Optris CT EtherNet/IP interface

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1 General

The Optris CT EtherNet/IP interface board can be easily installed inside the electronic box of any CT, CTlaser or CTratio. The EtherNet/IP 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 Ethernet with an IP67 protection rate and a screw retention feature. An extra implemented software stack guarantees the EtherNet/IP communication functionality.

The EtherNet/IP settings are stored on the board and the board communicates with the Optris CT via serial interface. The EtherNet/IP settings remain on the board in case of interchanging the Optris CT electronic box.

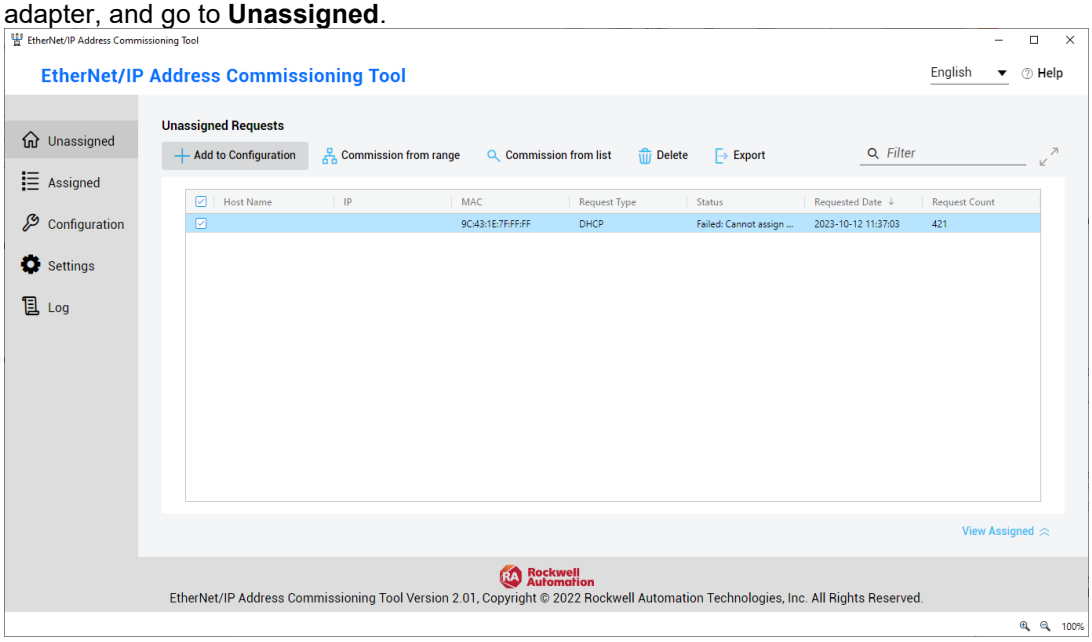
2 Description

Optris CT EtherNet/IP interface board basic characteristics:
• Device class: adapter device
• Device type: 06h
• Connection: 1 x M12
• Transfer speed up to 100Mbit/s full-duplex, auto-negotiation capable
The CT EtherNet/IP module maps the object temperature, internal temperature, device status, and other Pyrometer data to its Input Assembly which is then sent onto the EtherNet/IP network using CIP. In the initialization phase, the CT EtherNet/IP interface board sends the device's configuration data which is accessible for setup via the PLC programming software Controller Tags. Furthermore, CT EtherNet/IP interface board allows you to change a subset of sensor parameters in data exchange mode using different classes.

3 Configuration

The easiest way to incorporate a CT EtherNet/IP device into a PLC programming software Project is by installing the EDS file and selecting the right module type (ACCTEIPK).
The ACCTEIPK interface is delivered in DHCP mode. For changing the IP address and the IP mode to static use the *"EtherNet/IP Address Commissioning Tool".*

Start the Rockwell *„EtherNet/IP Address Commissioning Tool*", go to **Settings**, select the used EtherNet adapter, and go to **Unassigned**.



Select the device and click **Add to Configuration**.
Set an IP address and a short description and click **OK**.

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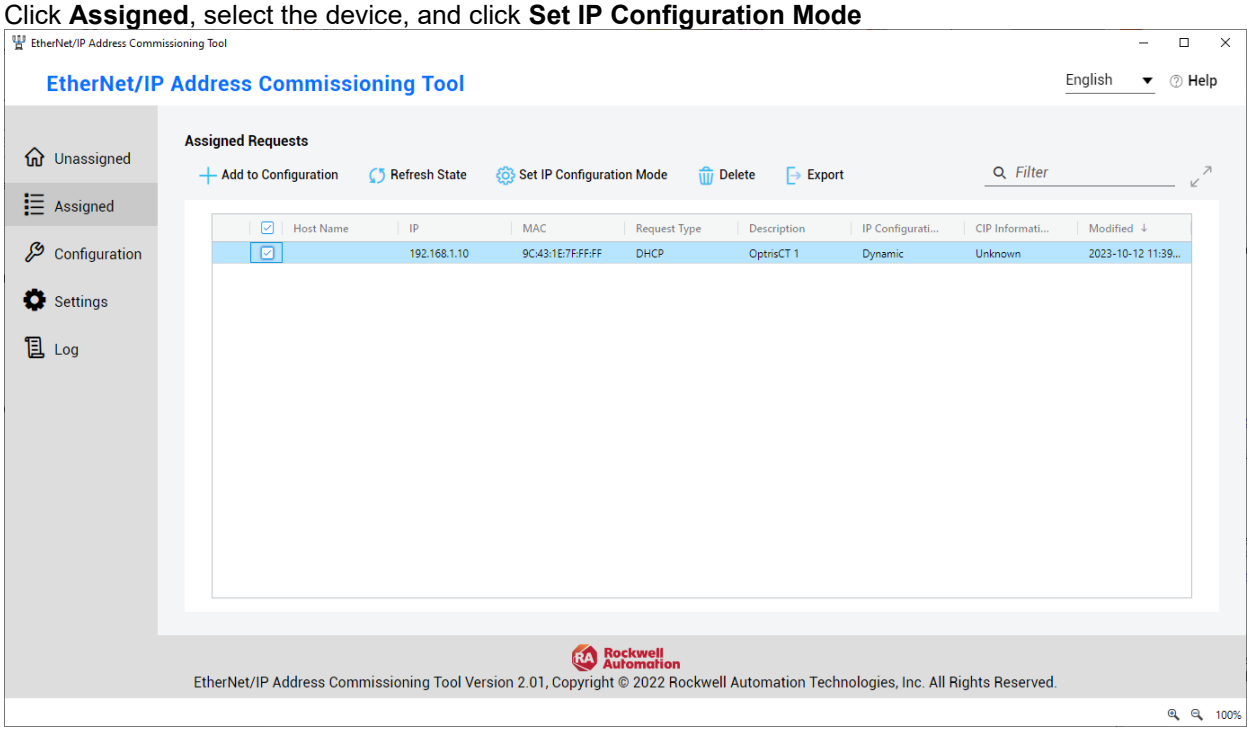
Click **Assigned**, select the device, and click **Set IP Configuration Mode**



Set the IP mode to Static Mode, click **Apply,** and close the program.

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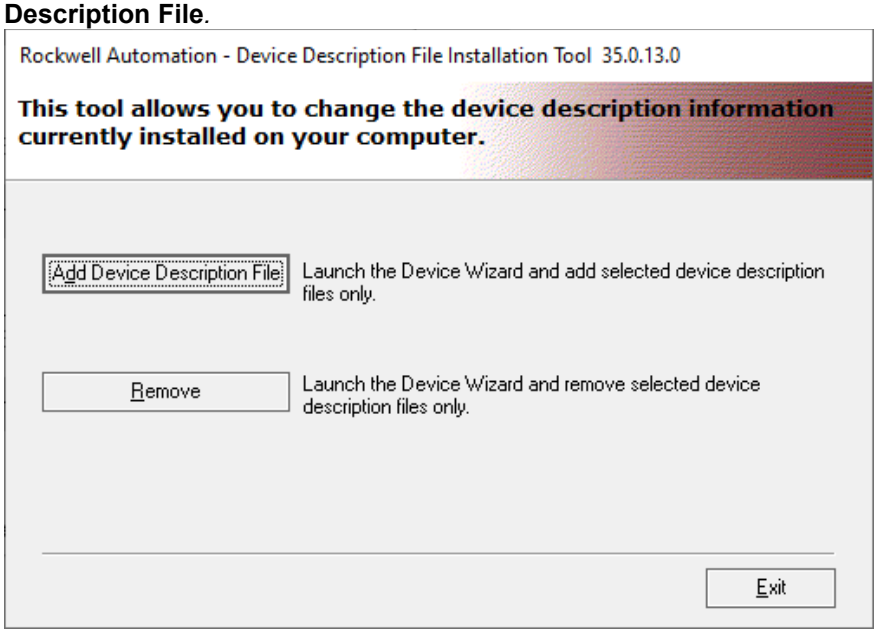
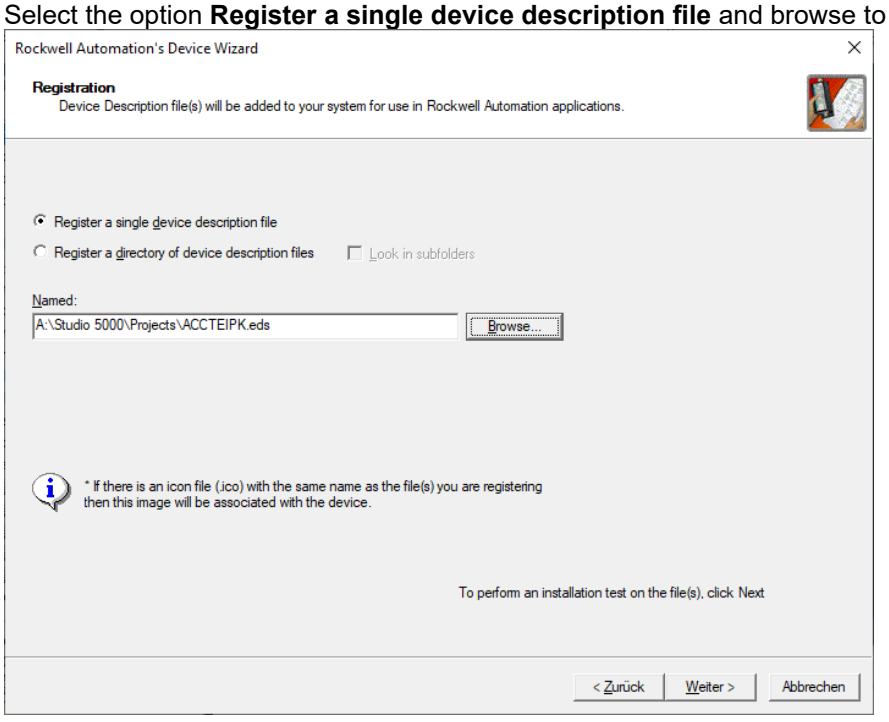
3.1 EDS File

To allow for easier implementation in automation projects, the device manufacturer describes the device features in an EDS file, which is supplied to the end-user and can be installed into the PLC programming environment using *"Rockwell Automation – Device Description File Installation Tool*".
The EtherNet/IP device EDS file is named: **ACCTEIPK.EDS**
Start the *"Rockwell Automation – Device Description File Installation Tool*" and click on **Add Device Description File**.



Select the option **Register a single device description file** and browse to the file **ACCTEIPK.EDS** file



Click **next** until the message appears that the installation is completed and close the software *"Rockwell Automation – Device Description File Installation Tool*".
Now the **ACCTEIPK.EDS** file is installed and the Optris CT device can be inserted into your project.

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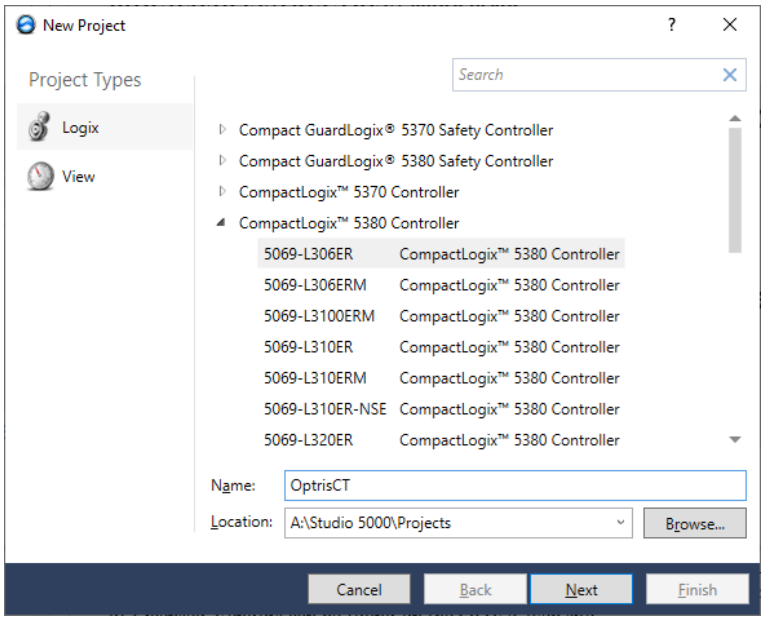
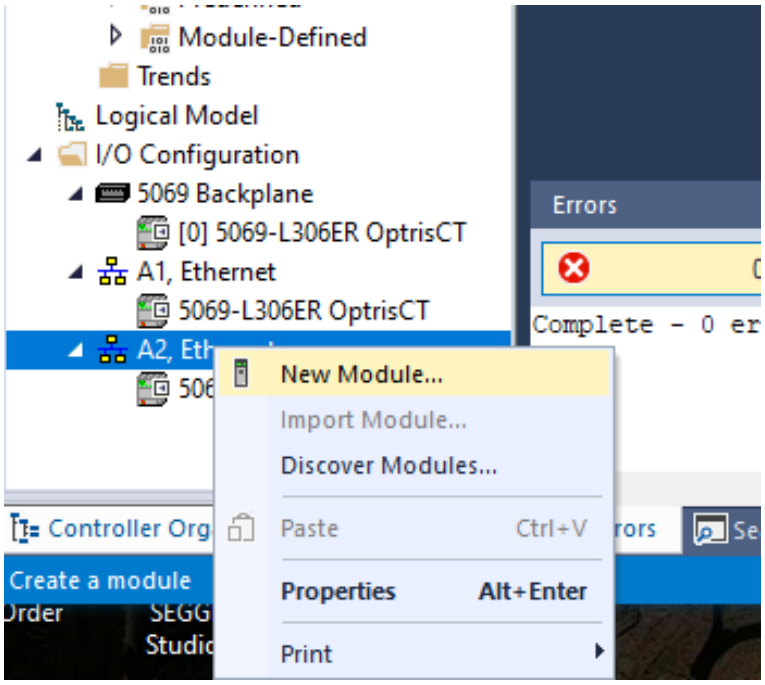
3.2 Configuration

The CT EtherNet/IP device configuration using the EDS file (after it has been installed) only consists of choosing the right module, naming the device, and typing in its IP address.

For the installation of the EDS file use the "*Rockwell Studio 5000"* and create a new project. You have also the possibility to import an existing project. Select the controller, name your project, and choose the location for the file.



Connect the OptrisCT to the AB PLC port click with the right mouse button on your port in the project and add a New Module.



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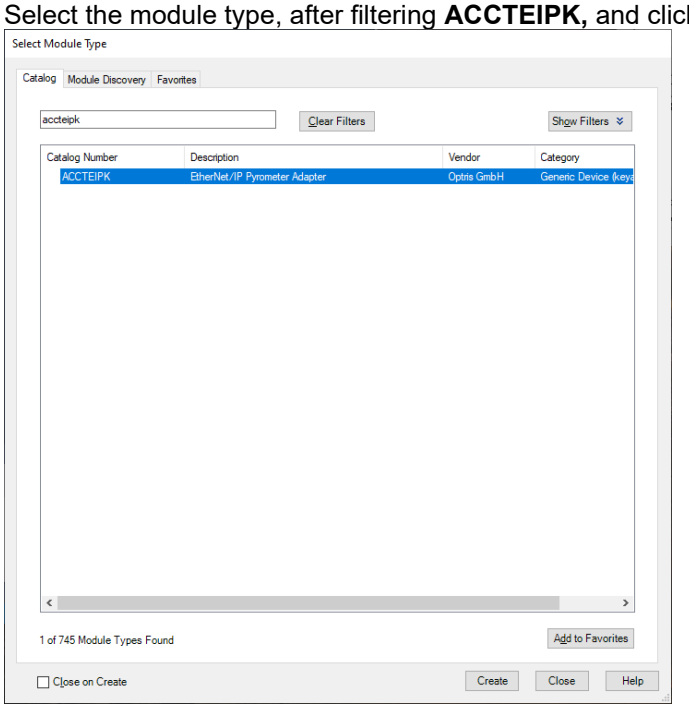
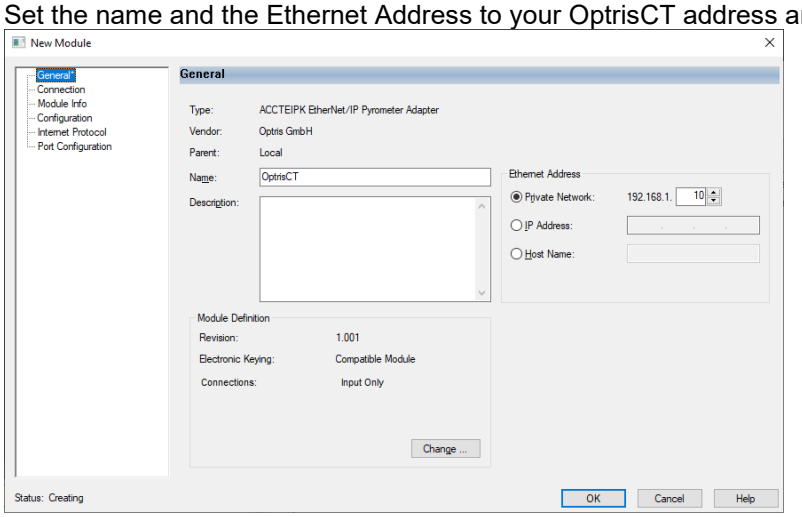
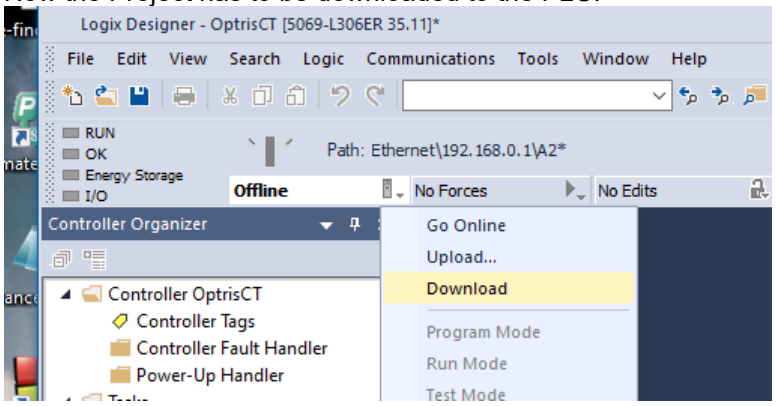
Select the module type, after filtering **ACCTEIPK,** and click on **Create**.



Set the name and the Ethernet Address to your OptrisCT address and click on **OK**.



Now the Project has to be downloaded to the PLC.



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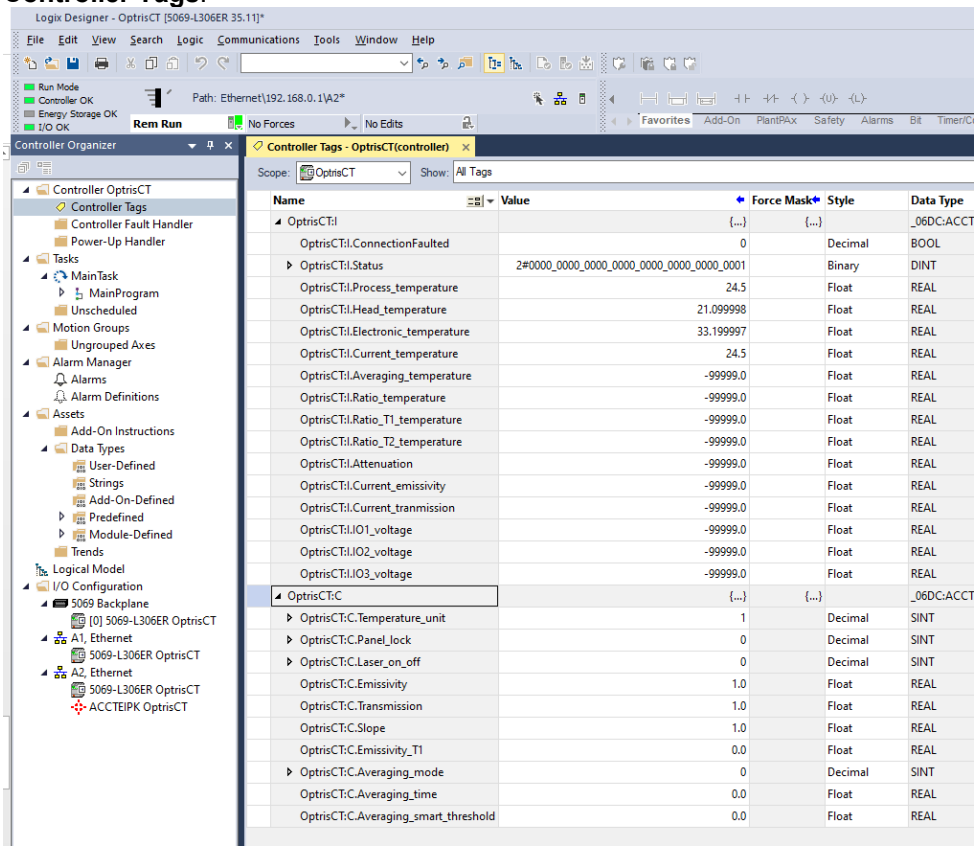
Start the PLC program by clicking **Run Mode**. To see the current cyclic values double-click on the **Controller Tags**.



4 Parameter Setting

Some settable parameters of an Optris pyrometer are available in the Configuration Data. Changing the parameters this way can only happen upon device initialization, i.e. when downloading the program to the PLC (default values are sent if no changes have been made). Once the parameter setting has been performed, the I/O device is ready to send cyclic productive data. While certain pyrometer characteristics are parameterizable only during the configuration, others can also be set in the data exchange mode using different classes. The tables below contain all the parametrizable characteristics and are followed by a short implementation description. If a value is not defined for a type of a pyrometer the value of *-99999.0* appears.

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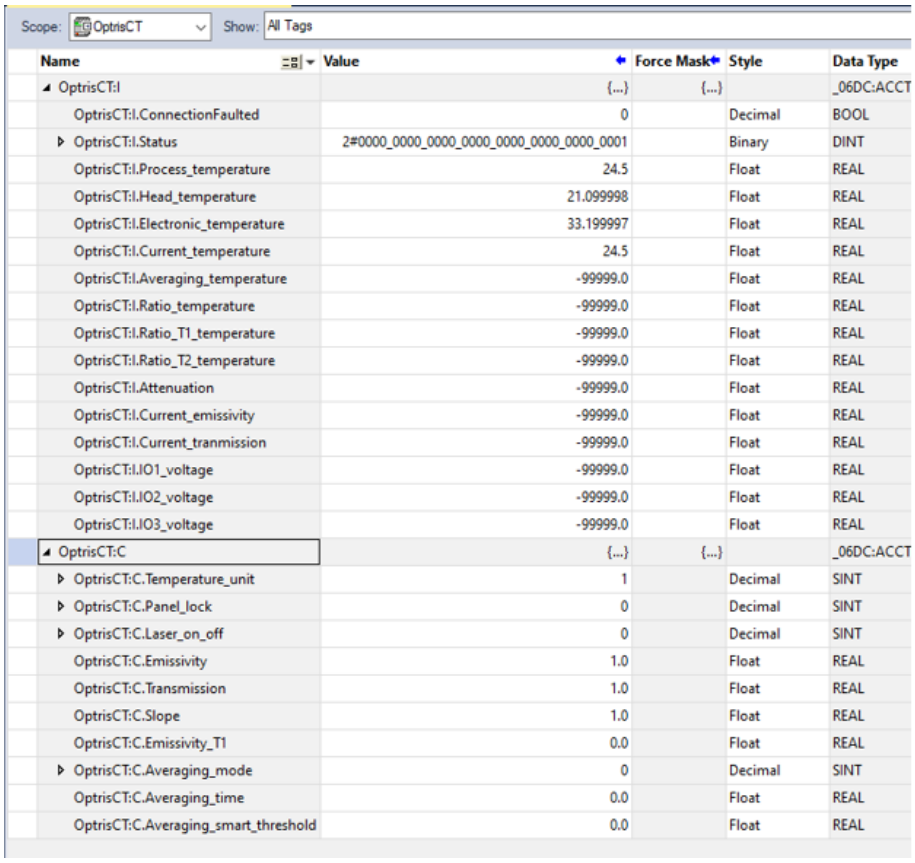
4.1 Pyrometer Parameters

The parameters included in the Configuration Data are accessible through Controller Tags in the Rockwell PLC programming environment (*Rockwell Studio 5000*). Changing them in the controller tags will first have an effect after downloading the program to the PLC. The Rockwell programming software allows however for an easy saving of these tags so that the values can always be sent as default upon initialization. These values must also be included in the user parameters.
The configuration data length is 28 bytes.

Table 1: Config data; once after project start (write only)

Offset	*Name*	*Size in byte*	*Format*
0	Temp. unit	1	uint8
1	Panel lock	1	uint8
2	Laser on/off	1	uint8
3	Emissivity	4	real
7	Transmission	4	real
11	Slope	4	real
15	Emissivity T1	4	real
19	Averaging Mode	1	real
20	Averaging Time	4	real
24	Smart Averaging threshold	4	real



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4.2 Pyrometer Input Data

The EtherNet/IP device Input data length is 60 bytes; the communication format is SINT.

Table 2: Input Data; (cyclic – read-only)

Offset	*Name*	*Size in byte*	*Format*
0	Status	4	dword
4	Process temperature	4	real
8	Head temperature	4	real
12	Electronic temperature	4	real
16	Current temperature	4	real
20	Averaging temperature	4	real
24	Ratio temperature	4	real
28	T1 temperature	4	real
32	T2 temperature	4	real
36	Attenuation	4	real
40	Current Epsilon	4	real
44	Current transmission	4	real
48	IO1 mV value	4	real
52	IO2 mV value	4	real
56	IO3 mV value	4	real

4.3 User Parameter

The EtherNet/IP device can read and set user parameters (see **Table 3**). The user parameter class is 0x0f.

Table 3: User Parameter; Clas 0x0f; Attribute 1

Instance	*Name*	*Size in byte*	*Format*	*R/W*
1	Temp. unit	1	uint8	R/W
2	Process temp.	4	real	R
3	Head temp.	4	real	R
4	Electronic temp.	4	real	R
5	Current temp.	4	real	R
6	Averaging temp.	4	real	R
7	Ratio temp.	4	real	R
8	Ratio T1 temp.	4	real	R
9	Ratio T2 temp.	4	real	R
10	Attenuation	4	real	R
11	Current emissivity	4	real	R
12	Current transmission	4	real	R
13	IO1 valtage	4	real	R
14	IO2 valtage	4	real	R
15	IO3 valtage	4	real	R

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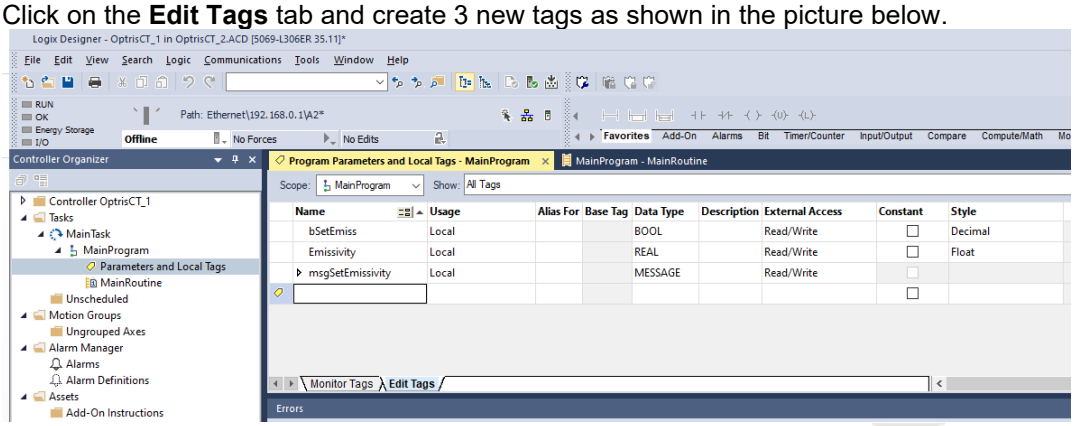
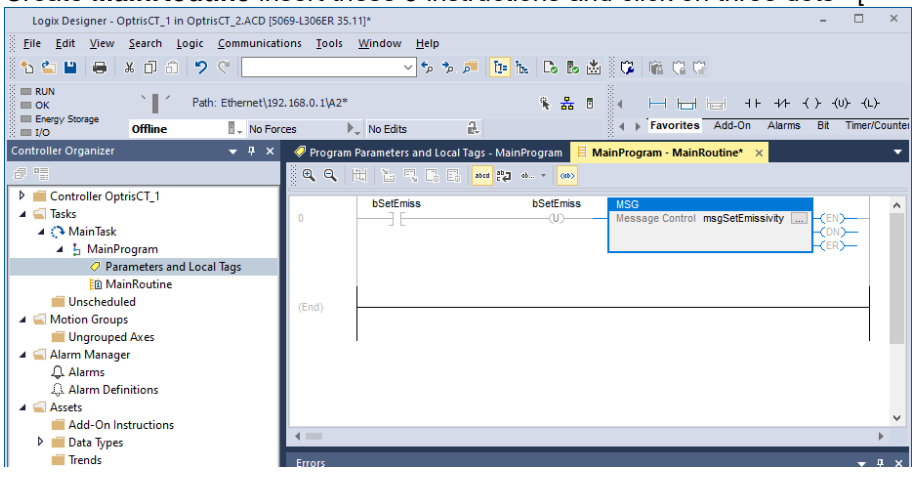
16	Panel lock	1	uint8	R/W
17	Laser on/off	1	uint8	R/W
18	Status	4	dword	R/W
19	Emissivity	4	real	R/W
20	Transmission	4	real	R/W
21	Slope	4	real	R/W
22	Emissivity T1	4	real	R/W
23	Averaging Mode	1	real	R/W
24	Averaging Time	4	real	R/W
25	Smart Averaging threshold	4	real	R/W
26	Max Attenuation max. Attenuation	4	real	R/W
27	Max Attenuation Mode	1	uint8	R/W
28	Max Attenuation fixed TRatio Value	4	real	R/W

4.3.1 User Parameter Example

Example of setting the *User Parameter* **Emissivity**.
Open your project and rename the controller's name (the names of the controller and the ACCTEIPK must be different) by double-clicking on the controller.
Create a **New Local Tag** for reading serial numbers and double-click on **Parameters and Local Tags**.
Click on the **Edit Tags** tab and create 3 new tags as shown in the picture below.



Create **MainRoutine** insert these 3 instructions and click on three dots [] in the MSG instruction.



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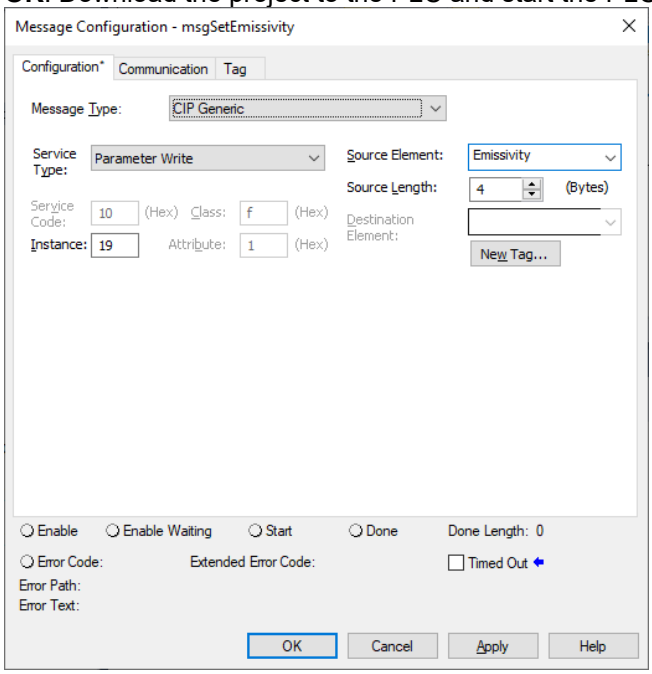
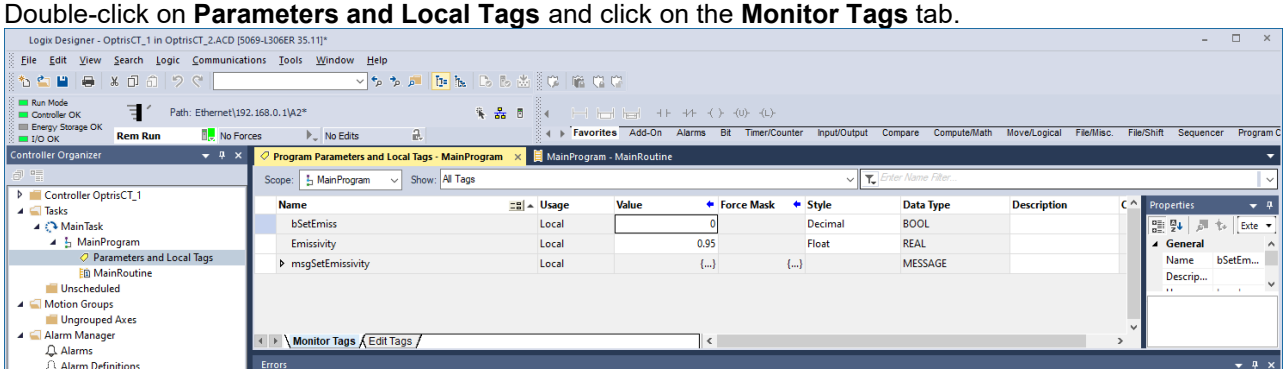
Set the configuration values according to **Table 3, s**et the communication path to OptrisCT, and click on **OK**. Download the project to the PLC and start the PLC program in **Run Mode**.



Double-click on **Parameters and Local Tags** and click on the **Monitor Tags** tab.



Set the value of the Emissivity to e.g. 0.95

4.4 Device Information

The EtherNet/IP device can read device information (see table). The device information class is 0x64.

Table 4: Device information; class 0x64, Attribute 1

Instance	*Name*	*Size in byte*	*Format*	*R/W*	*comment*
1	Serial	4	uint32	R	
2	FW rev.	2	uint16	R	
3	temp. unit	1	uint8	R	0- °F / 1- °C
4	Range low 1	4	real	R	
5	Range high 1	4	real	R	
6	Range low 2	4	real	R	
7	Range low 3	4	real	R	
8	Range Ambient low	4	real	R	

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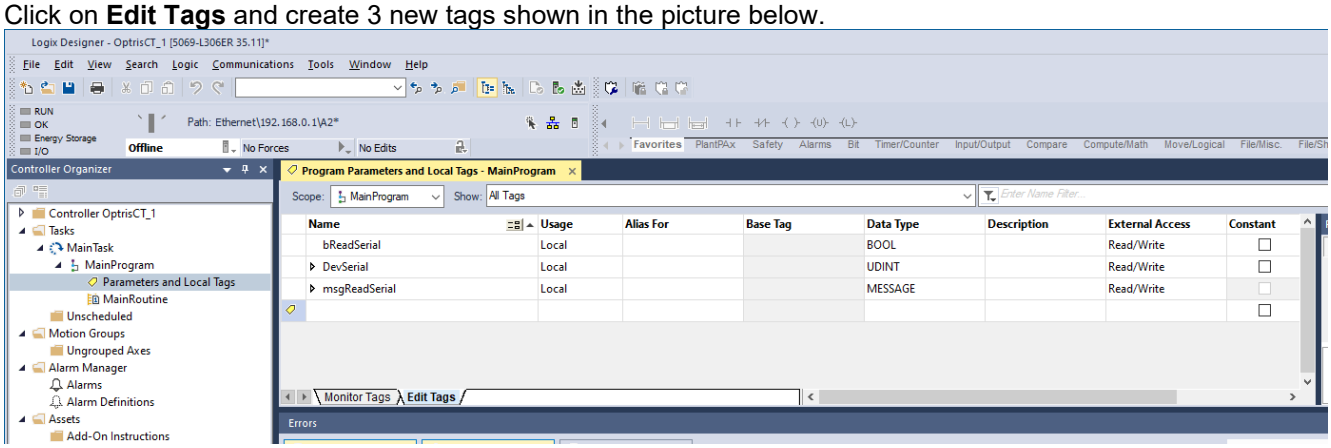
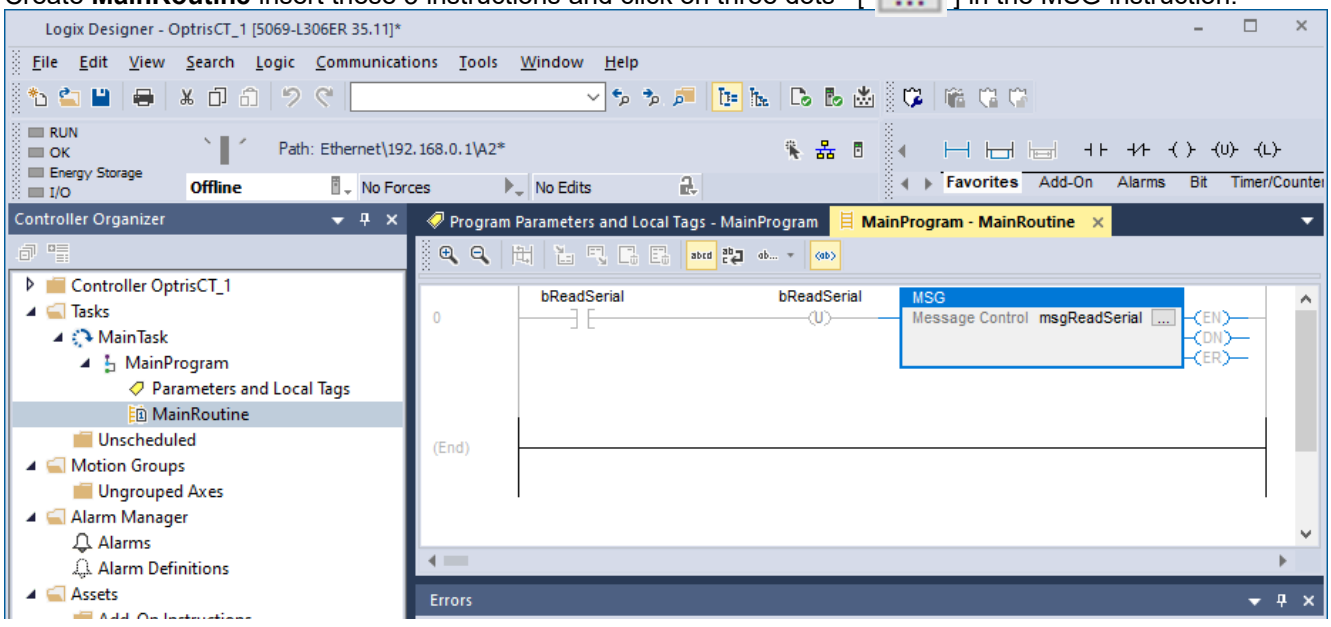
9	Range Ambient high	4	real	R	
10	Model strings	24	char[]	R	
11	Model flags	8	uint16[]	R	not used

4.5 Example read Device Information

Example of reading serial number.
Open your project and rename the controller's name (the names of the controller and the ACCTEIPK must be different) by double-clicking on the controller.
Create a **New Local Tag** for reading serial numbers and double-click on **Parameters and local tags**.
Click on **Edit Tags** and create 3 new tags shown in the picture below.



Create **MainRoutine** insert these 3 instructions and click on three dots [...] in the MSG instruction.



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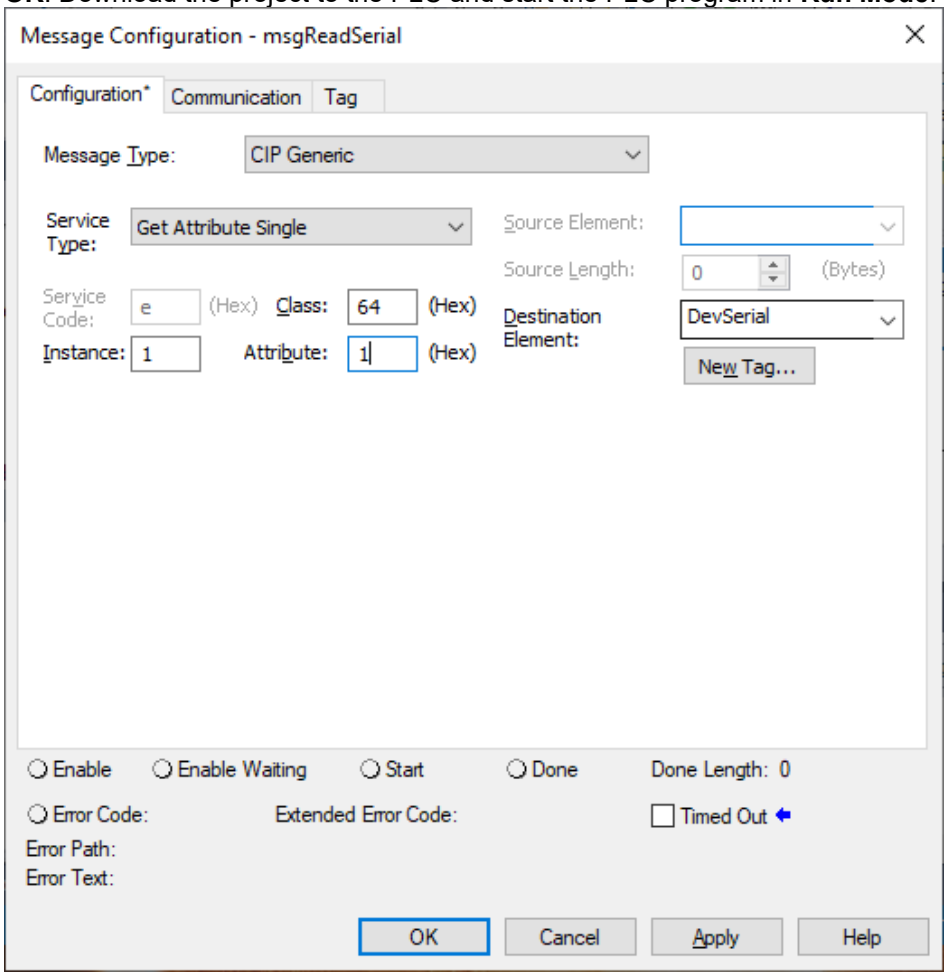
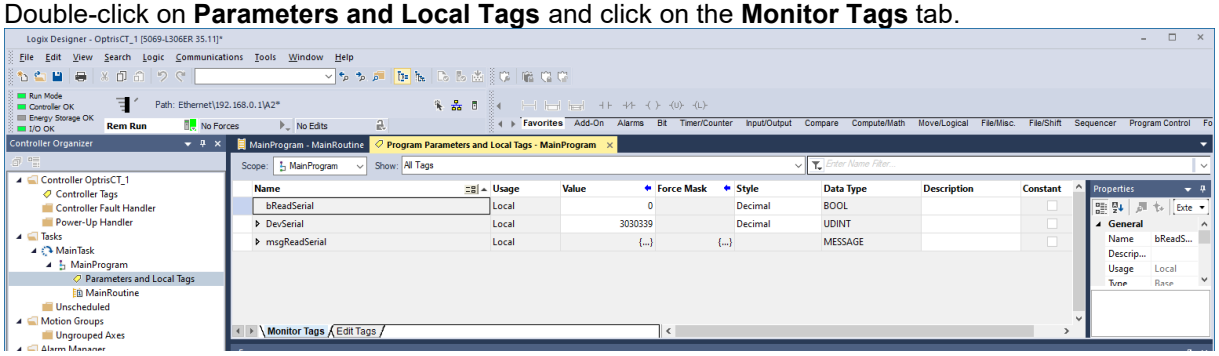
Set the configuration values according to **Table 3, s**et the communication path to OptrisCT, and click on **OK**. Download the project to the PLC and start the PLC program in **Run Mode**.



Double-click on **Parameters and Local Tags** and click on the **Monitor Tags** tab.



Set the value from bReadSerial to 1 and press Enter.
The Serial number of the OptrisCT is shown under DevSerial.

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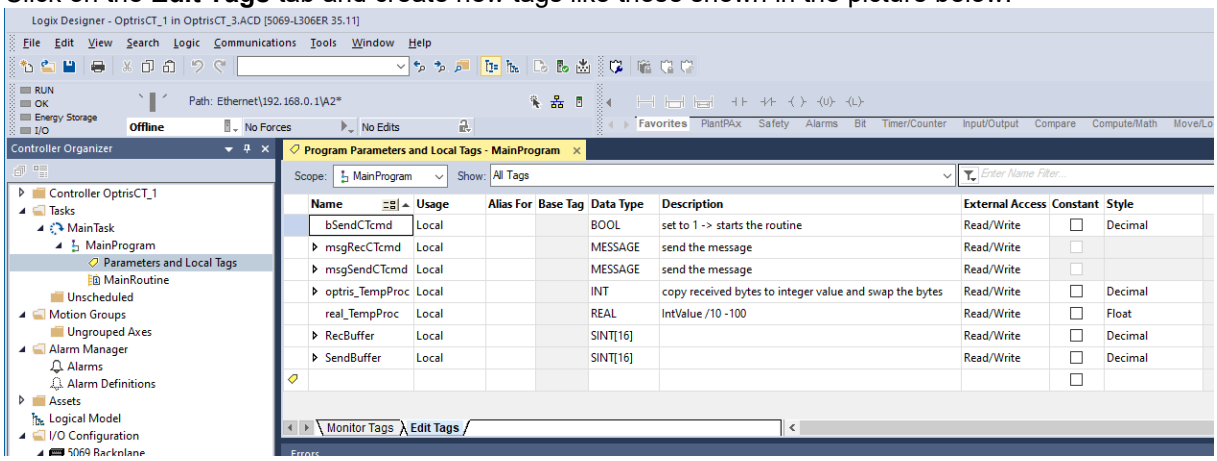
4.6 CT direct communication

The EtherNet/IP device can communicate directly with the OptrisCT. The user parameter class is 0x65.

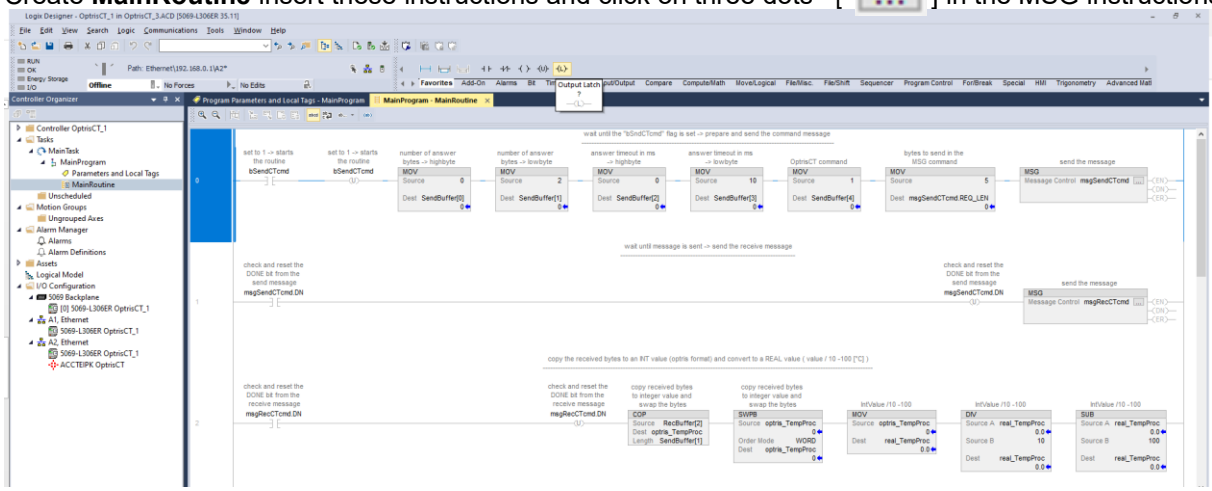
Attribute	*Name*	*Size in byte*	*Format*	*R/W*
1	send/receive	variable	uint8[]	R/W

4.6.1 Example CT direct communication

Example of setting USER PARAMETER **Emissivity**.
Open your project and rename the controller's name (the names of the controller and the ACCTEIPK must be different) by double-clicking on the controller.
Create a **New Local Tag** for reading serial numbers and double-click on **Parameters and Local Tags**.
Click on the **Edit Tags** tab and create new tags like those shown in the picture below.



Create **MainRoutine** insert these instructions and click on three dots [...] in the MSG instructions.



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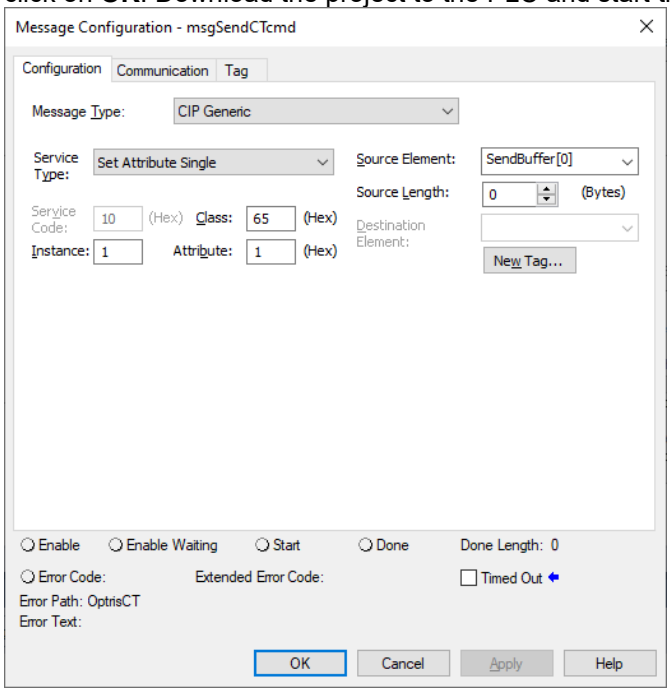
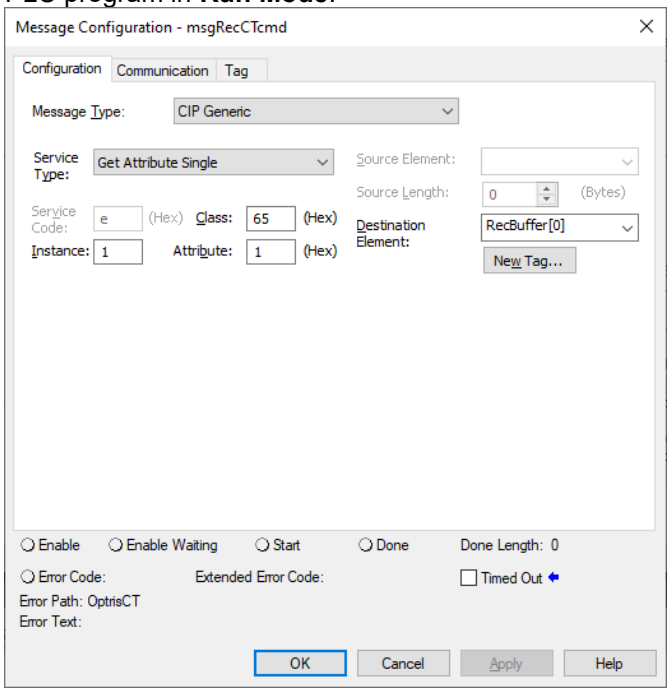
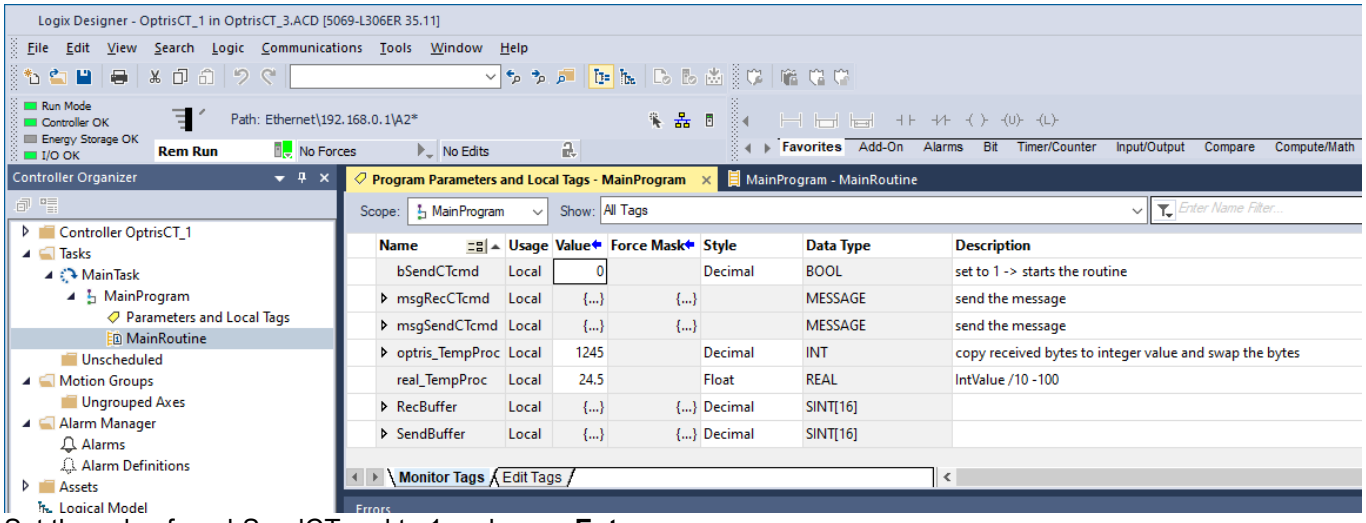
Set the configuration values like shown in the picture below, **s**et the communication path to OptrisCT, and click on **OK**. Download the project to the PLC and start the PLC program in **Run Mode**.





Double-click on **Parameters and Local Tags** and click on the **Monitor Tags** tab.



Set the value from bSendCTcmd to 1 and press **Enter**.
The process temperature of the OptrisCT is shown under real_TempProc.

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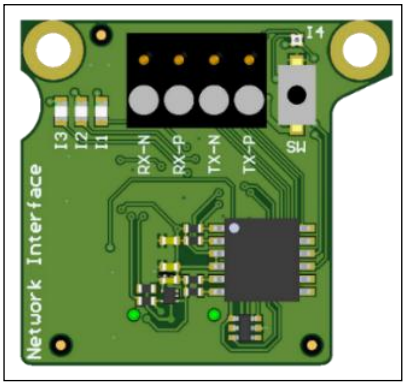
5 LED functions and reset Button

The CT EtherNet/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 EtherNet/IP box 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:	**0.0.0.0**
Subnet mask:	**0.0.0.0**
Gateway:	**0.0.0.0**

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