

DISCOVERY Plus
user manual

january 2009

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Revision 1.0.2 dated 01/30/2009

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CONTENTS

	introduction	3
personal computer minimum requirements		3
	scheme of the installation procedure	4
connecting the discover plus ccd camera		5
	installation of the drivers	6
	connecting cables and power leads	10
detail of the discovery plus connectors		10
	9-pin user port connector	11
	power supply connector	12
	optical window cleaning	13
	specifications	14
	index	15

INTRODUCTION

DISCOVERY Plus CCD camera series is marked by high sensitivity, reduced weight and dimensions and low costs.

As it is characterised by high integration, it offers quality performances like a professional CCD: fast downloading of image up to 420 Kpixel/s.

This is thanks to the use of a selectable 12/14/16 bit A/D Converter with programmable CDS at 64 amplification gains with changeable offset. The latter characteristic enables us to better optimise the binning function modalities.

The camera is connected to the PC by means of a USB 1.1/2.0 connection port.

Powered at 10-15V it can also be used in the open air using a car battery.

Every component is integrated in the aluminium head: CCD, electromechanical shutter, Peltier cooling system, electronics.

You can choose between the standard cooling version: Single stage Peltier reaching up 35 °C below ambient and the enhanced cooling version:

Double stage Peltier reaching up 45 °C below ambient.

This series uses Kodak KAF CCD sensors, displaying a wide range of resolutions and pixels dimensions. The sensors are front-illuminated, supported by an excellent quantum efficiency. All of them (apart from those with the anti-blooming option) can offer a 100% fill factor, allowing one to shoot marvellous images!

Among the main application fields: Astronomy, Plasma Physics.



PERSONAL COMPUTER MINIMUM REQUIREMENTS

- CPU Celeron 1 Ghz
- 256 Mb di RAM
- Microsoft Windows XP/Vista
- USB port

SCHEME OF THE INSTALLATION PROCEDURE:

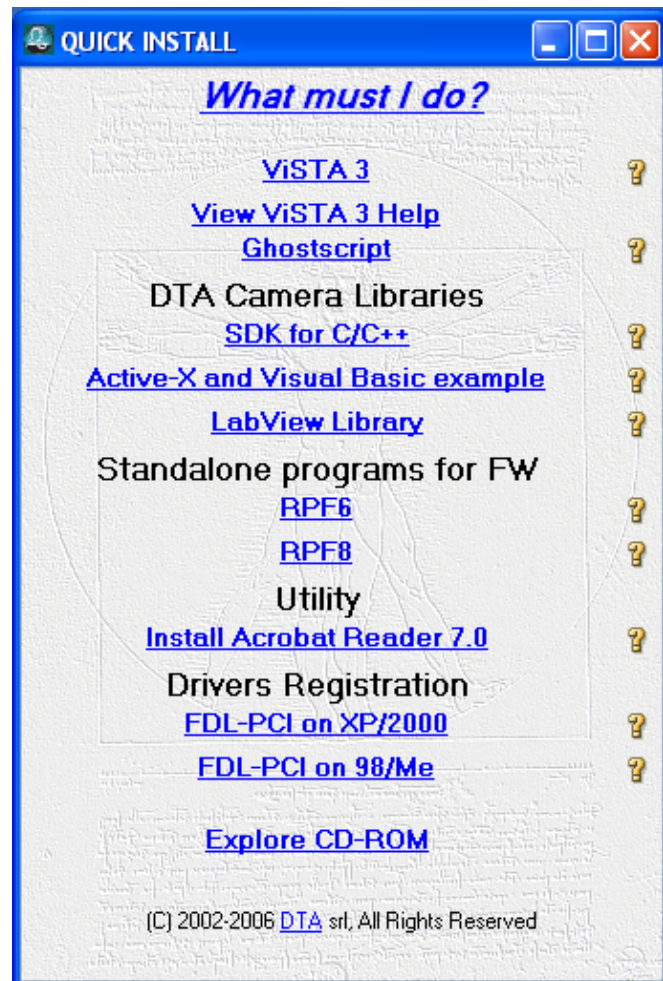
When you use the camera for the first time, you must install the ViSTA software.

Insert the ViSTA 3 CD-ROM, provided with the camera, into the CD-ROM reader, wait a few seconds so as to allow the PC to load the "QUICK INSTALL" menu.

Let click on ViSTA 3 and QUICK INSTALL will start and take you through the process of installing the software.

The default settings will install the full software package and all options.

You may be asked to reboot the PC if certain files in use by Windows needs to be updated.



CONNECTING THE DISCOVERY PLUS CCD CAMERA

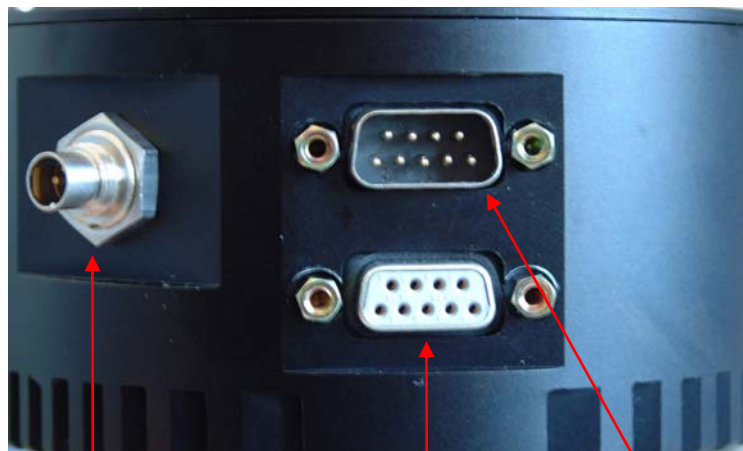
To install your hardware platform on the PC, follow the steps below:

- ⇒ Connect the power supply cable to the DISCOVERY Plus CCD camera. The power supply is not supplied with the camera but we can provide it you on request
- ⇒ Turn on the camera and connect the USB cable (supplied with a standard length of 1.8 m) to the corresponding port of the PC

Pay attention:

- 1) The power supply must be connected to an electric system provided of a ground;
- 2) The lateral sides of the camera and of the power supply must be free for the right working of the ventilation system;
- 3) Place the system so that you can easily manage the switch of the power supply, positioned on the front panel.

Now, install the drivers for the USB connection.



Power supply connector

User Port

USB connector

INSTALLATION OF THE DRIVERS:

When you use the camera for the first time, you will be asked to specify where the available drivers are.

Let's analyse the sequence of operations to be carried out.

It will be shown the example with WINDOWS XP Operating System. The operation are similar for the other Operating Systems.

Follow the steps on the basis of your Operative System.

WINDOWS XP

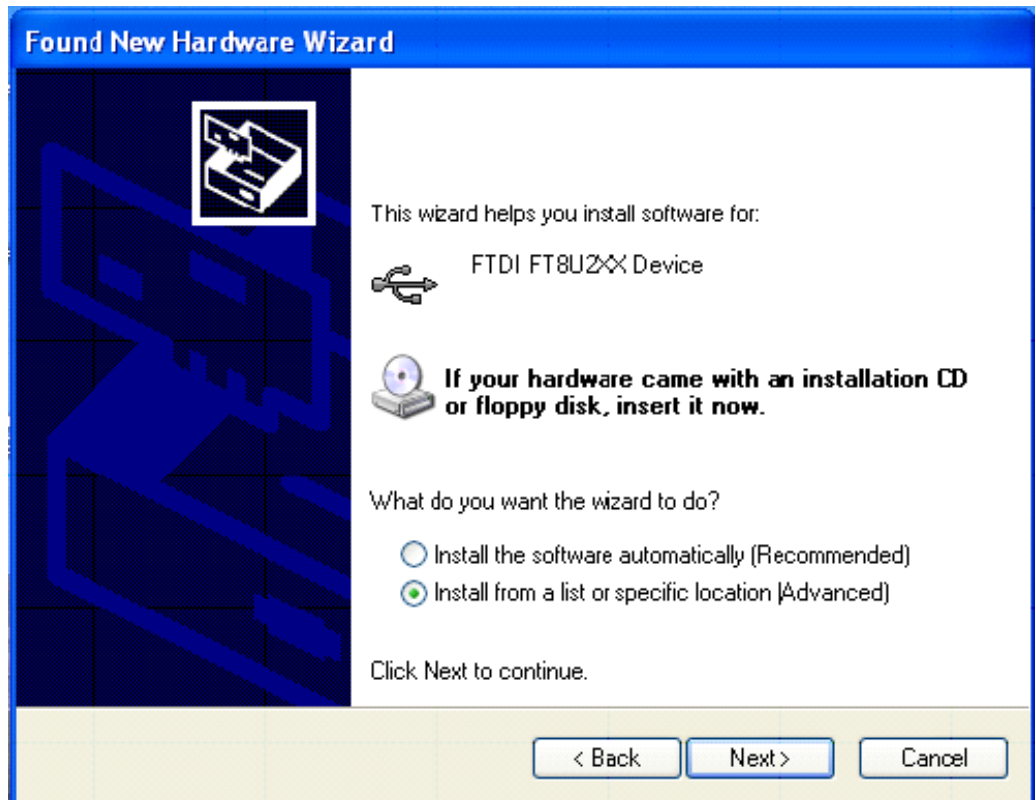
Once you have connected the camera to the PC following the instructions reported on the previous page, a window (like the one shown below) will appear, noticing you a new hardware was found.



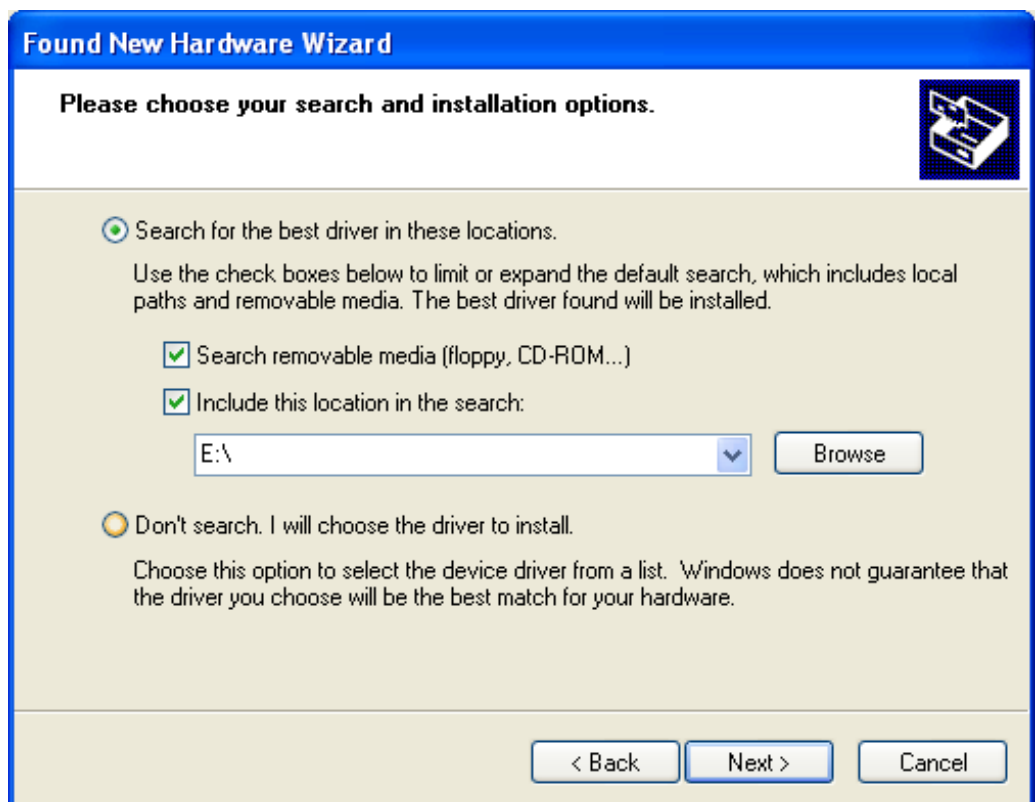
Then, it appears a window like the one shown below, where you'll be requested to connect for Windows update. Select: "No, not at this time" and click on "Next" to continue the installation.



Select the option "Install from a list or specific location (Advanced)" (recommended choice). Then click on "Next" to continue the installation.



Check the functions selected in the window below (in this case, E:\ indicates the CD-ROM drive) and click on next to continue.



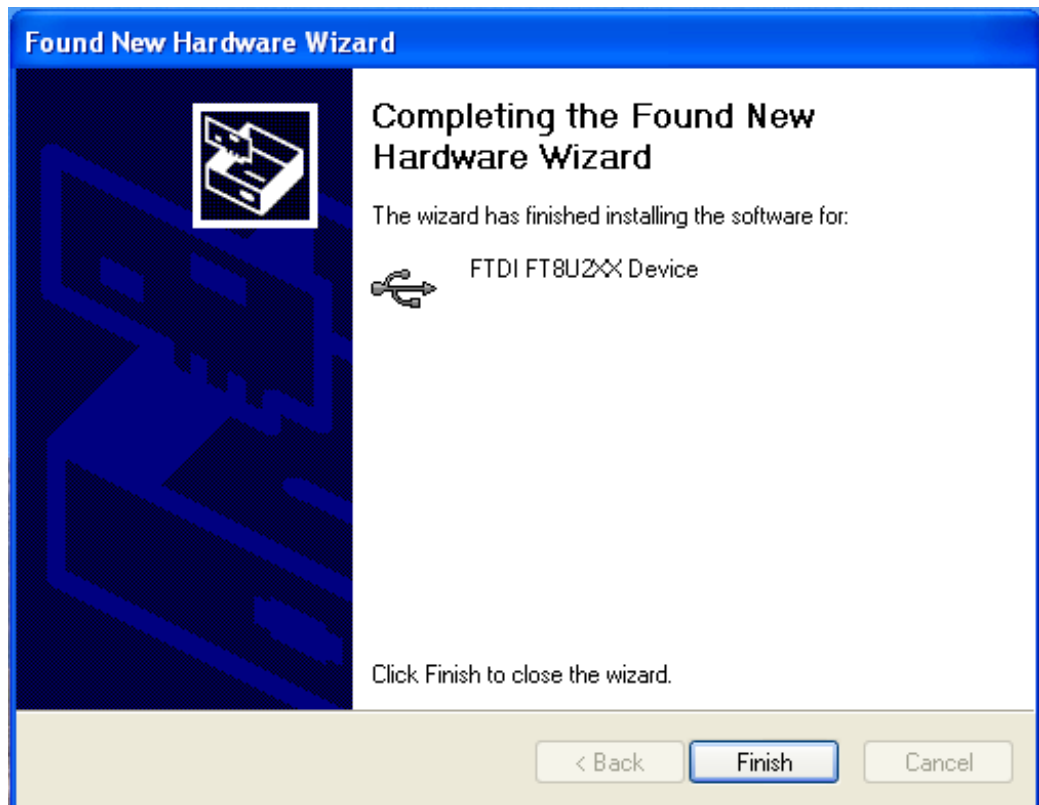
Select the folder that contains drivers for USB hardware according to the Operative System:

- Windows 98/Me2000/XP: select Windows
- Windows XP Professional x64: select XPx64 (as in the image below)

Then, click on OK and wait while the wizard installs the software (just few seconds).



When the installation has been completed, a window like the one below will appear. Click on finish to close the wizard and restart the PC (recommended choice).



CONNECTING CABLES AND POWER LEADS

Connect the cables between the parallel port and the camera. We advise you to carry out this operation with all your **instruments not powered !**

The connectors are fixed by means of screws; those, however, should only be slightly tightened to avoid any damage to them. For the Discovery series the power connector is connected to a 10-15V 3A power supply. The camera is always turned on at the power supply.

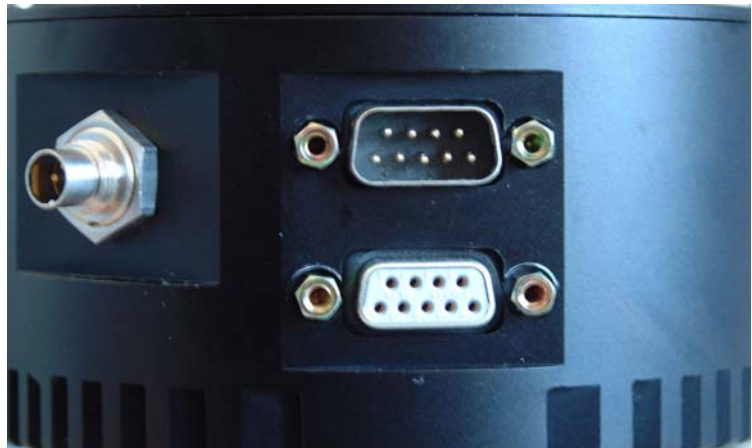
Before making any connection, **make sure your computer is off and the Discovery is not powered !**

DETAIL OF THE DISCOVERY PLUS CONNECTORS

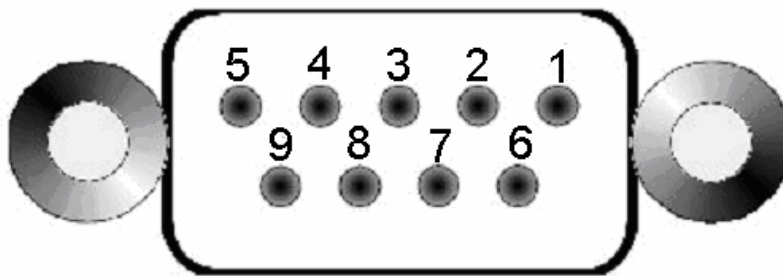
On the DISCOVERY Plus you will find the connectors required to connect it to the PC, to the power supply and to mount it on to a photographic tripod.

Starting from the left in clockwise direction the following connectors are shown :

- Power connector
- USB PORT: 9-pin male connector for USB communication with the PC
- USER PORT: 9-pin female connector which implements a communication port, to be used to run the RPF6 filter wheel or the autoguide or the shutter signal



9 PIN USER PORT CONNECTOR

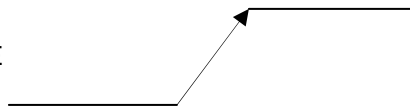


1	SHUTTER	2	EX1	3	EX2
4	EX3	5	EX4	6	PWR
7	GND	8	TRIG	9	EXI

- **SHUTTER:** output signal of shutter control.
- **EX1:** (output) RPF6 control or N (North) control for autoguide.
- **EX2:** (output) RPF6 control or S (South) control for autoguide.
- **EX3:** (output) RPF6 control or E (East) control for autoguide.
- **EX4:** (output) RPF6 control or W (West) control for autoguide.
- **EXI:** (input) autoguide input.
- **TRIG INPUT:** trigger input.

When we enable the TRIGGER mode, it is necessary to provide the signal for starting the camera acquisition. In fact, when we run the function: "DC_GetCCD", the camera, after the Clear CCD operation, wait for the hardware signal to start the acquisition, that is the TRIG INPUT signal.

This signal is **RISING EDGE SENSITIVE**

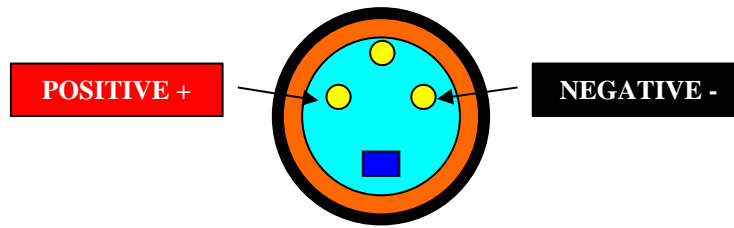


Once the signal is provided, after just 1-2 ns, it opens the shutter, start the acquisition of the image (the acquisition time is prefixed by the user), then, after the hysteresis time for the shutter closure, there is the image downloading.

- **PWR:** Warning main power supply, 13.8V
- **GND:** ground.

Note: all signals are TTL compatible.

POWER SUPPLY CONNECTOR



Front View

By means of this connector 12V 3A power is carried to DISCOVERY.

POWER SUPPLY WARNING:

To let the camera work properly, it is necessary to use a power supply able to provide continuous 3A with low duty-cycle.

WARNING ! Do not reverse the power polarity due to the risk of an irreparable malfunctioning of the camera !

OPTICAL WINDOW CLEANING

Both the optical window and the CCD cleaning are carried out in the clean room by means of a 30-magnifying power microscope. This procedure removes any dust which can otherwise bring about unmistakable marks on the image you have taken. In particular such spots increase as the focal ratio gets wider. In other words an image may not show any mark at f/5.6 but it can be clearly noted at f/32 because of an obvious geometrical problem of projection. Due to the shutter or elapsed time, the external surface of the optical window may gather dirty particles that may be easily removed.

To perform such task we use a compressed air cylinder specifically designed for optical cleaning.

*Be careful !!! There are similar products that, instead of using compressed air, use a liquefiable gas : at ambient pressure it quickly gassifies, thus "triggering" an air-compressed-effect. You do **not** absolutely have to use these products : they may give rise to heavy marks or rings on the windows itself.*



A product we can recommend is DUST-OFF provided by EDMUND-OPTICS. Thanks to DUST-OFF (or any other similar product) it is very easy to get rid of any microparticles : keep the shutter open for a few seconds (by the camera control program) and spray some air blast. We kindly advise you against using cloths, optical paper and cleaning liquids because the dirt will be only mixed up or, even worse, increased. The risk is to finally damage the coating of the optical window itself !

SPECIFICATIONS

SHUTTER:

Electromechanical. Exposure time: from 0.1 s to 9999 s

A/D CONVERTER:

Selectable 12/14/16 bit

SETTABLE GAINS:

64

READ OUT SPEED:

up to 420 kpixel/s

INTERFACE:

USB 1.1/2.0

COOLING:

Single stage Peltier up to 35 °C ΔT below ambient (standard version)

Double stage Peltier up to 45 °C ΔT below ambient (on request)

CCD TEMPERATURE CONTROL:

± 0.1 °C

OPTICAL WINDOW:

Fused silica

FILTER WHEEL:

External (optional)

BACKFOCUS:

17.5 mm

MAX TOTAL NOISE:

15 e⁻

MOUNT:

C

BINNING:

From 1 x 1 to 8 x 8 or arbitrary

POWER SUPPLY (optional):

230V

MAX ABSORPTION:

36 W

WEIGHT:

800 g

DIMENSIONS:

118 (Φ) x 53 (h) mm

INDEX

	9
9-pin user port connector	11
c	
connecting cables and power leads	10
connecting the discovery plus ccd camera	5
d	
detail of the discovery plus connectors	10
i	
introduction	3
installation of the drivers	6
o	
optical window cleaning	13
p	
personal computer minimum requirements	3
power supply connector	12
s	
scheme of the installation procedure	4
specifications	14
w	
windows xp	6

