

optris[®] PI NetBox

Mini PC for optris PI series



Operators manual

CE-Conformity

The product complies with the following standards:

EMC: EN 61326-1:2013
(Basic requirements)
EN 61326-2-3:2013
Safety Regulations: EN 61010-1:2010

The product accomplishes the requirements of the EMC Directive 2014/30/EU and of the Low Voltage Directive 2014/35/EU.



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Read the manual carefully before the initial start-up. The producer reserves the right to change the herein described specifications in case of technical advance of the product. References to other chapters are marked as [► ...].

Warranty

Each single product passes through a quality process. Nevertheless, if failures occur please contact the customer service at once. The warranty period covers 24 months starting on the delivery date. After the warranty is expired the manufacturer guarantees additional 6 months warranty for all repaired or substituted product components. Warranty does not apply to damages, which result from misuse or neglect. The warranty also expires if you open the product. The manufacturer is not liable for consequential damage or in case of a non-intended use of the product. If a failure occurs during the warranty period the product will be replaced, calibrated or repaired without further charges. The freight costs will be paid by the sender. The manufacturer reserves the right to exchange components of the product instead of repairing it. If the failure results from misuse or neglect the user has to pay for the repair. In that case you may ask for a cost estimate beforehand.

Content

	Page		Page
1 Description	3	5 System Information	34
1.1 Scope of Supply	3	5.1 Watchdog	34
1.2 Maintenance	4	5.2 Startup	35
1.3 Cautions	4	5.3 System Time	36
2 Technical Data	5	5.4 System Recovery	37
2.1 General Specifications	5		
2.2 Electrical Specifications	5		
3 Installation	6		
3.1 Mounting	6		
3.2 Controls and Connections	7		
3.3 Protective Housing	8		
3.4 SD Card	10		
3.5 Mini-USB Socket	10		
3.6 Power Supply	10		
4 Operation	11		
4.1 Operation Modes	11		
4.2 Status LEDs	11		
4.3 Stand-Alone Operation	12		
4.4 Network Settings	14		
4.5 Remote Access to the NetBox (NetBox Utility)	19		
4.6 File transfer between NetBox and PC	22		
4.7 NetBox Control Center	23		
4.8 Converter mode USB – Ethernet	28		
4.9 Write Protection Filter	32		

1 Description

The optris PI NetBox is a miniaturized PC which expands the optris PI series to a stand-alone solution or which works as a USB to Ethernet converter. This mode generates larger possible distances between process (IR camera) and process control (PC).

The NetBox works with a Windows 7 operating system that allows the user to install additional software. The housing of the NetBox is made of anodized aluminum – the optional NetBox protection housing supports the usage in industrial environments (IP65/ NEMA-4 rating).

1.1 Scope of Supply

- NetBox incl. Micro SDHC card (32 GB)
- Power supply (100-240 VAC / 24 VDC)
- HDMI cable (Micro HDMI to HDMI/ 1,5 m)
- Ethernet cable, 1 m
- System recovery stick (USB/ 8 GB)
- Rail mount adapter
- Operators manual



1.2 Maintenance

The housing of the NetBox can be cleaned with a soft, humid tissue moistened with water or a water based cleaner.

PLEASE NOTE: Never use cleaning compounds which contain solvents. Take care that no moisture infiltrates into the housing.

1.3 Cautions

Take care that no foreign substances penetrate into the venting slots of the NetBox. In case of problems or questions which may arise when you use the NetBox, please contact our service department.

**Please use only the threads in the housing or the supplied rail mount adapter for mechanical installation of the NetBox.
Avoid mechanical violence – this may destroy the system (expiry of warranty).**

2 Technical Data

2.1 General Specifications

Operating temperature	0...50 °C
Storage temperature	-20...75 °C
Relative humidity	10...95 %, non condensing
Material (housing)	Anodized aluminum
Dimensions	113 mm x 57 mm x 47 mm (L x W x H)
Weight	385 g
Vibration	IEC 60068-2-6 (sinus shaped) IEC 60068-2-64 (broadband noise)
Shock	IEC 60068-2-27 (25g and 50g)
Operating system	Windows 7 Professional

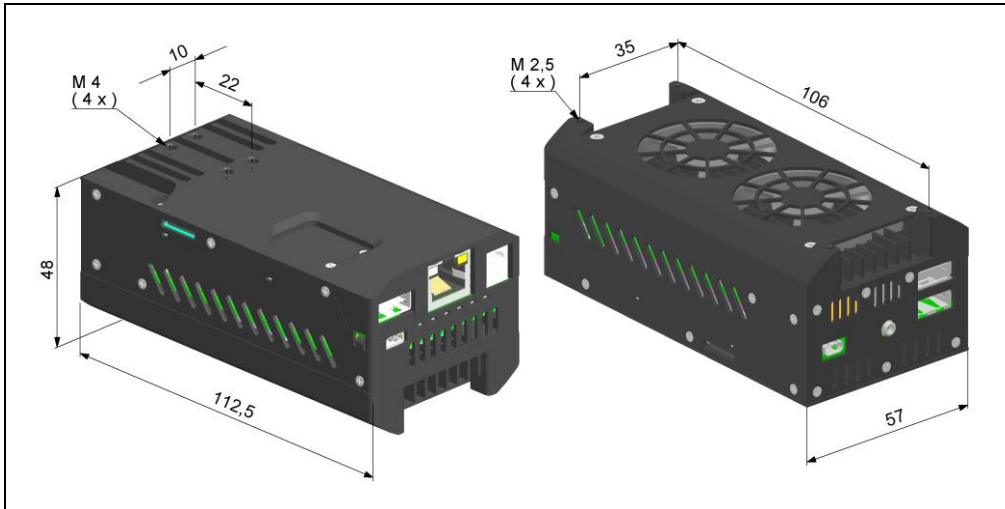
2.2 Electrical Specifications

Power supply	8...48 VDC or Power over Ethernet (PoE/ 1000BASE-T)
Power consumption	7,5 W (+ additional 2,5 W for IR camera)
Cooling	active via two integrated fans
Board	COM Express mini embedded board
Processor	Intel® Atom™ E3845, Quad Core, 1,91 GHz
Hard disc	16 GB SSD
RAM	2 GB (DDR2, 533 MHz)
Ports	2x USB 2.0/ 1x USB 3.0/ 1x Mini-USB 2.0 Micro HDMI Ethernet (Gigabit Ethernet)
Extensions	Micro SDHC or SDXC card
Additional functions	4x Status LEDs (L1-L4)

3 Installation

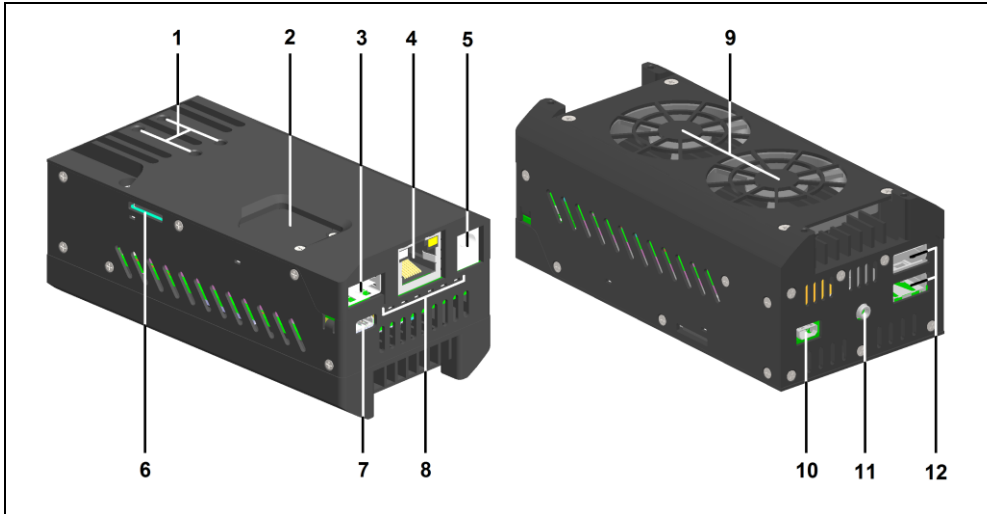
3.1 Mounting

The NetBox can be mounted easily on a DIN rail (TS35) according EN50022 using the supplied rail mount adapter. For this purpose please screw the 4 screws (M4) into the designated holes on the upper side of the NetBox housing. Now you can place the rail mount adapter on the housing and fix it with the 4 nuts. On the bottom side of the NetBox housing you will find 4 holes M2,5 which also can be used for mounting.



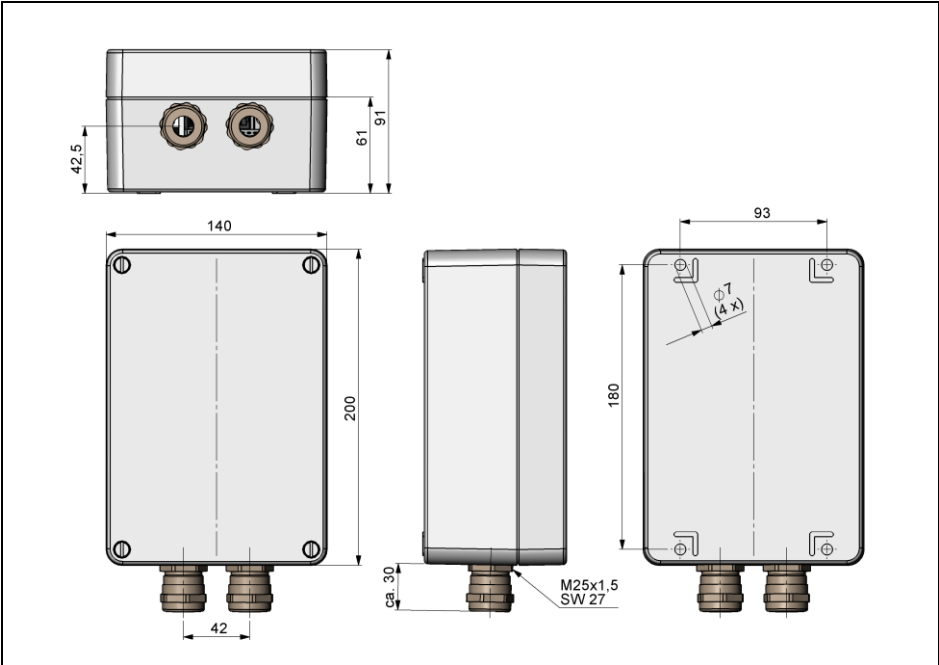
Dimensions NetBox

3.2 Controls and Connections



- | | | | |
|----------|--|-----------|--|
| 1 | Mounting holes for rail mount adapter | 9 | Cooling fans |
| 2 | CMOS battery compartment | 10 | Micro HDMI socket |
| 3 | USB 3.0 socket | 11 | Functional Input (presently inactive) |
| 4 | Ethernet socket (GigE) | 12 | 2x USB 2.0 sockets |
| 5 | Power supply socket | | |
| 6 | Micro SDHC/ SDXC card slot | | |
| 7 | Mini-USB 2.0 socket | | |
| 8 | Status-LEDs (L1-L4) | | |

3.3 Protective Housing



IP65 Protective housing (Alu die-cast) [ACPINBPH]



**Protective housing with power supply
[ACPINBPHPS]**



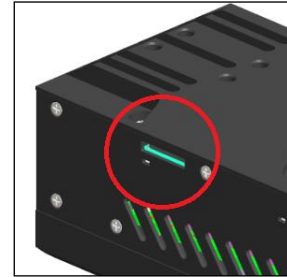
**IR camera with NetBox inside CoolingJacket Advanced
for ambient temperatures up to 315 °C**

3.4 SD Card

The NetBox will be delivered with a 32 GB Micro SDHC card which is already installed on the unit. If required you can exchange this card.

The NetBox is supporting Micro SDHC and Micro SDXC cards.

To remove the card please take a ball pen or similar and push onto the card from outside carefully. Please take care when you insert a card that it is placed correctly into the according guide slot.



3.5 Mini-USB Socket

With the Mini-USB socket you can get a direct access to the IR camera from a separate PC without changing cables on the NetBox.

For this purpose the camera needs to be connected to the USB 3.0 socket.

3.6 Power Supply

For powering the NetBox you either can use the supplied power adapter or a suitable industrial power supply with a voltage output between 8 VDC and 48 VDC **[► Technical Data]**.

Alternatively the NetBox can also be powered via the Ethernet cable (PoE – Power over Ethernet).

For this purpose a PoE injector is needed.

4 Operation

4.1 Operation Modes

The NetBox can be used in three different operation modes:

1. Stand-alone operation with an IR camera
2. Converter mode USB – Ethernet with direct connection to a PC (point-to-point connection)
3. Converter mode USB – Ethernet with connection of a PC via a network or via the internet

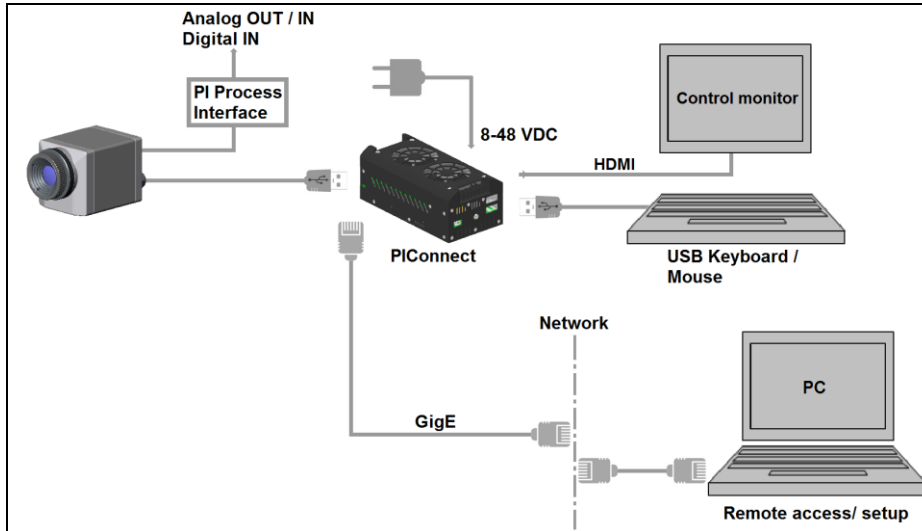
4.2 Status LEDs

The NetBox is equipped with 4 status LEDs (L1-L4).

LED	Function	LED lights up if...
L1	Power	NetBox is powered via PoE or by power supply (via power connector)
L2	Net data	video frames are continuously transmitted through the network connection (flashing)
L3	USB data	the imager is connected to an USB port, calibration files are loaded, and raw data frames are continuously delivered by the imager (flashing)
L4	Application OK	the main application (PIConnect or Imager Net Server) is running
L5	not active	
L6	not active	

4.3 Stand-Alone Operation

As a stand-alone PC the NetBox can expand an IR camera to an autonomous system. For this operation mode you should connect a monitor with a HDMI input and a USB keyboard to the NetBox. If your monitor has only a DVI input please use a customary HDMI to DVI adapter. In addition the system can also be controlled via a remote access over an Ethernet connection. [► **Remote Access to the NetBox**]



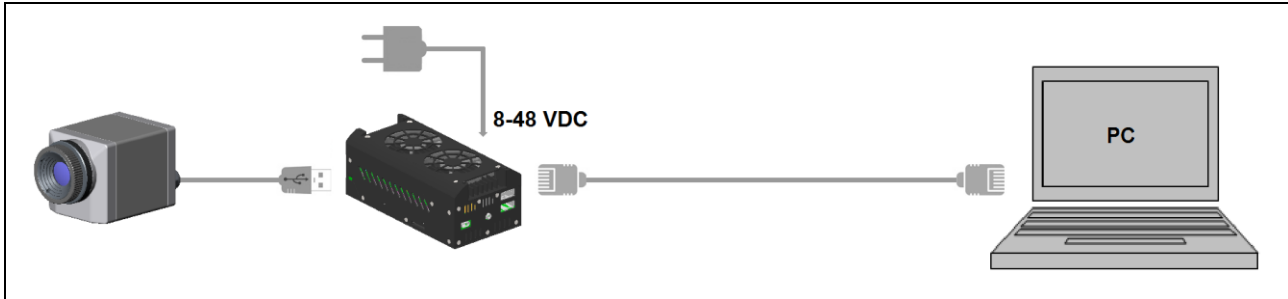
Stand-alone operation with remote monitoring via GigE network/ NetBox powered via power supply

After booting the NetBox the **PIConnect** software starts automatically. If a PI is connected the first time to the NetBox the software will ask you for the calibration files.

If you connect the NetBox to the Internet using the Ethernet connection the calibration files will be downloaded automatically. Otherwise you can load the calibration files also manually via the menu Tools/ Extended/ Reimport calibration files (from an USB stick e.g.).

4.4 Network Settings

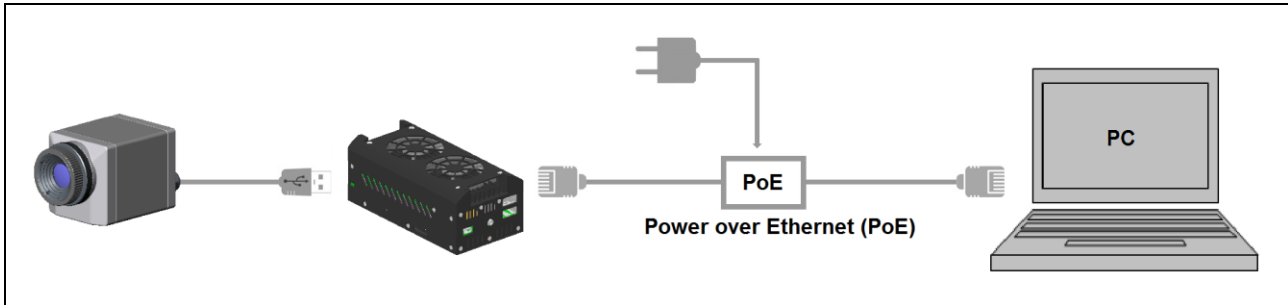
Please connect your imager with the supplied USB connection cable with the NetBox. Please connect your PC with an Ethernet cable with the NetBox. Now connect the power supply to the NetBox and to the mains. The NetBox will start to boot the system and should be ready to use after 1-2 minutes. You can check the status with the LEDs. At proper functioning now L1 should light up.



Ethernet direct connection (point-to-point connection)/ NetBox powered via power supply

If you use a PoE injector the power supply for the NetBox is not needed. In this case please connect the PoE injector as shown in the drawing below.

The used Ethernet cables should be at least category 5 cables (Cat-5 according ISO/IEC 11801).



Ethernet direct connection (point-to-point connection)/ NetBox powered via PoE injector

Connection to the NetBox

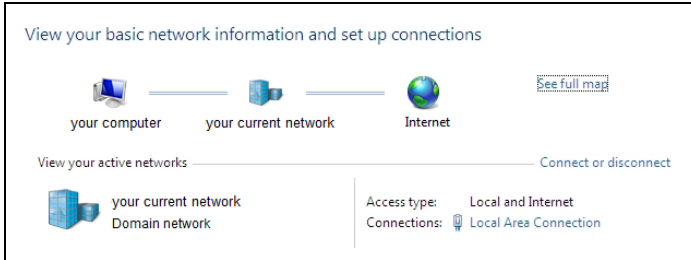
The communication with the NetBox is done via the TCP/ IP protocol (**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol). The NetBox can get its IP address (**I**nternet **P**rotocol address) either from a DHCP server or it can work with a fixed IP address.

On a direct connection to a PC both, the NetBox as well as the PC must use a fixed IP address because no DHCP server¹⁾ is available here. The NetBox is using in this case the IP address **192.168.0.100**. On your PC you have to do the following settings once (depending on the operating system the procedure can differ from the here shown – the following description refers to a Windows 7 system).

¹⁾ DHCP – **D**ynamic **H**ost **C**onfiguration **P**rotocol: allows the automatic integration of a computer into an existing network.

1. Go to **System controls**; open **Network and Sharing Center**.

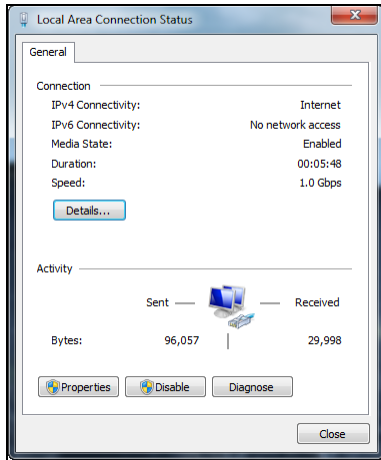
2. If you have an existing connection to a network (company network e.g.) you should see the following information:



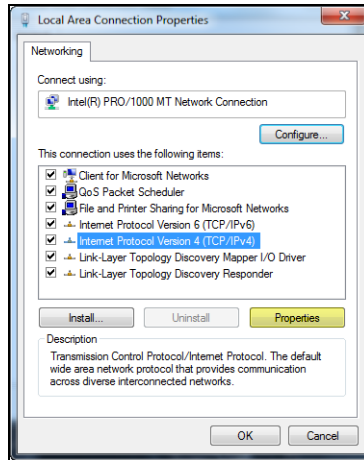
If your PC is not connected to any network, please go to **Change adapter settings** after you opened the **Network and Sharing Center**. Now go to **Local Area Connection**, right mouse button: **Properties**.
[continue at item 4]

3. Go to **Local Area Connection** – a status screen according [1] will be shown. Then go to **Properties**.

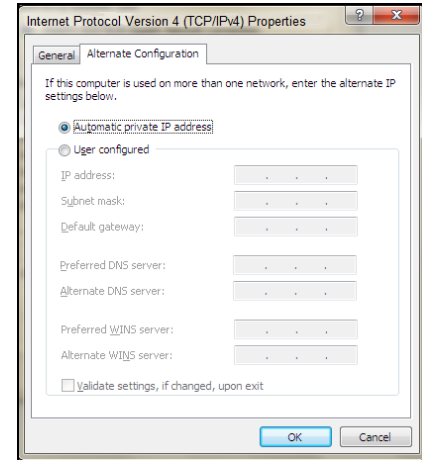
4. In the following window [2] mark **Internet protocol Version 4 (TCP/IPv4)** and go again to **Properties**.



[1]



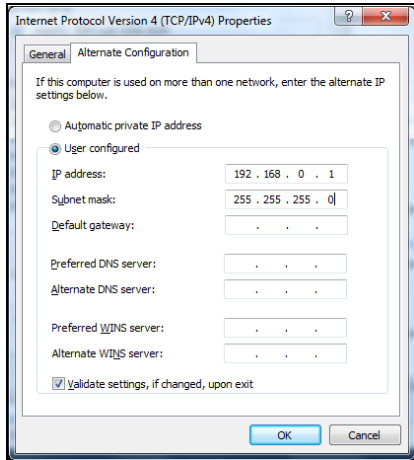
[2]



[3]

5. Please open now in window [3] the register **Alternate Configuration** and activate the checkbox **User configured**.

6. Now you can enter a user defined IP address for your PC. Please take care that the network part of the address has to be identical with the network part of the IP address of the NetBox, thus **192.168.0**. For the host part you have to use an address which is different from the one of the NetBox (100), so you may use 1 for example.

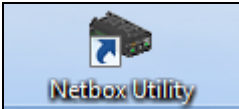


After you have made these settings and connected your PC with the NetBox using an Ethernet cable your PC will establish a point-to-point connection. This procedure can take several minutes. In the **Network and Sharing Center** your network will now be shown up as a *non-identified network*.

4.5 Remote Access to the NetBox (NetBox Utility)

For a remote access to the NetBox install at first **NetBox Utility** on your PC. You will find the setup program (install.bat) in the folder **NetBox Utility** on your PIConnect CD. Beside the utility software also the UltraVNC viewer will be installed. You will find this program under **Start/ Programs/ NetBox-UltraVNC**.

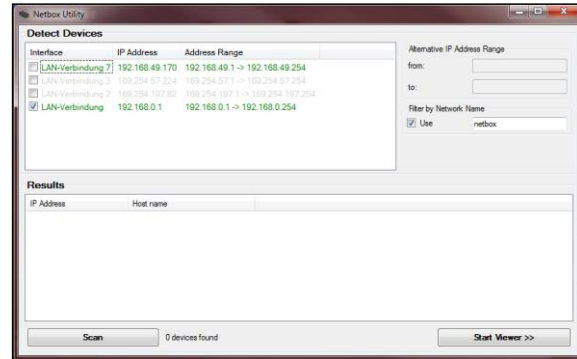
After the installation is finished you will find the following icon on your desktop:



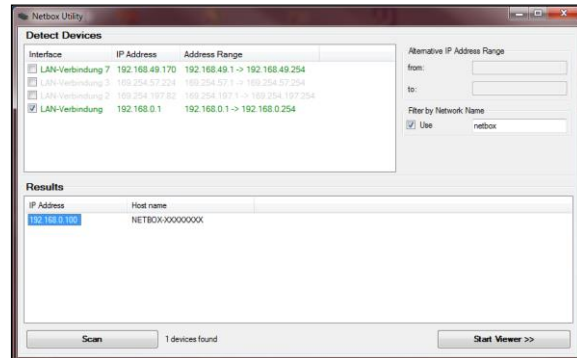
Now you can have access to a NetBox which is directly connected to your PC or to a NetBox which is located anywhere in the same network. Also remote connection via the internet is possible.¹⁾

¹⁾ For remote access from outside to a NetBox connected to a company network please ask your system administrator for possibly necessary settings.

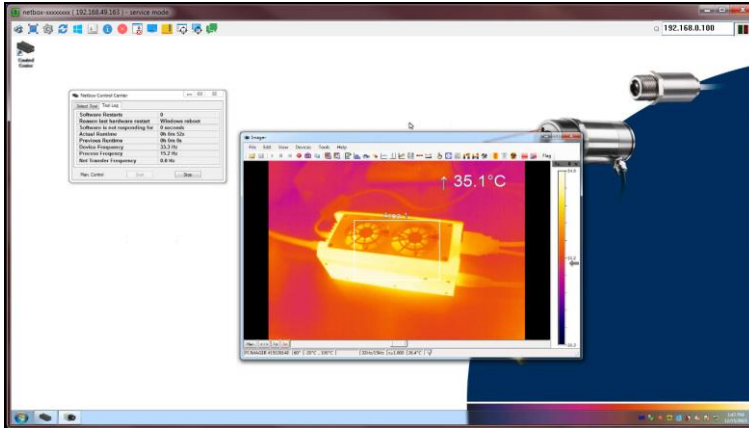
Please start NetBox Utility:



Select the desired network adapter and press **Scan**. The Utility program searches for NetBoxes located in your network or directly connected to your PC. The filter function allows a selective search for NetBoxes only. Mark the desired NetBox in the window **Results** and press the button **Start Viewer >>**.



The UltraVNC viewer starts now and shows the desktop of the NetBox:



Alternatively you can scan only a certain IP address range:

Interface	IP Address	Address Range	Alternative IP Address Range
<input type="checkbox"/> LAN-Verbindung 7	192.168.49.170	192.168.49.1 -> 192.168.49.254	from: 192.168.0.1
<input type="checkbox"/> LAN-Verbindung 3	169.254.57.224	169.254.57.1 -> 169.254.57.254	to: 192.168.0.100
<input type="checkbox"/> LAN-Verbindung 2	169.254.197.82	169.254.197.1 -> 169.254.197.254	Filter by Network Name
<input checked="" type="checkbox"/> LAN-Verbindung	192.168.0.1	192.168.0.1 -> 192.168.0.100	<input checked="" type="checkbox"/> Use netbox

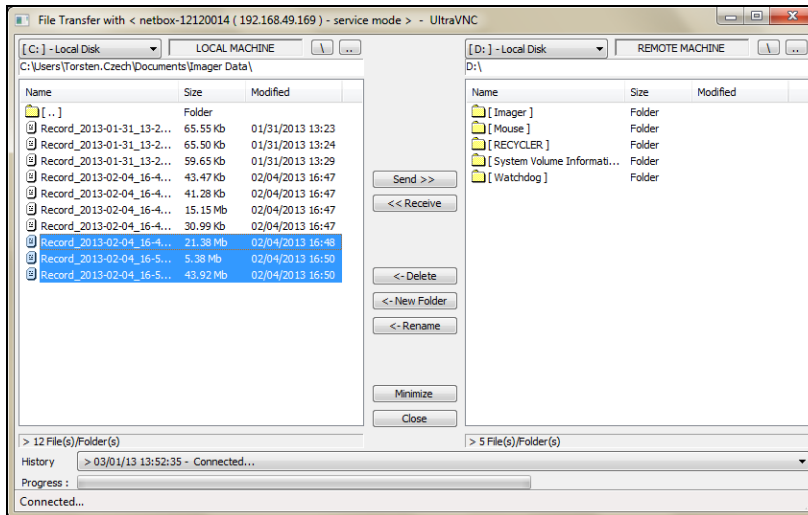
Please mark the desired network connection up front.

4.6 File transfer between NetBox and PC

To exchange files between the NetBox and a directly connected or in the network located PC please move the cursor to the title bar of the **UltraVNC Viewer** window and press the right mouse button. Start **File Transfer**. Alternatively you can also press the following button in the tool bar:



In the following explorer window you see on the left side your local PC (LOCAL MACHINE) and on the right side the NetBox (REMOTE MACHINE). Now you can copy files between both computers via the network link by marking them and pressing **Send** or **Receive**.

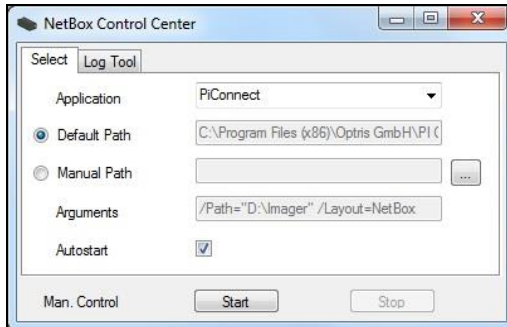


4.7 NetBox Control Center

On the desktop of the NetBox you will find a short cut for the NetBox Control Center:



The Control Center allows an easy configuration of the NetBox. On the tab **Select** you can select programs which will be started automatically after starting the NetBox:

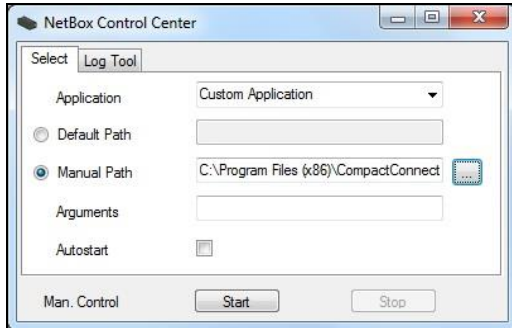


At **Application** you can select between PiConnect, Imager Net Server and Custom Application.

Application **Operation mode of the NetBox**

PIConnect	Stand-Alone operation
Imager Net Server	Converter mode USB-Ethernet
Custom Application	Usage of the NetBox for other applications (example: You can select here the pyrometer software CompactConnect which is already pre-installed on the NetBox.)

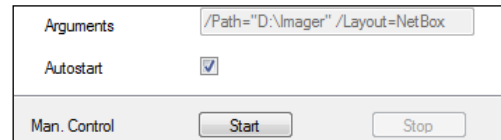
As factory default setting the **PIConnect** will be started by the Control Center.



The start options selected in the Control Center are saved automatically in the NetBox and are available after a restart.

At **Arguments** you can enter command line parameters (a special layout, with which the PIConnect should start automatically e.g.).

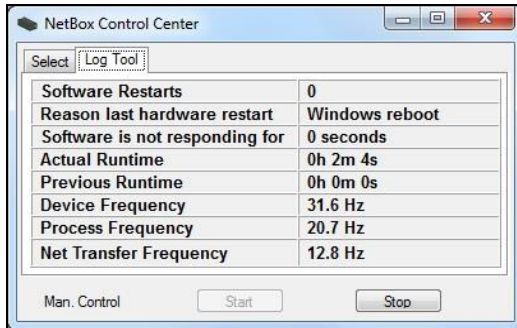
Activate **Autostart** in order to ensure that the selected application will be restarted automatically after a reboot of the NetBox.

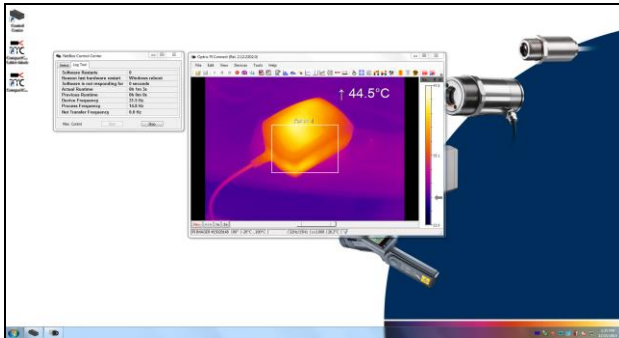


If, for any reason, the application is not working properly anymore (software crash), the NetBox Control Center will restart the software automatically (software watchdog) if autostart was selected.

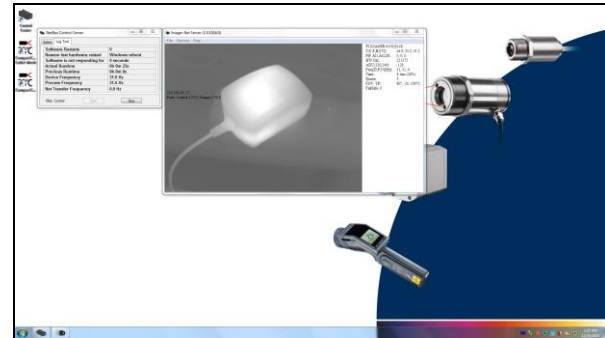
The tab **Log Tool** is giving you the following information:

Software Restarts	Number of software restarts
Reason last hardware restart	Why the NetBox was restarted the last time
Software is not responding for	Timer, which will be started at non-responding of the software and which is initiating the restart of the selected application
Actual runtime	Current runtime of the software
Previous runtime	Previous runtime of the software
Device Frequency	Camera frame rate
Process Frequency	Processed frame rate (display frame rate)
Net Transfer Frequency	Frame rate transferred via network (at Imager Net Server)





Screen of the NetBox – PI Connect



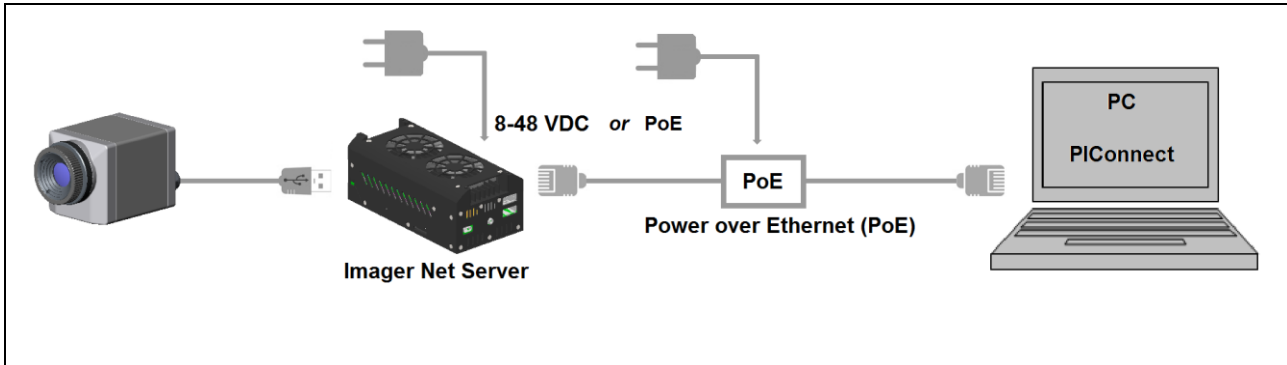
Screen of the NetBox – Imager Net Server

Menu	File Devices Flag	exit of the program shows the connected imager manual operation of the camera flag
PI IMAGER #	[Serial number]	of the connected device
T (C, F, B)		Device temperatures (°C): C: FPA-Chip F: Flag temperature B: Housing temperature
PIF AI1, AI2, DI		Status of the PIF input: AI1: Analog IN1 (voltage level in mV) AI2: Analog IN2 (voltage level in mV) DI: Digital IN (Low/ High)
HW Cnt.		Hardware-Counter (frame counter)
ADU (192, 144)		ADU value of the center pixel (e.g. 192, 144 at PI4xx)
Freq (D, P, N)		Frequency (Hz): D: Device/ P: Processing/ N: Network
Time		Time per single frame
Queue		Number of frames in network queue
FOV, TR		Field of view (horizontal) of the imager lens, Temperature range
FailSafe		0/1 (alternating with connected industr. PIF) 1 at FailSafe alarm

Information in the *Imager Net Server* – application window

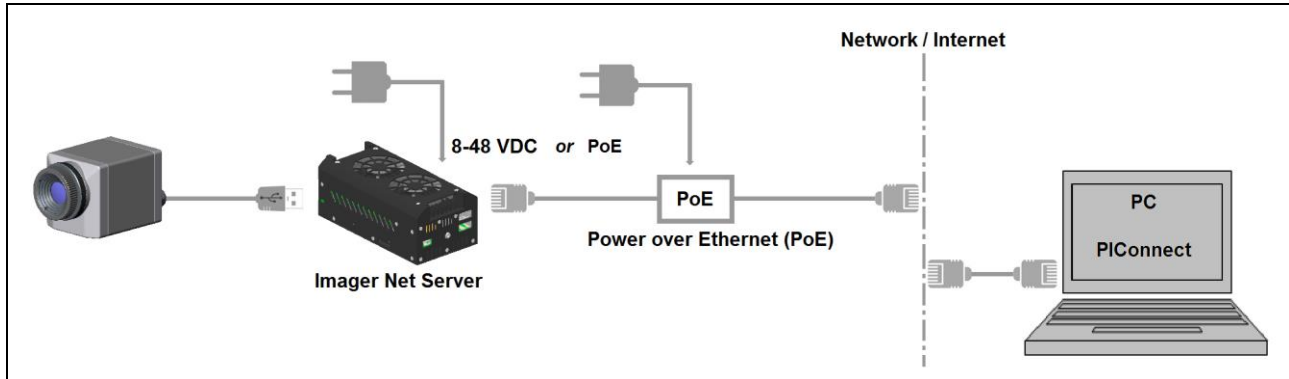
4.8 Converter mode USB – Ethernet

In this mode the NetBox is used as converter from USB to Ethernet. Either a direct connection to a PC (point-to-point) or a connection via an existing network is possible. On the NetBox the program **Imager Net Server** must be active ¹⁾.



NetBox as converter USB – Ethernet/ direct network connection

¹⁾ The models PI450 G7 and PI1M are not supported yet.

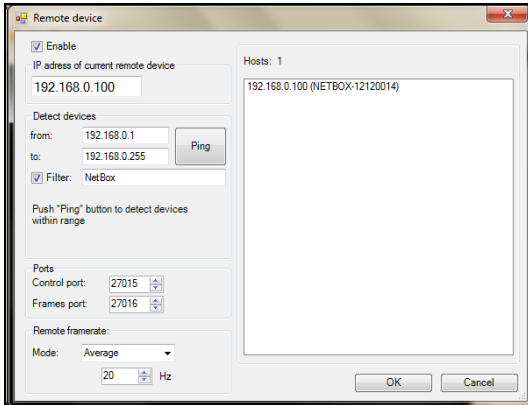


NetBox as converter USB – Ethernet/ integration into a network

After establishing the network connection please start the PIConnect on your PC and open the menu item **Tools/ Extended/ Remote devices...**

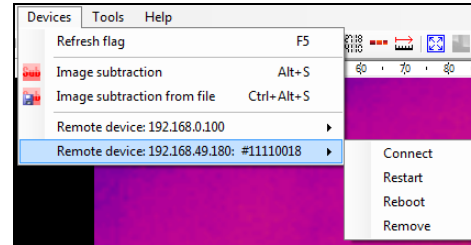
In the window which is appearing you should set a hook on **Enable** and enter the IP address of the NetBox (**192.168.0.100 on a direct connection**) or the address range of your local network at **Detect devices**¹⁾. The fourth block should have the range **0** to **255**. If you now press **Ping** all computers inside the selected address range will be shown.

¹⁾ To determine the address range of your local network you can use **NetBox Utility [► Remote Access to the NetBox]**.



Search for network devices in PICConnect

For a faster search in a network you should activate the **filter** and enter *NetBox*. Now only computers with *NetBox* in their name will be shown.



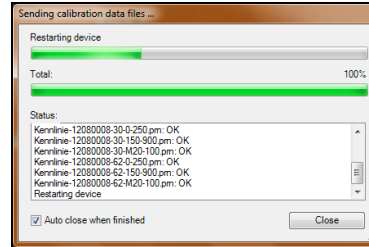
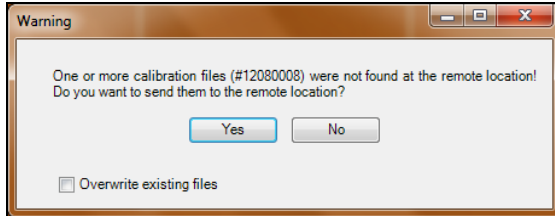
Device selection in PICConnect

Under **Hosts** you can now select your NetBox and press **OK**. The software will establish a connection to the remote device (imager) automatically.

Under **Remote framerate** you can enter the desired frame rate which should be transmitted via the network. Under the menu item **Devices** the imager which is connected to the NetBox shows up now. The following functions can be selected here:

- | | |
|----------------|---|
| Connect | manual connection with the remote device |
| Restart | restart of the Imager Net Server application on the NetBox |
| Reboot | reboot of the NetBox |
| Remove | remove of the device entry in this menu |

If the used imager is connected for the first time to the NetBox the following message appears:



Please confirm with **Yes**. The calibration files will be transferred automatically from your PC to the NetBox and stored there. Now you should see the live picture from the imager on your PC. Alternatively you can copy the calibration data also manually via an USB stick into the NetBox folder **D:\Imager\Cali**.

4.9 Write Protection Filter

The NetBox has a factory pre-installed write protection filter. This filter is protecting reliably the operating system and the complete drive C and allows a switch-off of the device without a shutdown of the operating system.

The write protection filter is shown as symbol in the task bar.

The colors have the following meaning:



red dot: protected mode



green dot: write mode

The NetBox should be used only with an activated write protection filter [red dot].

To save changed settings or if you want to install additional software the write protection has to be deactivated temporarily. To do this please move the cursor to the red dot in the task bar and push the right mouse button:

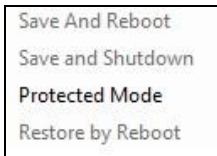
A context menu with four options: 'Save And Reboot', 'Save and Shutdown', 'Save And Standard Write Mode', and 'Restore by Reboot'.

- Save And Reboot
- Save and Shutdown
- Save And Standard Write Mode
- Restore by Reboot

You can select between four different actions:

Save and Reboot	Changes will be saved + Restart
Save and Shutdown	Changes will be saved + shut down
Save and Standard Write Mode	Changes will be saved + Switch into the write mode (green dot)
Restore by Reboot	Restart without saving of changes

If you select **Save and Standard Write Mode** the context menu will change to:



In order to go back to the protected mode select **Protected Mode**. All changes will be saved and the system will be restarted.

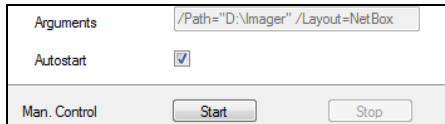
The SSD drive of the NetBox has by factory default two partitions. The write protection refers to partition C only. On the partition D you can save application data. On drive D also the calibration data of the infrared imager are stored.

5 System Information

5.1 Watchdog

If, for any reason, the main software application (**PIConnect** or **Imager Net Server**) does not work properly (software hang-up or crash) or if the main application will be closed, the integrated software watchdog (via the NetBox Control Center) is restarting the program automatically.

For this functionality it is required that the *Autostart* is activated in the **Select Tool**:



In addition a hardware watchdog is monitoring the Windows operating system permanently – you see the symbol [WD] in the right part of the task bar:

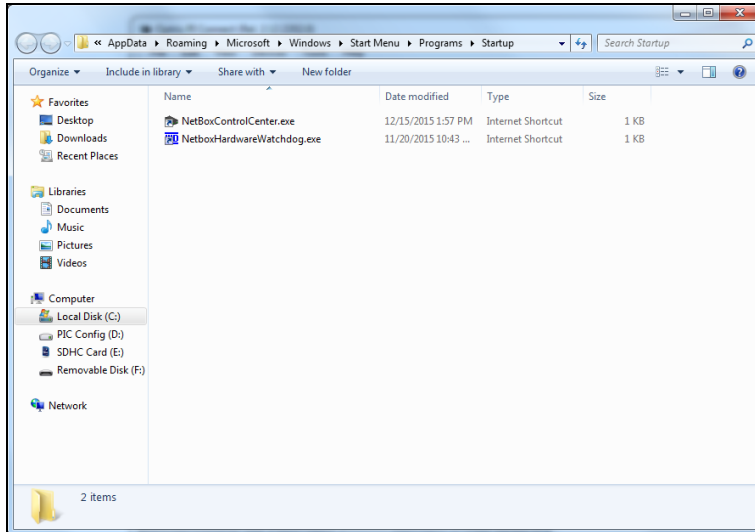


If the watchdog is recognizing a system error or problem it will restart the NetBox automatically.

5.2 Startup

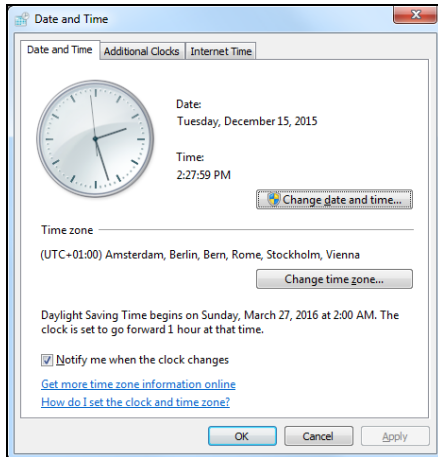
In the Windows Startup folder of the NetBox the following shortcuts are set default:

NetboxControlCenter starts the program which was selected in the Select Tool
NetboxHardwareWatchdog starts the hardware watchdog application



5.3 System Time

The NetBox contains a CMOS battery which is used for keeping the system time if the computer is switched off. If a battery change should be necessary please open the battery compartment and exchange by a new battery of the same type (CR1225 or CR1632, depending on production date).



To adapt the NetBox to your local time zone you have to open the Windows date and time setup (Control Panel/ Date and Time). The NetBox is set by default to UTC+01:00. To save the new setting permanently you have to deactivate the ► **Write Protection Filter** temporarily.

5.4 System Recovery

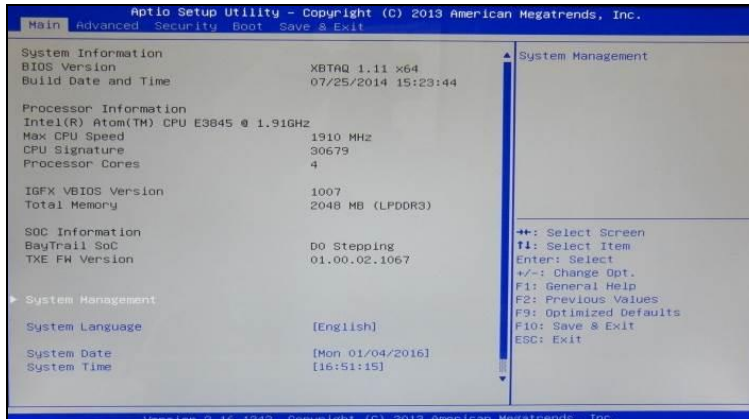
In case a recovery of the Windows operating system of the NetBox is necessary you should use the supplied USB recovery stick. Follow the steps described hereafter. **Do not disconnect power from the NetBox during the recovery procedure.**

After the system recovery the NetBox has the factory default settings. All data which was stored before on the SSD will get lost.

Step 1:

Connect a monitor and a USB keyboard with the NetBox. Connect the USB Recovery stick to a free USB port of the NetBox and switch on the unit.

Press and keep pressed the **DEL button** until the Aptio Setup Utility screen appears:



Step 2:

Select **Hard Drive BBS Priorities** in the menu **Boot** and press **Enter**:

```

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
Main  Advanced  Security  Boot  Save & Exit

Boot Configuration
Setup Prompt Timeout          1
Bootup NumLock State         [Off]

Quiet Boot                    [Disabled]
Fast Boot                     [Disabled]

WIN8 Support                  [Disabled]

Boot Option Priorities
Boot Option #1                [Intenso Basic Line ]

Hard Drive BBS Priorities
▶ CSM Parameters

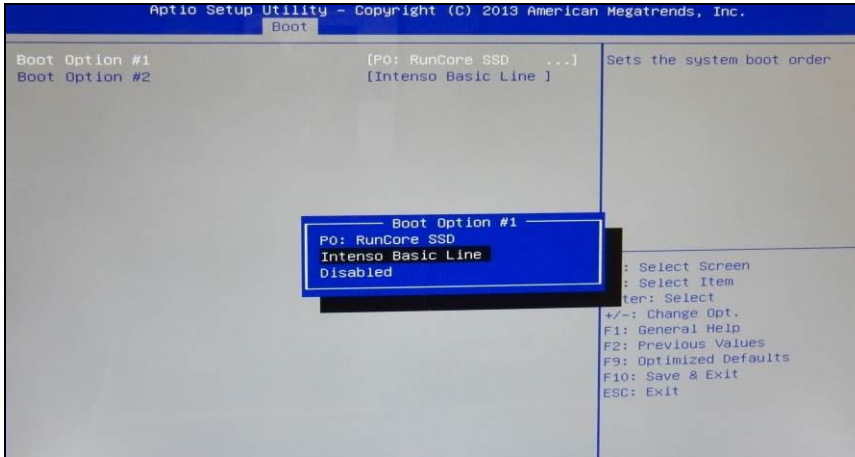
Set the order of the legacy devices in this group

--: Select Screen
T1: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit
ESC: Exit

Version 2.16.1242, Copyright (C) 2013 American Megatrends, Inc.
```

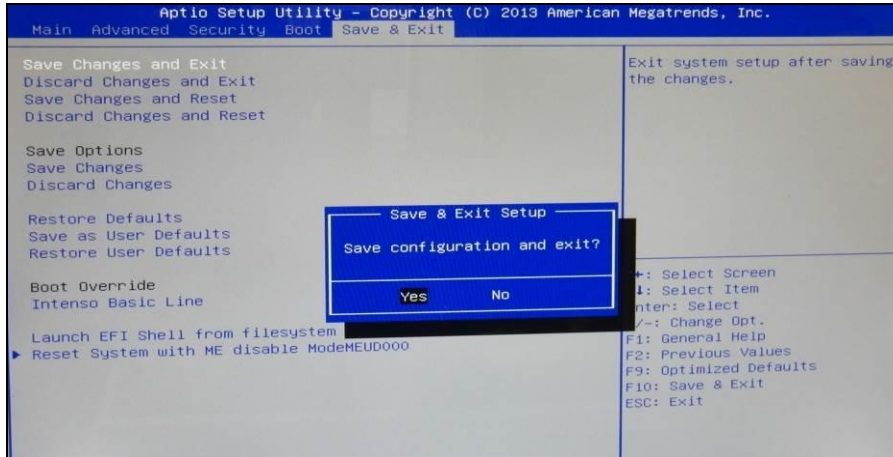
Step 3:

Select **Boot Option #1**, press **Enter** and select **Intenso Basic Line** (confirm with **Enter**):



Step 4:

Now press **F10** and confirm with **Enter**:



The system will restart now and boot from the USB stick.

Step 5:

Select **Recovery system** in the following screen and press **Enter**:

