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## **Optris Ethernet TCP/IP / Modbus TCP communication interface for Optris Xi-series and CSvision**

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## 1. General

The Optris Ethernet TCP/IP /Modbus TCP interface board can be easily installed on any Optris Xi-series (except Xi 400) or Optris CSvision pyrometer. The interface has a 4-pin, M12, D-coded connector. It is suited for industrial Ethernet with an IP67 protection rate. It is suited for industrial communication with an IP67 protection rate and a screw retention feature.

The network settings are stored on the board and the board communicates with the Optris devices via serial interface. The network settings remain on the board in case of interchanging the Optris devices.

### 1.1.1 Device settings

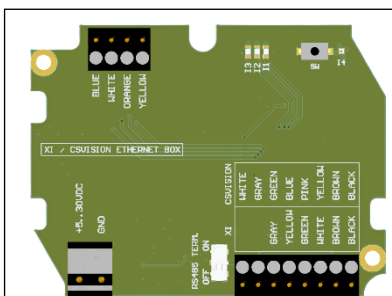
Use the supplied USB cable for the device to set the device for the Ethernet TCP/IP / Modbus TCP communication.

For Optris CSvision use the software *CompactPlus Connect* and go to **SETUP** Menu. Go to Tab **Advanced Settings** and choose the **RS422** Mode under Interface and choose **115200** Baud rate.

For Optris Xi-series use the software *PIX Connect* and go to the **Configuration** button. Under the Tab **Device (PIF)** choose the **115200** Baud rate. The checkbox must not be checked under Bus address. You have the possibility to choose up to 9 measuring areas (9 ROI for Xi 80, 3 ROI for Xi 410)

## 2. Scope

The Optris Ethernet TCP/IP / Modbus TCP communication Interface allows you to communicate with your device via the TCP/IP or Modbus TCP protocol in a network.



For the communication three different possibilities are supplied:

- Fully developed C# scripts as pre-installed examples as window batch files
- Excel sheet with macros for the TCP/IP communication
- Communication with your Modbus tool via the Modbus TCP protocol

Figure 1: Optris Ethernet TCP/IP / Modbus TCP communication interface board

## 3. Installation overview

Connect the process interface cable of your Optris device to the ACXICSVENMBTCPK like described in ACXICSVENMBTCPK-MAD-E2024-01-A.pdf. Power the interface box with 5-30 VDC. Connect the Ethernet TCP/IP / Modbus TCP communication interface board socket with a network cable to a switch in your network (**DHCP mode**) – recommended, or directly to your PC (**direct mode**).

The baud rate must be set to 115k baud and “0” as Bus address for the communication on the Optris device. Connect your Optris device with the supplied USB cable and change the settings in the Optris software CompactPlus Connect for CSvision or PIX Connect for Xi series.

### 3.1 DHCP mode

The Network interface is supplied in DHCP mode by default.

Connect the interface to your company network. To find the IP address of the interface, use the supplied Excel sheet (3.1.1) or your own DHCP commissioning tool.

## 3.1.1 Supplied Excel sheet

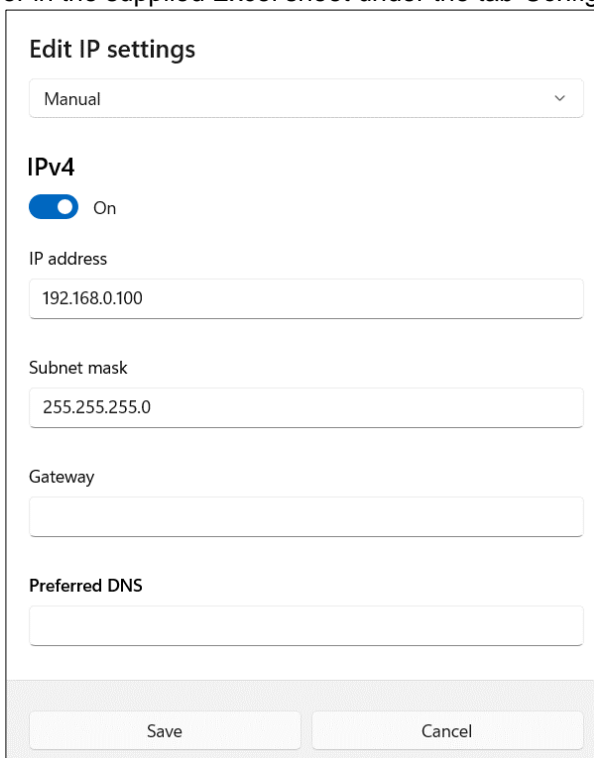
Open the supplied Excel sheet. Under the tab *Discover* click on the button **Discover devices**. All connected Xi/CSV Ethernet TCP/IP modules in your network will be shown in the table. Use the found IP address to communicate with the interface.

## 3.1.2 C#-Examples

Use the provided C#-Examples to communicate with the Ethernet TCP/IP / Modbus TCP communication interface. Change in the batch files the IP addresses and execute the **Discovery.bat** or **GetConfig.exe** to see your configuration and IP settings and use the **Command.exe** to see the temperatures.

## 3.2 Direct mode

Your Ethernet TCP/IP / Modbus TCP communication interface needs to work in static IP mode. For this purpose, change your settings on your PC to a static IP address. This can be done via the internet browser or in the supplied Excel sheet under the tab *Configuration*.



The image shows a screenshot of the Windows 'Edit IP settings' dialog box. At the top, there is a dropdown menu set to 'Manual'. Below this, the 'IPv4' section is turned 'On'. The 'IP address' field contains '192.168.0.100', the 'Subnet mask' field contains '255.255.255.0', and the 'Gateway' field is empty. There is also a 'Preferred DNS' field which is empty. At the bottom, there are 'Save' and 'Cancel' buttons.

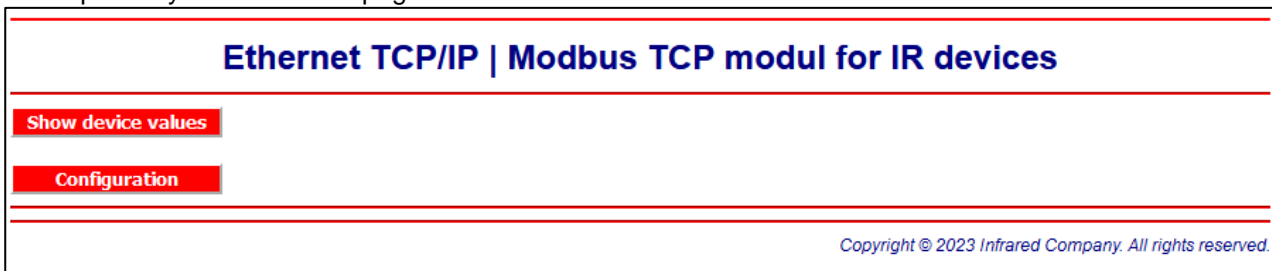
**Figure 2:** Network settings

The Ethernet TCP/IP / Modbus TCP communication interface is in DHCP mode by default, this needs to be changed to static mode, we recommend using the web interface or the supplied Excel sheet.

Connect the Ethernet TCP/IP / Modbus TCP communication interface to your PC. Use any DHCP commissioning tool to set the IP address of the Ethernet TCP/IP / Modbus TCP communication interface or use the web interface with the founded IP address of the DHCP mode. Change the DHCP mode of the

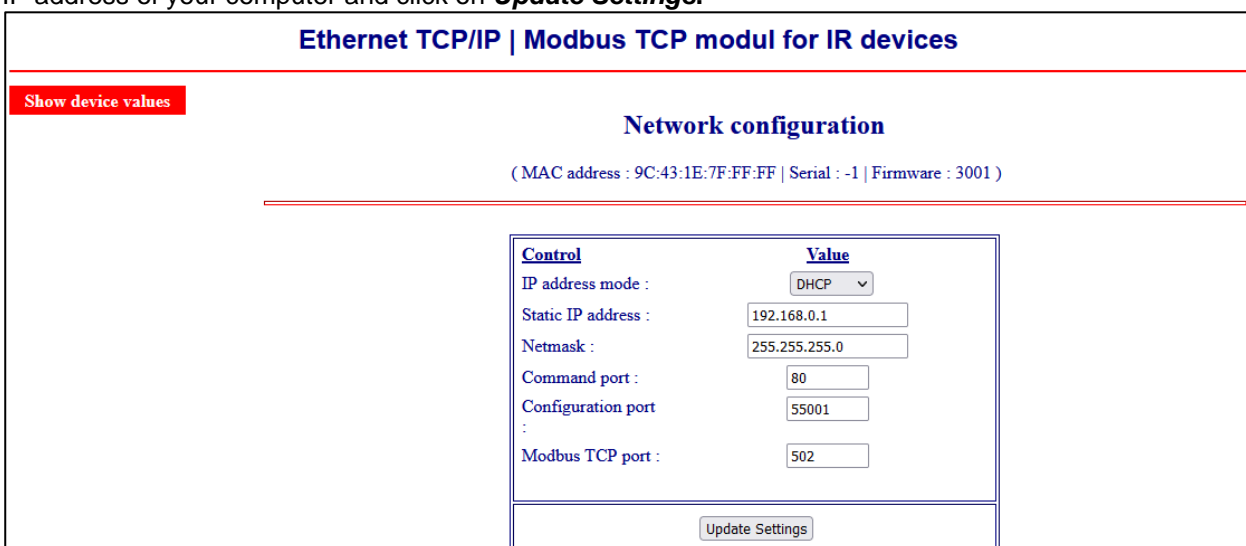
module to a static IP address with the same subnet and same subnet mask via the web browser or the supplied Excel sheet.

In this picture you see the webpage of the Ethernet TCP/IP / Modbus TCP communication interface.



**Figure 3:** Web interface of the Ethernet TCP/IP Modbus TCP module

Click on **Configuration**. Change the IP address mode to **Static IP** and set the IP address to the network IP address of your computer and click on **Update Settings**.



**Figure 4:** Network Configurations of the Ethernet TCP/IP Modbus TCP module

To change the IP address in the supplied Excel sheet, go to the tab *Configuration* and change the settings for the IP-mode and the static IP address.

## 4. Communication

### 4.1.1 Communication with Excel

In the supplied Excel sheet, you can find three tabs *Discover*, *Read\_Temp* and *Configuration*. Click on the button **Discover devices** under the *Discover* tab to find all your XI/CSV Ethernet TCP/IP / Modbus TCP communication interfaces with the right IP address in your network. The founded interfaces will be listed in the table TCP/IP devices.

TCP/IP devices :							
IP address	MAC address	Ipmode	static IP	subnet mask	Port config	Port command	Port Modbus
192.168.49.77	00:1A:B6:00:02:74	0	10.10.10.1	255.255.255.0	55001	55002	502

Under the tab *Read\_Temp* use the drop-down menu button to select founded IP addresses of the Ethernet TCP/IP modules and click on the button **Connect**, the table will be filled, and the diagram will show the measured temperature values. The table is limited to the set number of values.

In the tab *Configuration* you can change your IP settings for the interface.

### 4.1.2 Communication with programmed C#-script

A folder with pre-installed files written in C# you can find on the USB flash drive as an example. There are three windows batch files to demonstrate the possibilities of integration into your own software. To communicate with the TCP/IP interface, change in the batch files the IP address to the IP address of the interface and execute the batch files. *Discovery.bat* and *GetConfig.bat* are files to see your configurations and ports. For the temperatures, execute the *command.bat* file.

## 5. LED functions and reset Button

The Ethernet TCP/IP / Modbus TCP module has 4 LED (I1...I4).  
I1 – LED on → The connection to the Optris device is established  
I2 – LED → no function  
I3 – LED on → Ethernet connection is established  
I3 – LED is flashing → data transfer  
I4 – LED → reset function

### 5.1.1 How to reset the interface

The interface must be switched off. Press the button **SW** on the board and switch the box on in the meantime. The I4 – LED flashes red. Release the button the fifth time it flashes. I4 – LED flashes green 5 times as confirmation. After reset follow settings are restored:

**IP-Mode:** DHCP  
**Static IP:** 192.168.0.1  
**Subnet mask:** 255.255.255.0  
**Port Modbus:** 502  
**Port Config data:** 55001  
**Port direct device:** 55002

## 6. Connection of multiple devices

Each of the devices must get an own IP address but they must be in the same subnet.

## 7. Troubleshooting

In case of missing .NET packages please go to the website <https://dotnet.microsoft.com/en-us/download/dotnet/thank-you/runtime-6.0.25-windows-x64-installer> and download the package for your operating system.

You can set the module to its default settings if required. Press the button of the module while the interface is not powered. Connect the device to the power supply while holding the button for 5 seconds, the red LED flashes 5 times. Release the button, the green LED I4 turns shortly on.

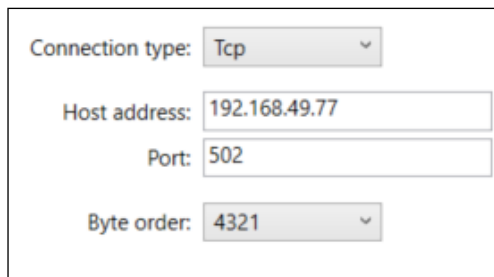
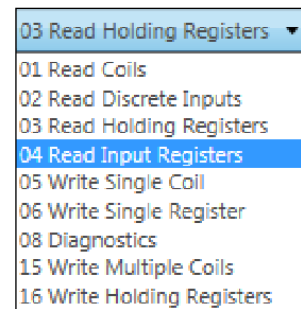
## 8. Modbus Register list

For the communication with a PLC, you can use a Modbus tool. The complete list you will find on the manufacturer's website.

Use a Modbus tool with following settings.

Read out the data is done via the **Read Holding Register** and **Read Input Register**.

Changing the settings of the device is done over the **Write Holding Register**.

### 8.1.1 Input Register

Description	Type	Register Address	Register-Size	Data-Format	Comment
Serial number	R - Input Register	1010	2	=ByteH(1)*2 <sup>24</sup> +ByteL(1)*2 <sup>16</sup> +ByteH(2)*8+ByteL(2)	
FW Revision	R - Input Register	1012	1	=(ByteH * 256 + Byte2)	

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
Temp. - process	R - Input Register	1020	1	°C	=(Value - 1000) / 10	
Temp. - Head	R - Input Register	1021	1	°C	=(Value - 1000) / 10	Temp.-Flag for Xi-series
Temp. - Box	R - Input Register	1022	1	°C	=(Value - 1000) / 10	
Temp. - Act	R - Input Register	1023	1	°C	=(Value - 1000) / 10	Temp.-Chip for Xi-series
Temp - Ratio	R - Input Register	1025	1	°C	=(ByteH * 256 + ByteL - 1000) / 10	Only for CSvision

<b>Temp - T2</b>	R - Input Register	1026	1	°C	$=(\text{ByteH} * 256 + \text{ByteL} - 1000) / 10$	Only for CSvision
<b>Temp - T1</b>	R - Input Register	1027	1	°C	$=(\text{ByteH} * 256 + \text{ByteL} - 1000) / 10$	Only for CSvision
<b>Temp - Attenuation</b>	R - Input Register	1028	1	°C	$=(\text{ByteH} * 256 + \text{ByteL} - 1000) / 10$	Only for CSvision

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
<b>Epsilon T1</b>	R - Input Register	1042	1		$=(\text{ByteH} * 256 + \text{ByteL}) / 1000$	Only for CSvision
<b>Epsilon T2</b>	R - Input Register	1043	1		$=(\text{ByteH} * 256 + \text{ByteL}) / 1000$	Only for CSvision
<b>Slope</b>	R - Input Register	1044	1		$=(\text{ByteH} * 256 + \text{ByteL}) / 1000$	Only for CSvision

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
<b>Area count</b>	R - Input Register	1089	1	-	$=(\text{Value} - 1000) / 10$	Only for Xi-Series
<b>Temp. Area 1-9</b>	R - Input Register	1090-1098	1	°C	$=(\text{ByteH} * 256 + \text{ByteL} - 1000) / 10$	Only for Xi-Series
<b>Temp. Calc.-Object 1-9</b>	R - Input Register	1100-1108	1	°C	$=(\text{ByteH} * 256 + \text{ByteL} - 1000) / 10$	Only for Xi-Series

## 8.1.2 Holding Register

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
<b>Epsilon</b>	R/W - Holding Register	10010	1		$=(\text{ByteH} * 256 + \text{ByteL}) / 1000$	
<b>Transmission</b>	R/W - Holding Register	10011	1		$=(\text{ByteH} * 256 + \text{ByteL}) / 1000$	
<b>Spot Illumination Laser</b>	R/W - Holding Register	10012	1		1 = On 0 = Off	Only for CSvision
<b>AVG Time</b>	R/W - Holding Register	10013	1	ms	= Value	Only for CSvision
<b>AVG Mode</b>	R/W - Holding Register	10014	1		1 = Smart Averaging 0 = Normal	Only for CSvision
<b>Smart Threshold</b>	R/W - Holding Register	10015	1	ms	= Value	Only for CSvision
<b>Hold time</b>	R/W - Holding Register	10016	1	ms	= Value	Only for CSvision
<b>Advanced Hold Mode</b>	R/W - Holding Register	10017	1		0 = Off 1 = Peak 2 = Valley 3 = Adv. Peak 4 = Adv. Valley	Only for CSvision
<b>Advanced Hold Threshold</b>	R/W - Holding Register	10018	1		$=(\text{Value} - 1000) / 10$	
<b>Advanced Hold Hysteresis</b>	R/W - Holding Register	10019	1	°C	$=(\text{Value}) / 10$	

Temp. Unit	R/W - Holding Register	10053	1		0 = °C 1 = °F	
Focusmotor position	R/W - Holding Register	1056	1			
Filtermotor position	R/W - Holding Register	1057	1			Only for CSvision

## 9. Contact information

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