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Operator‘s Manual

optris® PI NetBox

Mini-PC for optris PI series

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Table of Contents

1 General Information

1.1 Description

Thank you for choosing the **optris® PI NetBox**.
The optris PI NetBox is a miniaturized PC which expands the optris PI/Xi series to a stand-alone solution with remote access via GigE and so allows greater distances between process (IR camera) and process monitoring (PC).
The NetBox works with a Windows 10 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).

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.

1.2 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.

1.3 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

1.4 Maintenance

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

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

1.5 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 68-2-27 (25 G and 50 G)
Operating system	Windows 10 Enterprise

2.2 Electrical Specifications

Power supply	8...48 VDC or Power over Ethernet (PoE+ (at least IEEE 802.3at))
Power consumption	10 W (+ additional 2,5 W for IR camera)
Cooling	active via two integrated fans
Board	COM Express mini embedded board
Processor	Intel Atom® E3940 Quad Core 1.6/ 1.8 GHz (Turbo)
Hard disc	32 GB SSD
RAM	4 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.

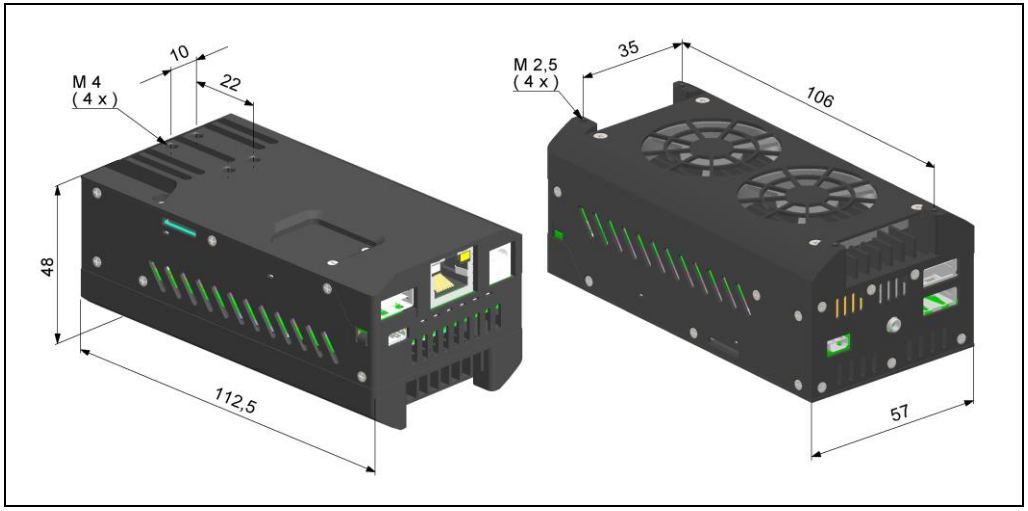


Figure 1: Dimensions NetBox

3.2 Controls and Connections

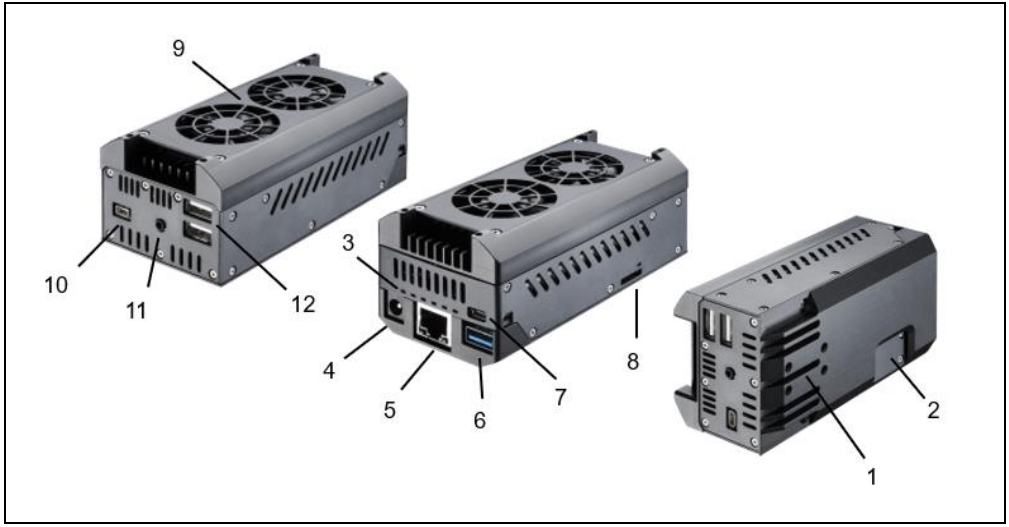


Figure 2: Connections NetBox

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

3.3 Protective Housing

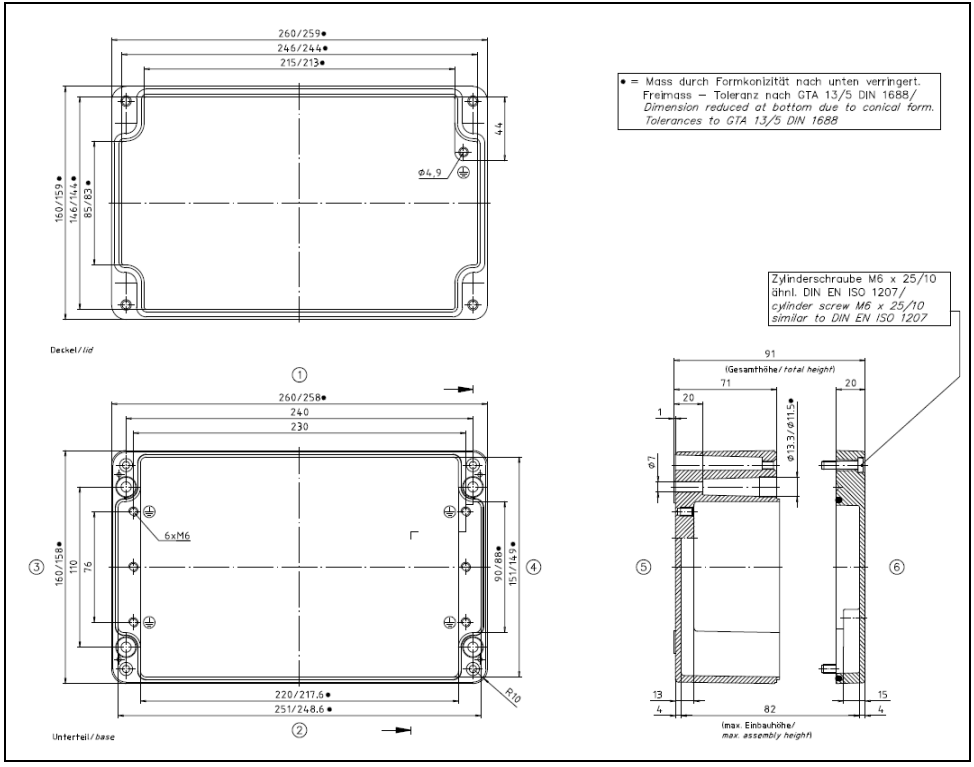


Figure 3: IP65 Protective housing (Alu die-cast) [**Part-No.: ACPINBPH**]

Figure 4: Protective housing with power supply [**Part-No.: ACPINBPHPS**]

Figure 5: 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 **[►2 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 (**Part-No.: ACPIPOE**)[1)].

[1)] For usage of the NetBox together with the high temperature Ethernet cables we recommend the following PoE components instead of ACPIPOE: Trendnet TPI-115GI or Netgear GS510TLP.

4 Operation

The NetBox can be used in following operation mode:

- Stand-alone operation with an IR camera

4.1 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	

4.2 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. **[►4.4 Remote Access to the NetBox (NetBox Utility)]**

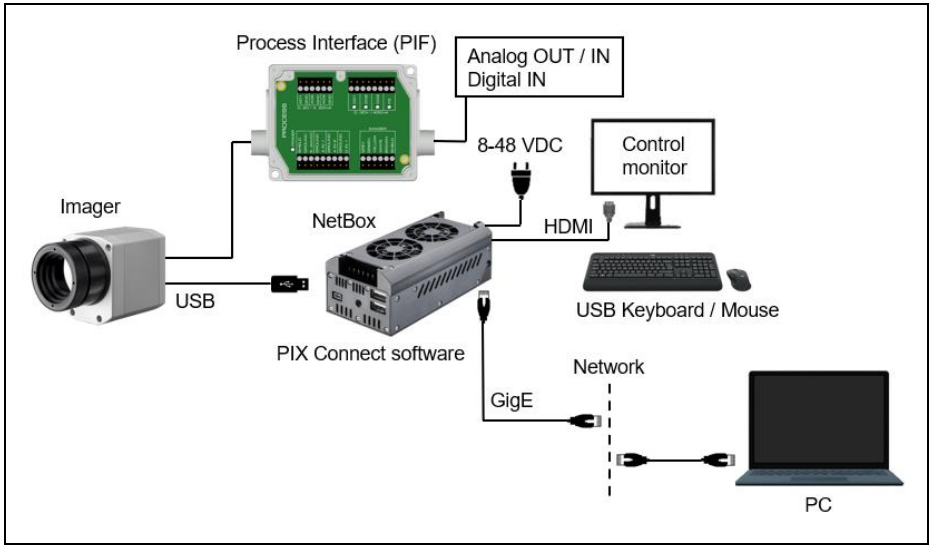


Figure 6: Stand-alone operation with remote monitoring via GigE network/ NetBox powered via power supply

After booting the NetBox the **PIX Connect** software starts automatically. If a PI/Xi 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.).

4.3 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.

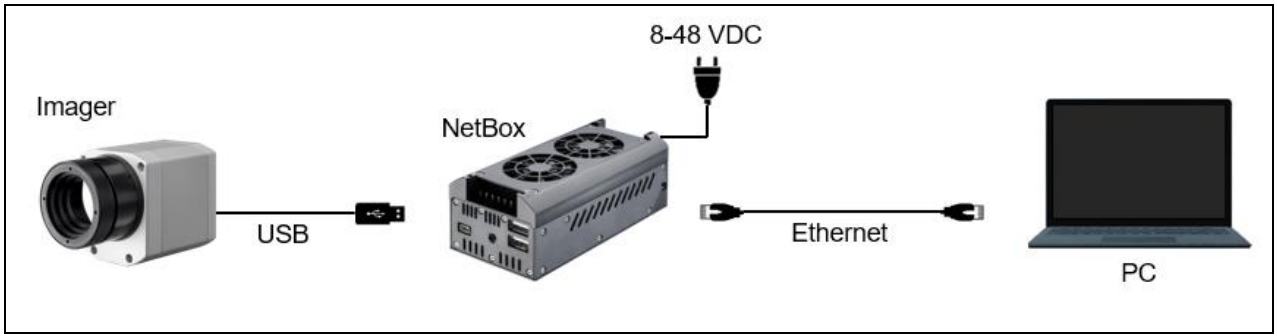


Figure 7: Ethernet direct connection (point-to-point connection)/ NetBox powered via power supply

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).

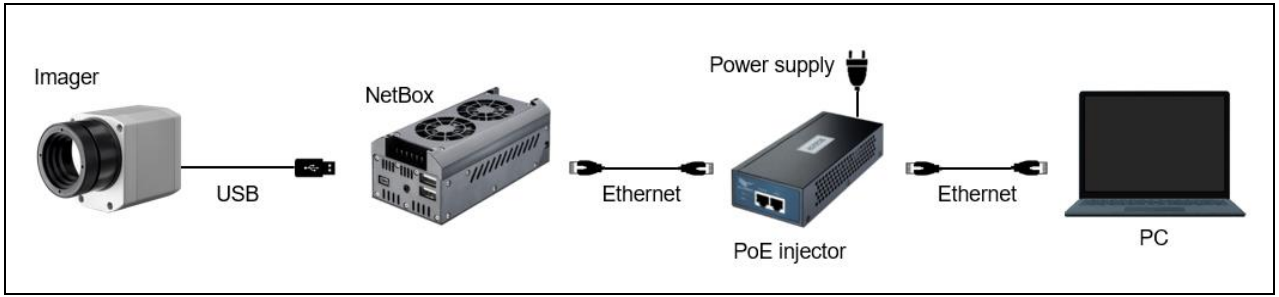


Figure 8: Ethernet direct connection (point-to-point connection)/ NetBox powered via PoE injector

Connection to the NetBox

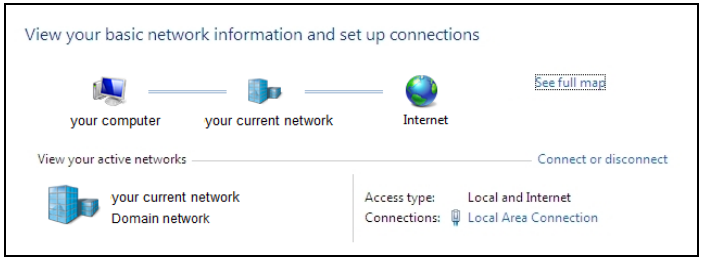
The communication with the NetBox is done via the TCP/ IP protocol (**T**ransmission **C**ontrol **P**rotocol/ **I**nternet **P**rotocol). The NetBox can get its IP address (**I**nternet **P**rotocol address) either from a DHCP server or it can work with a fixed IP address.

On a direct connection to a PC both, the NetBox as well as the PC must use a fixed IP address because no DHCP server[1)] 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:

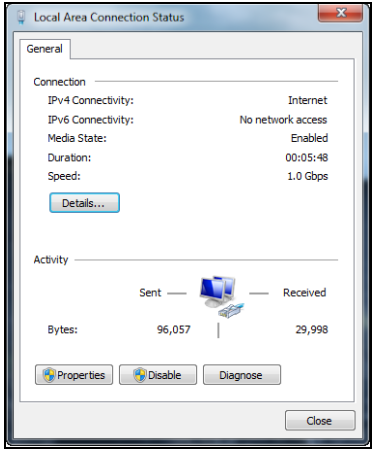


If your PC is not connected to any network, please go to **Change adapter settings** after you opened the **Network and Sharing Center**. Now go to **Local Area Connection**, right mouse button: **Properties**.
[continue at item 4]

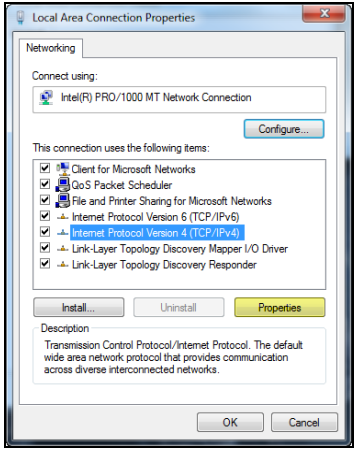
If your PC is not connected to any network, please go to **Change adapter settings** after you opened the **Network and Sharing Center**. Now go to **Local Area Connection**, right mouse button: **Properties**. [continue at item 4]

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

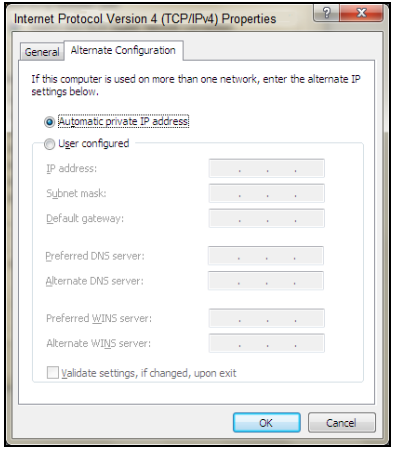
4. In the following window [2] mark **Internet protocol Version 4 (TCP/IPv4)** and go again to **Properties**.



[1]



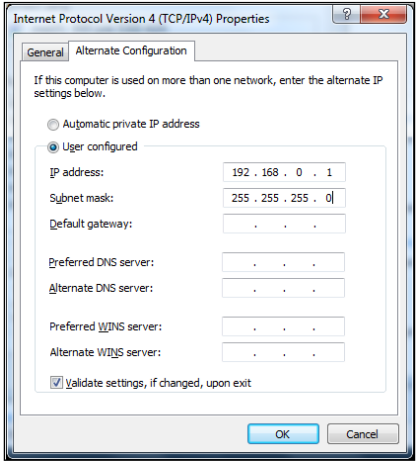
[2]



[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*.

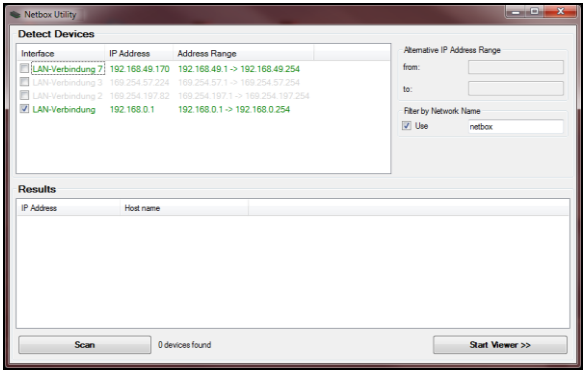
4.4 Remote Access to the NetBox (NetBox Utility)

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 PIX Connect 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:

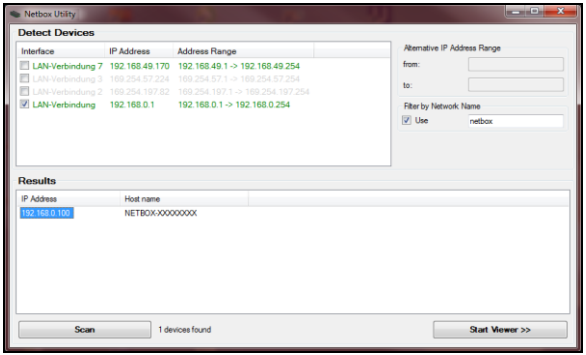
Now you can have access to a NetBox which is directly connected to your PC or to a NetBox which is located anywhere in the same network. Also remote connection via the internet is possible.[1)]

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

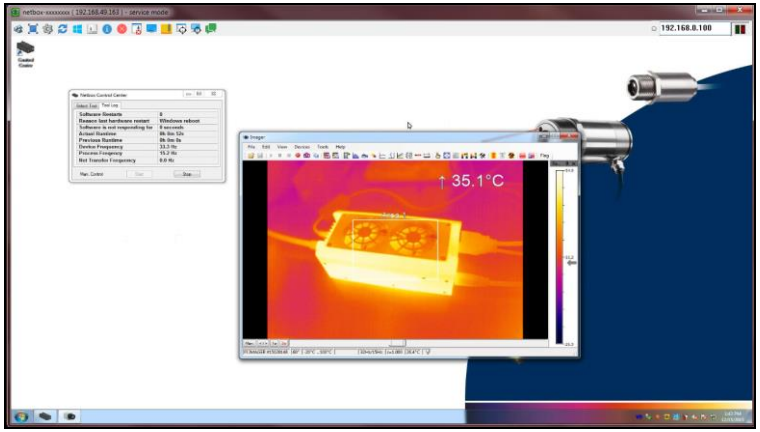
Please start NetBox Utility:



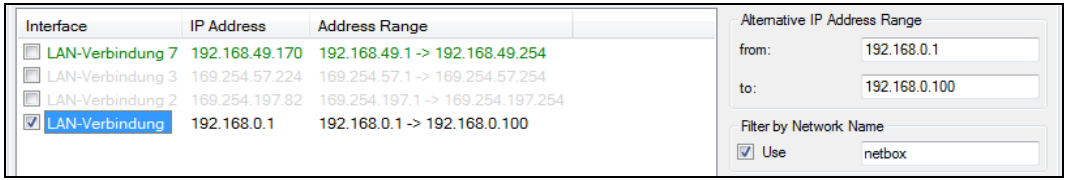
Select the desired network adapter and press **Scan**.
The Utility program searches for NetBoxes located in your network or directly connected to your PC. The filter function allows a selective search for NetBoxes only.
Mark the desired NetBox in the window **Results** and press the button **Start Viewer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



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



Alternatively, you can scan only a certain IP address range:

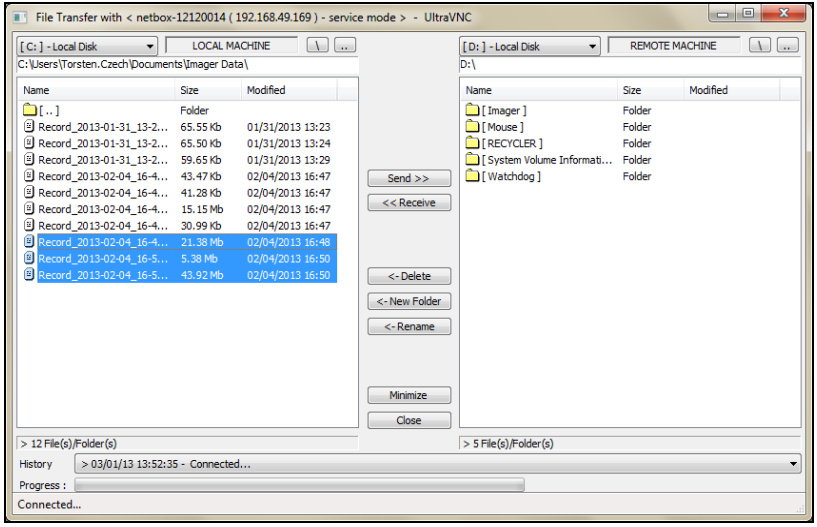


Please mark the desired network connection up front.

4.5 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:

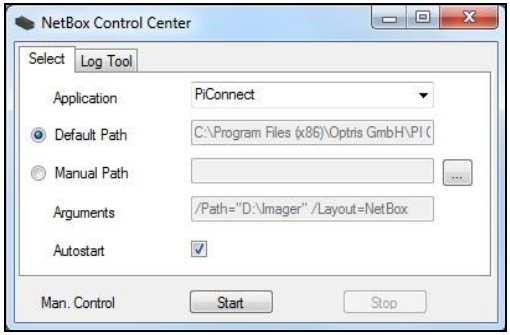
In the following explorer window you see on the left side your local PC (LOCAL MACHINE) and on the right side the NetBox (REMOTE MACHINE). Now you can copy files between both computers via the network link by marking them and pressing **Send** or **Receive**.



4.6 NetBox Control Center

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

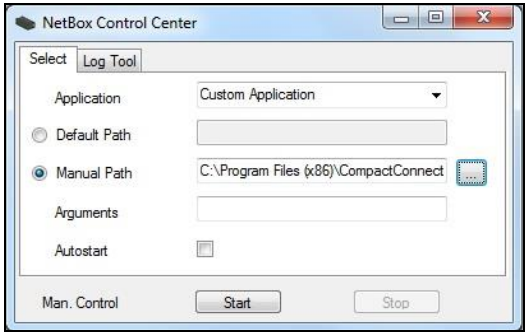
The Control Center allows an easy configuration of the NetBox. On the tab **Select** you can select programs which will be started automatically after starting the NetBox:



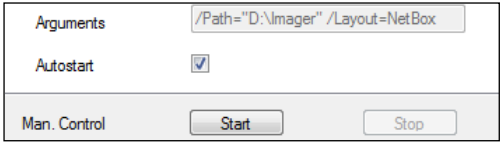
At **Application** you can select between PIX Connect and Custom Application.

Application	Operation mode of the NetBox
PIX Connect	Stand-Alone operation
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 **PIX Connect** 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.

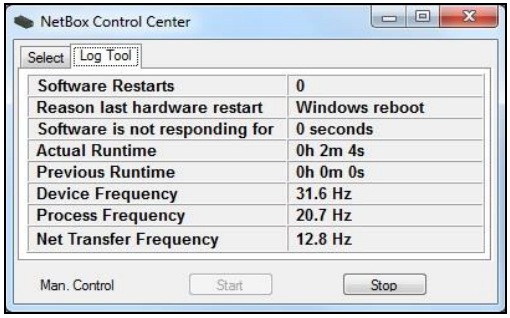


At **Arguments** you can enter command line parameters (a special layout, with which the PIX Connect should start automatically e.g.).
Activate **Autostart** in order to ensure that the selected application will be restarted automatically after a reboot of the NetBox.

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 for 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)



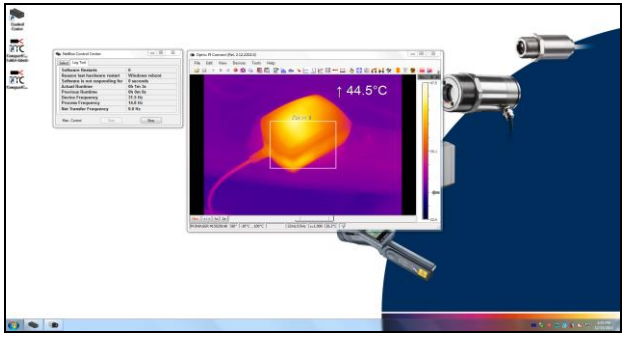


Figure 9: Screen of the NetBox – PIX Connect

4.7 Write Protection Filter

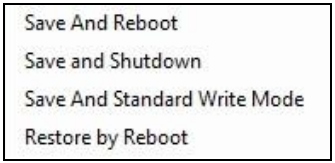
The NetBox has a factory pre-installed write protection filter. This filter is protecting reliably the operating system and the complete drive C and allows a switch-off of the device without a shutdown of the operating system.
The write protection filter is shown as symbol in the task bar.
The colors 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].

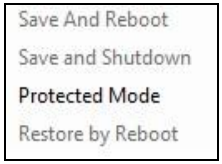
To save changed settings or if you want to install additional software the write protection has to be deactivated temporarily. To do this please move the cursor to the red dot in the task bar and push the right mouse button:



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:



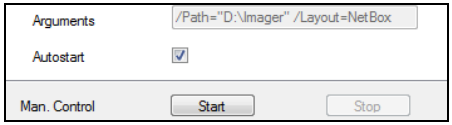
In order to go back to the protected mode select **Protected Mode**. All changes will be saved and the system will be restarted.

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 (**PIX Connect**) 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**:



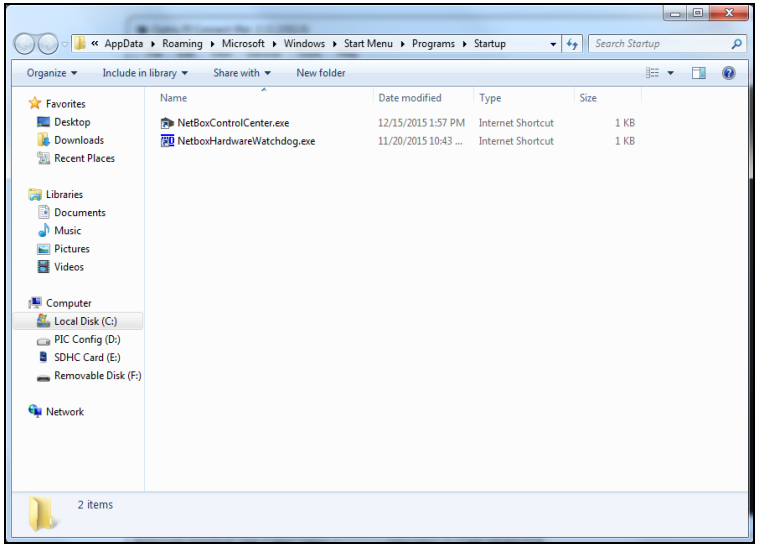
In addition a hardware watchdog is monitoring the Windows operating system permanently – you see the symbol [**WD**] in the right part of the task bar:

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

5.2 Startup

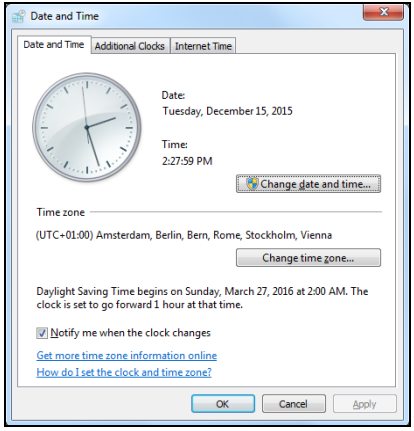
In the Windows Startup folder of the NetBox the following shortcuts are set default:

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).



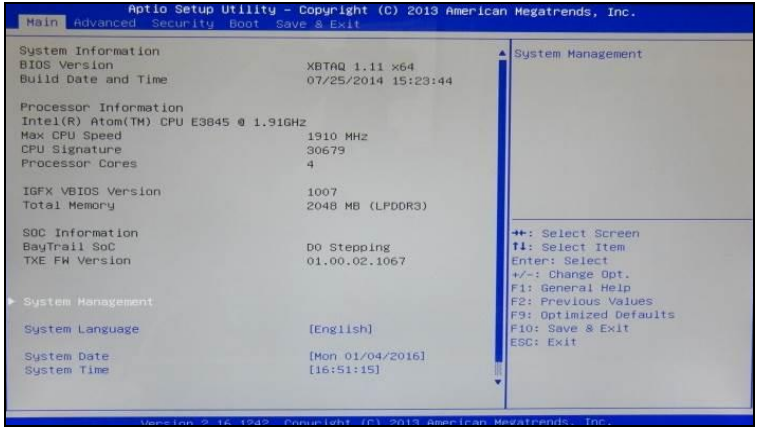
To adapt the NetBox to your local time zone you have to open the Windows date and time setup (Control Panel/ Date and Time).
The NetBox is set by default to UTC+01:00.
To save the new setting permanently you have to deactivate the **►4.7 Write Protection Filter** temporarily.

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.

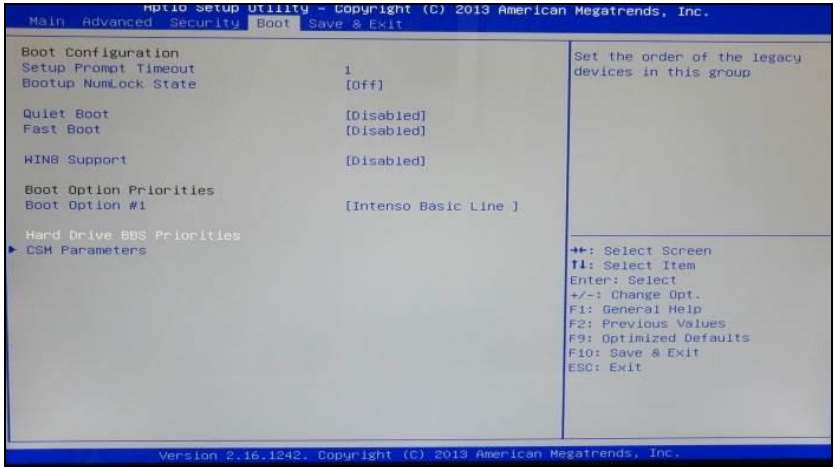
Step 1:

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 Ultility screen appears:



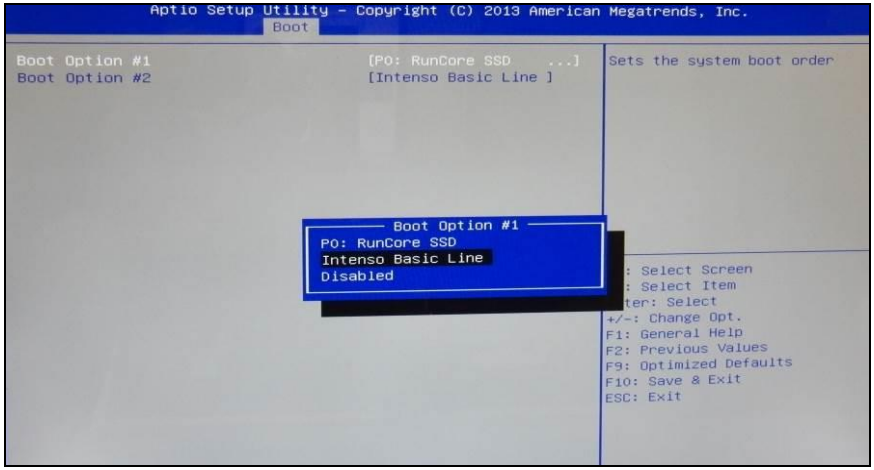
Step 2:

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



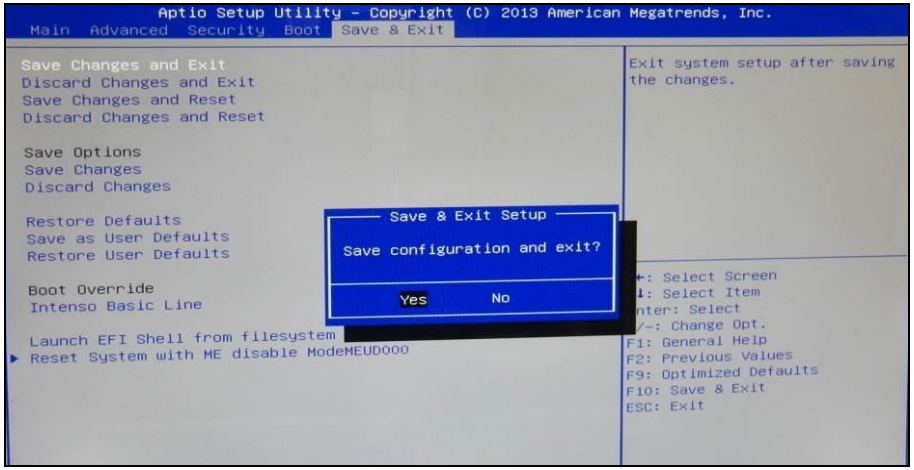
Step 3:

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



Step 4:

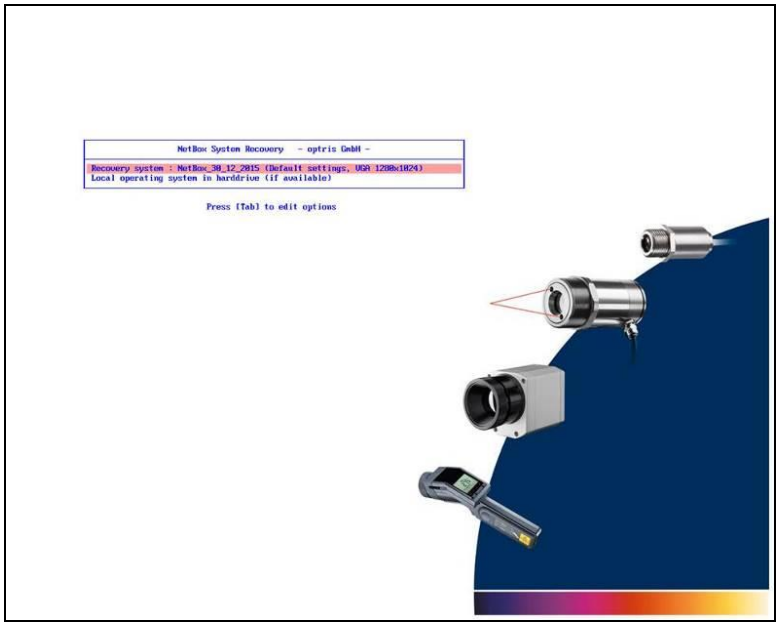
Now press **F10** and confirm with **Enter**:



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

Step 5:

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



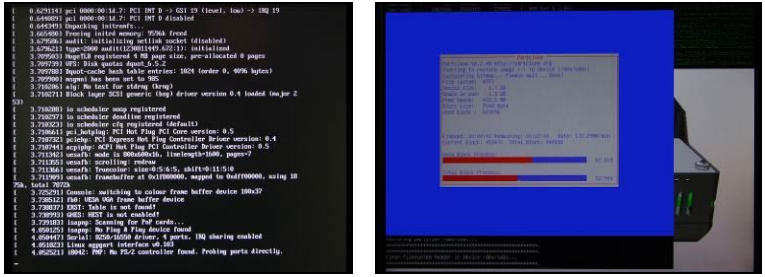
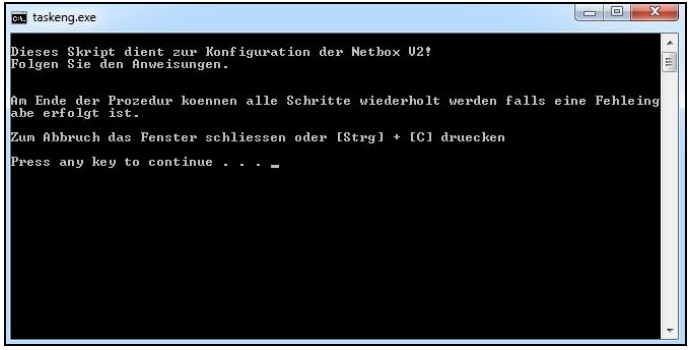


Figure 10: Screens during system recovery

After a complete recovery the NetBox will restart and boot the system. After the booting process all necessary drivers will be installed automatically and a first configuration script will be started.
Please follow the instructions:



Appendix A – Declaration of Conformity

EG-Konformitätserklärung
EU Declaration of Conformity

optris
infrared measurements

Wir / We

Optris GmbH
Ferdinand Buisson Str. 14
D-13127 Berlin

erklären in alleiniger Verantwortung, dass
declare on our own responsibility that

die Produktserie optris PI NetBox
the product group optris PI NetBox

den Anforderungen der EMV-Richtlinie **2014/30/EU** und der allgemeinen Produktsicherheits-richtlinie **2001/95/EG** entspricht.
meets the provisions of the EMC Directive **2014/30/EU** and the General Product Safety Directive **2001/95/EC**.

Angewandte harmonisierte Normen:
Applied harmonized standards:

EMV Anforderungen / EMC General Requirements:

EN 61326-1:2013 (Grundlegende Prüfanforderungen / Basic requirements)
EN 61326-2-3:2013

Gerätesicherheit von Messgeräten / Safety of measurement devices:

EN 61010-1:2010
EN 60825-1:2014 (Lasersicherheit / Laser safety)

Dieses Produkt erfüllt die Vorschriften der Richtlinie **2015/863/EU** (RoHS) des Europäischen Parlaments und des Rates vom 4. Juni 2015 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten.
This product is in conformity with Directive **2015/863/EU** (RoHS) of the European Parliament and of the Council of 4 June 2015 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Berlin, 22.09.2020

Ort, Datum / place, date

Dr. Ulrich Kienitz
Geschäftsführer / General Manager

optris PI NetBox-MA-E2020-12-A