

1394 Analyzer Quickstart Guide

FS9x32bT, FS6x32bT, FS4x30xx, FS3x30xx, FS3x32xx, FS3x22xx

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Chapter 1. Hardware

1.1. Gen4 Analyzer Series

The Gen4 Series of analyzers embodies a complete redesign of the well-known Advanced and Triple series analyzers. This brand-new line offers improved performance due to a more powerful embedded processor, the very latest FPGA technology and modern interfaces like USB3, enhanced Scriptor capabilities and more data capture memory.

The Gen4 Series uses a more powerful architectural design with two 667Mhz on-board ARM processors. It was designed with performance and flexibility in mind. Modularity not only results in several configuration options with respect to 1394 speeds, transformer coupling and host connectivity options but also results in the possibility of combining up-to 3 Triple FireSpy Mainboards (Units) into a full 9-bus IEEE-1394 analyzer. The FS9432bT/FS9832bT is the first Gen4 Series model released and several different configurations followed its initial release.

A standard off-the-shelf Physical Layer chip connects to a highly optimized FPGA which not only acts as a Link layer but also incorporates the data recording functionality, Trigger and Filter engines as well as the Data Monitor. Recorded data is directly captured into dedicated onboard data memory of 4GB per unit.

1.1.1. FireSpy 9432bT, 9832bT

The FireSpy9x32bT bus analyzer is world's only nine-channel IEEE-1394 bus analyzer. Based on the 4th generation FireSpy analyzer architecture the FireSpy9x32bT is the most advanced 1394 test equipment in the market. The FireSpy9x32bT in fact combines nine FireSpy analyzers in one single instrument. It comprises a significantly more powerful on-board processor and improved connectivity to the host.



The FireSpy9x32bT has nine 1394 nodes connected to nine synchronized analysis engines. They are controlled by three dual core ARM processors running at 667MHz. Each node is connected to two 1394 ports. Both ports of each node are connected to a separate LEMO connector which was chosen over standard 1394 connectors for improved ruggedness.

The FireSpy9x32bT is equipped with 15 GB internal memory and extensive hardware filtering and trigger possibilities. The analyzer can be connected to a host computer using the USB3 interface. On the host you can control the FireSpy using a graphical user interface to analyze and display the bus traffic in a user-friendly way; or you can use the API to program your own control software.

The seamless integration of the SAE AS5643 protocol makes the FireSpy9x32bT the preferred tool for many Aerospace & Defense development tasks. DapTechnology has taken considerable efforts to fully support the AS5643 protocol in all major functional areas of the FireSpy9x32bT and continuously updates the analyzer functionality according to implementation requirements and ongoing standardization efforts.

1.1.1.1. Main Feature Summary

GENERAL

- IEEE 1394-2008 Beta compliant
- Supports S100B-S800B transfer rates depending on exact model

- Connects to host using USB3.0 interface
- 15GByte memory for embedded OS and packet and data storage
- Firmware field upgradeable to enable future expansions
- AUX connector for:
 - Trigger input and output functions
 - Recording external events
- Software runs on Windows™ Operating Systems

MONITOR

- Displays bus activity:
 - isochronous packets
 - all types of asynchronous packets
 - all types of PHY packets
 - all types of acknowledge packets
 - several types of Errors
- Counts packets according to type, speed, ack and error condition
- Counts number of bus resets

RECORDER

- Time stamping of all packets and status events with 10ns resolution
- Packets hidden by slower connections are visible as 'prefix only' packets
- Extensive packet/event filtering/trigger/search capabilities
 - Packet type
 - Transmission speed
 - Boolean combination of 4 programmable packet sets
 - Data payload patterns
 - Error conditions
 - Various status events
 - Graphical Trigger Sequencer
- Adjustable trigger position within programmable record buffer size
- Cyclic pre-trigger buffer management option
- Different kinds of packet display views, including:
 - Time View, displays all packets on a time line, including the prefix
 - Packet View, displays packets as list plus selected packet options
 - Transaction View, displays transactions as list or flow graph
 - Topology View, graphical topology displays as is during recording
 - Protocol View, displays packets decoded to selected protocol
- Precise time measurements
- Marking of individual packets or packet ranges
- Export format for re-generation of packets by Scriptor or API

GENERATOR

- Simultaneous generation of up to 63 iso streams on 9 buses
 - Graphically programming of stream transmit block
 - Data payload import from file
- Generator and Scriptor run simultaneous for stream and asynchronous packet generation
- Special AS5643 stream generator package (optional)

SCRIPTOR

- Script Editor
 - C-like scripting language
 - Function Library
 - Macros to automatically generate blocks of code
 - Syntax coloring
 - Integrated Debugger
 - Floating point data types
- Data Editor

- Control Panel
 - Graphical display elements for data value representation
 - Ethernet-connected Client Panels for remote data monitoring
- Several Sample Scripts

COMMANDER

- Reading and/or writing of local and reading of remote PHY registers
- Reading and/or writing of remote memory locations (incl. CSR register space)
- Possibility to graphically view the current Topologies
- Sending of user definable packets

1.1.1.2. Specifications

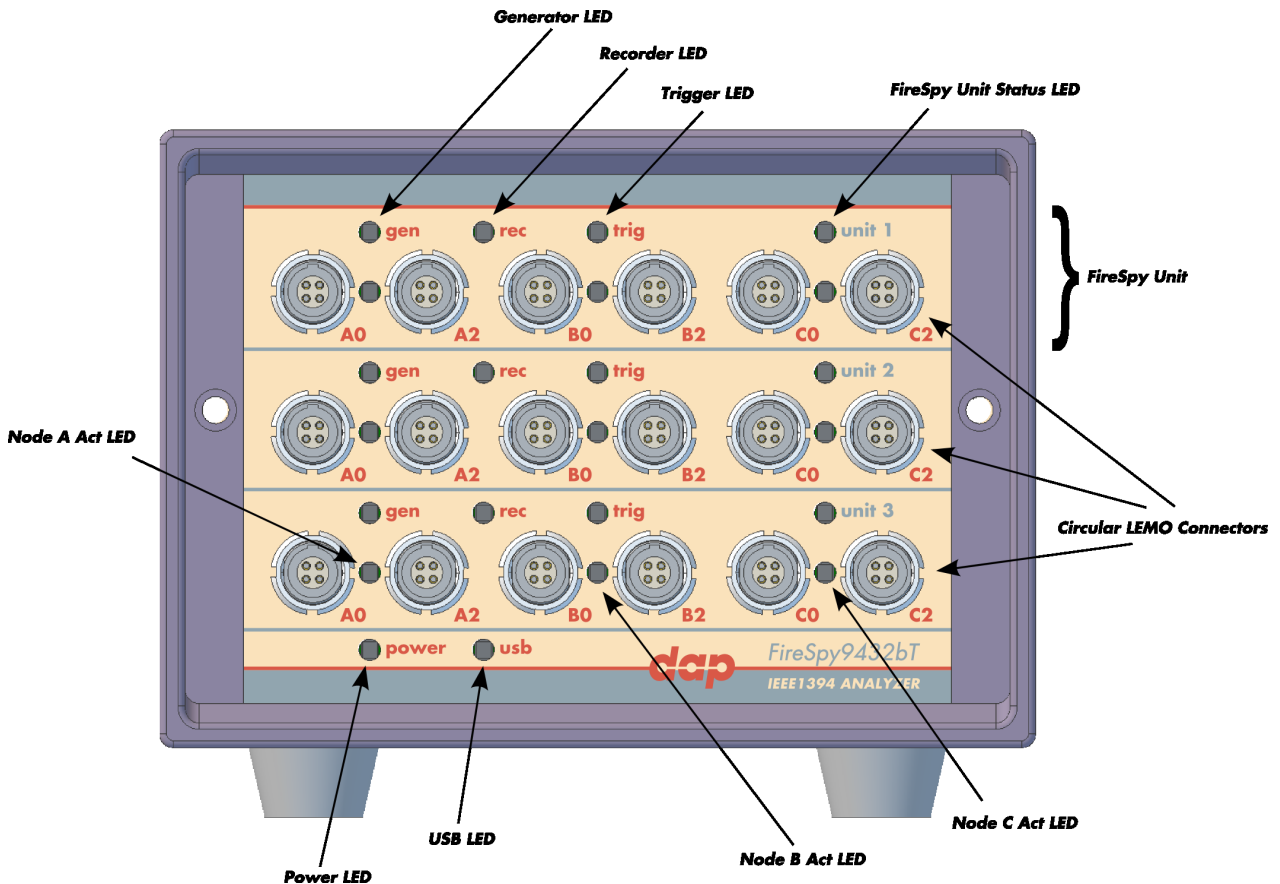
Dimensions:	125 mm x 96 mm x 301 mm
Weight:	2260 g
Operating Range:	0 – 45 C
Power Requirements:	12 V, 40Watt max.
Compliance:	FCC Class A
Connections:	<ul style="list-style-type: none"> • USB 3.0 connector for host-computer • 18x LEMO connectors (EYG.0B.304) for 1394 Beta connections • Auxiliary connector • Power connector
Indicators:	<ul style="list-style-type: none"> • Multi-colored LEDs for: Unit status, Recorder, Generator, Trigger, Active (per node) • Red LEDs for: USB, Power
Switches:	Toggle switch for Power On/Off
Package Content:	FireSpy9x32bT Power Adapter (12V, 5A) USB 3.0 Cable
Product warranty:	36 months limited warranty
Part Number:	FS9432bT or FS9432bTAS5643 analyzer with AS5643 SW protocol package FS9832bT or FS9832bTAS5643 analyzer with AS5643 SW protocol package
Optional Configuration:	N/A
SW Add-on modules:	SBP2 protocol software package IIDC protocol software package AV/C protocol software package IP1394 protocol software package AS5643 protocol software package AMI-C protocol software package

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

1.1.1.3. FireSpy Front



Generator LED

This LED will light up green while the FireSpy Generator is active. See Generator.

Recorder LED

This LED will light up red while recording is in progress. After the recording stops it will be orange during the post-processing phase. As soon as data is ready for download to the host, the LED will turn green. See Recorder.

Trigger LED

This LED will light up green while the Trigger/Sequencer is active but not yet triggered. When the Trigger occurs, the LED turns red. See Filter/Trigger.

FireSpy Unit

This FireSpy model consists of three triple FireSpy Analyzer Units to form a total of 9 analyzer nodes. Each Unit has its own section on the front panel with connectors and status LEDs. Units are numbered top-down from 1 to 3. The FireSpy application can be used to control one unit at a time or multiple units simultaneously.

FireSpy Unit Status LED

This led will light up orange when the FireSpy Unit is switched on but not yet configured. The bootloader will configure the device with the firmware version last used. When configuration is successful the LED will turn green. A red LED indicates an error.

Node A,B and C Act LEDs

(Not yet implemented) The function of these LEDs can be configured through the settings dialog of the FireSpy Application. These LEDs can also be controlled by the FireSpy Scriptor.

Power LED

The Power LED will light up red when power is supplied to the power connector on the back. Please be aware that this LED also lights up when the Power Switch on the back is in the Off position.

USB LED

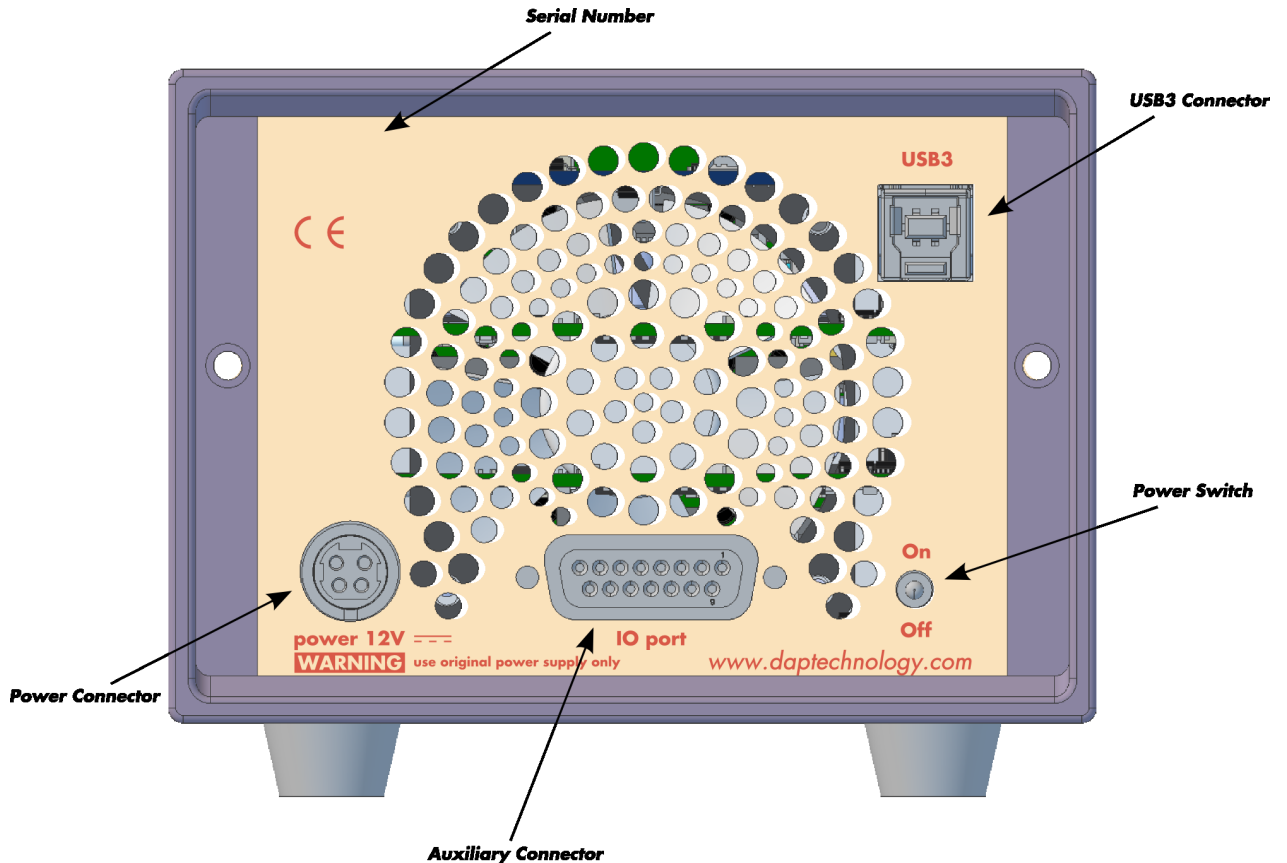
The USB LED will light up when the FireSpy is connected to the USB port of your computer (see 'FireSpy Rear' below) and the computer is switched on. It indicates the availability of USB bus power.

LEMO Connectors

With these connectors the FireSpy can be connected to the IEEE1394 bus to be analyzed. Each connector may be connected to the bus. The IEEE1394b ports are (from left to right) A0, A2, B0, B2, C0, C2.

Each connector is transformer coupled.

1.1.1.4. FireSpy Rear



Power Switch

Using this switch the FireSpy can be switched on and off. When switched on, the Unit LEDs on the front panel will light up orange to indicate they are starting up. Note that the power supply needs to be connected to the FireSpy (see below) to be able to switch the FireSpy on.

Power Connector

The power supply must be connected to the FireSpy, using this connector. Note that, for safety reasons, only the original power supply should be used. Whenever power is supplied to the analyzer, the Power LED on the front panel will light up red. (Even when the Power Switch is in the Off position).

Auxiliary Connector

The auxiliary port will be discussed in a separate chapter. See [Auxiliary connector ports](#).

USB3 Connector

The FireSpy must be connected to the computer using this connector. A USB3 cable, which is part of the FireSpy-package, is connected between this connector and the USB3 port of the computer.

Serial Number

Each FireSpy has an 11-character serial number. This number is also programmed into the FireSpy and can be read with the License Manager of the FireSpy application. The software will only work when a valid license certificate is installed for the serial number of the currently connected FireSpy. See License Manager for more information on license certificates.

1.1.2. FireSpy 6432bT, 6832bT

The FireSpy6x32bT bus analyzer is world's only six-node IEEE-1394 bus analyzer. Based on the 4th generation FireSpy analyzer architecture the FireSpy6x32bT is the most advanced 1394 test equipment in the market. The FireSpy6x32bT in fact combines six FireSpy analyzers in one single instrument. It comprises a significantly more powerful on-board processor and improved connectivity to the host.



The FireSpy6x32bT has six 1394 nodes connected to six synchronized analysis engines. They are controlled by two dual core ARM processors running at 667MHz. Each node is connected to two 1394 ports. Both ports of each node are connected to a separate LEMO connector which was chosen over standard 1394 connectors for improved ruggedness.

The FireSpy6x32bT is equipped with 10 GB internal memory and extensive hardware filtering and trigger possibilities. The analyzer can be connected to a host computer using the USB3 interface. On the host you can control the FireSpy using a graphical user interface to analyze and display the bus traffic in a user-friendly way; or you can use the API to program your own control software.

The seamless integration of the SAE AS5643 protocol makes the FireSpy6x32bT the preferred tool for many Aerospace & Defense development tasks. DapTechnology has taken considerable efforts to fully support the AS5643 protocol in all major functional areas of the FireSpy6x32bT and continuously updates the analyzer functionality according to implementation requirements and ongoing standardization efforts.

1.1.2.1. Main Feature Summary

GENERAL

- IEEE 1394-2008 Beta compliant
- Supports S100B-S800B transfer rates depending on exact model
- Connects to host using USB3.0 interface
- 10GByte memory for embedded OS and packet and data storage
- Firmware field upgradeable to enable future expansions
- AUX connector for:
 - Trigger input and output functions
 - Recording external events
- Software runs on Windows™ Operating Systems

MONITOR

- Displays bus activity:
 - isochronous packets
 - all types of asynchronous packets
 - all types of PHY packets
 - all types of acknowledge packets
 - several types of Errors
- Counts packets according to type, speed, ack and error condition

- Counts number of bus resets

RECORDER

- Time stamping of all packets and status events with 10ns resolution
- Packets hidden by slower connections are visible as 'prefix only' packets
- Extensive packet/event filtering/trigger/search capabilities
 - Packet type
 - Transmission speed
 - Boolean combination of 4 programmable packet sets
 - Data payload patterns
 - Error conditions
 - Various status events
 - Graphical Trigger Sequencer
- Adjustable trigger position within programmable record buffer size
- Cyclic pre-trigger buffer management option
- Different kinds of packet display views, including:
 - Time View, displays all packets on a time line, including the prefix
 - Packet View, displays packets as list plus selected packet options
 - Transaction View, displays transactions as list or flow graph
 - Topology View, graphical topology displays as is during recording
 - Protocol View, displays packets decoded to selected protocol
- Precise time measurements
- Marking of individual packets or packet ranges
- Export format for re-generation of packets by Scriptor or API

GENERATOR

- Simultaneous generation of up to 63 iso streams on 6 buses
 - Graphically programming of stream transmit block
 - Data payload import from file
- Generator and Scriptor run simultaneous for stream and asynchronous
 - packet generation
- Special AS5643 stream generator package (optional)

SCRIPTOR

- Script Editor
 - C-like scripting language
 - Function Library
 - Macros to automatically generate blocks of code
 - Syntax coloring
 - Integrated Debugger
 - Floating point data types
- Data Editor
- Control Panel
 - Graphical display elements for data value representation
 - Ethernet-connected Client Panels for remote data monitoring
- Several Sample Scripts

COMMANDER

- Reading and/or writing of local and reading of remote PHY registers
- Reading and/or writing of remote memory locations (incl. CSR register space)
- Possibility to graphically view the current Topologies
- Sending of user definable packets

1.1.2.2. Specifications

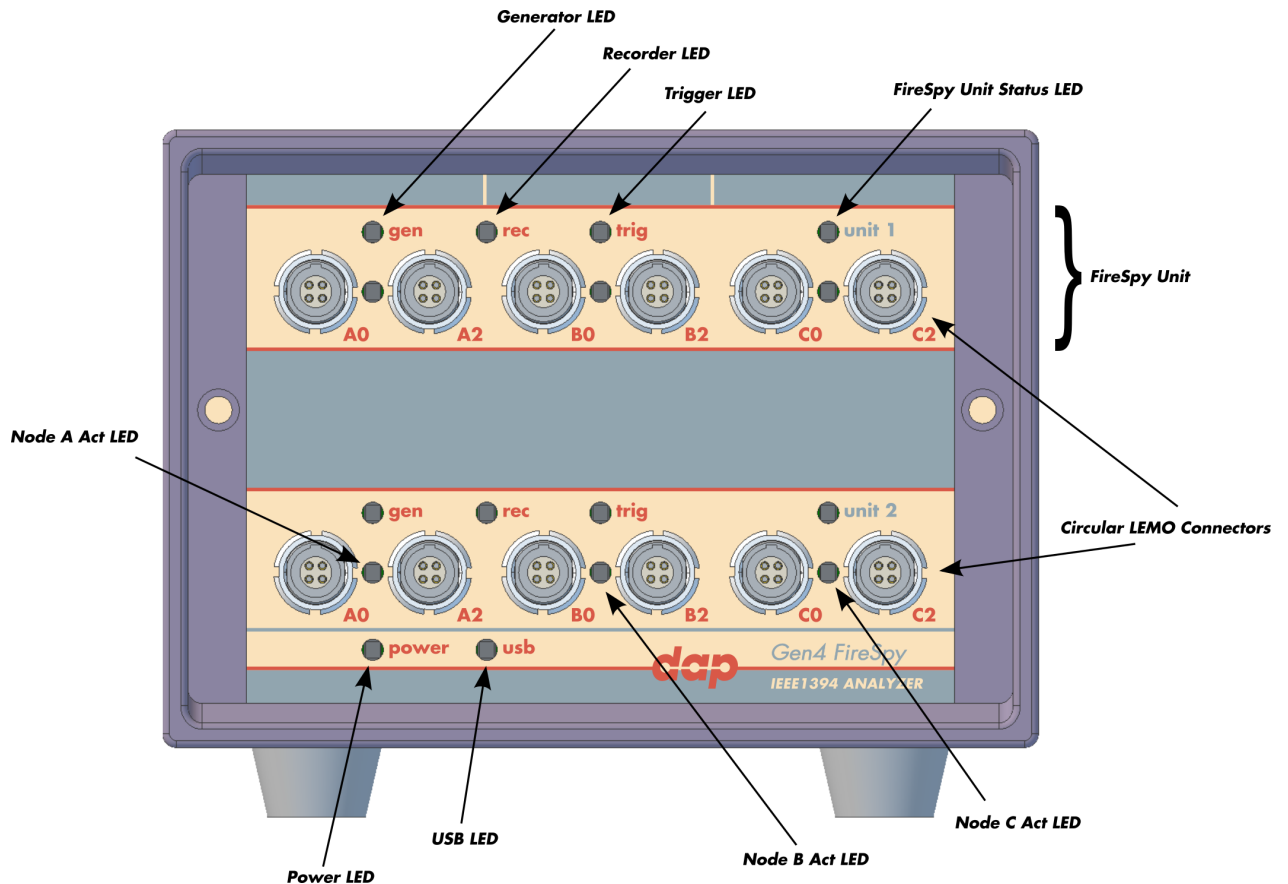
Dimensions:	125 mm x 96 mm x 301 mm
Weight:	2090 g
Operating Range:	0 – 45 C
Power Requirements:	12 V, 40Watt max.
Compliance:	FCC Class A
Connections:	<ul style="list-style-type: none"> • USB 3.0 connector for host-computer • 12x LEMO connectors (EYG.0B.304) for 1394 Beta connections • Auxiliary connector • Power connector
Indicators:	<ul style="list-style-type: none"> • Multi-colored LEDs for: Unit status, Recorder, Generator, Trigger, Active (per node) • Red LEDs for: USB, Power
Switches:	Toggle switch for Power On/Off
Package Content:	FireSpy6x32bT Power Adapter (12V, 5A) USB 3.0 Cable
Product warranty:	36 months limited warranty
Part Number:	FS6432bT or FS6432bTAS5643 analyzer with AS5643 SW protocol package FS6832bT or FS6832bTAS5643 analyzer with AS5643 SW protocol package
Optional Configuration:	N/A
SW Add-on modules:	SBP2 protocol software package IIDC protocol software package AV/C protocol software package IP1394 protocol software package AS5643 protocol software package AMI-C protocol software package

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

1.1.2.3. FireSpy Front



Generator LED

This LED will light up green while the FireSpy Generator is active. See Generator.

Recorder LED

This LED will light up red while recording is in progress. After the recording stops it will be orange during the post-processing phase. As soon as data is ready for download to the host, the LED will turn green. See Recorder.

Trigger LED

This LED will light up green while the Trigger/Sequencer is active but not yet triggered. When the Trigger occurs, the LED turns red. See Filter/Trigger.

FireSpy Unit

This FireSpy model consists of two triple FireSpy Analyzer Units to form a total of 6 analyzer nodes. Each Unit has its own section on the front panel with connectors and status LEDs. Units are numbered top-down from 1 to 2. The FireSpy application can be used to control one unit at a time or multiple units simultaneously.

FireSpy Unit Status LED

This led will light up orange when the FireSpy Unit is switched on but not yet configured. The bootloader will configure the device with the firmware version last used. When configuration is successful the LED will turn green. A red LED indicates an error.

Node A,B and C Act LEDs

(Not yet implemented) The function of these LEDs can be configured through the settings dialog of the FireSpy Application. These LEDs can also be controlled by the FireSpy Scriptor.

Power LED

The Power LED will light up red when power is supplied to the power connector on the back. Please be aware that this LED also lights up when the Power Switch on the back is in the Off position.

USB LED

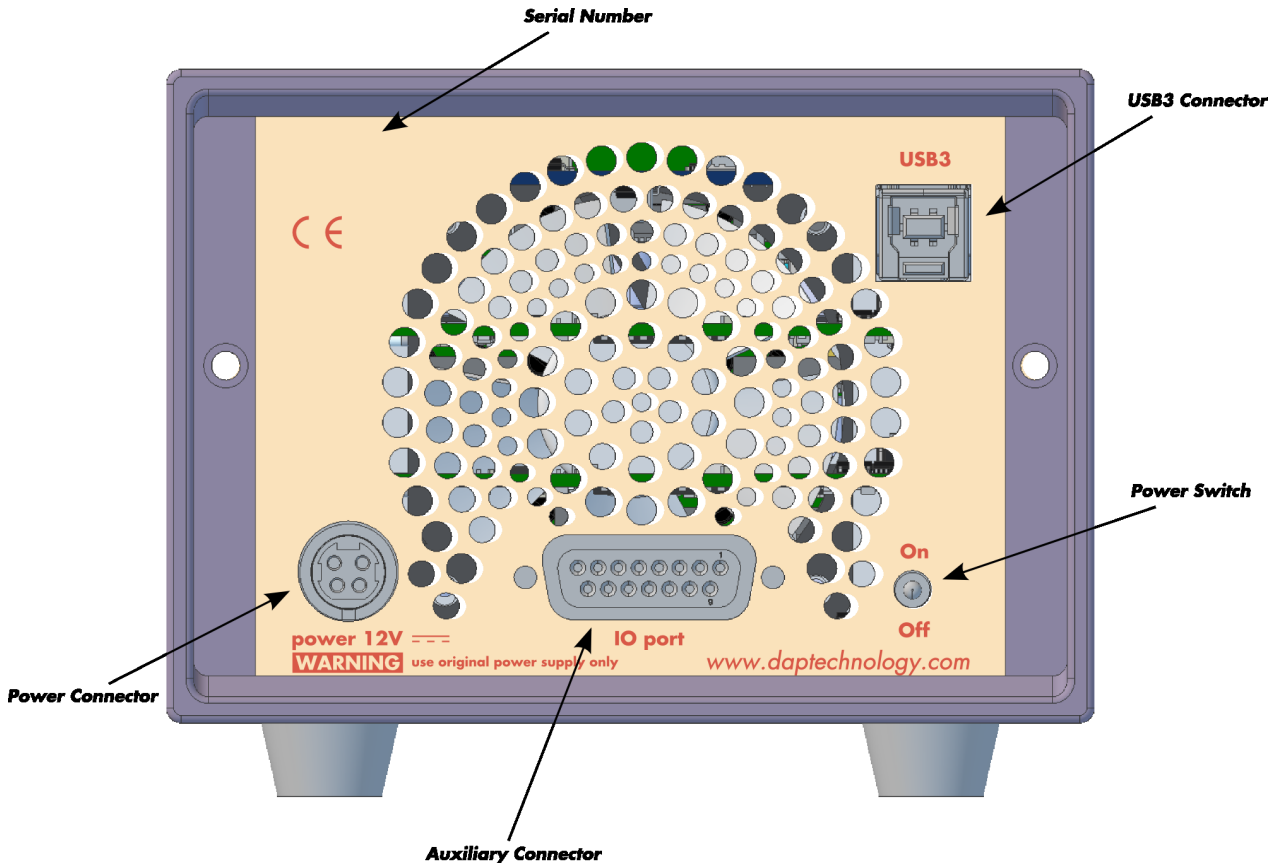
The USB LED will light up when the FireSpy is connected to the USB port of your computer (see 'FireSpy Rear' below) and the computer is switched on. It indicates the availability of USB bus power.

LEMO Connectors

With these connectors the FireSpy can be connected to the IEEE1394 bus to be analyzed. Each connector may be connected to the bus. The IEEE1394b ports are (from left to right) A0, A2, B0, B2, C0, C2.

Each connector is transformer coupled.

1.1.2.4. FireSpy Rear



Power Switch

Using this switch the FireSpy can be switched on and off. When switched on, the Unit LEDs on the front panel will light up orange to indicate they are starting up. Note that the power supply needs to be connected to the FireSpy (see below) to be able to switch the FireSpy on.

Power Connector

The power supply must be connected to the FireSpy, using this connector. Note that, for safety reasons, only the original power supply should be used. Whenever power is supplied to the analyzer, the Power LED on the front panel will light up red. (Even when the Power Switch is in the Off position).

Auxiliary Connector

The auxiliary port will be discussed in a separate chapter. See [Auxiliary connector ports](#).

USB3 Connector

The FireSpy must be connected to the computer using this connector. A USB3 cable, which is part of the FireSpy-package, is connected between this connector and the USB3 port of the computer.

Serial Number

Each FireSpy has an 11-character serial number. This number is also programmed into the FireSpy and can be read with the License Manager of the FireSpy application. The software will only work when a valid license certificate is installed for the serial number of the currently connected FireSpy. See License Manager for more information on license certificates.

1.1.3. FireSpy 3430b, 3430bT, 3830, 3830bT

The FireSpy3x30xx bus analyzer is based on the 4th generation FireSpy analyzer architecture and is the most advanced 1394 test equipment in the market. The FireSpy3x30xx in fact combines three FireSpy analyzers in one single instrument. It comprises a significantly more powerful on-board processor and improved connectivity to the host.



The FireSpy3x30xx has three 1394 nodes connected to three synchronized analysis engines. They are controlled by a dual core ARM processor running at 667MHz. Each node is connected to three 1394 ports. All ports of each node are connected to a separate IEEE-1394 connector with screw mount holes which was chosen over standard 1394 connectors for improved ruggedness.

The FireSpy3x30xx is equipped with 5 GB internal memory and extensive hardware filtering and trigger possibilities. The analyzer can be connected to a host computer using the USB3 interface. On the host you can control the FireSpy using a graphical user interface to analyze and display the bus traffic in a user-friendly way; or you can use the API to program your own control software.

The seamless integration of the SAE AS5643 protocol makes the FireSpy3x30xx the preferred tool for many Aerospace & Defense development tasks. DapTechnology has taken considerable efforts to fully support the AS5643 protocol in all major functional areas of the FireSpy3x30xx and continuously updates the analyzer functionality according to implementation requirements and ongoing standardization efforts.

1.1.3.1. Main Feature Summary

GENERAL

- IEEE 1394-2008 Beta compliant
- Supports S100B-S800B transfer rates depending on exact model
- Connects to host using USB3.0 interface
- 5GByte memory for embedded OS and packet and data storage
- Firmware field upgradeable to enable future expansions
- AUX connector for:
 - Trigger input and output functions
 - Recording external events
- Software runs on Windows™ Operating Systems

MONITOR

- Displays bus activity:
 - isochronous packets
 - all types of asynchronous packets
 - all types of PHY packets
 - all types of acknowledge packets
 - several types of Errors
- Counts packets according to type, speed, ack and error condition

- Counts number of bus resets

RECORDER

- Time stamping of all packets and status events with 10ns resolution
- Packets hidden by slower connections are visible as 'prefix only' packets
- Extensive packet/event filtering/trigger/search capabilities
 - Packet type
 - Transmission speed
 - Boolean combination of 4 programmable packet sets
 - Data payload patterns
 - Error conditions
 - Various status events
 - Graphical Trigger Sequencer
- Adjustable trigger position within programmable record buffer size
- Cyclic pre-trigger buffer management option
- Different kinds of packet display views, including:
 - Time View, displays all packets on a time line, including the prefix
 - Packet View, displays packets as list plus selected packet options
 - Transaction View, displays transactions as list or flow graph
 - Topology View, graphical topology displays as is during recording
 - Protocol View, displays packets decoded to selected protocol
- Precise time measurements
- Marking of individual packets or packet ranges
- Export format for re-generation of packets by Scriptor or API

GENERATOR

- Simultaneous generation of up to 63 iso streams on 3 buses
 - Graphically programming of stream transmit block
 - Data payload import from file
- Generator and Scriptor run simultaneous for stream and asynchronous
 - packet generation
- Special AS5643 stream generator package (optional)

SCRIPTOR

- Script Editor
 - C-like scripting language
 - Function Library
 - Macros to automatically generate blocks of code
 - Syntax coloring
 - Integrated Debugger
 - Floating point data types
- Data Editor
- Control Panel
 - Graphical display elements for data value representation
 - Ethernet-connected Client Panels for remote data monitoring
- Several Sample Scripts

COMMANDER

- Reading and/or writing of local and reading of remote PHY registers
- Reading and/or writing of remote memory locations (incl. CSR register space)
- Possibility to graphically view the current Topologies
- Sending of user definable packets

1.1.3.2. Specifications

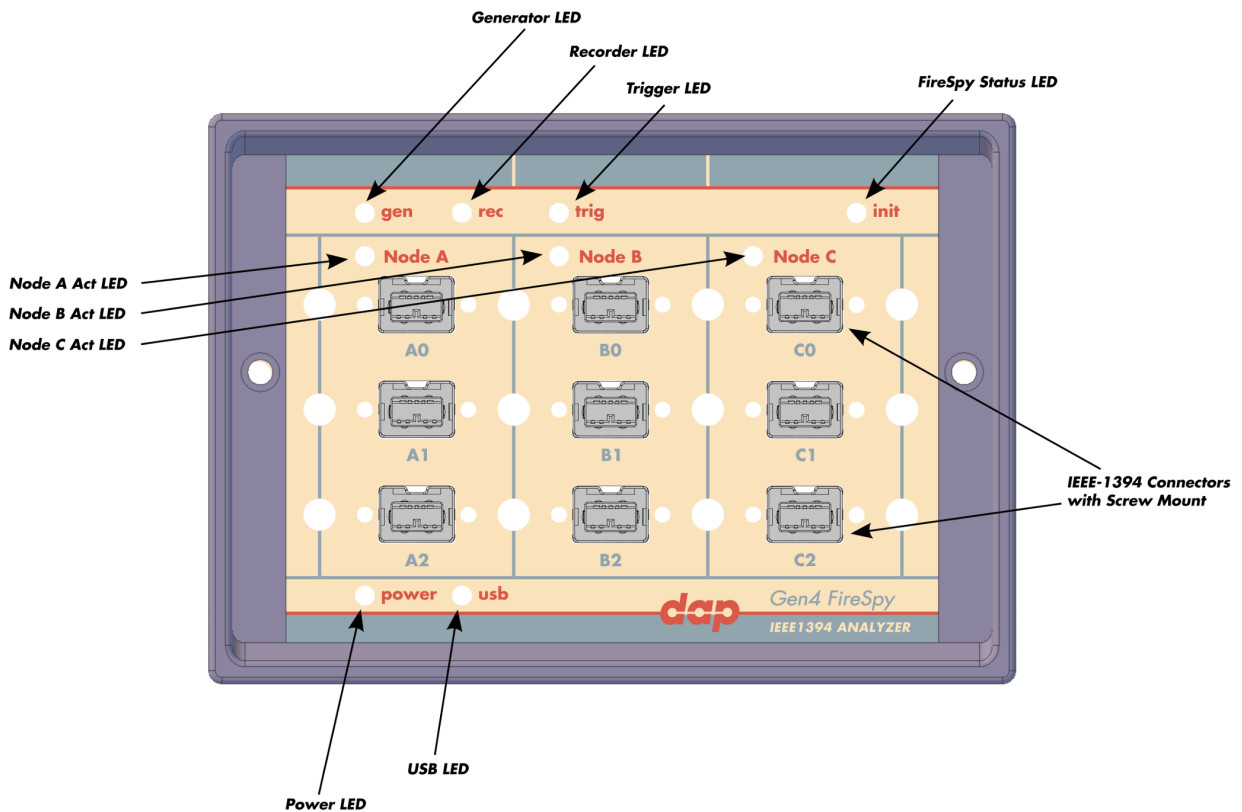
Dimensions:	125 mm x 96 mm x 301 mm
Weight:	1790 g
Operating Range:	0 – 45 C
Power Requirements:	12 V, 40Watt max.
Compliance:	FCC Class A
Connections:	<ul style="list-style-type: none"> • USB 3.0 connector for host-computer • 9x IEEE-1394 connectors with screw holes • Auxiliary connector • Power connector
Indicators:	<ul style="list-style-type: none"> • Multi-colored LEDs for: Unit status, Recorder, Generator, Trigger, Active (per node) • Red LEDs for: USB, Power
Switches:	Toggle switch for Power On/Off
Package Content:	FireSpy3x30xx Power Adapter (12V, 5A) USB 3.0 Cable
Product warranty:	36 months limited warranty
Part Number:	FireSpy3430b or FireSpy3430bAS5643 analyzer with AS5643 SW protocol package FireSpy3430bT or FireSpy3430bTAS5643 analyzer with AS5643 SW protocol package FireSpy3830 or FireSpy3830AS5643 analyzer with AS5643 SW protocol package FireSpy3830bT or FireSpy3830bTAS5643 analyzer with AS5643 SW protocol package
Optional Configuration:	N/A
SW Add-on modules:	SBP2 protocol software package IIDC protocol software package AV/C protocol software package IP1394 protocol software package AS5643 protocol software package AMI-C protocol software package

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

1.1.3.3. FireSpy Front



Generator LED

This LED will light up green while the FireSpy Generator is active. See Generator.

Recorder LED

This LED will light up red while recording is in progress. After the recording stops it will be orange during the post-processing phase. As soon as data is ready for download to the host, the LED will turn green. See Recorder.

Trigger LED

This LED will light up green while the Trigger/Sequencer is active but not yet triggered. When the Trigger occurs, the LED turns red. See Filter/Trigger.

FireSpy Status LED

This led will light up orange when the FireSpy Unit is switched on but not yet configured. The bootloader will configure the device with the firmware version last used. When configuration is successful the LED will turn green. A red LED indicates an error.

Node A,B and C Act LEDs

(Not yet implemented) The function of these LEDs can be configured through the settings dialog of the FireSpy Application. These LEDs can also be controlled by the FireSpy Scriptor.

Power LED

The Power LED will light up red when power is supplied to the power connector on the back. Please be aware that this LED also lights up when the Power Switch on the back is in the Off position.

USB LED

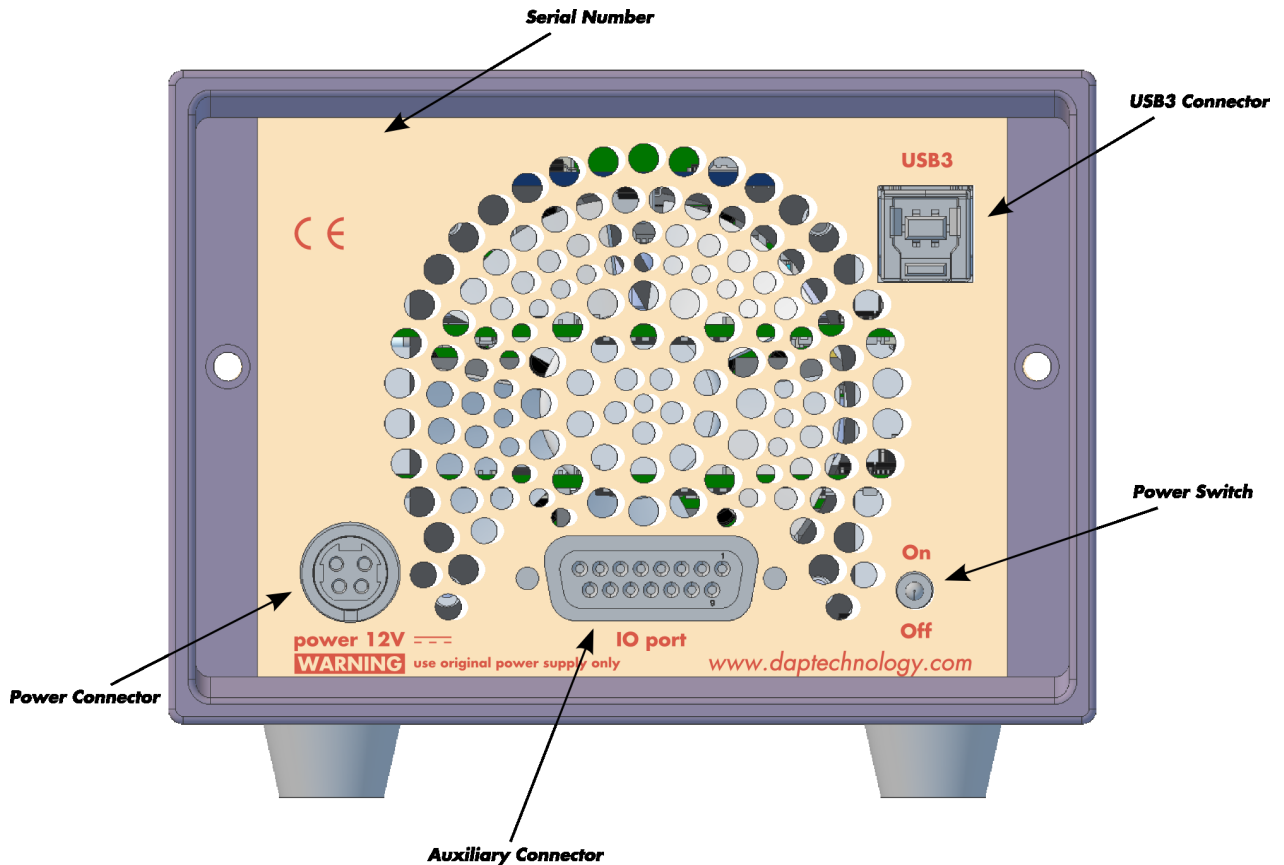
The USB LED will light up when the FireSpy is connected to the USB port of your computer (see 'FireSpy Rear' below) and the computer is switched on. It indicates the availability of USB bus power.

IEEE-1394 Connectors

With these connectors the FireSpy can be connected to the IEEE1394 bus to be analyzed. Each connector may be connected to the bus. The IEEE1394b ports are (top-down, left-right) A0, A1, A2, B0, B1, B2, C0, C1, C2.

Depending on the exact model, each connector is transformer coupled.

1.1.3.4. FireSpy Rear



Power Switch

Using this switch the FireSpy can be switched on and off. When switched on, the Unit LEDs on the front panel will light up orange to indicate they are starting up. Note that the power supply needs to be connected to the FireSpy (see below) to be able to switch the FireSpy on.

Power Connector

The power supply must be connected to the FireSpy, using this connector. Note that, for safety reasons, only the original power supply should be used. Whenever power is supplied to the analyzer, the Power LED on the front panel will light up red. (Even when the Power Switch is in the Off position).

Auxiliary Connector

The auxiliary port will be discussed in a separate chapter. See [Auxiliary connector ports](#).

USB3 Connector

The FireSpy must be connected to the computer using this connector. A USB3 cable, which is part of the FireSpy-package, is connected between this connector and the USB3 port of the computer.

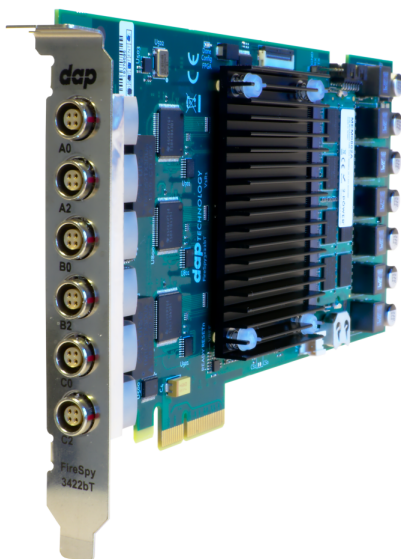
Serial Number

Each FireSpy has an 11-character serial number. This number is also programmed into the FireSpy and can be read with the License Manager of the FireSpy application. The software will only work when a valid license certificate is installed for the serial number of the currently connected FireSpy. See License Manager for more information on license certificates.

1.1.4. FireSpy 3422bT, 3822bT

The FireSpy3x22bT bus analyzer series is world's only PCIe-based multi-channel FireWire bus analyzer product line. The different models differ only in their support for different speeds, architecturally they

based on the latest Gen4 concept. Each analyzer card in fact combines three FireSpy analyzers in one single instrument.



The PCIe's format takes flexibility to a higher level and addresses the industries growing support for this data interface. This solution enables users to install the FireSpy hardware in any modern PC that has at least one 4-lane PCIe slot available. This allows for installation of the FireSpy in developers existing PCs or installing the analyzer in a rugged field service laptop or lunchbox computer.

The FireSpy3x22bT have three 1394 nodes connected to three synchronized analysis engines. They are controlled by a dual core ARM processor running at 667MHz. Each node is connected to two 1394 ports. Two ports of each 1394 node are connected to a LEMO connector.

The FireSpy3x22bT are equipped with 5 GB internal memory and extensive hardware filtering and trigger possibilities. The analyzer can be connected into a host computer using its PCIe interface. On the host you can control the FireSpy using a graphical user interface to analyze and display the bus traffic in a user-friendly way; or you can use the API to program your own control software.

1.1.4.1. Main Feature Summary

GENERAL

- IEEE 1394-2008 Beta compliant
- Supports S100-S800 transfer rates depending on exact model
- Connects to host using PCIe interface
- 5GByte memory for embedded OS and packet and data storage
- Firmware field upgradeable to enable future expansions
- AUX connector for:
 - Trigger input and output functions
 - Recording external events
 - Time synchronization
- GUI and API for Windows™ Operating Systems

MONITOR

- Displays bus activity:
 - isochronous packets
 - all types of asynchronous packets
 - all types of PHY packets
 - all types of acknowledge packets
 - several types of Errors
- Counts packets according to type, speed, ack and error condition
- Counts number of bus resets

- Measurement of bus power voltages (bilingual ports)

RECORDER

- Time stamping of all packets and status events with 10ns resolution
- Packets hidden by slower connections are visible as 'prefix only' packets
- Extensive packet/event filtering/trigger/search capabilities
 - Packet type
 - Transmission speed
 - Boolean combination of 4 programmable packet sets
 - Data payload patterns
 - Error conditions
 - Various status events
 - Graphical Trigger Sequencer
- Adjustable trigger position within programmable record buffer size
- Cyclic pre-trigger buffer management option
- Different kinds of packet display views, including:
 - Time View, displays all packets on a time line, including the prefix
 - Packet View, displays packets as list plus selected packet options
 - Transaction View, displays transactions as list or flow graph
 - Topology View, graphical topology displays as is during recording
 - Protocol View, displays packets decoded to selected protocol
- Precise time measurements
- Marking of individual packets or packet ranges
- Export format for re-generation of packets by Scriptor or API

GENERATOR

- Simultaneous generation of up to 63 iso streams on 9 buses
 - Graphically programming of stream transmit block
 - Data payload import from file
- Generator and Scriptor run simultaneous for stream and asynchronous
 - packet generation
- Special AS5643 stream generator package (optional)

SCRIPTOR

- Script Editor
 - C-like scripting language
 - Function Library
 - Macros to automatically generate blocks of code
 - Syntax coloring
 - Integrated Debugger
 - Floating point data types
- Data Editor
- Control Panel
 - Graphical display elements for data value representation
 - Ethernet-connected Client Panels for remote data monitoring
- Several Sample Scripts

COMMANDER

- Reading and/or writing of local and reading of remote PHY registers
- Reading and/or writing of remote memory locations (incl. CSR register space)
- Possibility to graphically view the current Topologies
- Sending of user definable packets

1.1.4.2. Specifications

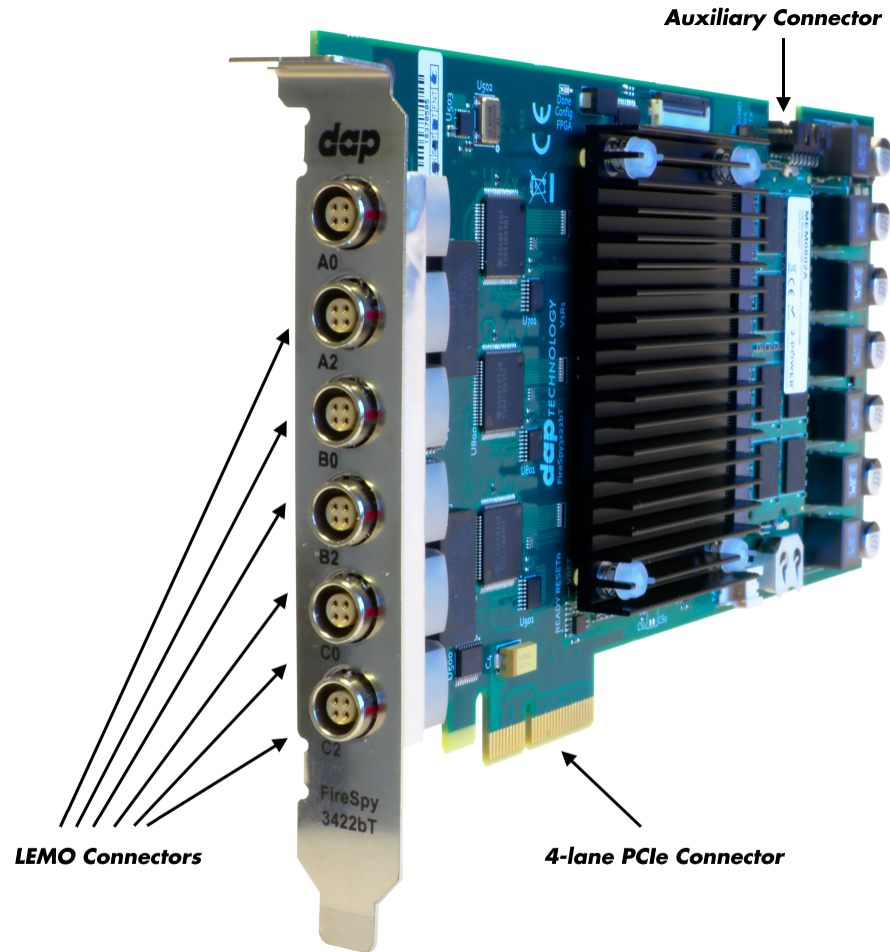
Dimensions:	4-lane PCIe: card length approx. 205 mm
Weight:	TBD
Operating Range:	0 – 70 C
Power Requirements:	25Watt max.
Compliance:	FCC Class A
Connections:	<ul style="list-style-type: none"> • PCIe connector • 6x LEMO connectors • Auxiliary connector
Indicators:	-
Switches:	-
Package Content:	FireSpy3x22bT 3x LEMO to Bilingual cables
Product warranty:	36 months limited warranty
Part Number:	FS3822bT or FS3822bTAS5643 analyzer with AS5643 SW protocol package FS3422bT or FS3422bTAS5643 analyzer with AS5643 SW protocol package
Optional Configuration:	N/A
SW Add-on modules:	SBP2 protocol software package IIDC protocol software package AV/C protocol software package IP1394 protocol software package AS5643 protocol software package AMI-C protocol software package

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

1.1.4.3. FireSpy PCI Board



LEMO Connectors

With these connectors the FireSpy can be connected to the IEEE1394 bus to be analyzed. Each connector may be connected to the bus. The IEEE1394b ports are (from left to right) A0, A2, B0, B2, C0, C2.

Each connector is transformer coupled.

Auxiliary Connector

The auxiliary port will be discussed in a separate chapter. See [Auxiliary connector ports](#).

1.1.5. FireSpy 4430b, 4430bT, 4830, 4830bT

The FireSpy4x30xx bus analyzer is world's only four-node IEEE-1394 bus analyzer. Based on the 4th generation FireSpy analyzer architecture the FireSpy4x30xx is the most advanced 1394 test equipment in the market. The FireSpy4x30xx in fact combines four FireSpy analyzers in one single instrument. It comprises a significantly more powerful on-board processor and improved connectivity to the host.



The FireSpy4x30xx has four 1394 nodes connected to four synchronized analysis engines. They are controlled by two dual core ARM processors running at 667MHz. Each node is connected to three 1394 ports. All ports of each node are connected to a separate IEEE-1394 connector with screw mount holes which was chosen over standard 1394 connectors for improved ruggedness.

The FireSpy4x30xx is equipped with 10 GB internal memory and extensive hardware filtering and trigger possibilities. The analyzer can be connected to a host computer using the USB3 interface. On the host you can control the FireSpy using a graphical user interface to analyze and display the bus traffic in a user-friendly way; or you can use the API to program your own control software.

The seamless integration of the SAE AS5643 protocol makes the FireSpy4x30xx the preferred tool for many Aerospace & Defense development tasks. DapTechnology has taken considerable efforts to fully support the AS5643 protocol in all major functional areas of the FireSpy4x30xx and continuously updates the analyzer functionality according to implementation requirements and ongoing standardization efforts.

1.1.5.1. Main Feature Summary

GENERAL

- IEEE 1394-2008 Beta compliant
- Supports S100B-S800B transfer rates depending on exact model
- Connects to host using USB3.0 interface
- 10GByte memory for embedded OS and packet and data storage
- Firmware field upgradeable to enable future expansions
- AUX connector for:
 - Trigger input and output functions
 - Recording external events
- Software runs on Windows™ Operating Systems

MONITOR

- Displays bus activity:
 - isochronous packets
 - all types of asynchronous packets
 - all types of PHY packets
 - all types of acknowledge packets
 - several types of Errors
- Counts packets according to type, speed, ack and error condition
- Counts number of bus resets

RECORDER

- Time stamping of all packets and status events with 10ns resolution
- Packets hidden by slower connections are visible as 'prefix only' packets

- Extensive packet/event filtering/trigger/search capabilities
 - Packet type
 - Transmission speed
 - Boolean combination of 4 programmable packet sets
 - Data payload patterns
 - Error conditions
 - Various status events
 - Graphical Trigger Sequencer
- Adjustable trigger position within programmable record buffer size
- Cyclic pre-trigger buffer management option
- Different kinds of packet display views, including:
 - Time View, displays all packets on a time line, including the prefix
 - Packet View, displays packets as list plus selected packet options
 - Transaction View, displays transactions as list or flow graph
 - Topology View, graphical topology displays as is during recording
 - Protocol View, displays packets decoded to selected protocol
- Precise time measurements
- Marking of individual packets or packet ranges
- Export format for re-generation of packets by Scriptor or API

GENERATOR

- Simultaneous generation of up to 63 iso streams on 4 buses
 - Graphically programming of stream transmit block
 - Data payload import from file
- Generator and Scriptor run simultaneous for stream and asynchronous
 - packet generation
- Special AS5643 stream generator package (optional)

SCRIPTOR

- Script Editor
 - C-like scripting language
 - Function Library
 - Macros to automatically generate blocks of code
 - Syntax coloring
 - Integrated Debugger
 - Floating point data types
- Data Editor
- Control Panel
 - Graphical display elements for data value representation
 - Ethernet-connected Client Panels for remote data monitoring
- Several Sample Scripts

COMMANDER

- Reading and/or writing of local and reading of remote PHY registers
- Reading and/or writing of remote memory locations (incl. CSR register space)
- Possibility to graphically view the current Topologies
- Sending of user definable packets

1.1.5.2. Specifications

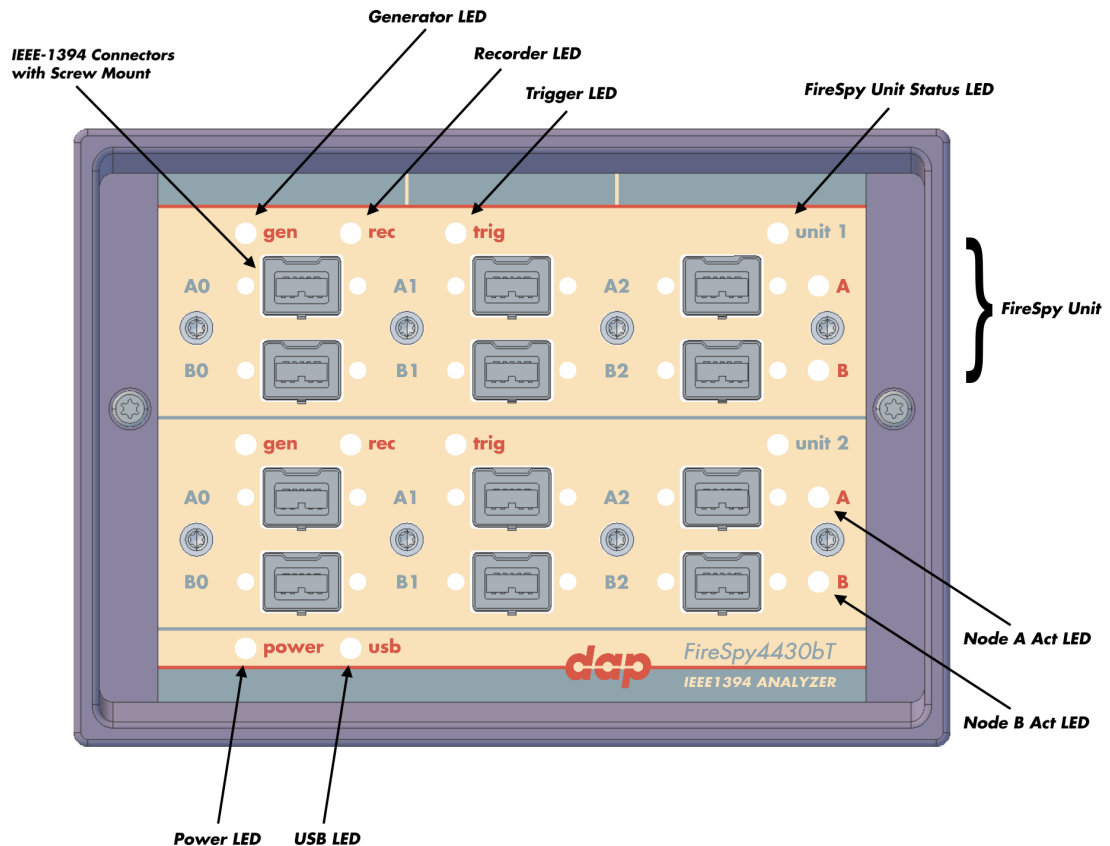
Dimensions:	125 mm x 96 mm x 301 mm
Weight:	2070 g
Operating Range:	0 – 45 C
Power Requirements:	12 V, 40Watt max.
Compliance:	FCC Class A
Connections:	<ul style="list-style-type: none"> • USB 3.0 connector for host-computer • 12x IEEE-1394 connectors with screw holes • Auxiliary connector • Power connector
Indicators:	<ul style="list-style-type: none"> • Multi-colored LEDs for: Unit status, Recorder, Generator, Trigger, Active (per node) • Green LEDs for: USB, Power
Switches:	Toggle switch for Power On/Off
Package Content:	FireSpy4x30xx Power Adapter (12V, 5A) USB 3.0 Cable
Product warranty:	36 months limited warranty
Part Number:	FS4430bT or FS4430bTAS5643 analyzer with AS5643 SW protocol package
Optional Configuration:	N/A
SW Add-on modules:	SBP2 protocol software package IIDC protocol software package AV/C protocol software package IP1394 protocol software package AS5643 protocol software package AMI-C protocol software package

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

1.1.5.3. FireSpy Front



Generator LED

This LED will light up green while the FireSpy Generator is active. See Generator.

Recorder LED

This LED will light up red while recording is in progress. After the recording stops it will be orange during the post-processing phase. As soon as data is ready for download to the host, the LED will turn green. See Recorder.

Trigger LED

This LED will light up green while the Trigger/Sequencer is active but not yet triggered. When the Trigger occurs, the LED turns red. See Filter/Trigger.

FireSpy Unit

This FireSpy model consists of two double FireSpy Analyzer Units to form a total of 4 analyzer nodes. Each Unit has its own section on the front panel with connectors and status LEDs. Units are numbered top-down from 1 to 2. The FireSpy application can be used to control one unit at a time or multiple units simultaneously.

FireSpy Unit Status LED

This led will light up orange when the FireSpy Unit is switched on but not yet configured. The bootloader will configure the device with the firmware version last used. When configuration is successful the LED will turn green. A red LED indicates an error.

Node A and B Act LEDs

(Not yet implemented) The function of these LEDs can be configured through the settings dialog of the FireSpy Application. These LEDs can also be controlled by the FireSpy Scriptor.

Power LED

The Power LED will light up red when power is supplied to the power connector on the back. Please be aware that this LED also lights up when the Power Switch on the back is in the Off position.

USB LED

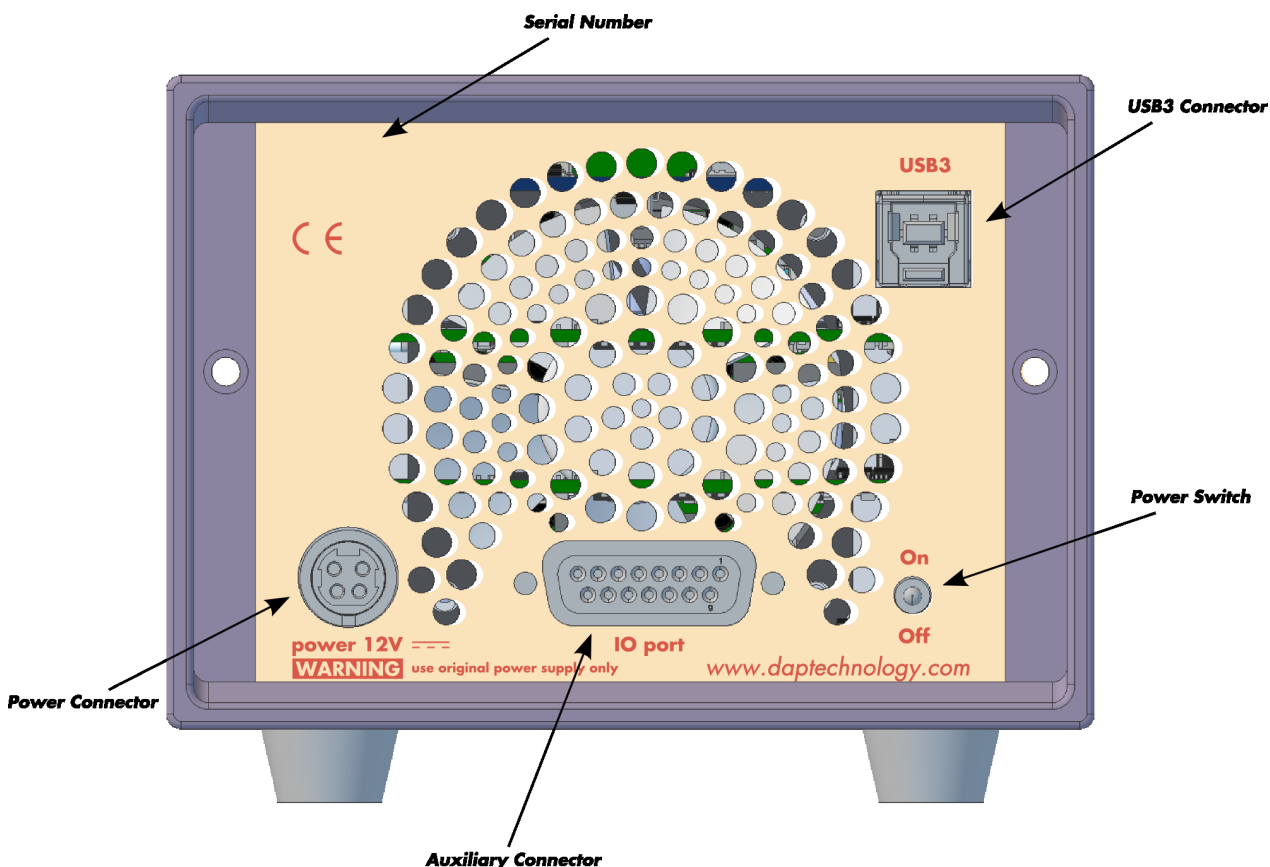
The USB LED will light up when the FireSpy is connected to the USB port of your computer (see 'FireSpy Rear' below) and the computer is switched on. It indicates the availability of USB bus power.

IEEE-1394 Connectors

With these connectors the FireSpy can be connected to the IEEE1394 bus to be analyzed. Each connector may be connected to the bus. The IEEE1394b ports are (top-down, left-right) A0, A1, A2, B0, B1, B2.

Depending on the exact model, each connector is transformer coupled.

1.1.5.4. FireSpy Rear



Power Switch

Using this switch the FireSpy can be switched on and off. When switched on, the Unit LEDs on the front panel will light up orange to indicate they are starting up. Note that the power supply needs to be connected to the FireSpy (see below) to be able to switch the FireSpy on.

Power Connector

The power supply must be connected to the FireSpy, using this connector. Note that, for safety reasons, only the original power supply should be used. Whenever power is supplied to the analyzer, the Power LED on the front panel will light up red. (Even when the Power Switch is in the Off position).

Auxiliary Connector

The auxiliary port will be discussed in a separate chapter. See [Auxiliary connector ports](#).

USB3 Connector

The FireSpy must be connected to the computer using this connector. A USB3 cable, which is part of the FireSpy-package, is connected between this connector and the USB3 port of the computer.

Serial Number

Each FireSpy has an 11-character serial number. This number is also programmed into the FireSpy and can be read with the License Manager of the FireSpy application. The software will only work when a valid license certificate is installed for the serial number of the currently connected FireSpy. See License Manager for more information on license certificates.

1.2. Auxiliary connector ports

All FireSpy devices have one or more auxiliary connector ports.
The signals on these ports are:

- A number of aux signals
- Ground (for aux signals and Power if available)
- Power (not on IDC connector)

The aux signals are all open drain CMOS output with a pullup resistor to 3.3 Volts. To prevent a short it is best to only pull these signals low and allowing the internal (or an extra external pullup) resistor to pull the signal high.

When you are sure some aux signal is only used as input, it may be pulled high actively, but it may never be pulled higher than 3.7 Volts.

The current that may flow into an aux pin when driven low by the FireSpy is maximum 12 mA.

All aux signals can be controlled by the Scriptor and for some of the aux signals special functions can be selected.

See the description of the 'External Ports' tab of the 'Settings Dialog' for the possible functions.

The Voltage of the Power signal and the current that can be drawn from it is FireSpy type dependant. The table below shows the Voltage and the maximum current that can be drawn from the Power pin.

FireSpy type	Voltage	Max current all ports together
FireSpy400b	5 +- 10%	100mA (SUBD port)
FireSpy800	5 +- 10%	100mA (SUBD port)
FireSpy410b	12 +- 10%	100mA (SUBD port)
FireSpy810	12 +- 10%	100mA (SUBD port)
FireSpy381x	12 +- 10%	200mA (SUBD and VHDCI ports together)
FireSpy385x	12 +- 10%	200mA (VHDCI port)

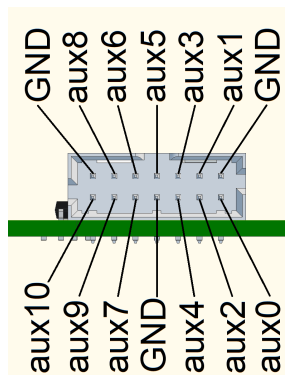
Note that the Power on the VHDCI connector can be switched off. See the General tab of the Settings Dialog.

Each aux port can be configured to have an active /TriggerOut pin. (This can be configured in the settingsdialog.) When the recorder is triggered, this pin will be active low for a duration of about 160nS.

1.2.1. The IBC connector

The 14 pin IBC connector is available for the FireSpy PCIx cards.

It has 11 aux signals.



This 14 pins connector has the following signals:

Pin 1	GND
Pin 2	aux2
Pin 3	aux6
Pin 4	aux9
Pin 5	aux10
Pin 6	aux1
Pin 7	aux3
Pin 8	GND
Pin 9	aux5
Pin 10	aux8
Pin 11	aux4
Pin 12	aux0
Pin 13	GND
Pin 14	aux7

For a description of the aux signals, [see above](#).

Chapter 2. Installation

DapTechnology analyzers are not packaged with any software-installation media. This is because we would like our customers to use the very latest software available and not an old version that happened to be the latest when we packaged the product.

You will be able to download the latest software version from our website: <http://www.daptechnology.com>

Click on the support button at the top of the web page and after inserting the serial number of your FireSpy, which can be found at the back of the unit, you will get access to your custom download page. On this page you will find the license keys for your analyzer as well as links to the software downloads available for your analyzer. (latest recommended or latest beta version)

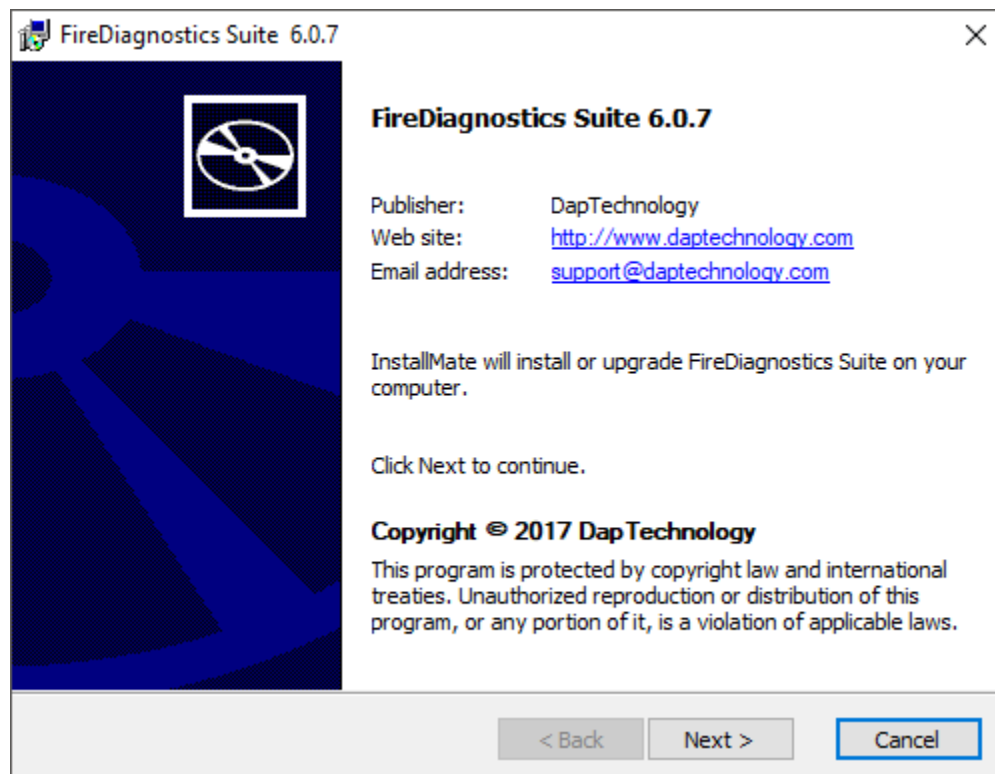
2.1. Windows

2.1.1. Installing the Software

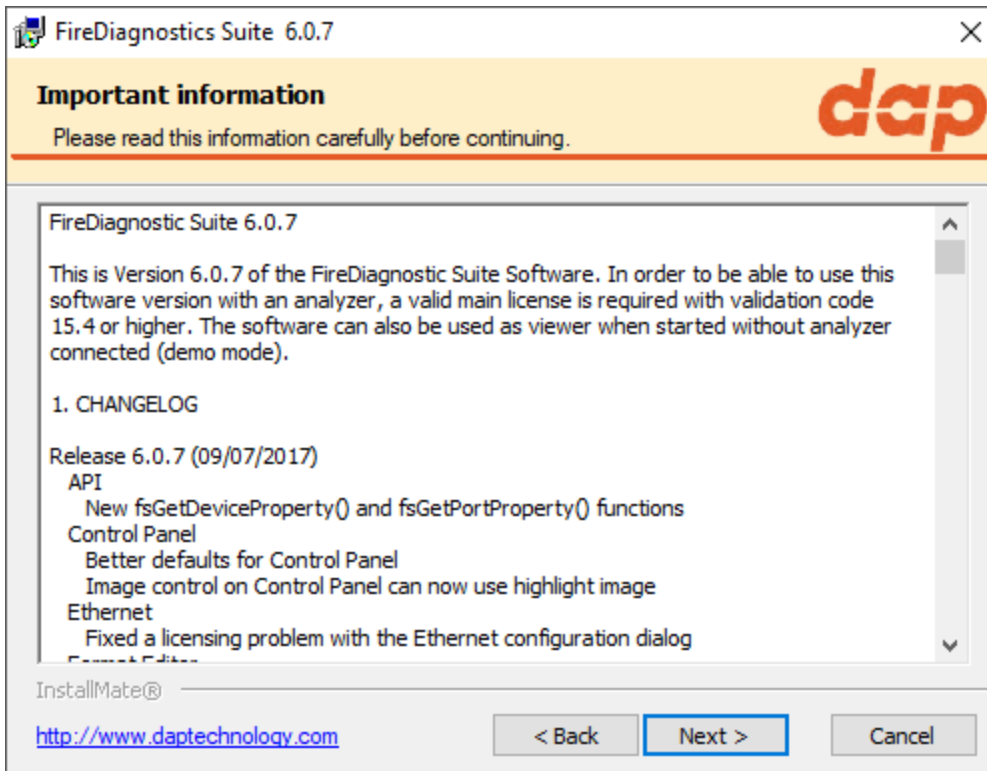
After downloading the FireDiagnostics Suite version of your choice from DapTechnology's website, please open the compressed folder and locate the file setup.exe. Run the setup.exe file, by one of the following ways:

- double click on the setup.exe file
- select 'Start->Run', browse to the setup.exe file and click 'OK'
- click with the right mouse button on setup.exe and select 'Open'

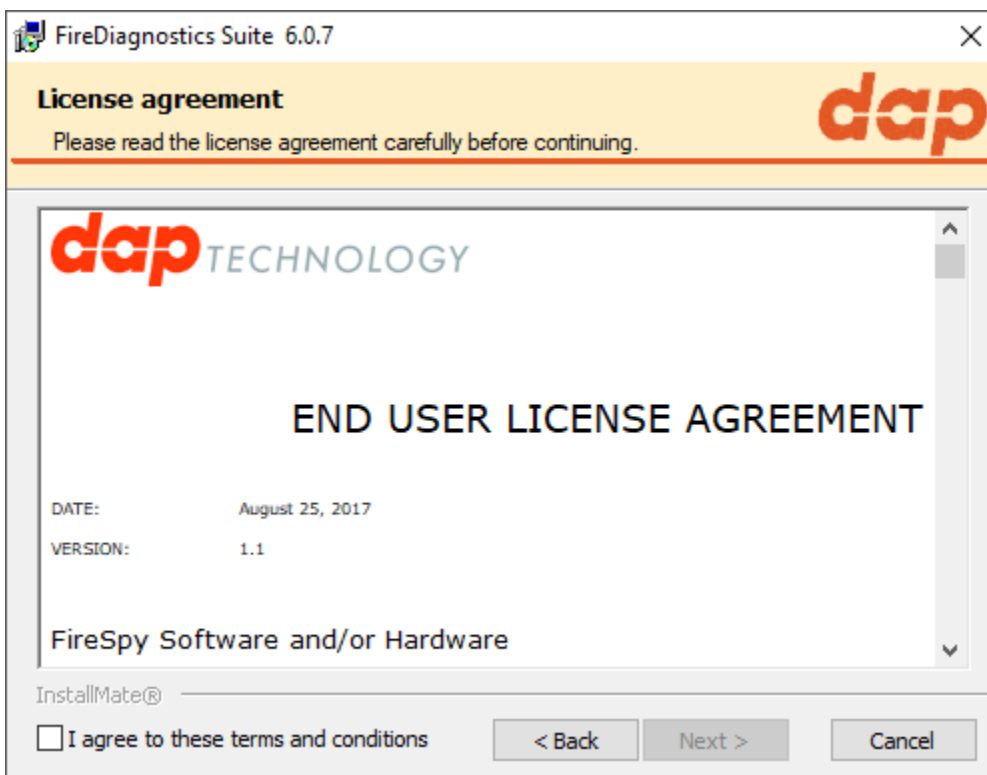
After starting the setup.exe program, the following window will be displayed. Note that the software version could be different if you are installing another version of the software.



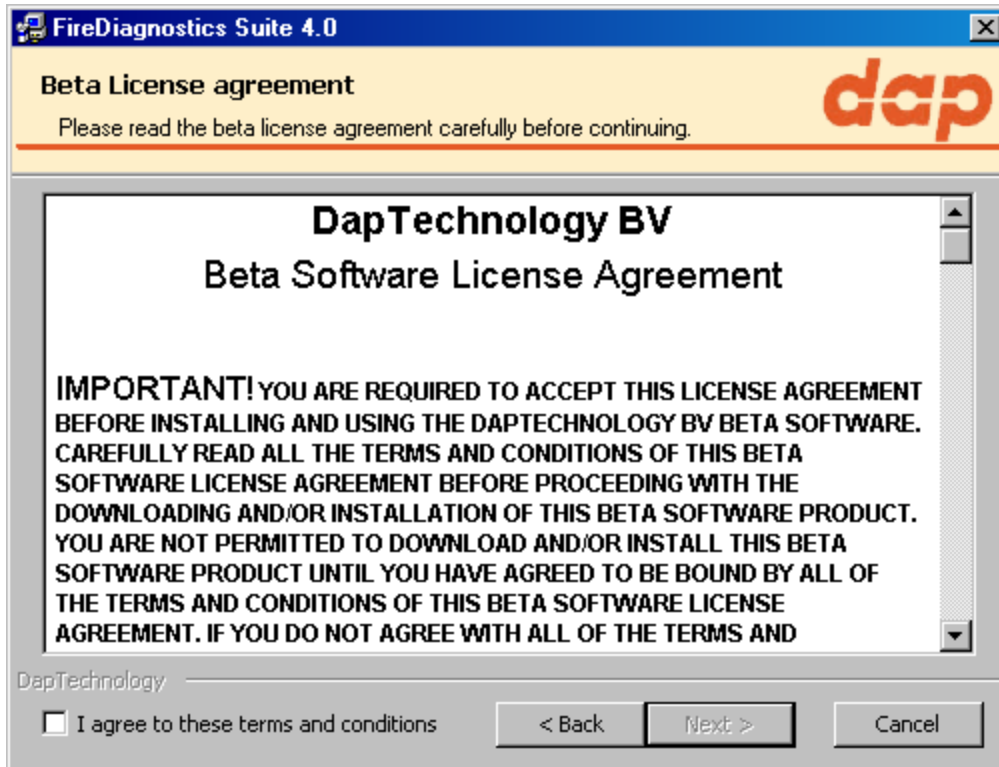
After clicking on "Next", the following window will be showed. It contains the latest information about the version of the software you are about to install. Please read it carefully before proceeding to the next step. The picture below contains just some example information.



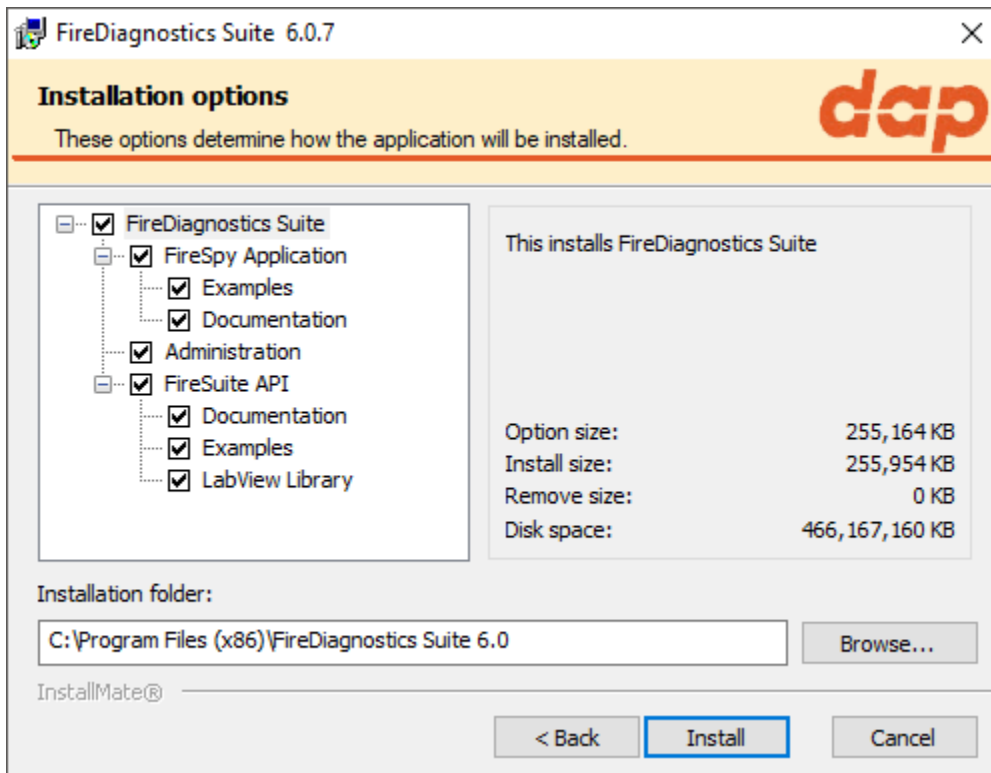
After clicking on "Next", the following window will be showed. It contains the License Information for the software you are about to install. Please read it carefully and check the checkbox to agree to the license agreement before proceeding to the next step.



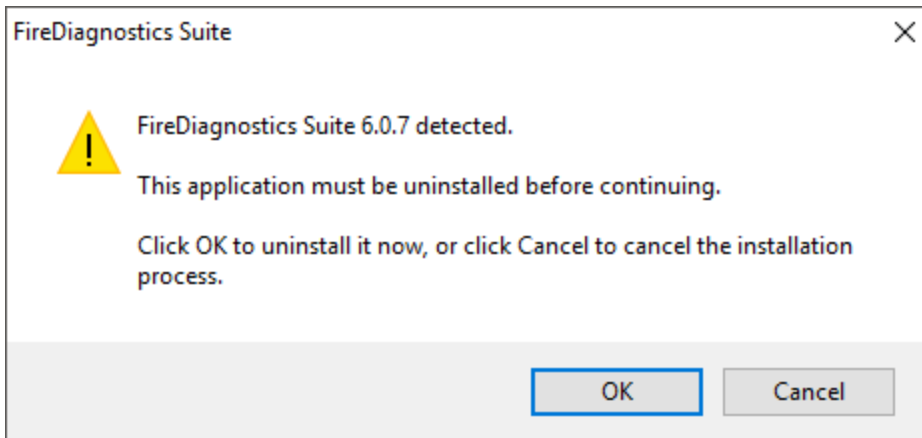
If you are installing a beta software version, an additional license agreement needs to be agreed with before continuing the installation process. Please check the checkbox and click next.



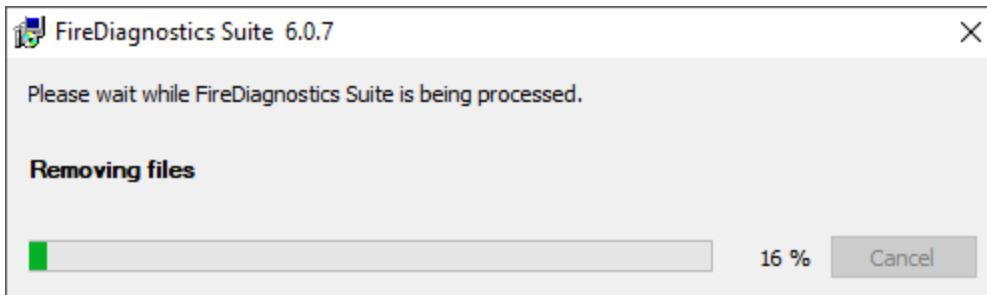
The installer options dialog as shown below allows the user to select which components to install. We recommend installing all components, however it is also possible to leave some components out.



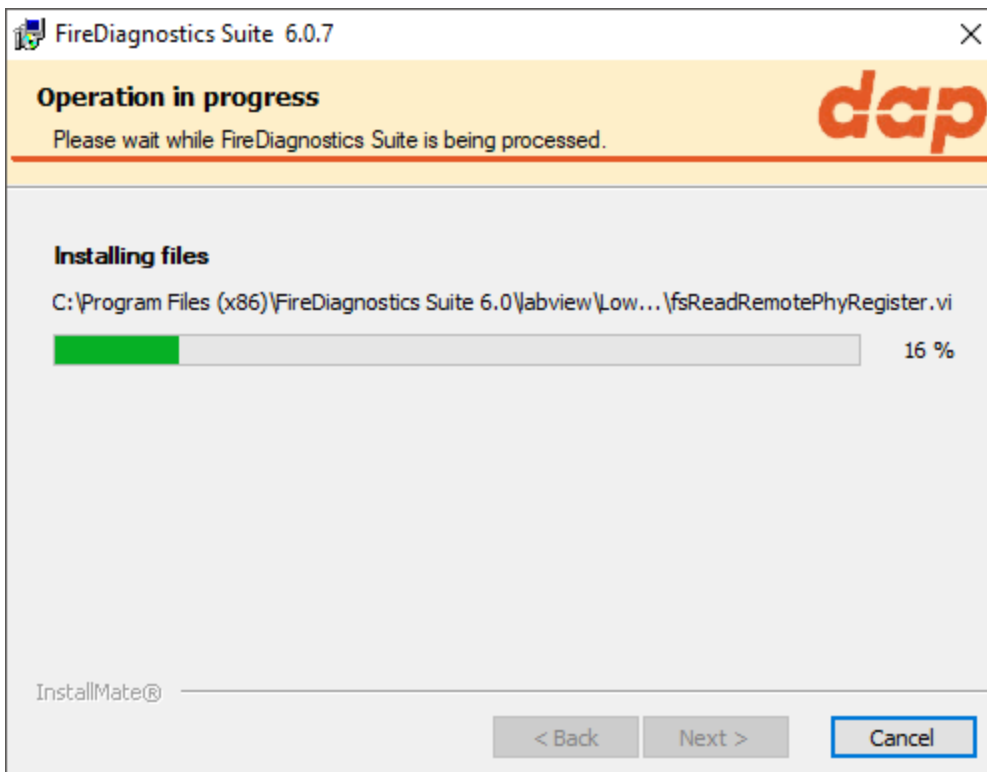
If another FireDiagnostics Suite installed version with the same main version number is found it needs to be reinstalled before the installer is able to continue. Software versions with a different major version number can be used alongside each other. Please click ok to proceed with the uninstallation process.



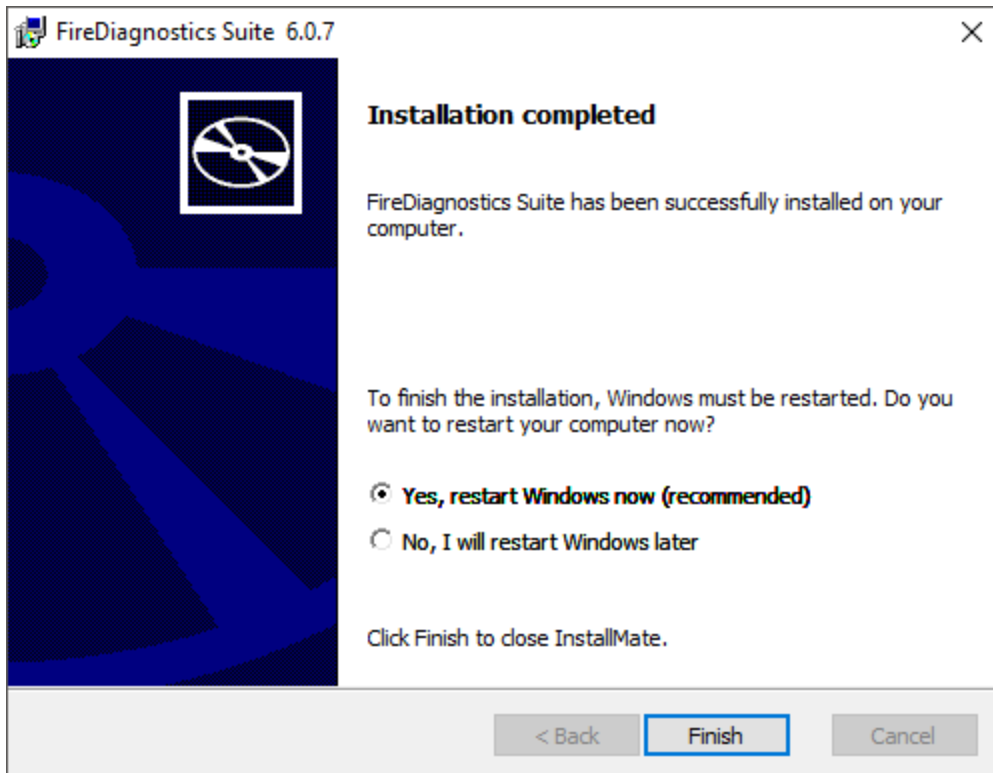
The following dialog will show uninstallation progress. Please wait until it finishes.



The following dialog will show installation progress. Please wait until it finishes.



After the installation is complete, the following dialog will appear. We recommend to always restart your computer after installing the FireDiagnostics software.



2.1.2. Installing the Driver

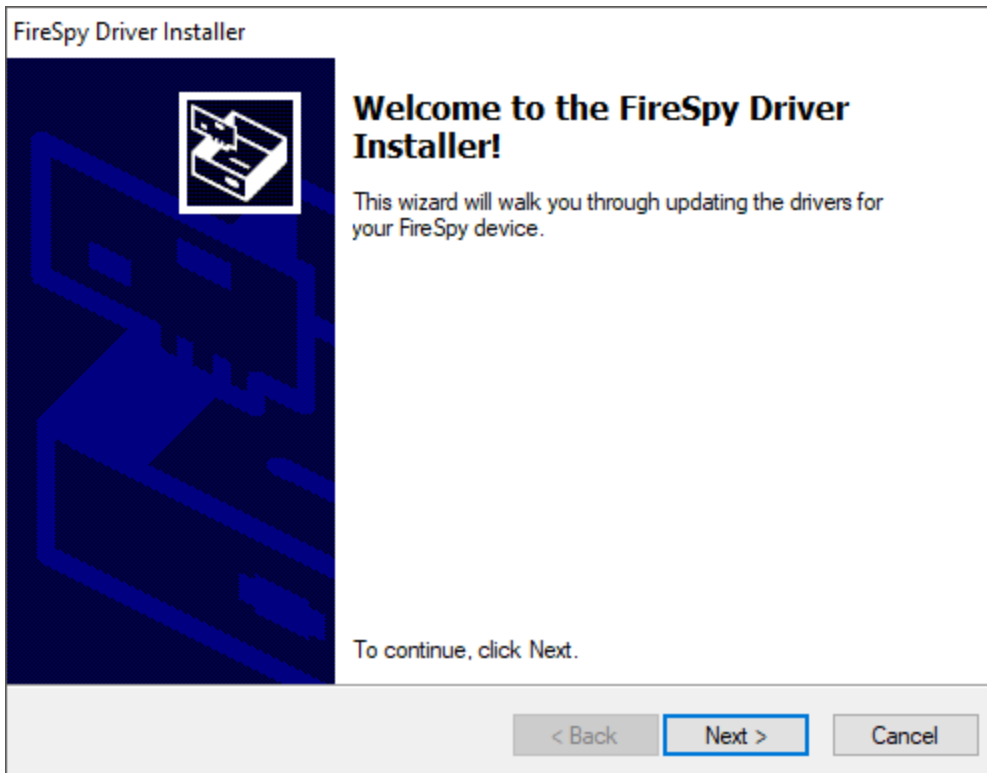
The driver installation will automatically start following the FireDiagnostics Suite installation, after the machine is rebooted. This installer will install the drivers for Windows 7 and Windows 10. Older Windows versions still work with the supplied drivers, but some additional steps may be required during installation. These steps are described in chapter [Older Windows versions](#).

After the device driver is installed the device ready to be used. Please continue reading at the "[Getting Started](#)" section.

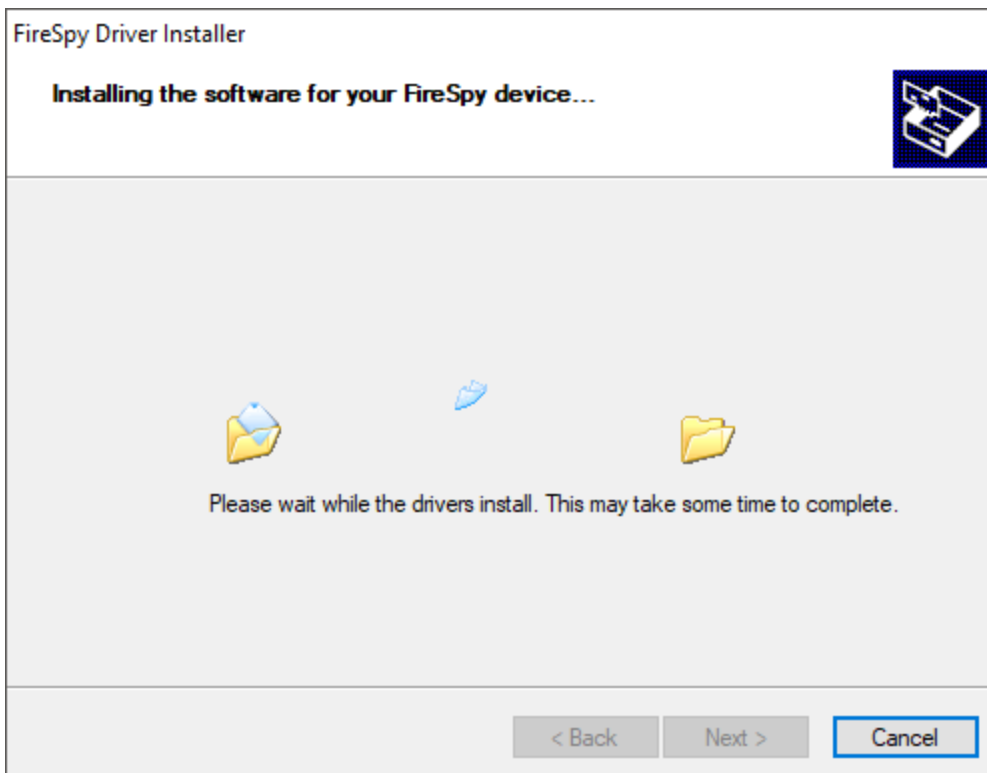
2.1.2.1. Windows Driver installer

At this point it is required to reboot the machine in order to install the device drivers. The device drivers will pre-allocate some memory that can be used for performing DMA operations and this needs to be done as early as possible after system startup. If done at a later point during system run it can take a very long time to load the driver.

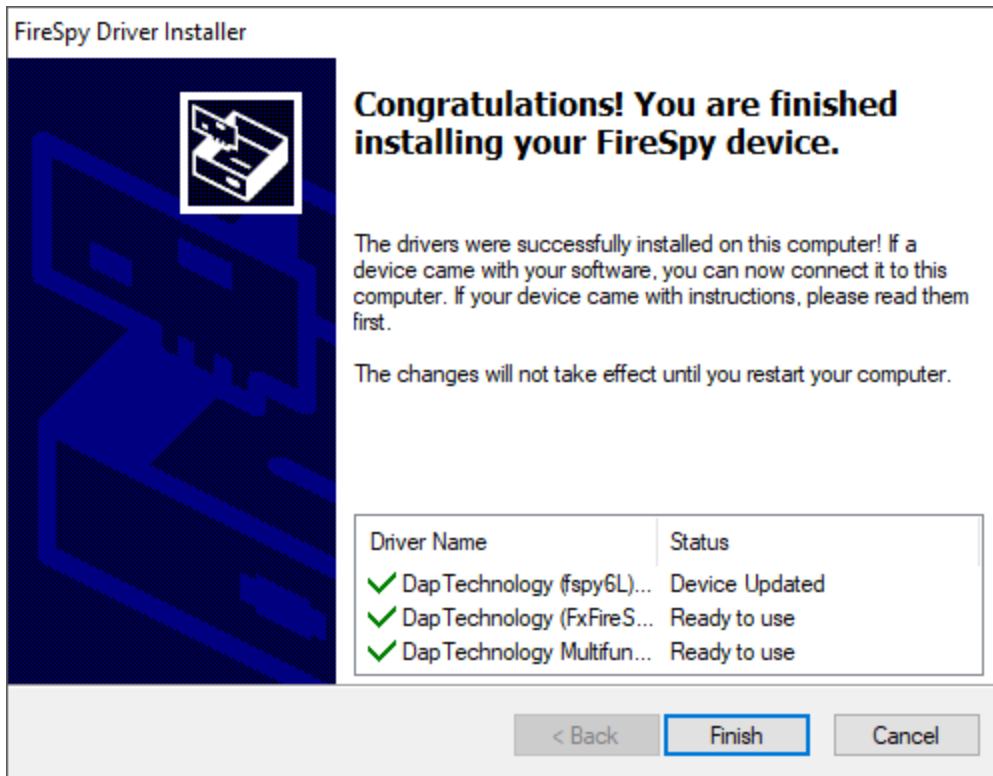
After rebooting the machine, the following window will be displayed. Note that the software version could be different if you are installing another version of the software.



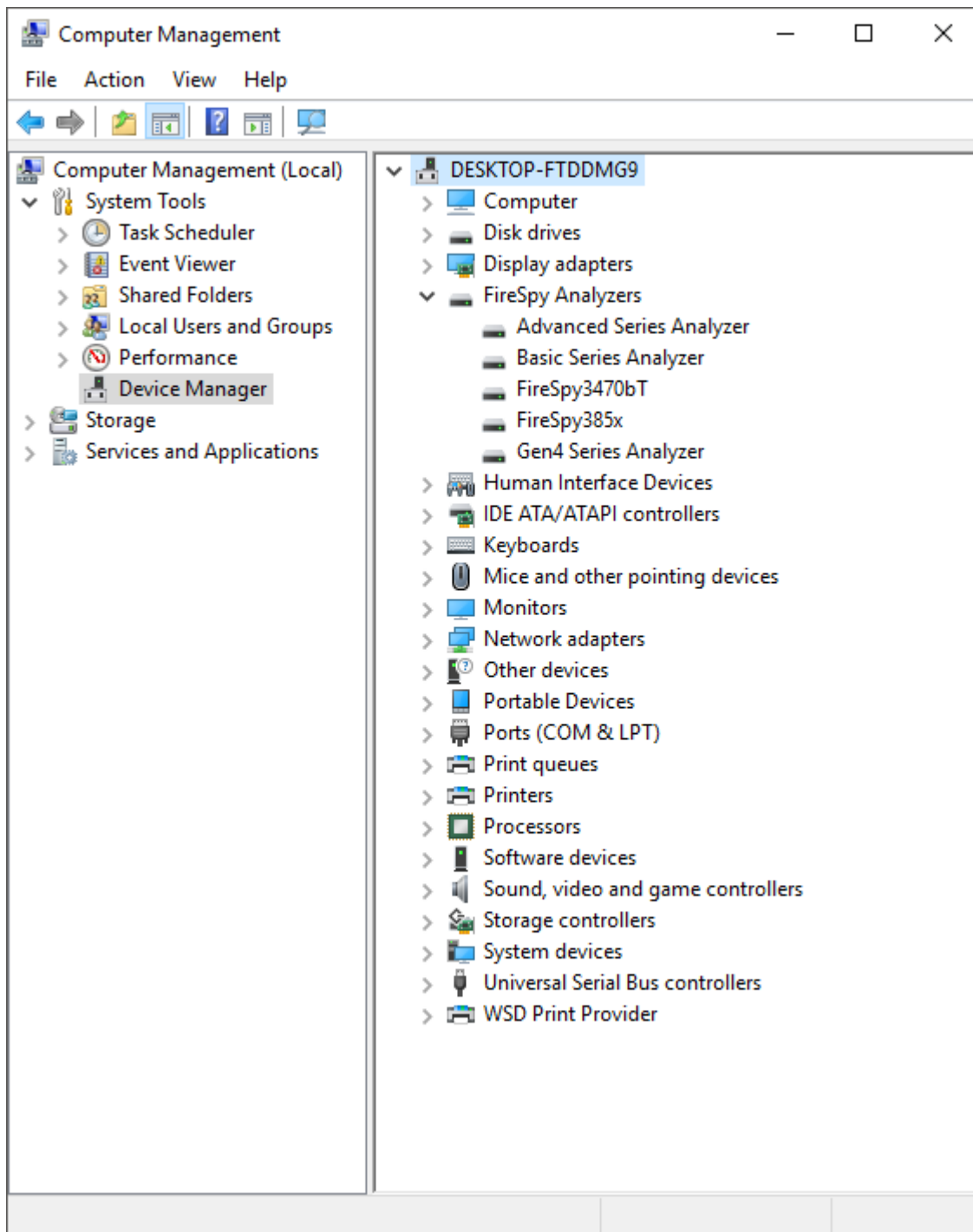
After clicking "Next", the drivers will be installed. Please wait until it finishes.



After the drivers are installed the following window will be showed. Click "Finish" to close the installation.



After you are booted to the desktop, you may check the device manager if the install has succeeded. The device manager will show a FireSpy under "Multifunction adapters". Here you find a several functions the device has.



2.1.2.1.1 Older Windows versions

For Windows versions older than Windows 7 some additional steps during the Driver installation may be required.

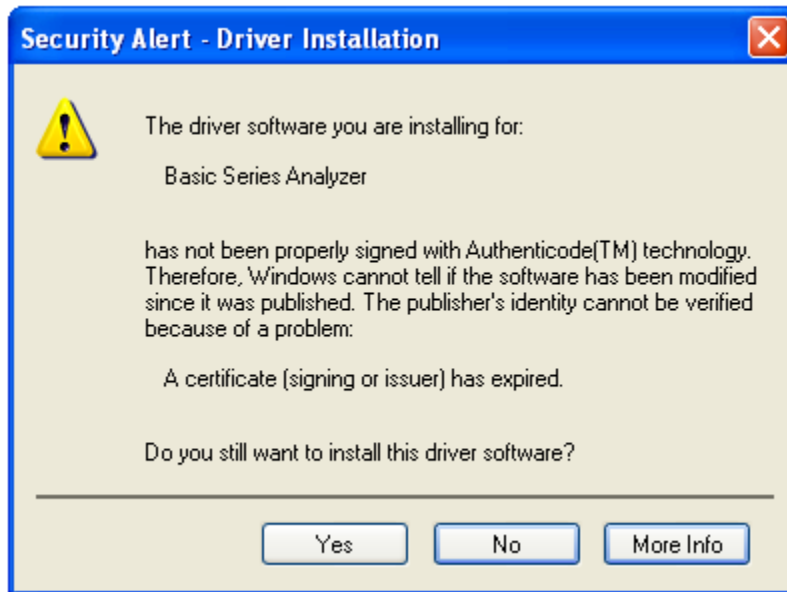
After the FireDiagnostics Suite installation, and after rebooting the machine, the Driver installer will start. During the installation the Windows Driver Wizard may appear, as shown in the following image. Please click "Cancel" to close the wizard for now, we need to install the drivers first before Windows can search for them.



At the start of the installation the following message may be displayed, saying the software has not passed Windows Logo testing. The FireSpy Logo testing is not supported for Windows versions older than Windows 7, but function on these Windows version regardless. Click "Continue Anyway" to continue with the installation.



During the installation of the Drivers, the following message may be displayed, saying the driver certificate has expired. As with the Windows Logo testing, the FireSpy driver signing is not supported for older Windows versions. Click "Yes" to continue installing the driver. This message may appear once or more during installation, depending on the number of FireSpy devices connected to the machine.

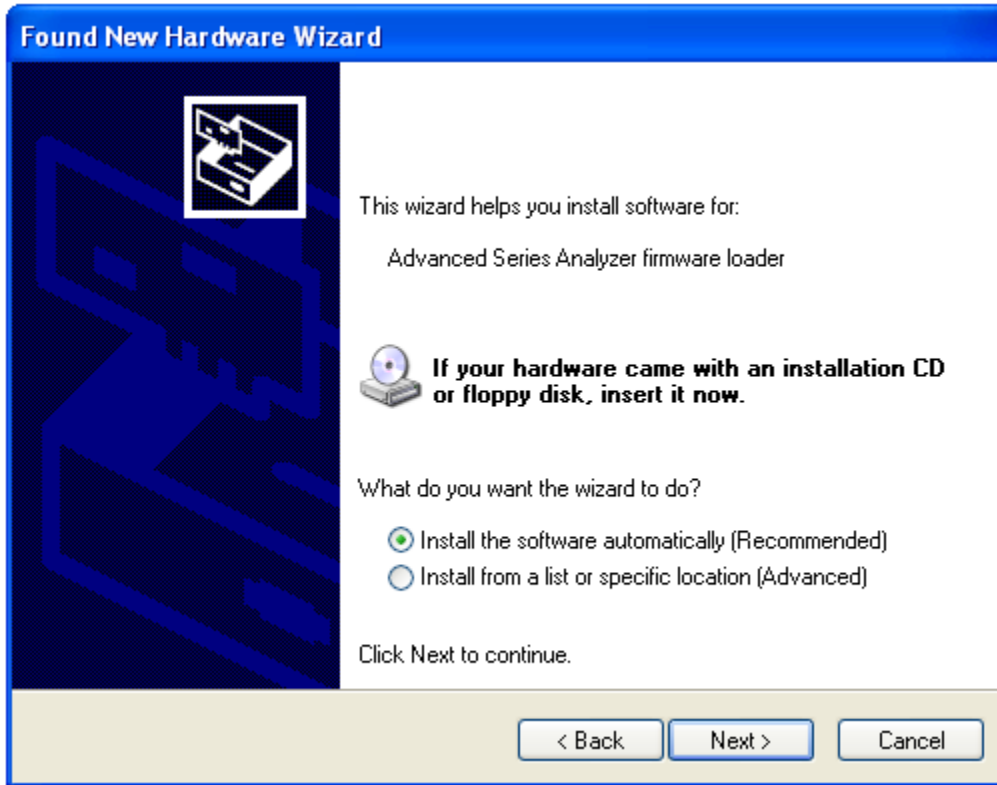


After the drivers are installed the following window will appear. Click "Finish" to continue starting Windows.

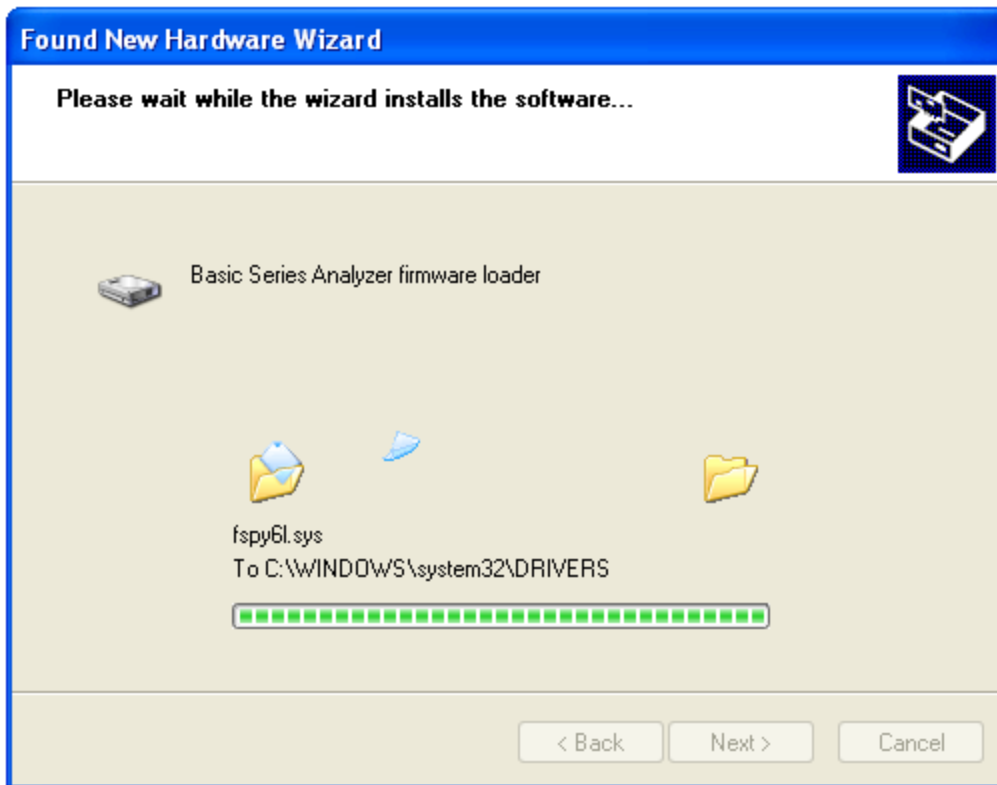


Any devices that were connected to the machine during the installation should work now. If there were any unplugged devices, please connect them to the machine now. The Windows Driver Wizard mentioned earlier should appear now. If it doesn't please reboot the machine. In the Driver Wizard, select the bottom option "No, not this time" to search for the already installed drivers, and click "Next" to continue.

Select the top option "Install the software automatically" from the following dialog, to let Windows search for the installed FireSpy drivers.



After clicking "Next" the Wizard will install the driver for the FireSpy device. Repeat this process for any additional FireSpy device that was not yet correctly installed during the installation.



2.1.2.2. Manual driver (un)installation

Drivers will be uninstalled when uninstalling the FireDiagnostics Suite. The uninstaller can be found in the Windows Start menu, under FireDiagnostics Suite x.x -> Uninstall FireDiagnostics Suite (for Windows 10), or FireDiagnostics Suite x.x -> Administration -> Uninstall FireDiagnostics Suite (for older Windows versions).

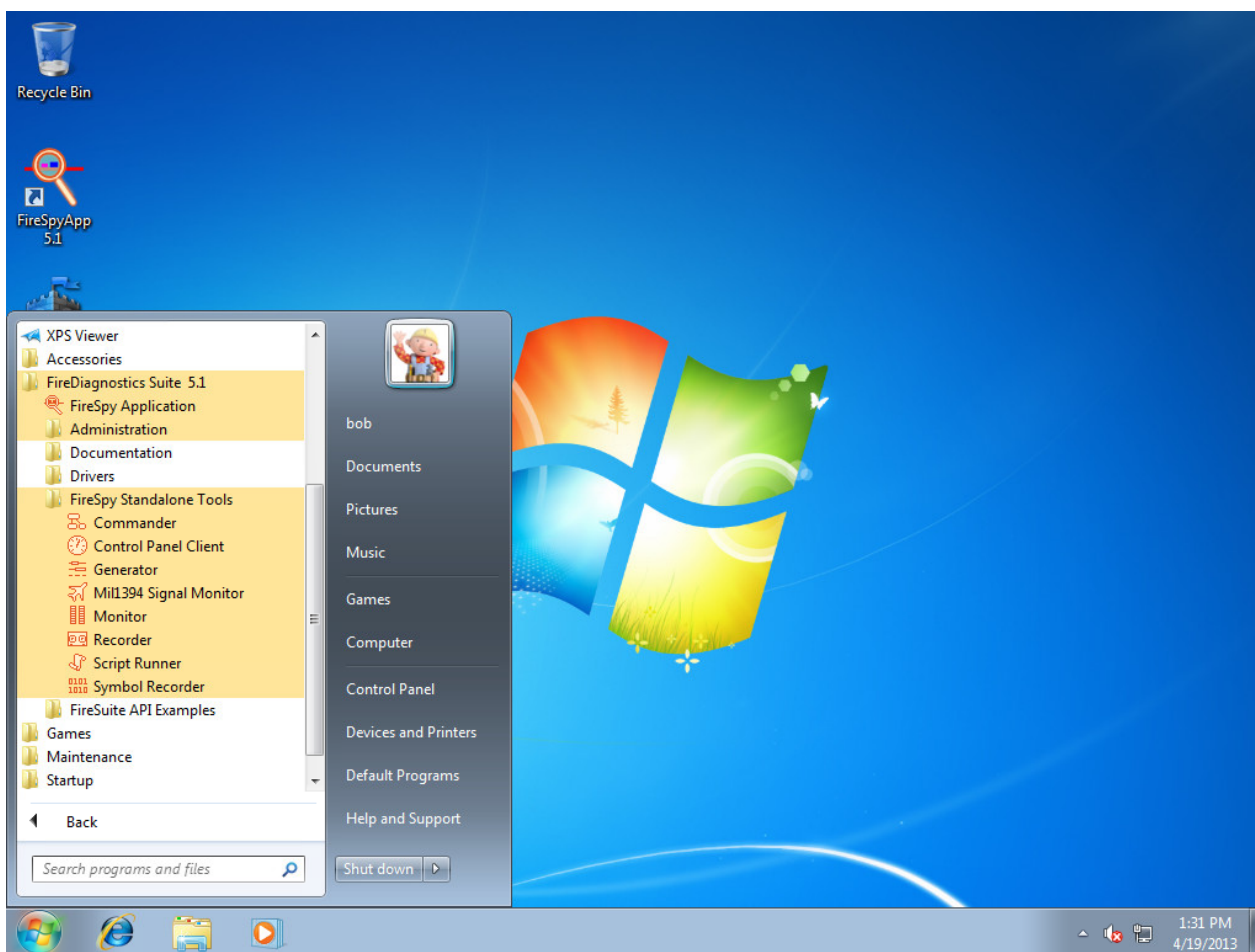
For example, when switching between versions of the FireDiagnostics Suite it may be needed to install a specific version of the FireSpy drivers manually without installing/uninstalling the complete FireDiagnosticsSuite software packaged, you can use the Driver Installer. This can be found in the Windows Start menu, under FireDiagnostics Suite x.x -> Install Drivers (for Windows 10) or FireDiagnostics Suite x.x -> Drivers -> Install Drivers (for older Windows versions). [A dialog will popup](#) and it will install the drivers.

Chapter 3. Getting Started

This section of the manual provides a quick-start guide for your analyzer and software. If you need help installing the application, please take a look at the [Installation](#).

3.1. FireSpy Standalone Tools

In addition to the main FireSpy application with all main FireSpy modules embedded there is also a way to start each module as a standalone application. These standalone versions can be started through the Windows start menu and then navigating to "All Programs", "FireDiagnostics Suite X.X" and then "FireSpy Standalone Tools". The picture below shows where to find the standalone versions.



Multiple standalone FireSpy tools can be started at the same time, but each module can only be started once per FireSpy. The following standalone FireSpy tools allow controlling multiple FireSpy devices from within a single application:

- Recorder
- Monitor
- Symbol Recorder

All other modules only allow controlling one FireSpy device from a single application.