Optris Ethernet TCP/IP / Modbus TCP communication Interface Kit

Optris Ethernet TCP/IP / Modbus TCP communication interface for Optris CT, CTlaser and CTratio

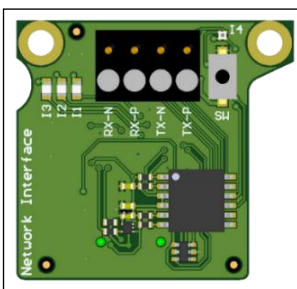# Optris Ethernet TCP/IP / Modbus TCP communication Interface Kit

1. General

The Optris Ethernet TCP/IP /Modbus TCP interface board can be easily installed inside the electronic box of any CT, CTlaser or CTratio. The interface connector is a 4-pin M12 connector, D-coded, installed on the left side of the CT electronic box. 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 CT via serial interface. The network settings remain on the board in case of interchanging the Optris CT electronic box.

2. Scope

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

For the communication four different possibilities are supplied:
- Compact Connect or CompactPlus Connect – software communication tool for Optris pyrometers.
- 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

Insert the Ethernet TCP/IP / Modbus TCP communication interface board in the CT electronic board like described in ACCTENMBTCPK-MAD-E2024-01-A.pdf. Power the CT electronic box with 8-36 V, the Ethernet TCP/IP / Modbus TCP communication interface board gets the power from the CT electronic box. 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 for the communication between the Optris CT electronic box and the Ethernet TCP/IP / Modbus TCP communication interface board.
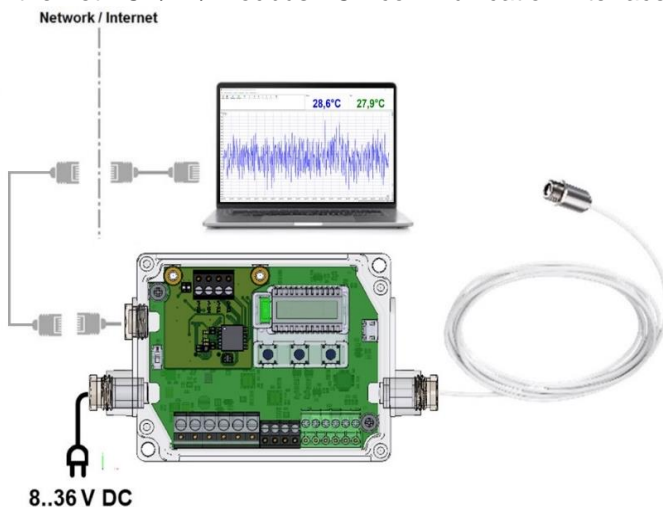

Figure 2: Installation overview

3.1 DHCP mode

The Network CT-TCP/IP interface is in DHCP mode by default.
Connect the interface to your company network. To find the IP address of the CT-TCP/IP module, use the supplied Excel sheet (3.1.1), the Optris communication software Compact Connect or CompactPlus Connect (3.1.2) 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 CT-TCP/IP modules in your network will be shown in the table. Use the found IP address to communicate with the CT-TCP/IP module.
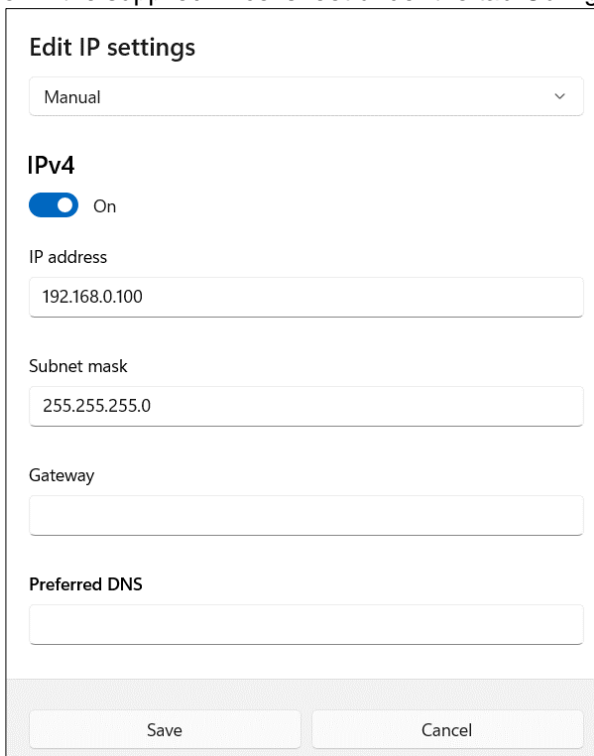
3.1.2 Compact Connect or CompactPlus Connect

All connected CT-TCP/IP interfaces in the same subnet will be shown in the software with its IP addresses and serial numbers.

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*.

Figure 3: Network settings

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The Ethernet TCP/IP / Modbus TCP communication interface is in DHCP mode by default, this needs to be changed to static mode, we recommend to use 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.
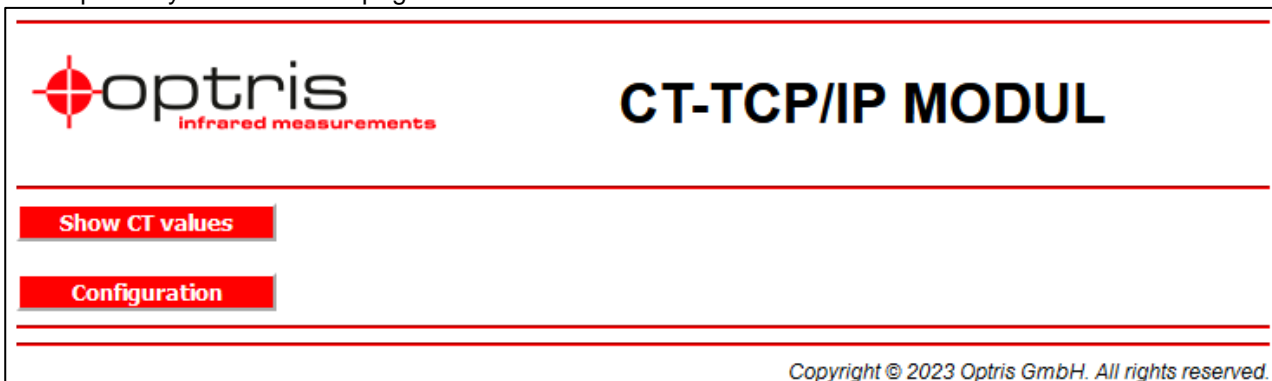In this picture you see the webpage of the Ethernet TCP/IP / Modbus TCP communication interface.

Figure 4: Web interface of the Network CT-TCP/IP 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*.
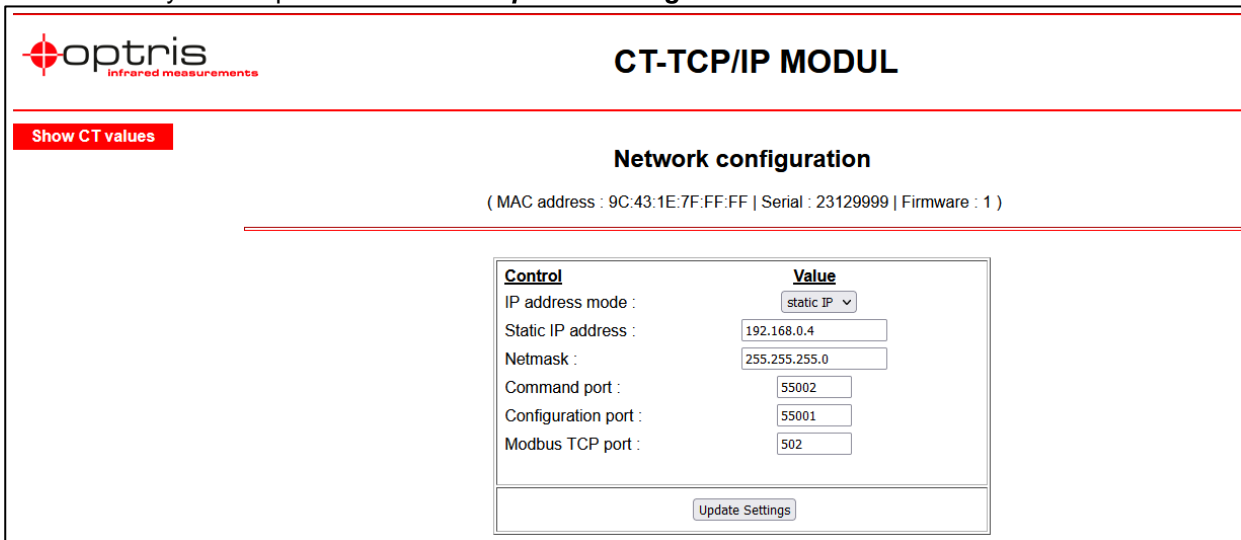

Figure 5: Network Configurations of the CT-TCP/IP module

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.

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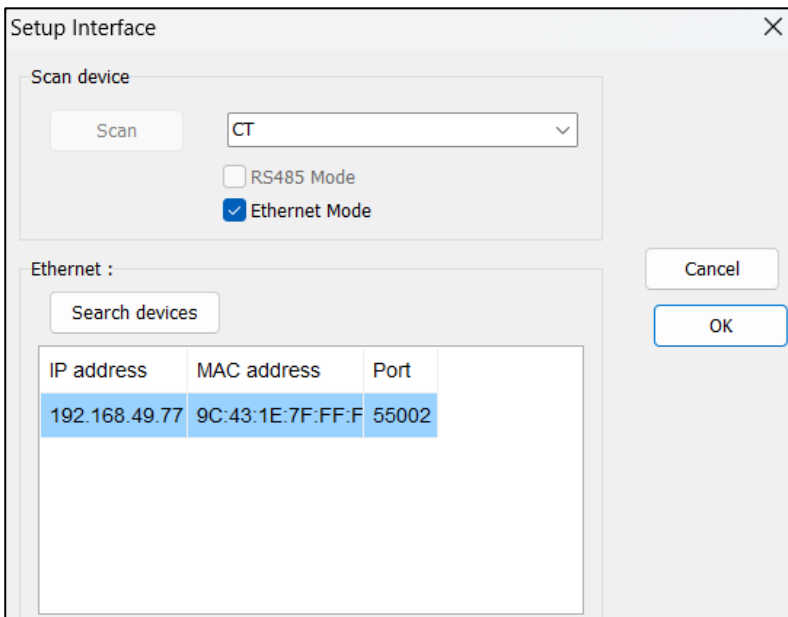
4. Communication

4.1 Communication with CompactConnect

Start the supplied software *CompactConnect*. Go to **interface** and set the hook in **Scan device** under **Ethernet Mode**.
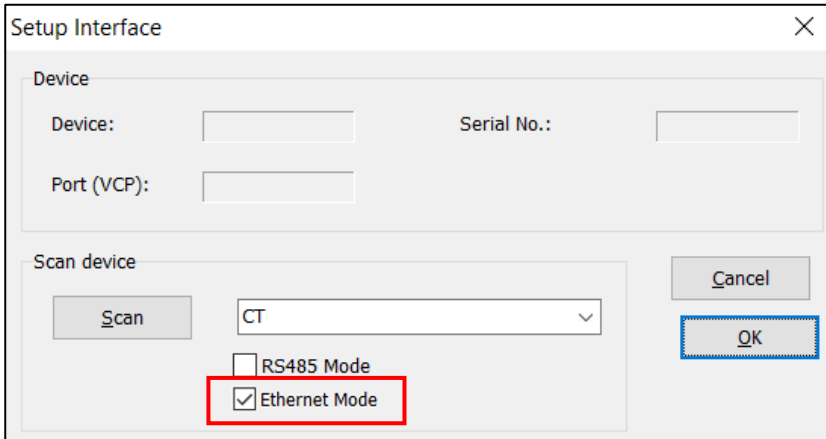
Figure 6: Setup interface CompactConnect

Click on Search Devices (**Figure 7**). After the *CompactConnect* has found your device click on **OK** and the measurement begins.
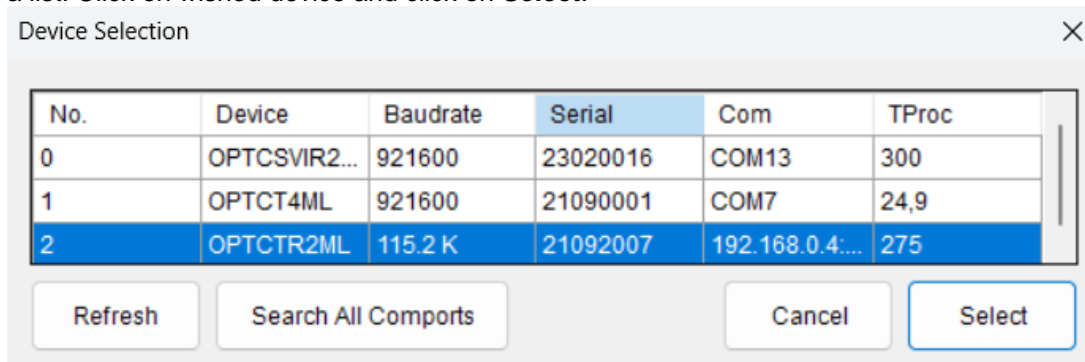

Figure 7: Search devices

Note: the earliest version of *CompactConnect* which supports the TCP/IP communication is **1.10.10.2**.

4.2 Communication with CompactPlus Connect

Start the software *CompactPlus Connect* and go to **Device** and **Scan Devices**. All devices are shown in a list. Click on wished device and click on **Select**.

No.	Device	Baudrate	Serial	Com	TProc
0	OPTCSVIR2...	921600	23020016	COM13	300
1	OPTCT4ML	921600	21090001	COM7	24,9
2	OPTCTR2ML	115.2 K	21092007	192.168.0.4:...	275

Refresh Search All Comports Cancel Select

Note: the earliest version of *CompactPlus Connect* which supports the TCP/IP communication is **1.6.27**

4.3 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 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 CT-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.

4.4 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.

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5. LED functions and reset Button

The CT TCP/IP module has 4 LED (I1…I4).
I1 – LED on → The connection to the CT 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 How to reset the CT communication interface

The CT 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 direkt CT:	**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 lease 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.

In case of a possibility to communicate directly via the IP address but the CompactConnect software cannot find the TCP/IP module in the network, check the subnet mask, they must be the same.

You can set the module to its default settings if required. Press the button of the module while the CT 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.

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8. Modbus Register list

For the communication with a PLC, you can use a Modbus tool.

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**.

Connection type:	Tcp
Host address:	192.168.49.77
Port:	502
Byte order:	4321

```
03 Read Holding Registers ▼
01 Read Coils
02 Read Discrete Inputs
03 Read Holding Registers
04 Read Input Registers
05 Write Single Coil
06 Write Single Register
08 Diagnostics
15 Write Multiple Coils
16 Write Holding Registers
```

8.1 Input Register

Description	Type	Register Address	Register-Size	Data-Format	Comment
Modbus CT FW Revision	R - Input Register	1000	1	= Value/100	Set by Firmware
Error-FileID	R - Input Register	1001	1	FileID where error is triggered	
Error-Line	R - Input Register	1002	1	Line in file where error is triggered	
Error-Code	R - Input Register	1003	1	Error code e.g. HAL_ERROR	
Error-Data	R - Input Register	1004	1	Additional data e.g. state	
Error-Count	R - Input Register	1005	1	Count how often this error has occurred	

Description	Type	Register Address	Register-Size	Data-Format	Comment
Serial number	R - Input Register	1010	2	= Value1*2^16 + Value2	For CTLT and CTxM
Serial number	R - Input Register	1010	2	= Value1*2^16 + Value2	For CTratio and CT4M
CT FW Revision	R - Input Register	1012	1	= Value	
CT Sensor Information	R - Input Register	1013	3	Value 1 = Sensor type Value 2 = Lower Temperature Value 3 = Upper Temperature	For CTLT

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. - Box	R - Input Register	1022	1	°C	= (Value - 1000) / 10	
Temp. - Act	R - Input Register	1023	1	°C	= (Value - 1000) / 10	
Temp. - Avg	R - Input Register	1024	1	°C	= (Value - 1000) / 10	For CTratio and CT4M

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	Type					
Temp - Ratio	R - Input Register	1025	1	°C	= (Value - 1000) / 10	Only for CTratio
Temp - T2	R - Input Register	1026	1	°C	= (Value - 1000) / 10	Only for CTratio
Temp - T1	R - Input Register	1027	1	°C	= (Value - 1000) / 10	Only for CTratio
Temp - Attenuation	R - Input Register	1028	1	°C	= (Value - 1000) / 10	Only for CTratio

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
Epsilon Act	R - Input Register	1040	1		= (Value) / 1000	For CTratio and CT4M
Transmission Act	R - Input Register	1041	1		= (Value) / 1000	For CTratio and CT4M
Epsilon T1	R - Input Register	1042	1		= (Value) / 1000	Only for CTratio
Epsilon T2	R - Input Register	1043	1		= (Value) / 1000	Only for CTratio
Slope	R - Input Register	1044	1		= (Value) / 1000	Only for CTratio

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
F1 mV value	R - Input Register	1050	1	mV	= (Value - 1000) / 10	For CTratio and CT4M
F2 mV value	R - Input Register	1051	1	mV	= (Value - 1000) / 10	For CTratio and CT4M
F3 mV value	R - Input Register	1052	1	mV	= (Value - 1000) / 10	For CTratio and CT4M
IO1 mV value	R - Input Register	1050	1	mV	= (Value - 1000) / 10	For CTratio and CT4M
IO2 mV value	R - Input Register	1051	1	mV	= (Value - 1000) / 10	For CTratio and CT4M
IO3 mV value	R - Input Register	1052	1	mV	= (Value - 1000) / 10	For CTratio and CT4M

Description	Type	Register Address	Register-Size	Data-Format	Comment
Model Information Block 1	R - Input Register	1060	15	Siehe pdf	Only for CTratio and CT4M
Model Information Block 2	R - Input Register	1075	12	Siehe pdf	Only for CTratio and CT4M

8.2 Holding Register

Description	Type	Register Address	Register-Size	Data-Format	Comment
MODBUS-ID	R/W - Holding Register	10000	1	ID: 1 - 247	MODBUS Setting
MODBUS Baudrate	R/W - Holding Register	10001	1	1: 9600 Baud 2: 19200 Baud	MODBUS Setting
Error-Count Reset	R/W - Holding Register	10002	1	0: Idle 1: Reset	Resets the error repetition count to 0

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Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
Transmission 2	R/W - Holding Register	10008	1		= (Value) / 1000	Only for CTratio
Epsilon Slope	R/W - Holding Register	10009	1		= (Value) / 1000	Only for CTratio
Epsilon	R/W - Holding Register	10010	1		= (Value) / 1000	
Transmission	R/W - Holding Register	10011	1		= (Value) / 1000	
Spot Illumination Laser	R/W - Holding Register	10012	1		1 = On 0 = Off	
AVG Time	R/W - Holding Register	10013	1	ms	= Value	
AVG Mode	R/W - Holding Register	10014	1		1 = Smart Averaging 0 = Normal	
Peak Hold Time	R/W - Holding Register	10015	1	ms	= Value	Only CTLT
Smart Threshold	R/W - Holding Register	10015	1	ms	= Value	Only for CTratio and CT4M
Valley Hold Time	R/W - Holding Register	10016	1	ms	= Value	Only CTLT
Hold time	R/W - Holding Register	10016	1	ms	= Value	Only for CTratio and CT4M
Advanced Hold Mode	R/W - Holding Register	10017	1		0 = Off 1 = Peak 2 = Valley	Only CTLT
Advanced Hold Mode	R/W - Holding Register	10017	1		0 = Off 1 = Peak 2 = Valley 3 = Adv. Peak 4 = Adv. Valley	Only for CTratio and CT4M
Advanced Hold Threshold	R/W - Holding Register	10018	1		= (Value - 1000) / 10	
Advanced Hold Hysteresis	R/W - Holding Register	10019	1	°C	= (Value) / 10	
Pick Mode	R/W - Holding Register	10020	1	-	0 = Off 1 = Peak Pick 2 = Valley Pick	Only for CTLT
ALARMx Mode	R/W - Holding Register	10021	1	-	See CT-CTlaser-CTvideo-commands.pdf	Only for CTLT
Low End for outputs	R/W - Holding Register	10022	1	°C	= (Value - 1000) / 10	Only for CTLT
High End for outputs	R/W - Holding Register	10023	1	°C	= (Value - 1000) / 10	Only for CTLT
Skal_Out_Min	R/W - Holding Register	10024	1		mV or µA	Only for CTLT
Skal_Out_Max	R/W - Holding Register	10025	1		mV or µA	Only for CTLT

AL1 value	R/W - Holding Register	10026	1	°C	= (Value - 1000) / 10	Only for CTLT
AL2 value	R/W - Holding Register	10027	1	°C	= (Value - 1000) / 10	Only for CTLT
AL3 value	R/W - Holding Register	10028	1	°C	= (Value - 1000) / 10	Only for CTLT
AL4 value	R/W - Holding Register	10029	1	°C	= (Value - 1000) / 10	Only for CTLT
Head Code Block 1	R/W - Holding Register	10030	2		see CT-Ctlaser-Ctvideo-commands.pdf, p. 9	Only for CTLT
Head Code Block 2	R/W - Holding Register	10032	2		see CT-Ctlaser-Ctvideo-commands.pdf, p. 9	Only for CTLT
Head Code Block 3	R/W - Holding Register	10034	2		see CT-Ctlaser-Ctvideo-commands.pdf, p. 9	Only for CTLT
Tweak Offset	R/W - Holding Register	10036	1		= (Value - 1000) / 10	Only for CTLT
User Offset Value	R/W - Holding Register	10036	1	°C	= (Value) / 10	Only for CT4M
Tweak Gain	R/W - Holding Register	10037	1		= (1/2^15) * (Value)	Only for CTLT
User Gain Value	R/W - Holding Register	10037	1		= (1/2^15) * (Value)	Only for CT4M
Amb. Temp Source	R/W - Holding Register	10038	1		1 = ext. Analog, 2 = ext. FIX, 3 = Head Temp	Only for CTLT
Amb. Temp. Fix Value	R/W - Holding Register	10039	1	°C	= (Value - 1000) / 10	Only for CTLT
Eps. Source	R/W - Holding Register	10040	1		1 = ext. Analog, 2 = ext. FIX, 3 = Head Temp	Only for CTLT
READ Out value for IR-DAC percentage	R/W - Holding Register	10041	1		Change value to send command	Only for CTLT
IR DAC percentage	R/W - Holding Register	10042	1	%	= 0... 100 %	Only for CTLT
READ Out value for Amb. DAC percentage	R/W - Holding Register	10043	1		Change value to send command	Only for CTLT
Set Amb. DAC percentage	R/W - Holding Register	10044	1	%	= 0… 100 %	Only for CTLT
RESET the DAC percentage output	R/W - Holding Register	10045	1		Change value to send command	Only for CTLT
SET Emissivity determination target temp	R/W - Holding Register	10046	1	°C	= (Value - 1000) / 10	Only for CTLT
SET Emissivity determination actual temp	R/W - Holding Register	10047	1	°C	= (Value - 1000) / 10	Only for CTLT

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Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
SET Emissivity determination status	R/W - Holding Register	10048	1	-	1 = On 0 = Off	Only for CTLT
IR Failsafe Mode	R/W - Holding Register	10049	1		0 = always HIGH 1 = under → HIGH over → LOW 2 = always LOW 3 = under → LOW over → HIGH	Only for CTLT
Amb. Failsafe Mode	R/W - Holding Register	10050	1		0 = always HIGH 1 = under → HIGH over → LOW 2 = always LOW 3 = under → LOW over → HIGH	Only for CTLT
SET DEFAULT	R/W - Holding Register	10051	1		Change value to send command	
PANEL LOCK	R/W - Holding Register	10052	1		0 = Keys available 1 = Keys locked	
Temp. Unit	R/W - Holding Register	10053	1		0 = °C 1 = °F	
Save Settings after changing	R/W - Holding Register	10054	1		1 = Data not written in flash 0 = Data are written in flash	Only for CTLT

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
User Offset Value Temp Ratio	R/W - Holding Register	10060	1	°C	= (Value - 1000) / 10	Only for CTratio
User Offset Value Temp T1	R/W - Holding Register	10061	1	°C	= (Value - 1000) / 10	Only for CTratio
User Offset Value Temp T2	R/W - Holding Register	10062	1	°C	= (Value - 1000) / 10	Only for CTratio
User Gain Value Temp Ratio	R/W - Holding Register	10063	1		= (Value)/ 2^15	Only for CTratio
User Gain Value Temp T1	R/W - Holding Register	10064	1		= (Value)/ 2^15	Only for CTratio
User Gain Value Temp T2	R/W - Holding Register	10065	1		= (Value)/ 2^15	Only for CTratio

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
Max Attenuation max. Attenuation	R/W - Holding Register	10070	1	%	= (Value- 1000) / 10	Only for CTratio
Max Attenuation Mode	R/W - Holding Register	10071	1			Only for CTratio
Max Attenuation fixed TRatio Value	R/W - Holding Register	10072	1	°C	= (Value - 1000) / 10	Only for CTratio
Ambient Temp Amb. Source	R/W - Holding Register	10073	1			Only for CTratio and CT4M

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
Ambient Temp Amb. Temp	R/W - Holding Register	10074	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
Ambient Temp Amb. Temp at 0V	R/W - Holding Register	10075	1	°C	= (Value - 1000) / 10	Only for CTratio
Ambient Temp Amb. Temp at 10V	R/W - Holding Register	10076	1	°C	= (Value - 1000) / 10	Only for CTratio

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
Output 0 Mode	R/W - Holding Register	10080	1			Only for CTratio and CT4M
Output 1 Mode	R/W - Holding Register	10081	1			Only for CTratio and CT4M
Output 0 Analog Source	R/W - Holding Register	10082	1			Only for CTratio and CT4M
Output 1 Analog Source	R/W - Holding Register	10083	1			Only for CTratio and CT4M
Output 0 Analog mA below	R/W - Holding Register	10084	1	µA	= Value	Only for CTratio and CT4M
Output 1 Analog mA below	R/W - Holding Register	10085	1	µA	= Value	Only for CTratio and CT4M
Output 0 Analog mA above	R/W - Holding Register	10086	1	µA	= Value	Only for CTratio and CT4M
Output 1 Analog mA above	R/W - Holding Register	10087	1	µA	= Value	Only for CTratio and CT4M
Output 0 Analog Range below	R/W - Holding Register	10088	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
Output 1 Analog Range below	R/W - Holding Register	10089	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
Output 0 Analog Range above	R/W - Holding Register	10090	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
Output 1 Analog Range above	R/W - Holding Register	10091	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
Output 0 Analog mV below	R/W - Holding Register	10092	1	mV	= Value	Only for CT4M
Output 1 Analog mV below	R/W - Holding Register	10093	1	mV	= Value	Only for CT4M
Output 0 Analog mV above	R/W - Holding Register	10094	1	mV	= Value	Only for CT4M
Output 1 Analog mV above	R/W - Holding Register	10095	1	mV	= Value	Only for CT4M

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Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
IO1 Function	R/W - Holding Register	10100	1		= Value	Only for CTratio and CT4M
IO2 Function	R/W - Holding Register	10101	1		= Value	Only for CTratio and CT4M
IO3 Function	R/W - Holding Register	10102	1		= Value	Only for CTratio and CT4M
IO1 Alarm Threshold Source 1	R/W - Holding Register	10103	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
IO1 Alarm Source	R/W - Holding Register	10104	1			Only for CTratio and CT4M
IO2 Alarm Source	R/W - Holding Register	10105	1			Only for CTratio and CT4M
IO3 Alarm Source	R/W - Holding Register	10106	1			Only for CTratio and CT4M
Output 0 Alarm Source	R/W - Holding Register	10107	1		= (Value - 1000) / 10	Only for CTratio and CT4M
Output 1 Alarm Source	R/W - Holding Register	10108	1			Only for CTratio and CT4M
Output 0 Alarm Threshold	R/W - Holding Register	10109	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
Output 1 Alarm Threshold	R/W - Holding Register	10110	1	°C	= (Value - 1000) / 10	Only for CTratio and CT4M
Output 0 Alarm Hysteresis	R/W - Holding Register	10111	1	°C	= (Value) / 10	Only for CTratio and CT4M
Output 1 Alarm Hysteresis	R/W - Holding Register	10112	1	°C	= (Value) / 10	Only for CTratio and CT4M
Output 0 Alarm mA - NO Alarm	R/W - Holding Register	10113	1	µA	= Value	Only for CTratio and CT4M
Output 1 Alarm mA - NO Alarm	R/W - Holding Register	10114	1	µA	= Value	Only for CTratio and CT4M
Output 0 Alarm mA - Alarm	R/W - Holding Register	10115	1	µA	= Value	Only for CTratio and CT4M
Output 1 Alarm mA - Alarm	R/W - Holding Register	10116	1	µA	= Value	Only for CTratio and CT4M
Output 0 Alarm NO NC	R/W - Holding Register	10117	1		= Value	Only for CTratio and CT4M
Output 1 Alarm NO NC	R/W - Holding Register	10118	1		= Value	Only for CTratio and CT4M
Output 0 Alarm mV - NO Alarm	R/W - Holding Register	10119	1	mV	= Value	Only for CT4M
Output 1 Alarm mV - NO Alarm	R/W - Holding Register	10120	1	mV	= Value	Only for CT4M

| Output 0 Alarm mV - Alarm | R/W - Holding Register | 10121 | 1 | mV | = Value | Only for CT4M |
| Output 1 Alarm mV - Alarm | R/W - Holding Register | 10122 | 1 | mV | = Value | Only for CT4M |

Description	Type	Register Address	Register-Size	Unit [ ]	Data-Format	Comment
DAC percentage output 1	R/W - Holding Register	10130	1	%	= Value	Only for CTratio and CT4M
DAC percentage output 2	R/W - Holding Register	10131	1	%	= Value	Only for CTratio and CT4M

9. Contact information

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