SDU 2040 User Manual
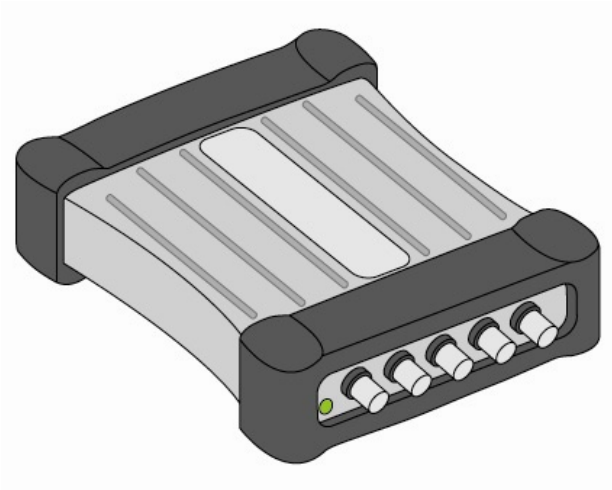
USB DYNAMIC SIGNAL ANALYZER

SDU 2040 User Manual

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	SDU 2040

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1. Product Quality Assurance

softDSP CO., LTD.. offers free repair or replacement if the product is found to have any defect within 1 year from the date when you bought the product though you have used it in a normal way as we take responsibility for any defect of the production, part and product.

However, for the defect that comes from the negligence, inappropriate maintenance and repair or management, malfunction or damage caused by the accident arising from the natural disaster, the repair or replacement service is charged regardless of the on-warranty period.

The liability of softDSP CO., LTD.. is confined to the product accepted by the headquarters or sales outlet during the on-warranty period, and free or charged services, refund is offered depending on the decision of the supplier. If the purchaser requests the warranty service, he or she can contact either the headquarters or the sale outlet, or describe the defect in detail and pack the product properly, and then, return the packed product to the nearest sales outlet after paying the mail fee and insurance fee. Then, the product will be mailed back to the purchaser at the expense of the suppler after the product is fixed.

However, if the defect of that product is not considered to meet the conditions of free repair offered during the on-warranty period, the quotation of the repair will be sent to the purchaser before the repair starts at the prior approval of the purchaser.

In this case, the cost of sending back the product (transportation cost) will be put up by softDSP CO., LTD.. and the purchaser will receive the invoice that includes both the repair cost and transportation cost. We do not take any responsibility for the damage caused by the carelessness, abnormal use against the note and warning, or the damage from the natural disaster, and even if softDSP CO., LTD.. was notified of such a risk in advance, softDSP CO., LTD.. is not liable for that.

2. Guide on the Product Warrant

Please read carefully the "notes for safe use" to ensure that you use this product safely.

The quality of this product was strictly managed and inspected, and if any defect happens in this product despite the normal operation, we provide the repair in accordance with the "Product Quality Assurrance" included in the manual. Please contact the headquars of softDSP CO., LTD.. or sale outlet if the manual does not have the product quality assurance or the product is not working.

3. Note for Safe Use

The following notes are for the safe and correct use of the product and prevent unexpected risk or damange. Please familiarize yourself with them before using the product.

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(1) Environment of Use

The temperature between 0℃ and 40℃ and the relative humidity between 10% and 80% are proper for the normal operation of this product.

(2) Power Related Things

+5V power is supplied from the USB terminal of computer. Therefore, do not connect the external power unnecessarily because that is not necessary.

(3) Be sure to be careful in using

- Do not operate the product in a way that may cause the wrong operation or impact
- Stop using this product immediately and disconnect the computer from the USB connection of this product if any abnormal smell, smog or sound comes from this product.
- Keep this product away from children or someone who should not use this product.
- Do not use this product with wet hand because electric shcok may result.
- Do not use this product for purpose other than measuring purpose.

(4) Place to Use this Product

- Fire or electric shock may result if the conductive solid material or liquid material gets into the case of this product. Keep this product away from humidity, water and dust.
- Do not use this product at a place where there is gas, combustible or explosive materials.
- Keep this product away from the direct sunlight.
- Do not use this product in dirty place, or where the machine is working or electromagnetic wave is severee.
- Do not place this product on unstable cart, stand, tripod, table and so on.
  Injury or breakage may result if this product is dropped.
- Generally, ground electric potential from 100mV to 1V happens for the signal grounded in the same building. But if high ground electric potential occurs between the object to be measured and the meter, the measured value may have the error or the measuring instrumemt may be damaged.
If the ground electric potential in excess of over $\pm2.5V$ for the voltage between the grond level of SDU 2040 and the object to be measured, the signal of the object to be measured cannot be safely measured. softDSP CO., LTD.. is not responsible for the damage to product or consumer caused by such a connection.
- Apply the pre-heating for over 20 minutes at least before using this produt to assure more accurate measuring.
- Disconnect the computer from the USB connection of this product if you do not use this product for a

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   long time.

- The temperature of 23℃ and the relative humidity of 50% are ideal for the strage of this product.

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4. AFTER-SALES-SERVICE Regulation

(1) AFTER-SALES-SERVICE Period

1 year free repair service is provided for all products that you bought from softDSP CO., LTD.. However, the repair service is charged for the following cases:

A. If the product was physically damaged

B. If the product is not working due to the fault attributable to consumer

C. If the product is damanged by the natural disaster

D. If the product is not working due to the disassembly, repair and improvement by user

E. If the product is not working due to the addition of equipment and connection which were not provided by the company

(2) Acceptance of AFTER-SALES-SERVICE

The after-sales-service is processed by mail or home delivery service and on-site repair is not available. The request for AFTER-SALES-SERVICE will be processed more quickly if you describe your name, contact, address and the symptom and so on. Please contact softDSP CO., LTD.. for details related to the after-sales-service.

Accpetance of request for after-sales-serviceInformation on request for AFTER-SALES-SERVICE

Address : Suite 203, Jeongil Building 552-1, Seongnae-dong, Gangdong-gu, Seoul

Tel : 02-470-0491Fax : 02-474-0659   E-mail : info@softdsp.com

(3) Return & Refund

We provide refund for any defect below that occurs within 14 days from the date of purchase.

A. If the product has functional problem due to the defect of manufacturing or the product is damaged

B. If the function of product and the specification does not matchWe do not provide any replacement or refund due to the simple change of mind of customer after the product is bought.

(4) Cost of AFTER-SALES-SERVICE

The cost of sending the product for the after-sales-serivce is shared equally by the customer and the manufacturer in principle. In short, the customer and softDSP CO., LTD.. pay in advance for the delivery of the product for the after-sales-service. The cost of the after-sales-service is shared like this:

A. Damage by the carelessness during the transportation: to be paid by softDSP CO., LTD.. only.

B. If the after-sales-service is provided within 1 year from the date of purchase: to be paid by softDSP
   CO., LTD.. only.

C. Damage by the natural disaster: to be paid by the customer only.

D. Damage due to the negligence of user: to be paid by the customer only.

E. No abnormal appearance or function : to be paid by the customer only.

   For what is not described in the above, we will comply with the normal trade practice, and do our
   utmost to prevent customers from suffering any loss in consultation with them.

5. Overview of SDU 2040

SDU 2040 is a device to gather and analyze the high speed data capable of storing and analyzing the data
for a long time in real time through the USB interface at high sampling speed using the high resultion of
24bit and 216KS/sec for all channels at the same time.

SDU 2040 can be applied to all electrically-run devices and is applicable extensively to environmental
monitoring, process monitoring, factory automation, laboratories, and so on.

Because it supports the perfect Plug and Play through the USB interface and detects the connection and
removal of device automatically, it has the advantage of being used immediately after the connection
without any need of setting, such as board address, IRQ, DMA, etc, like when the existing DAQ board is
used.

In addition, the fast speed of data transmission from the data collection device to the computer enables the
obtained data to be processed at a fast speed because it adopts the USB2.0 interface. The channel of SDU
2040 can be extended to 12 channels using 3 modules. SDU 2040 can provide more powerful
performance if the provided software is upgraded because it is the monitoring equipment that is run in the
computer environment. Moreover, the software can be restructured to fit the purpose of user because API
is provided to allow the user to realize the application.

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6. Component of SDU 2040

- Main body (SDU 2040)
- User's Manual
- SoftDAQ S/W
- Portable Carrier Bag
- USB Communication Cable

7. System Requirement

삭제됨: ● 장치 확장 케이블 .

CPU : **Over Intel Pentium** 3

Memory : Over 128MB

USB : **Supporting** USB2.0 High-Speed (480Mbps)

OS : Windows 2000 SP4 or the following version, Windows XP SP1 or the following version

Method to confirm the OS version

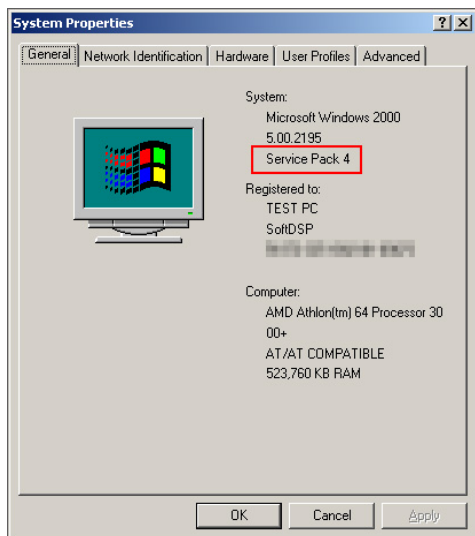- Windows 2000, Windows XP common

  If the window key and Pause/Break key are pressed at the same time on the keyboard, system registration information window appears.
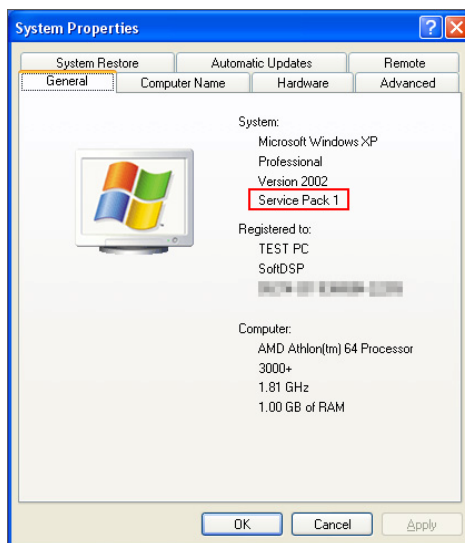
- Windows XP

  System registration information window appears if you get in following order: Start-> Control Borad -> Performance and Maintenance/Management -> System

- Windows 2000

  System registration information window appears if you get in following order: Start-> Setting-> Control Borad -> System

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Windows 2000 System Registartion Information

Windows XP System Registartion Information

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	SDU 2040

8. Explanation of the Product Appearance.

Front Panel
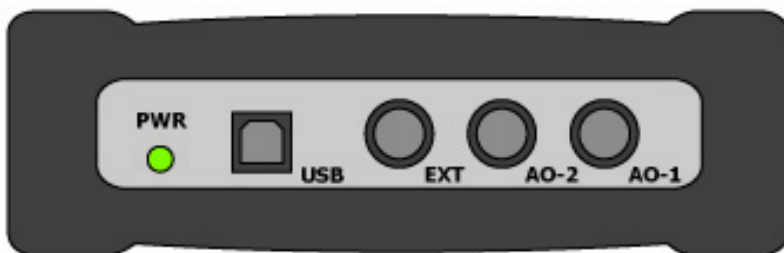
Rear Panel

(1) USB Interface (USB)

● **Plug ＆ Play**

USB doesn't require the computer to be switched on and off when the peripheral devices are replaced because it has perfect plug & play function.

Though the serial connection device or parallel port must be re-booted because they depend on the plug & play of window, USB has its own plug & play function without regard to the operation of window.

● **Hardware Connection**

USB cable is composed of a pair of connector called Series A and Seires B. Series A is to be connected to the host or hub, and series B plug is to be connected to hub of the target device

● **Power**

Separate external power is not necessary because the 5V electric power is provided from USB.

● **Speed of transmission**

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The spped of transmission of USB adopts the version 2.0, making the high speed transmission of signal possible, and 480Mb/sec at the maximum is supported.

(2) Analog Input Channel (CH1, CH2, CH3, CH4)

The analogue input channel is composed of 4 channels : CH1, CH2, CH3, CH4. And the input is possible through the BNC cable.

Three modules can be used at the same time when the multi-channle is extended, and the analogue input up to a total of 12 channels is possible.

- **Property of Analogue Input**
    - ◆ DC20V 4mA current source supply (ICP)
    - ◆ AC/DC coupling support
    - ◆ $\pm$10V range.
    - ◆ Anti aliasing low pass filter.
    - ◆ Inter-channel simultaneous sampling (216KS/sec)
    - ◆ High resolution support (24BIT)

- **Piezoelectric Sensor Input**

The fig. below shows the connection between SDU2040 and Piezoelectric sensor. It enables the piezoelectric sensor to be driven by 20V DC 4mA power from the analogue input of SDU 2040. The signal that comes from the sensor that is being driven is input through the input capacitor of SDU 2040 via AC coupling.

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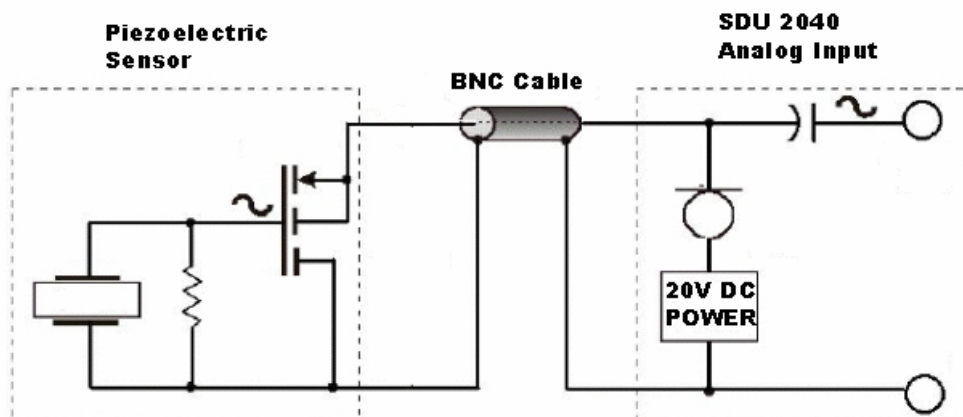
(3) Analog output channel (AO-1, AO-2)

SDU 2040 provides 2 analogue output channel that enables the output of various waves that user wants, and the output frequency is possible from 1Hz to 1KHz at the speed of 24Bit 96KS/sec, and the output voltage is possible up to $\pm10V$.

Analog output can be used for the analogue input, and also can be used to control the exterior apparatus. All output of the analogue output can be controlled by the operation software that is provided, and are output through the BNC connector. It is used to fit the sync among modules when the multi-channel is extended.

(4) Counter channel (CNT)

SDU 2040 provides 1 counter channel and the frequency can be measured up to 100kHz.

The input condition l can be used as the trigger by counting the exterior signal through the TTL level, and is used to fit the sync among modules when the multi-channel is extended.

(5) External Trigger (EXT)

TTL level input to control the analogue input channel from the outside is possible, and it is used to fit the sync among modules when the multi-channel is extended.

(6) ACT

ACT(LED) is lighted regularly when the analogue input data is collected without any problem, so it can be checked from the outside whether the data of equipment is being collected.

(7) PWR

PWR(LED) islighted when the USB power is supplied without a hitch. If the PWR is not lighted even after the USB connector is connected to SDU2040, check whether the computer USB port is not working normally. If no problem is found, it is likely that SDU 2040 equipment has problem. In that case, please contact the sales outlet for the after-sales-service.

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9. Analog signal input

(1) Connecting signal.

As for all the analogue input of SDU 2040, simultaneous sampling at the speed of up to 216KS/sec is possible until the data collected is completed, and the data is collected in the same phase among the channels. All input and output channel of SDU 2040 are composed of BNC connector. Among them, AC/DC coupling is possible for the analogue input channel through the differential input. Moreover, it provides the electricity source to drive the ICP type sensor.

Please be careful lest the input connector of BNC cable contacts each other by channel, which is connected to the input channel in case that the noise has to be kept at the minimum and more accurate measurement is required.

Be sure to check the following details because they have to be made sure all the time before connecting the signal apparatus to SDU 2040.

- Whether the input signal is in the floating state or grounded

  The floating signal can be measured through the ground basis of SDU 2040 by using SDU 2040. As for the grounded signal, If the signal, whose ground electric potential of signal source changes over $\pm$ 2.5V more than the ground electric potential of SDU 2040, is connected to the SDU 2040, DU2040 can measure all floating signals. Inaccurate measuring or damage to the equipment may result. softDSP CO., LTD.. has no liability for the damage to the equipment if that damage is caused by such a connection.

- Does the Accelerometer or Microphone that is being used require the electricity source into ICP form? The ICP coupling must be chosen in the provided software because the electricity source has to be supplied to deive the exterior sensor from the BNC conntector of the analogue input if the ICP type sensore is used.

- Which method to measure is appropriate for AC/DC coupling?

  DC component can be removed through the AC coupling and only AC component can be output if the input signal is AC signal that includes the DC voltage.

- What is the voltage level of input signal?

  he input voltage of SDU 2040 is possible to $\pm$10V. If the voltage upwards of that, you should be careful. If the voltage in excess of 42Vpeak is used, the product may be damaged.

(2) Signal Source

The analogue input channel of SDU 2040 receives the signal through the unbalanced differential input. The following diagram shows the 2 types of input type.

삭제됨:

┄┄┄┄┄페이지 나누기┄┄┄┄┄
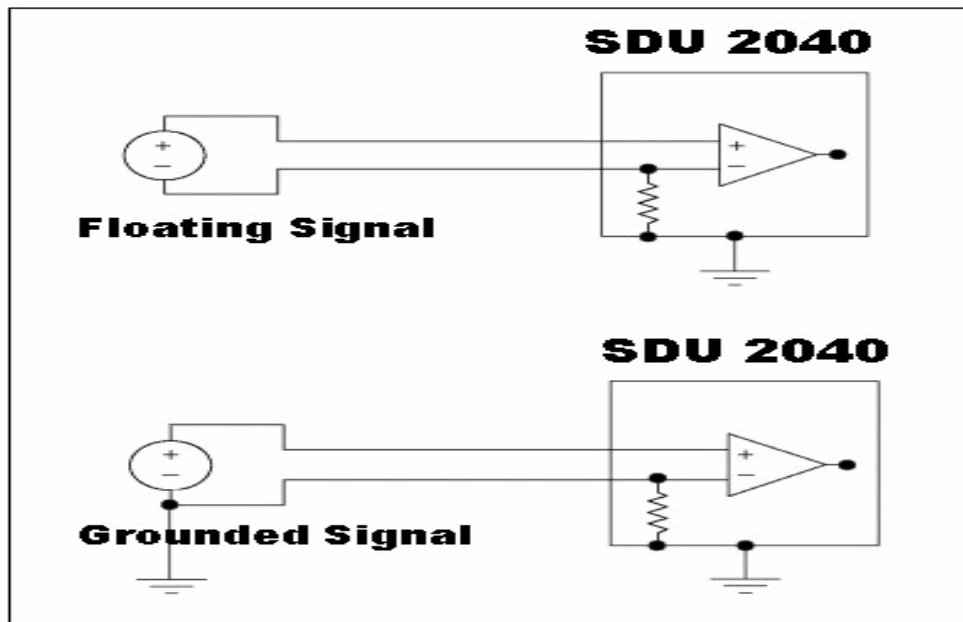
Input type of SDU 2040

(3) Floating Signal

The floating signal refers to the signal for which the object to be measured is not connected to the ground. For example, it means the output of equipment, isolater and so on which uses the transformer and battery. The floating signal can be measured through the ground basis of SDU 2040. And SDU 2040 enables all floating signals to be measured.

(4) Grounded Signal

The grounded signal has the differenece in the ground electric potential ranging from 100mV to 1V. However, if the difference in the ground electric potential is high between the object to be measured and the measuring instrument, error may result or the measuring instrument may be damaged.

If the ground electric potential has the difference over $\pm2.5V$ between the object to be measured and the ground level of SDU 2040, inaccurate measurement may result or the equipment may be damaged.

(5) Supplying the electricity source

If the ICP accelerometer or the microphone is used for the analogue input channel, SDU 2040 supplies the DC power to operate the ICP type sensor. If the ICP operation is switched on, it shifts to AC coupling automatically to remove the offset voltage, and the user can freely choose the DC coupling state to use.

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(6) Input Coupling

User can freely chose the type of analogue input channel. 3 type of input, such as AC Coupling, DC Coupling, ICP, can be set, and the cut-off frequency of AC coupling is 3.5Hz.

(7) Input Polarity and Input Range

The polarity input SDU 2040 is possible on the basis of 0V, and the input voltage range is up to ±10V. If the input is over ±10V, the waveform above that is intercepted by the internal protection circuit. The output is possible up to ±10V.

10. Installation of Software

Note!) Be sure to install the software prior to connecting SDU 2040 to computer. If the software is installed with SDU 2040 connected, abnormal operation may result.

(1) Insert the installation CD into the CD-Rom driver.

(2) If the installation CD is inserted, the software starts to be installed automatically. If it is not automatically executed, use the window explorer to execute 'Setup.exe' on the installation CD.

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(3) The software begins to be installed. Click the 'Next' button.
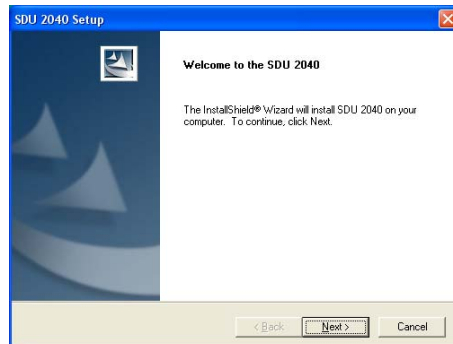
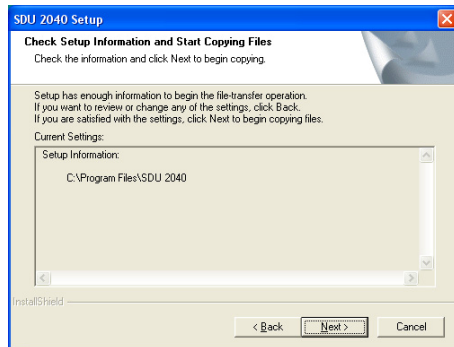(4) If you agree to the contract on the right to use the program, click 'Yes' button.
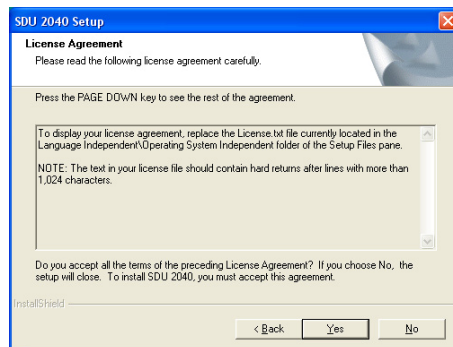
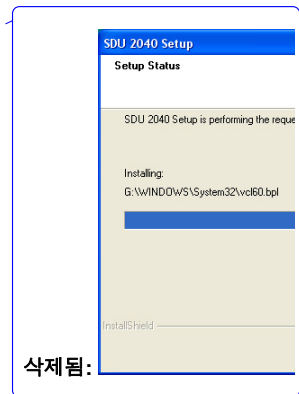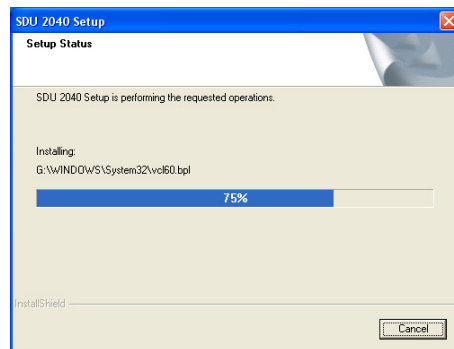(5) Set the route that is to be installed, and click 'Yes' button.
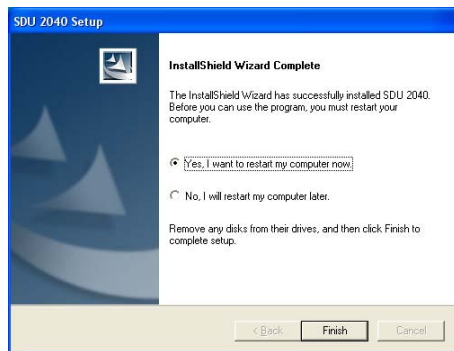
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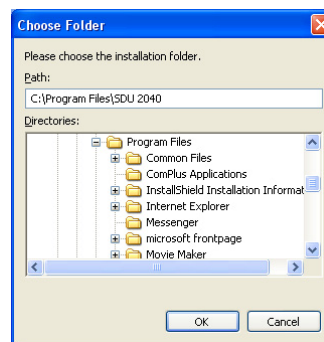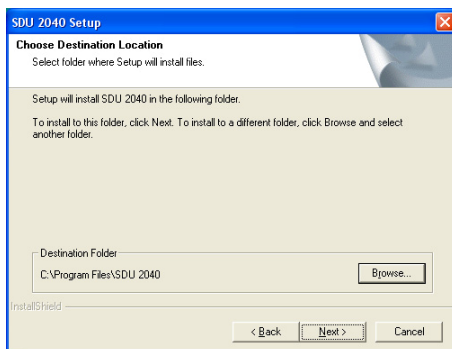
(6) Confirm the installation information and then click 'Next' button

(7) The installation is progressed.

삭제됨:

(8) After the installation is over, you are asked whether you will restart. Choose 'Yes' and then click 'Finish' button.

Note!) The program must be restarted before using the program to use the program properly.

(9) If the computer restarts, a new hardware is found.

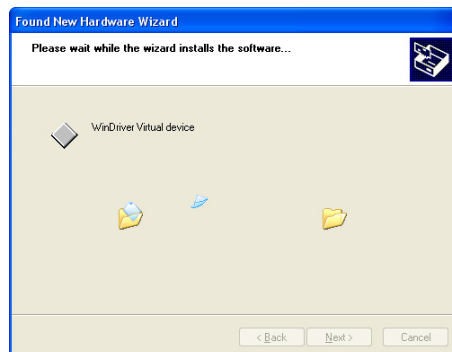(10) Start the new hardware detecting magician.

Choose the 'automatic installation of softare', and then click 'Next' button.

(11) New hardware exploring magician searches the apparatus.
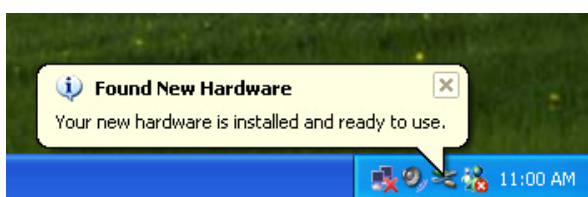
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(12) The new hardware exploration magician installs the apparatus driver.

(13) The new hardware exploring magician is completed.

(14) The new hardware installation is completed and a message appears asking if you are ready to use.
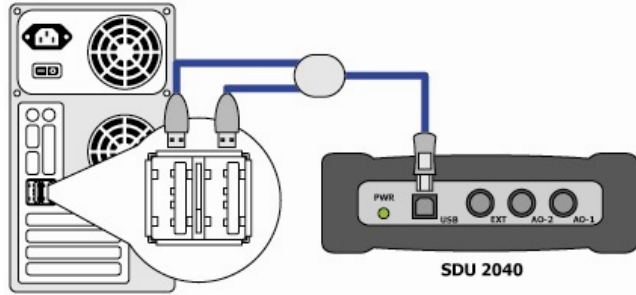
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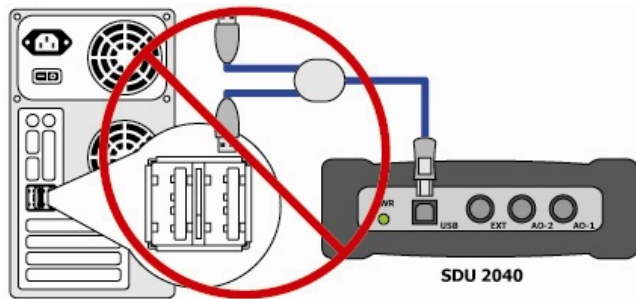
SDU 2040

11. Installation of hardware

Note!) The software should be necessarily installed before connecting SDU 2040 to computer. If SDU 2040 is installed with SDU 2040 uninstalled, abnormal operation may result.

(1) Connecting directly to computer

Normal connection to SDU 2040 and computer

Use USB-Y cable provided when you bought the product to connect the USB port of SDU 2040 and the USB port of computer as shown in the fig. above. 2 terminals of USB Y cable should be connected to the USB port of computer by any means. If only one terminal is connected, the apparatus recognition fails on OS and the product may work abnormally.
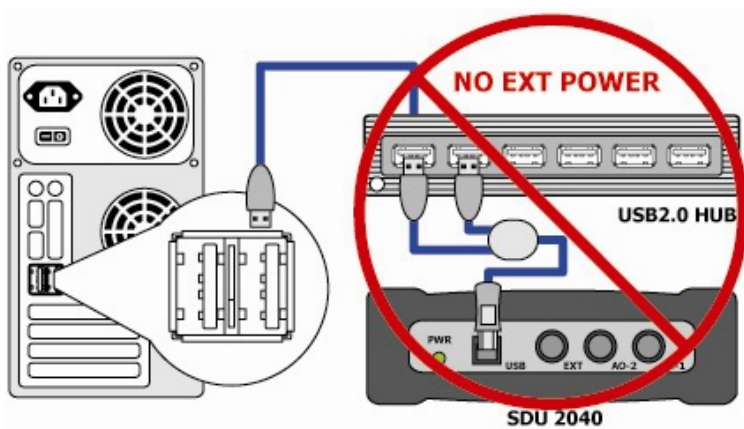

Wrong connection between SDU 2040 and computer

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(2) If one USB2.0 hub is used exteriorly for the connection
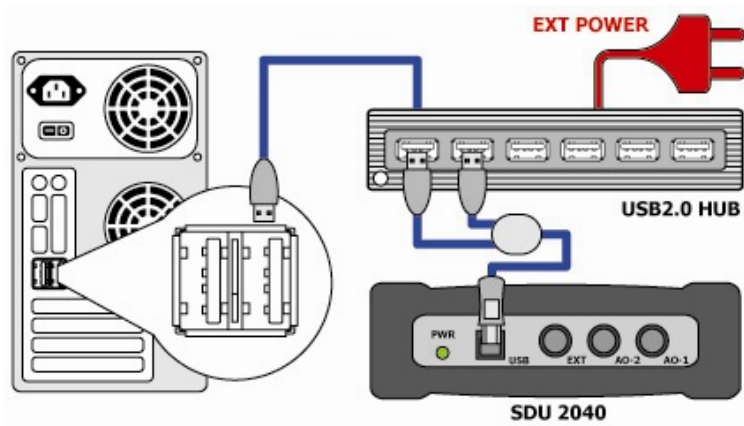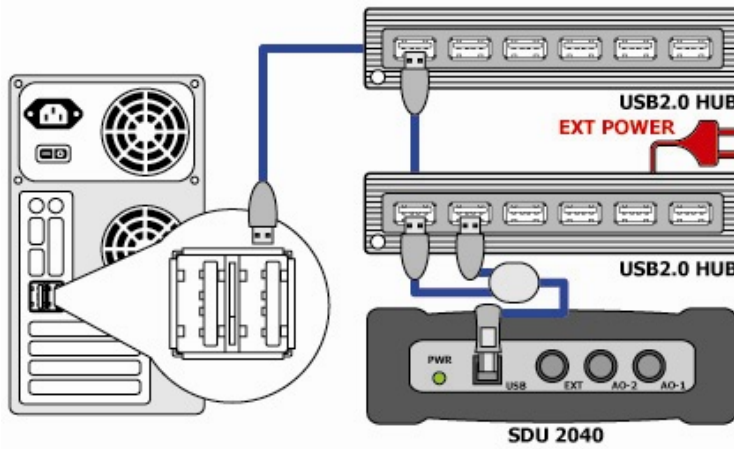

Normal connection that uses the electricity source USB2.0 hub

If SDU 2040 is to be connected through the exterior USB2.0, be sure to use the electricity source hub to which the separate power is supplied. If the power is not supplied though you use the electricity source hub, the apparatus recognition fails on OS, or the product may not work properly.


Wrong connection that uses non electricity source USB2.0 hub

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(3) In case of using several USB2.0 hubs exteriorly for the connection.

Normal connection that uses several USB2.0 hub

If several exterior USB2.0 hub is used to connect SDU 2040, be sure to use the electricity source hub, the hub that is finally connected to SDU 2040 should be electricity source hub to which separate external power is supplied. If the power is not supplied though you use the electricity source hub, the apparatus recognition may fail on OS, or the product may not work properly.

Wrong connection that uses several USB2.0 hub

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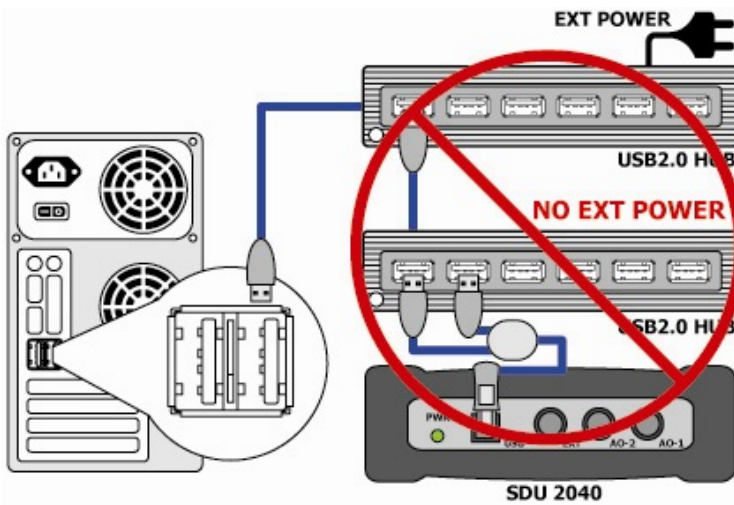
(4) New hardware is fond if the connection is normally made according to the method of 1,2 and 3.
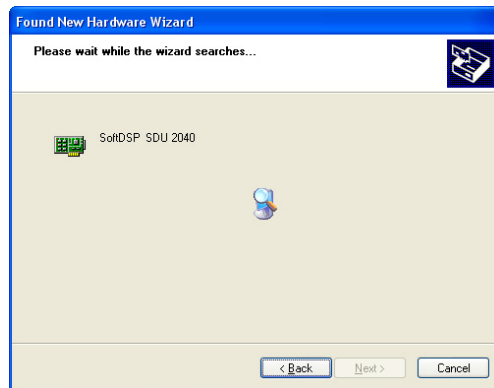

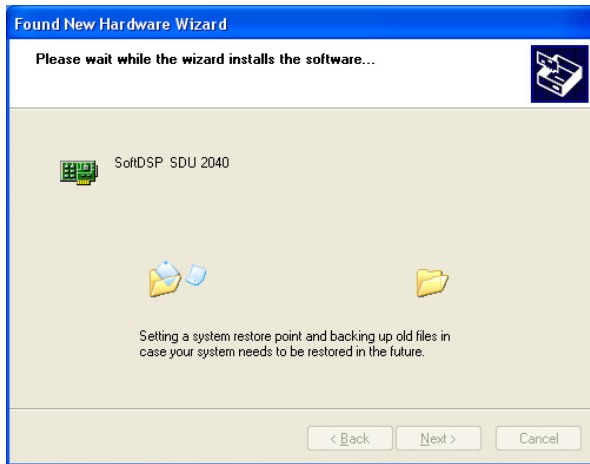(5) The new hardware magician starts the searching.

    Choose the 'automtic installation of software', and then click the 'Next' button.
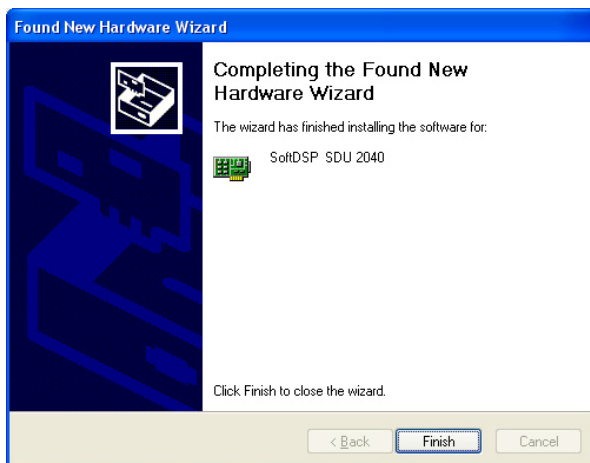
(6) The new hardware exploring magician searches the apparatus.
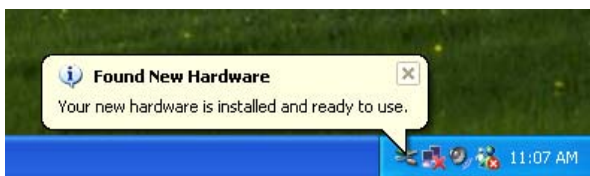
(7) The new hardware exploring magician installs the apparatus driver.
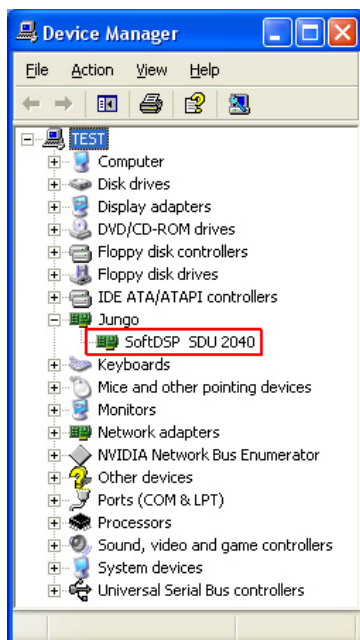

(8) New hardware exploring magician is completed.

(9) The message that asks whether you are ready to use appears after the new hardware installation is completed.

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(10) You can check whether the SDU 2040 was installed normally in the apparatus manager.

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12. Trigger

(1) External Trigger Input

SDU 2040 External Trigger Input

SDU 2040 has one external trigger input called EXT. The input of external trigger is possible only while the data is collected by the software. Except that, no trigger occurs though any signal may be input. The trigger circuit extracts the edge of EXT input waveform to generate the trigger.

- **External Trigger Input**
- ▪ Connector : BNC connector that is marked as EXT
- ▪ Input Signal Range :   0V~5V TTL compatible digital signal
- ▪ Type of trigger input : Rising Edge, Falling Edge (set by the software)

(2) External Counter Input

SDU 2040 external conter input

SDU 2040 has one external counter input called CNT. This external counter input cannot be used as the trigger source. The counter pulse can be used for trigger input only while the data is collected by the software. No trigger happens no matter what signal is input except that.
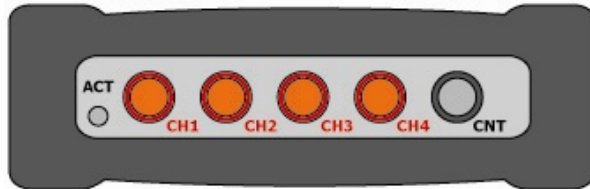
To generate the trigger, the trigger circuit compares the number of pulse coming into the external counter input which it counted as 32 bit and the 32 bit trigger level value that is set.

- **Input of External Counter Trigger**
- ▪ Connector : BNC connector that is marked as CNT

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▪ Input Signal Range : 0V~5V TTL compatible digital signal

▪ Type of input trigger : Positive pulse, Negative pulse (set by the software)

(3) Analogue Input

SDU 2040 External Analogue Input

The software can be set to make a certain trigger sourse used among the 4 analogue channels to generate the trigger. Choosing one analogue input channel with one trigger source does not affect the original function of input channel at all. The analogue input can be used as the trigger input only while the data is collected by the software. No trigger happens no matter what signal is input except that. The trigger circuit compares the entire 24 bit sample that is converted to the 24 bit trigger level and digital that is set previously.

● **Input of External Analogue**

▪ Connector: BNC connector that is marked as CH1~CH4

▪ Input Signal Range : analogue signal ranging from -10V   to 10V

● **Conditon to generate the trigger which uses the external analogue input**

The input of external analogue has the hysteresis with the range of ±2mV centering around the trigger level set by the user. On the supposition that the user is using the analogue rising edge trigger and the trigger level is set at 5V, it gets into the trigger generating mode when the analogue signal drops below 4.998V. If it gets over 5.002V, the trigger happens. Even if the analogue reached 5V which is the trigger level at the voltage greater than 5V, the trigger mode does not set in because of the hysteresis. Even if the analogue signal reaches 5V which is the trigger level after the trigger mode sets in, no trigger happens before it gets over 5.002V.

Likewise, on the supposition that the user is using the analogue falling eduge and sets the trigger level at 5V, dthe trigger generating mode sets in when the analogue signal is over 5.002V, and the trigger happens when it is below 4.998V.

  Even if the signal reached 5V which is the trigger level at the voltage greater than 5V, the trigger mode does not set in until the analogue signal is above 5.002V because of the hysteresis. Even if the analogue

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