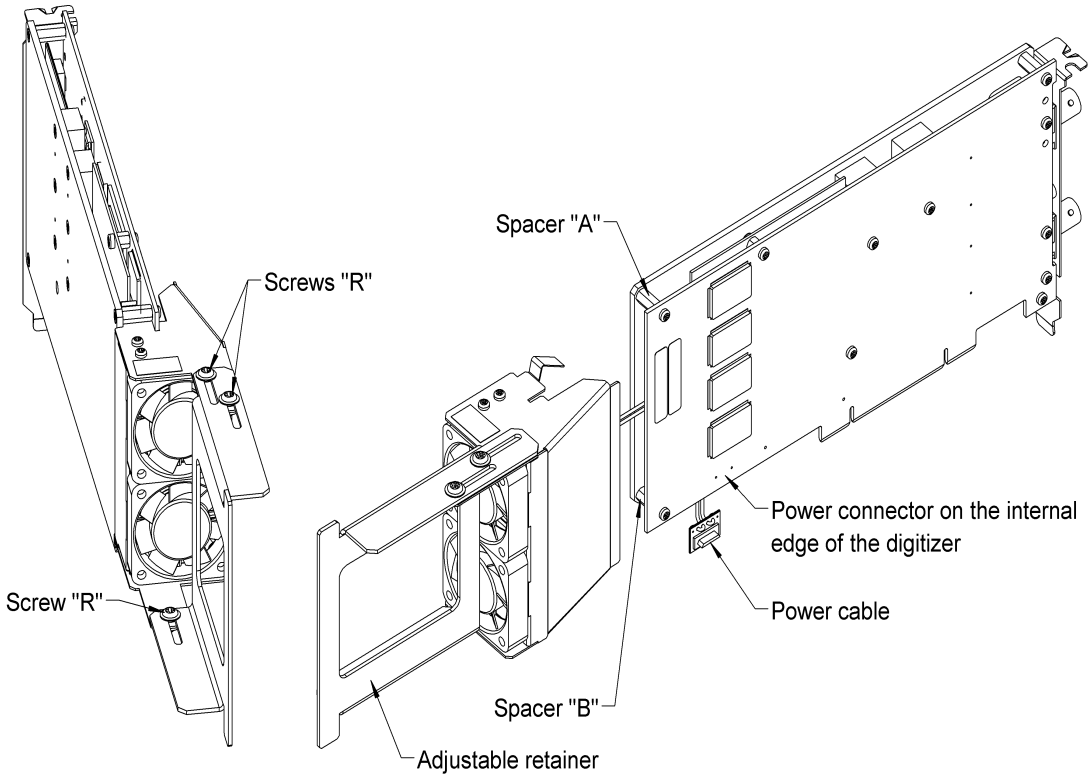
Airflow : 16 m3/h, typical speed 6500 rpm, maximal noise 30 dB(A).
Nominal Voltage : 5 VDC.
Power input : 2.1 W.
With electronic protection against reverse polarity, impedance-protected against blocking and overloading.
Operating temperature : 0 °C to 70 °C.
Life expectancy (at 25 °C) : 50000 hours.
Safety approvals : CE, VDE, UL, and CSA.
Materials : Box of stainless steel, aluminium and fan of fiberglass reinforced plastic, PBT housing, PA impeller.

HOW TO INSTALL/REMOVE THE FAN ON A DIGITIZER :

1. Remove the digitizer from the PC, prior to installing or removing the fan unit.
2. Twist the fan's cable a few times in order for the 2 wires to stay together.
3. Introduce the cable between the spacers "A" and "B" at the back of the digitizer.
4. Push the fan unit into the back of the digitizer so that the two springs lock into place.
5. Insure that the two springs are safely attached behind the two spacers and that the fan's box is in contact with the digitizer cover.
6. Connect the fan's cable. The position of the power connector can vary between different digitizer models.
7. To remove the fan unit, first unplug its power cable and then press on both fan springs and pull it away from the digitizer.

HOW TO INSTALL/REMOVE THE DIGITIZER IN A PCI SLOT OF A PC :

1. Install the fan on the digitizer as described above.
2. Release the three screws "R" from the adjustable retainer and move the retainer against the fans.
3. Introduce the digitizer into the PCI slot and tighten the front panel screw.
4. Push the retainer into the PCI slot guide and tighten the three screws "R". The digitizer is now installed.
5. To remove the digitizer it is necessary to first release the three screws "R" and pull back the adjustable retainer.



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