MICRO-EPSILON

Instruction Manual

thermoIMAGER TIM NetBox

Mini PC for TIM series

MICRO-EPSILON
MESSTECHNIK
GmbH & Co. KG
Königbacher Strasse 15

94496 Ortenburg / Germany

Tel. +49 (0) 8542 / 168-0
Fax +49 (0) 8542 / 168-90
e-mail info@micro-epsilon.de
www.micro-epsilon.com

Notes on CE Marking

The product accomplishes the requirements of the EMC Directive 2014/30/EU.

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 [► ...].

Liability for Material Defects

All components of the device have been checked and tested for perfect function in the factory. In the unlikely event that errors should occur despite our thorough quality control, this should be reported immediately to MICRO-EPSILON.
The warranty period lasts 12 months following the day of shipment. Defective parts, except wear parts, will be repaired or replaced free of charge within this period if you return the device free of cost to MICRO-EPSILON.
This warranty does not apply to damage resulting from abuse of the equipment and devices, from forceful handling or installation of the devices or from repair or modifications performed by third parties.
No other claims, except as warranted, are accepted. MICRO-EPSILON will specifically not be responsible for eventual consequential damage. The terms of the purchasing contract apply in full.
MICRO-EPSILON always strives to supply the customers with the finest and most advanced equipment. Development and refinement is therefore performed continuously and the right to design changes without prior notice is accordingly reserved. For translations in other languages, the data and statements in the German language operation manual are to be taken as authoritative.

Content

	Page		Page
Description	**3**	**System Information**	**34**
Unpacking, Included in Delivery	3	Watchdog	34
Maintenance	4	Startup	35
Cautions	4	System Time	36
Technical Data	**5**	System Recovery	37
General Specifications	5		
Electrical Specifications	5		
Installation	**6**		
Mounting	6		
Controls and Connections	7		
Protective Housing	8		
SD Card	10		
Mini-USB Socket	10		
Power Supply	10		
Operation	**11**		
Operation Modes	11		
Status LEDs	11		
Stand-Alone Operation	12		
Network Settings	14		
Remote Access for the TIM NetBox	19		
File Transfer between TIM NetBox and PC	22		
TIM NetBox Control Center	23		
Converter Mode USB – Ethernet	28		
Write Protection Filter	32		

Description

The TIM NetBox is a miniaturized PC which expands the TIM 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 TIM NetBox includes a Windows 7 Professional operating system that allows the user to install additional software.
The housing of the TIM NetBox is made of anodized aluminum – the optional TIM NetBox protection housing supports the usage in industrial environments (IP 65/ NEMA-4 rating).

Unpacking, Included in Delivery

- TIM 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
- Instruction manual

Maintenance

The housing of the TIM 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.

Cautions

Take care that no foreign substances penetrate into the venting slots of the TIM NetBox.
In case of problems or questions which may arise when you use the TIM 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 TIM NetBox.
Avoid mechanical violence – this may destroy the system (expiry of warranty).

Technical Data

General Specifications

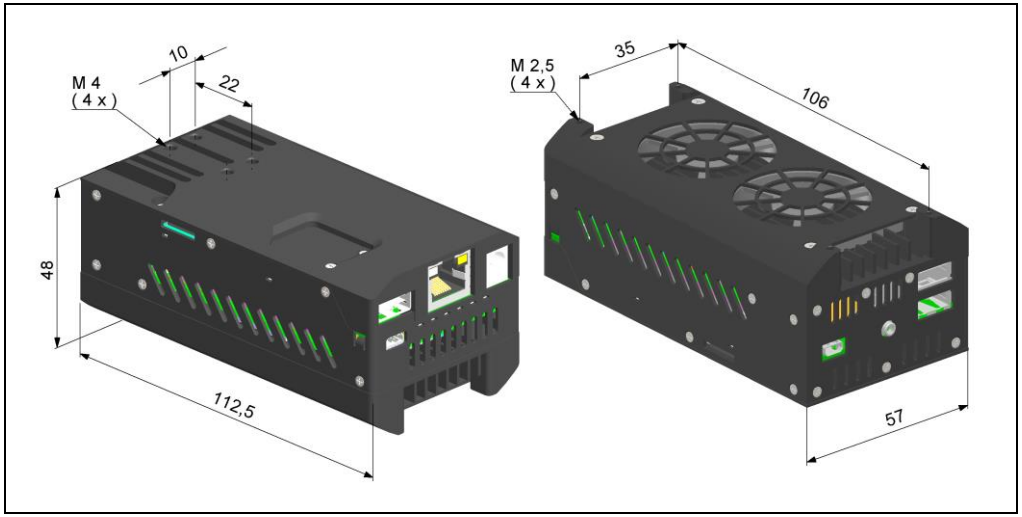
Operating temperature	0 ... 50 °C (+32 … +122)
Storage temperature	-20 ... 75 °C (-4 … +167)
Relative humidity	10 ... 95 %, non-condensing
Material (housing)	Anodized aluminum
Dimensions	113 mm x 57 mm x 47 mm (L x W x H)
Weight	385 g
Vibration	IEC 680068-2-6 (sinus shaped) IEC 680068-2-64 (broadband noise)
Shock	IEC 680068-2-27 (25 g and 50 g)
Operating system	Windows 7 Professional

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	4 x Status LEDs (L1 – L4)

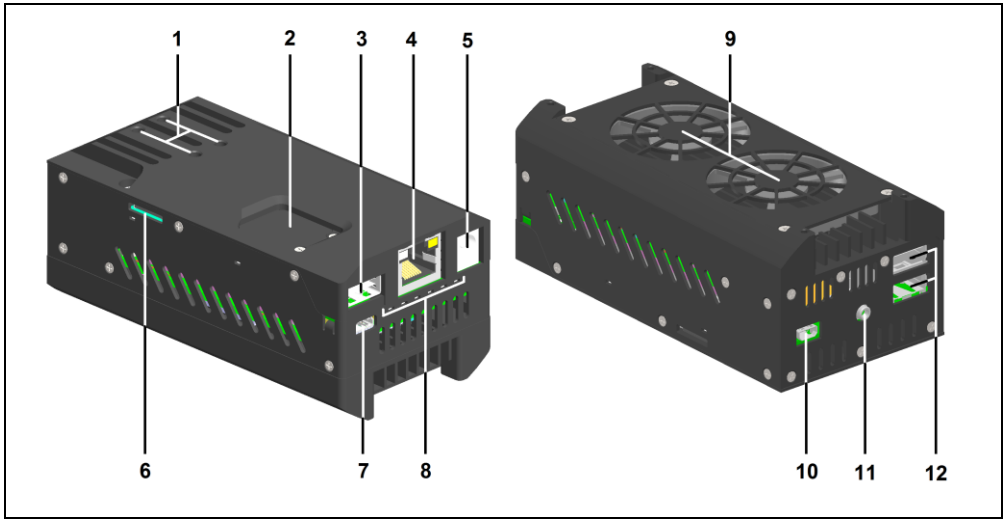
Installation
Mounting

The TIM 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 TIM 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 TIM NetBox housing you will find 4 holes M2,5 which also can be used for mounting.



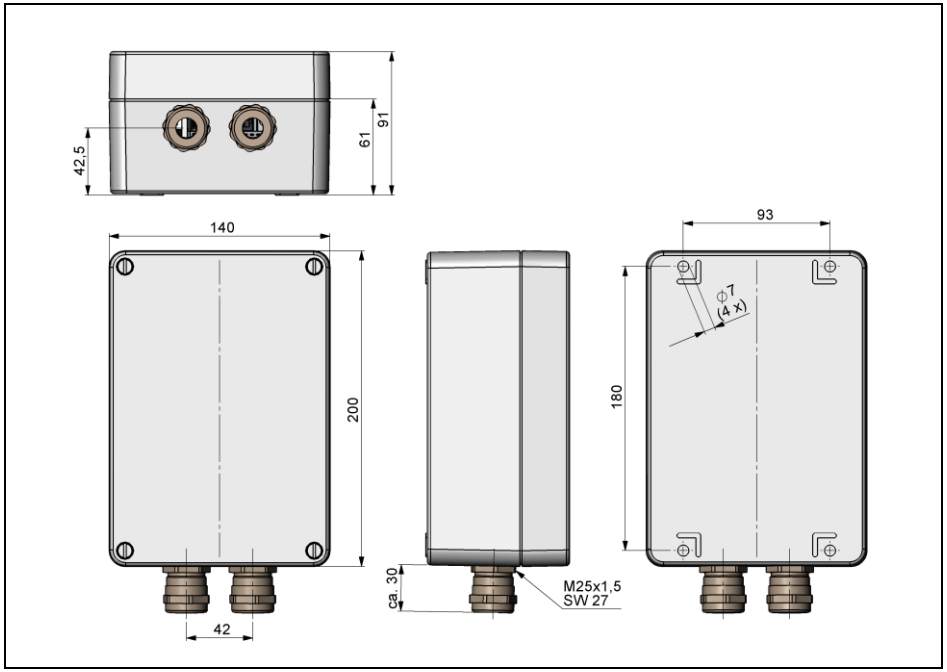
Dimensions TIM NetBox in mm, not to scale

Controls and Connections



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

Protective Housing

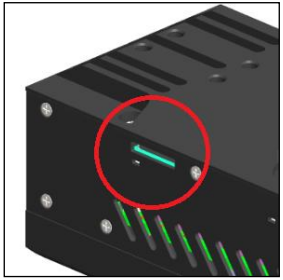


IP 65 Protective housing (Alu die-cast) (TM-NBPH-TIM), dimensions in mm, not to scale

Prospective housing with power supply (TM-NBPHPS-TIM)

IR camera inside CoolingJacket Advanced, connected to a TIM NetBox

SD Card



The TIM 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 TIM 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.

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

Power Supply

For powering the TIM 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 TIM NetBox can also be powered via the Ethernet cable (PoE – Power over Ethernet).
For this purpose a PoE injector is needed (Part-No.: TM-POE-TIM) [1].

1 For usage of the NetBox together with the high temperature Ethernet cables we recommend the following PoE components instead of TM-POE-TIM: Trendnet TPI-115GI or Netgear GS110TP

Operation

Operation Modes

The TIM NetBox can be used in three different operation modes:

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

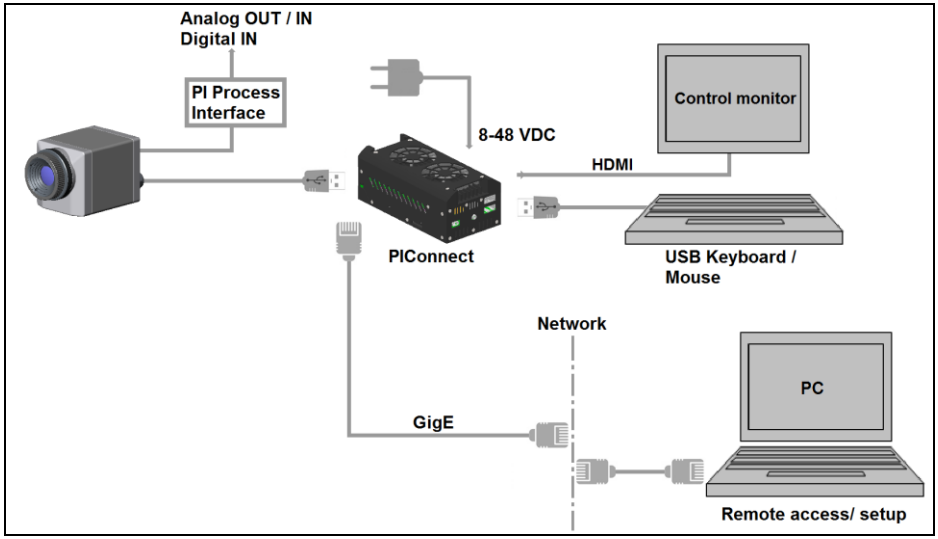
Status LEDs

The TIM 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	

Stand-Alone Operation

As a stand-alone PC the TIM 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 TIM 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 TIM NetBox]**



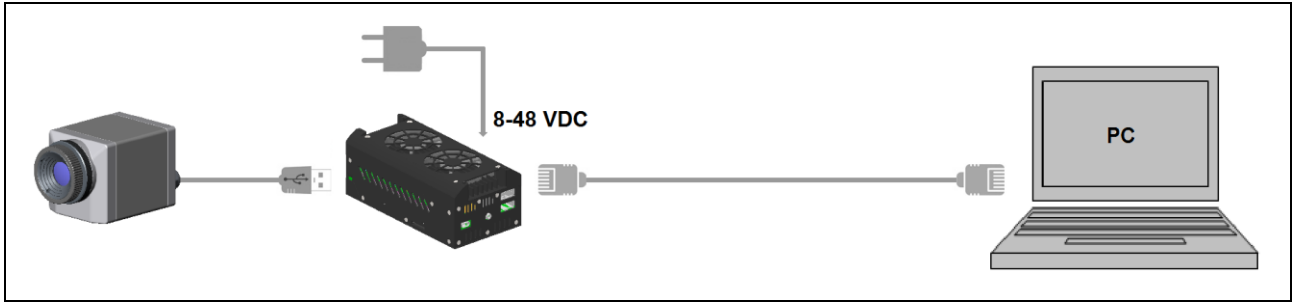
Stand-alone operation with remote monitoring via GigE network/ TIM NetBox powered via power supply

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

If you connect the TIM 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.).

Network Settings

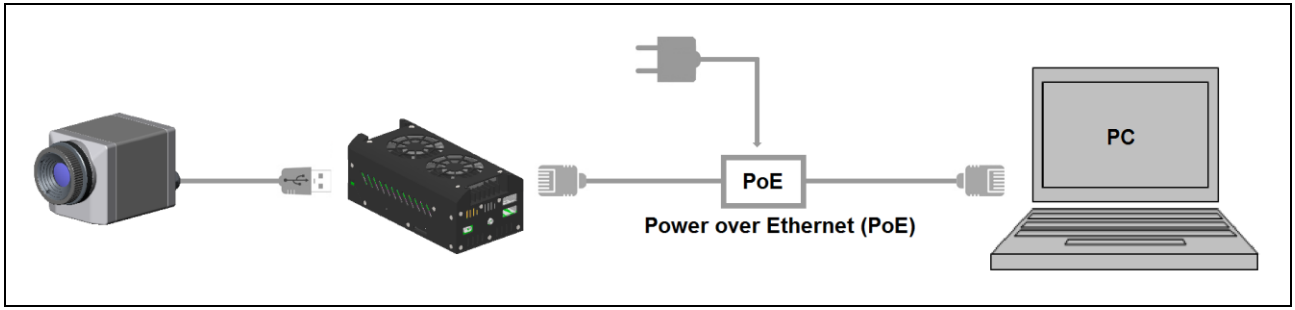
Please connect your imager with the supplied USB connection cable with the TIM NetBox. Please connect your PC with an Ethernet cable with the TIM NetBox. Now connect the power supply to the TIM NetBox and to the mains. The TIM NetBox will start to boot the system and should be ready to use after 1-2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



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

If you use a PoE injector the power supply for the TIM 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)/ TIM NetBox powered via PoE injector

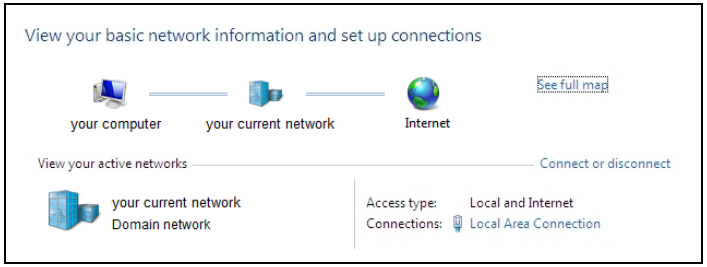
Connection to the TIM NetBox

The communication with the NetBox is done via the TCP/ IP protocol (**T**ransmission **C**ontrol **P**rotocol/ **I**nternet **P**rotocol). The TIM 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 TIM NetBox as well as the PC must use a fixed IP address because no DHCP server[1)] is available here. The TIM 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).

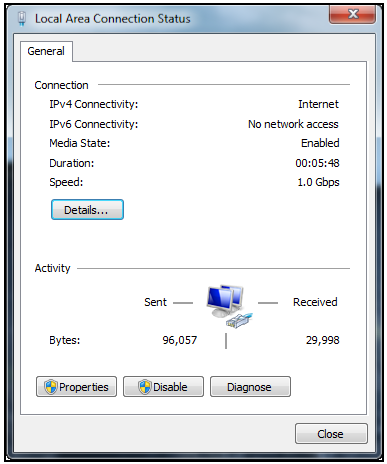
1) DHCP – Dynamic Host Configuration Protocol: allows the automatic integration of a computer into an existing network.

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:

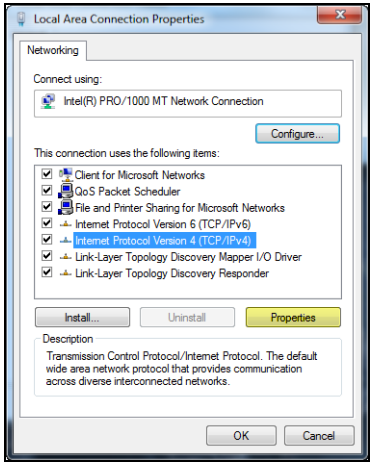


If your PC is not connected to any network, please go to **Change adapter settings** after you opened the **Network and Sharing Center**. Now go to **Local Area Connection**, right mouse button: **Properties**.
[continue at item 4]

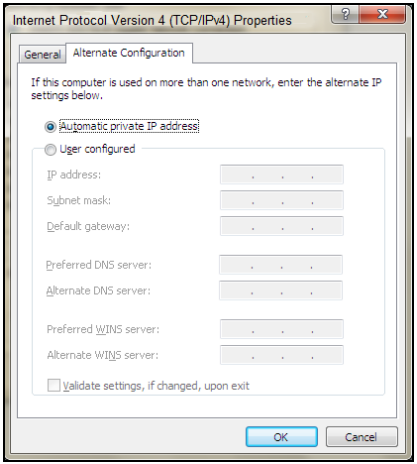
3. Go to **Local Area Connection** – a status screen according [1] will be shown. Then go to **Properties.**
4. In the following window [2] mark **Internet protocol Version 4 (TCP/IPv4)** and go again to **Properties**.



[1]



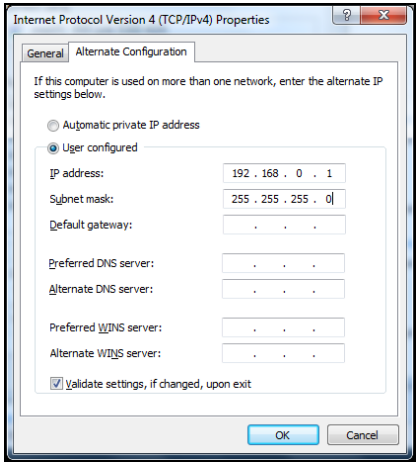
[2]



[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 TIM NetBox, thus **192.168.0**. For the host part you have to use an address which is different from the one of the TIM NetBox (100), so you may use **1** for example.



After you have made these settings and connected your PC with the TIM 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*.

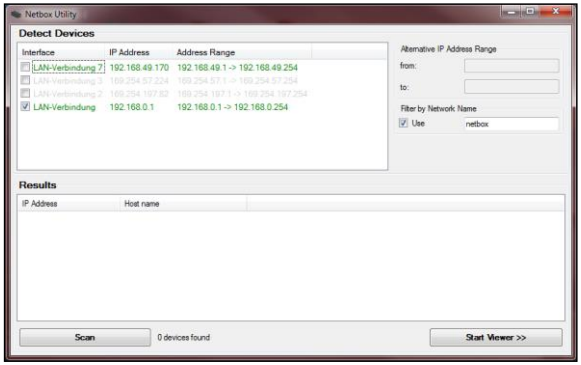
Remote Access to the TIM NetBox (NetBox Utility)

For a remote access to the TIM 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:

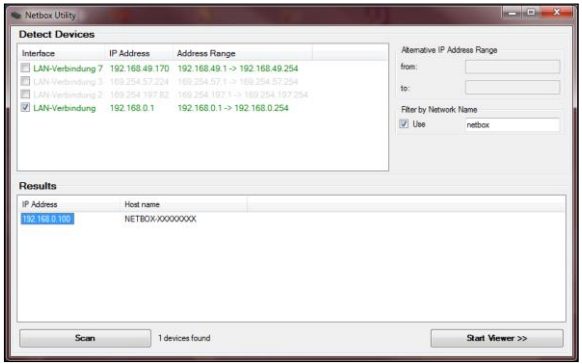
Now you can have access to a TIM NetBox which is directly connected to your PC or to a TIM NetBox which is located anywhere in the same network. Also remote connection via the internet is possible.[1)]

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

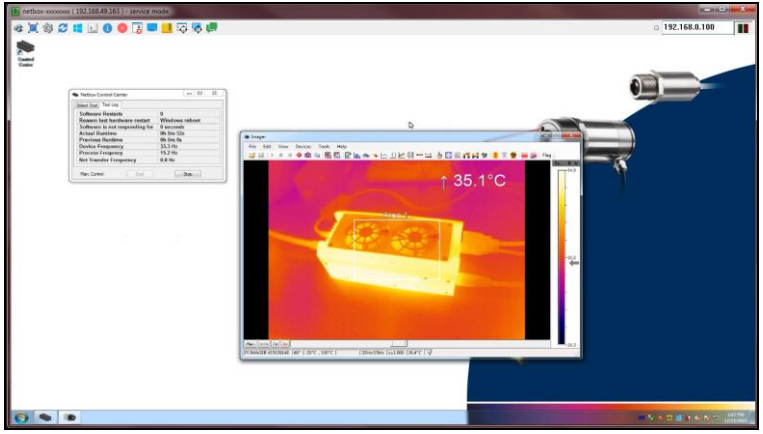
Please start TIM NetBox Utility:



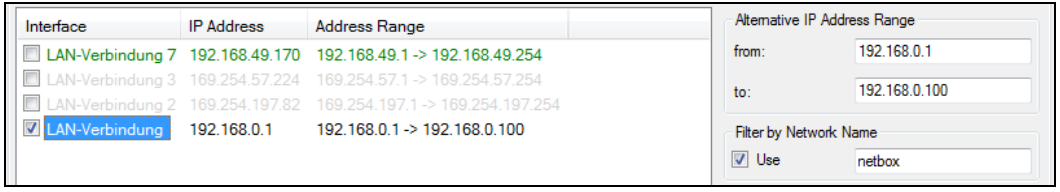
Select the desired network adapter and press **Scan**.
The Utility program searches for TIM NetBoxes located in your network or directly connected to your PC. The filter function allows a selective search for TIM NetBoxes only. Mark the desired TIM NetBox in the window **Results** and press the button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



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



Alternatively you can scan only a certain IP address range:

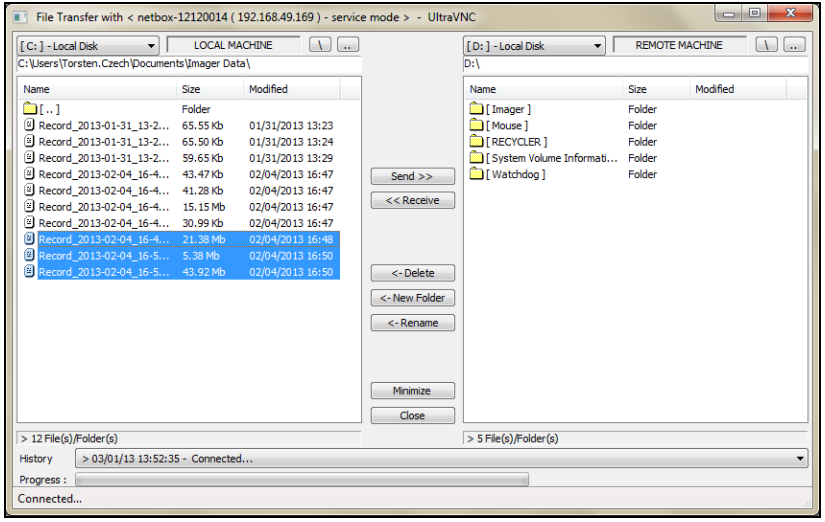


Please mark the desired network connection up front.

File transfer between TIM NetBox and PC

To exchange files between the TIM 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:

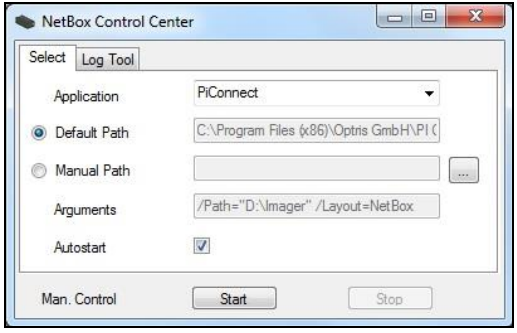
In the following explorer window you see on the left side your local PC (LOCAL MACHINE) and on the right side the NetBox (REMOTE MACHINE). Now you can copy files between both computers via the network link by marking them and pressing **Send** or **Receive**.



TIM NetBox Control Center

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

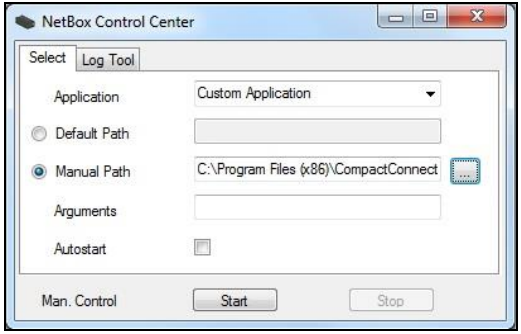
The Control Center allows an easy configuration of the TIM NetBox. On the tab **Select** you can select programs which will be started automatically after starting the TIM NetBox:



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

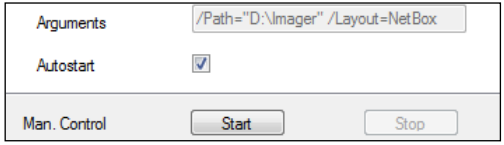
Application	Operation mode of the TIM NetBox
TIMConnect	Stand-Alone operation
Imager Net Server	Converter mode USB-Ethernet
Custom Application	Usage of the TIM NetBox for other applications (example: You can select here the pyrometer software CompactConnect which is already pre-installed on the TIM NetBox.)

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



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

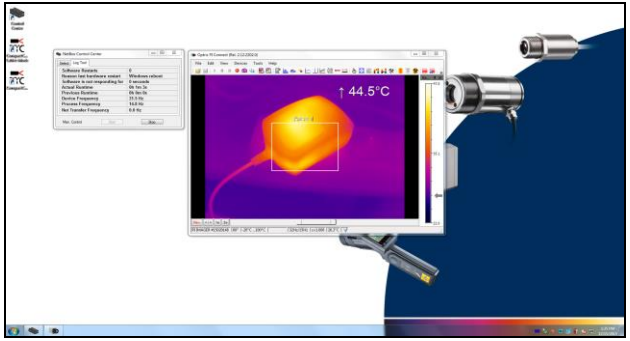
At **Arguments** you can enter command line parameters (a special layout, with which the TIMConnect should start automatically e.g.). Activate **Autostart** in order to ensure that the selected application will be restarted automatically after a reboot of the NetBox.



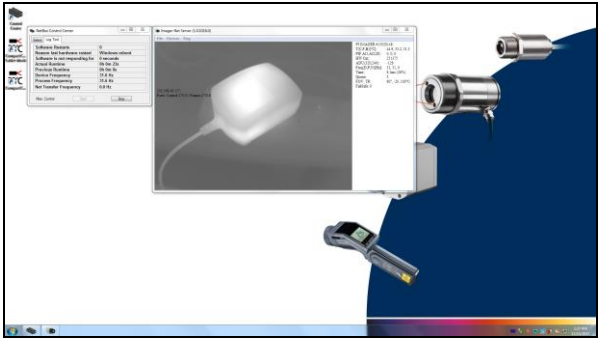
If, for any reason, the application is not working properly anymore (software crash), the NetBox Control Center will restart the software automatically (software watchdog) if autostart was selected.

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

Software Restarts	Number of software restarts
Reason last hardware restart	Why the TIM 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 TIM NetBox – TIM Connect



Screen of the TIM NetBox – Imager Net Server

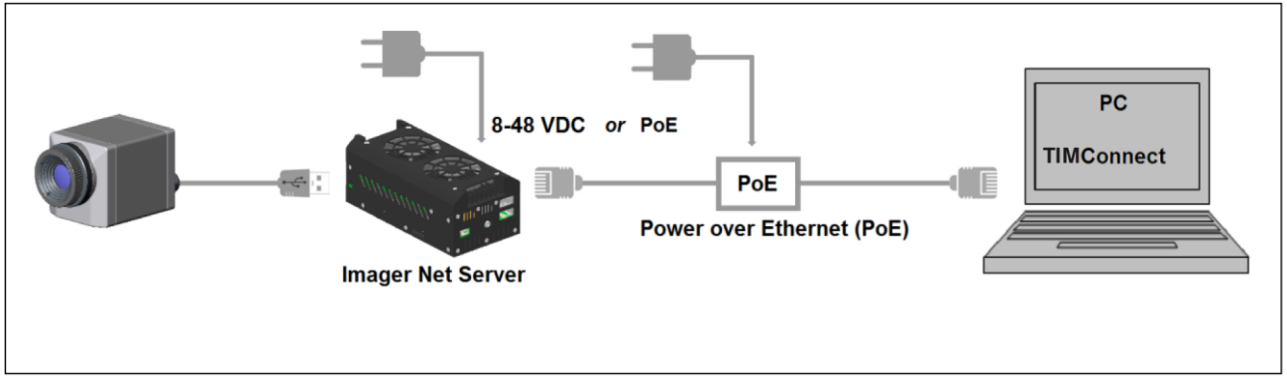
Menu	**File**	**exit of the program**
	Devices	**shows the connected imager**
	Flag	**manual operation of the camera flag**

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

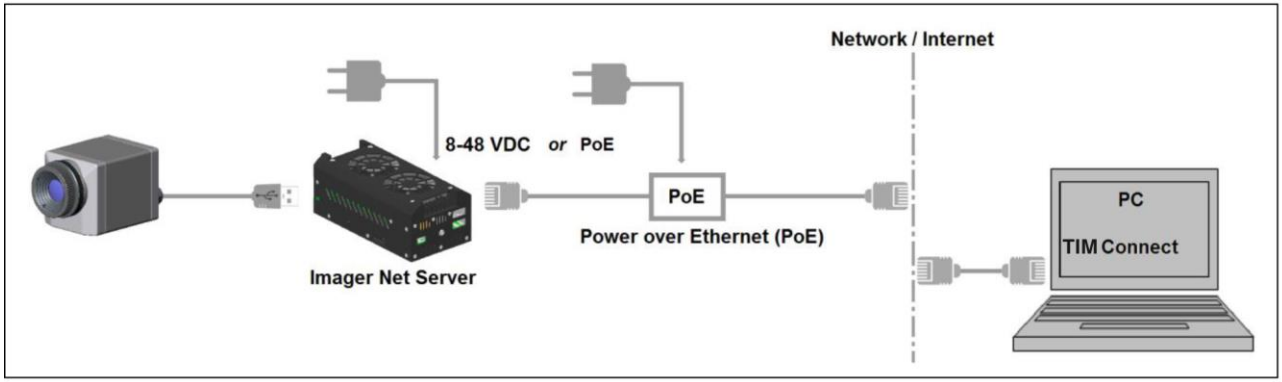
Converter mode USB – Ethernet

In this mode the TIM 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 TIM NetBox the program **Imager Net Server** must be active [1)].



TIM NetBox as converter USB – Ethernet/ direct network connection

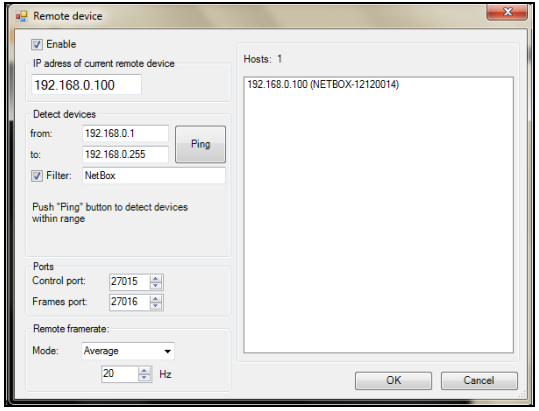
1) The models TIM450 G7 and TIM M-1 are not supported yet.



TIM NetBox as converter USB – Ethernet/ integration into a network

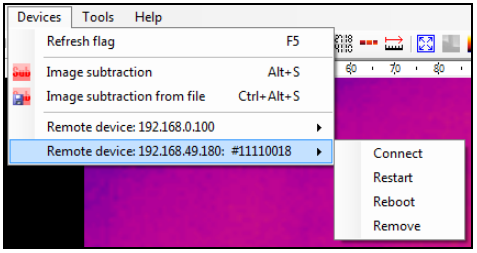
After establishing the network connection please start the TIMConnect on your PC and open the menu item **Tools/ Extended/ Remote devices...**.
In the window which is appearing you should set a hook on **Enable** and enter the IP address of the TIM NetBox (**192.168.0.100 on a direct connection**) or 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 TIMConnect

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.



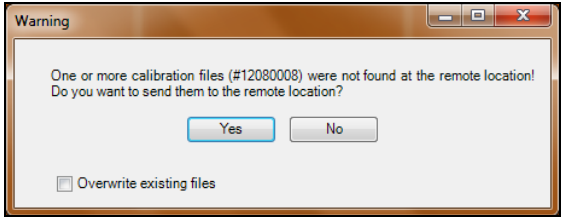
Device selection in TIMIConnect

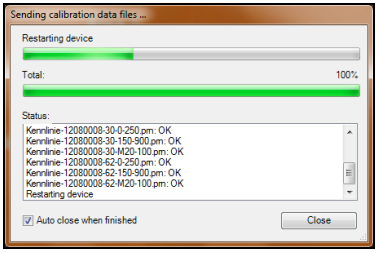
Under **Hosts** you can now select your TIMNetBox and press **OK**. The software will establish a connection to the remote device (imager) automatically.

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 TIM 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 TIM 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 TIM NetBox the following message appears:





Please confirm with **Yes**. The calibration files will be transferred automatically from your PC to the TIM 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 TIM NetBox folder **D:\Imager\Cali**.

Write Protection Filter

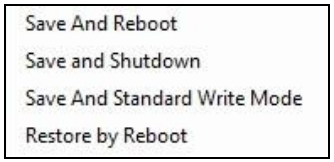
The TIM NetBox has a factory pre-installed write protection filter. This filter is protecting reliably the operating system and the complete drive C and allows a switch-off of the device without a shutdown of the operating system.
The write protection filter is shown as symbol in the task bar.
The colors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

red dot: **protected mode**

green dot: **write mode**

The TIM 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:

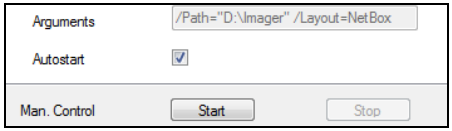
In order to go back to the protected mode select **Protected Mode**. All changes will be saved and the system will be restarted.

The SSD drive of the TIM 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.

System Information

Watchdog

If, for any reason, the main software application (**TIMConnect** 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**:



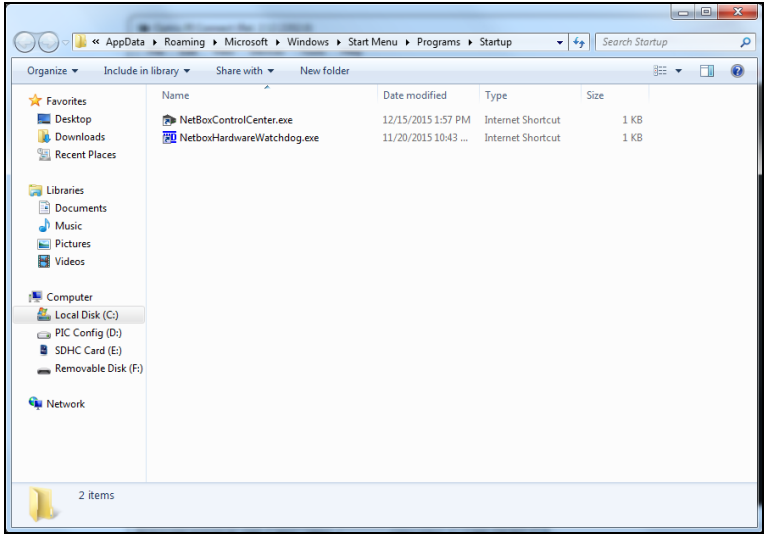
In addition a hardware watchdog is monitoring the Windows operating system permanently – you see the symbol [**WD**] in the right part of the task bar:

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

Startup

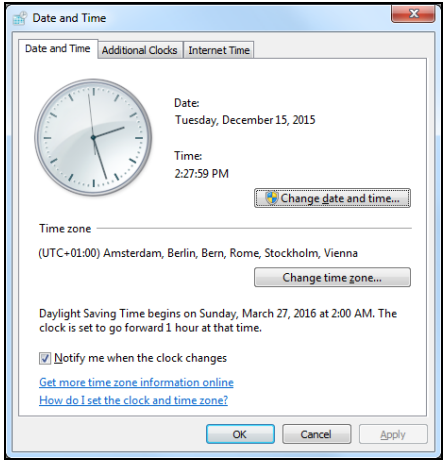
In the Windows Startup folder of the TIM NetBox the following shortcuts are set default:

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



System Time

The TIM 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).



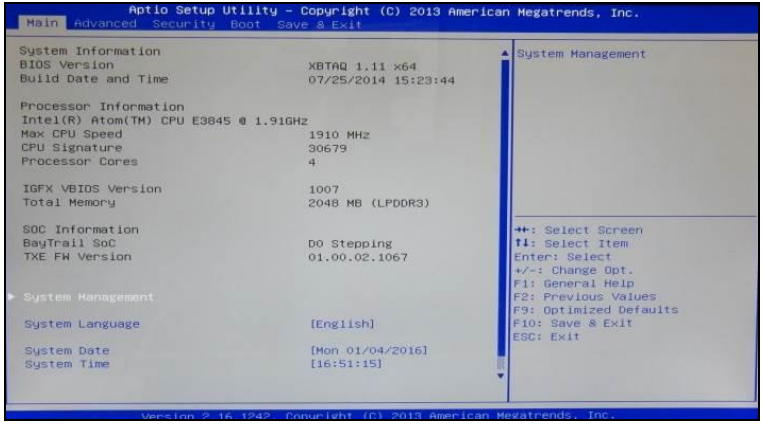
To adapt the TIM NetBox to your local time zone you have to open the Windows date and time setup (Control Panel/ Date and Time).
The TIM NetBox is set by default to UTC+01:00.
To save the new setting permanently you have to deactivate the ► **Write Protection Filter** temporarily.

System Recovery

In case a recovery of the Windows operating system of the TIM NetBox is necessary you should use the supplied USB recovery stick. Follow the steps described hereafter. **Do not disconnect power from the TIM NetBox during the recovery procedure.**
After the system recovery the TIM NetBox has the factory default settings. All data which was stored before on the SSD will get lost.

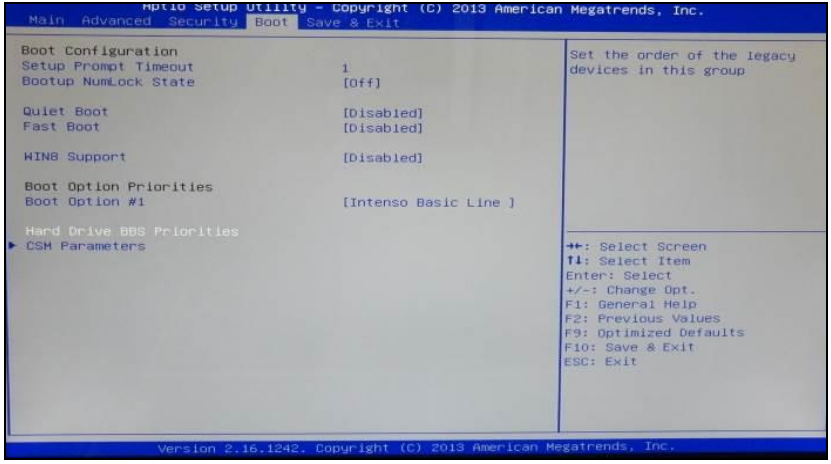
Step 1:

Connect a monitor and a USB keyboard with the TIM NetBox. Connect the USB Recovery stick to a free USB port of the TIM NetBox and switch on the unit.
Press and keep pressed the **DEL button** until the Aptio Setup Ultility screen appears:



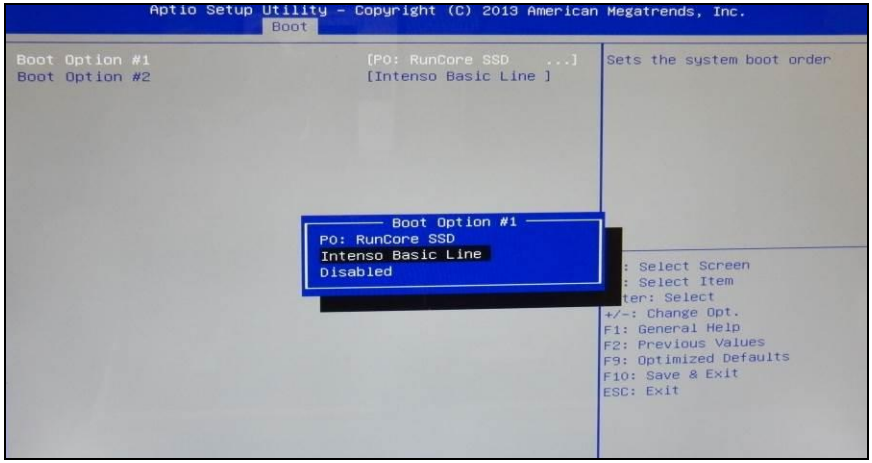
Step 2:

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



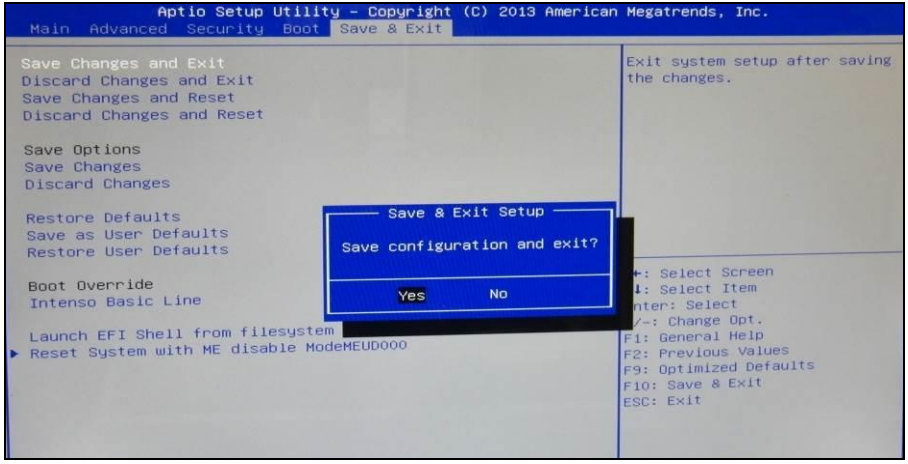
Step 3:

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



Step 4:

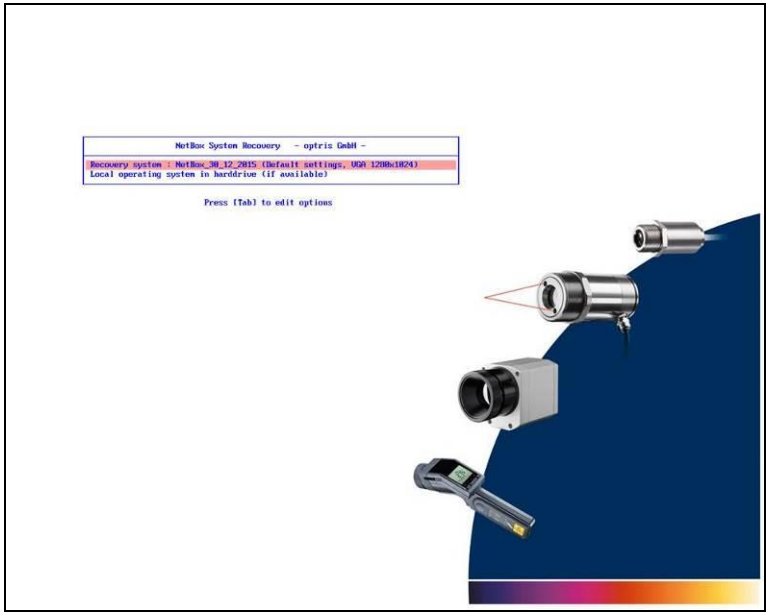
Now press **F10** and confirm with **Enter**:

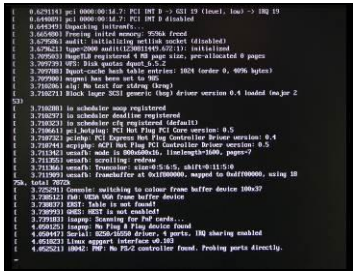


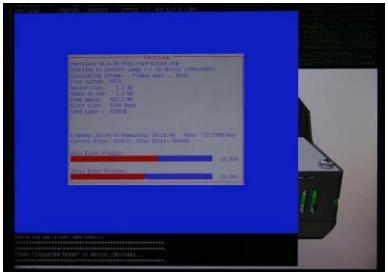
The system will restart now and boot from the USB stick.

Step 5:

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

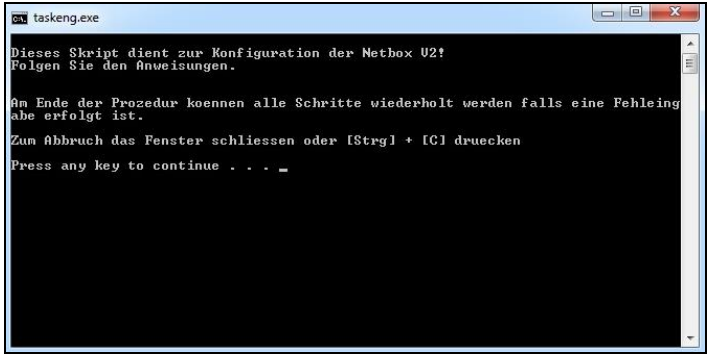






Screens during system recovery

After a complete recovery the TIM 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:



MICRO-EPSILON MESSTECHNIK GmbH & Co. KG
Königbacher Str. 15 · 94496 Ortenburg / Germany
Tel. +49 (0) 8542 / 168-0 · Fax +49 (0) 8542 / 168-90
info@micro-epsilon.de · www.micro-epsilon.com

X9751342-B021058HDR

© MICRO-EPSILON MESSTECHNIK