Optris Modbus RTU communication interface for CT, CTlaser and CTratio

Serial interface parameters

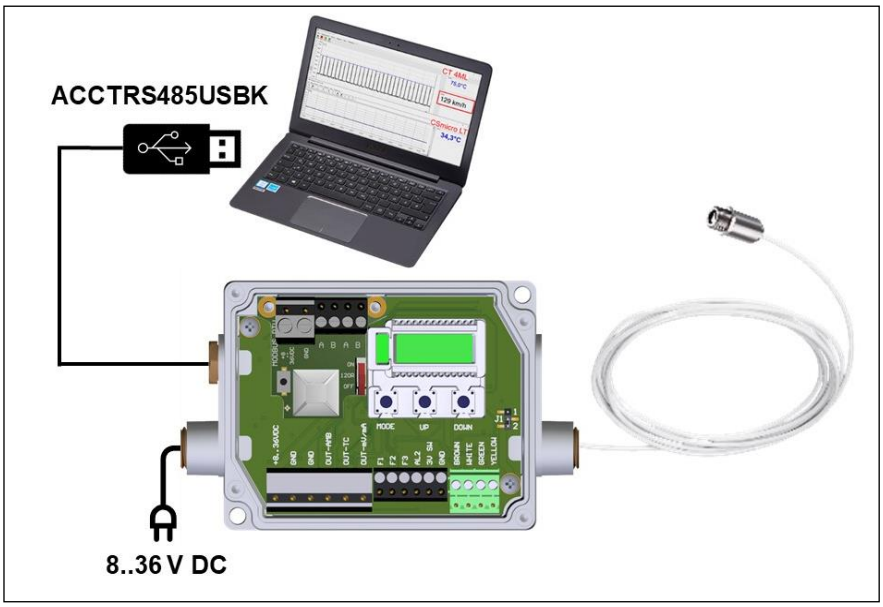
- **Baud rate:** **9600 or 19200, set by user (factory default: 9600)**
- **Data bits:** **8**
- **Parity:** **even**
- **Stop bits:** **1**
- **Flow control:** **off**

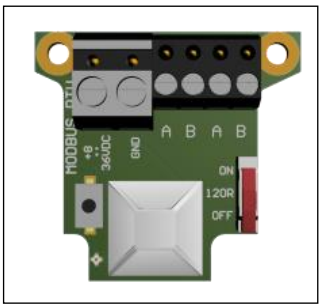
Protocol

The protocol is a Modbus RTU protocol.

Installation overview

Insert the Modbus RTU interface on the CT electronic board. Power the CT electronic box with 8-36 V, the Modbus gets the power from the CT electronic box. The RS422 mode and the baud rate of 115,2 kBaud must be selected on the electronic box.





Modbus RTU interface

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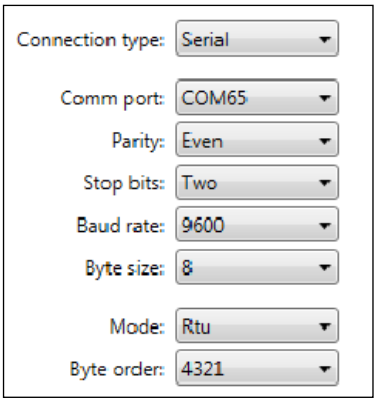
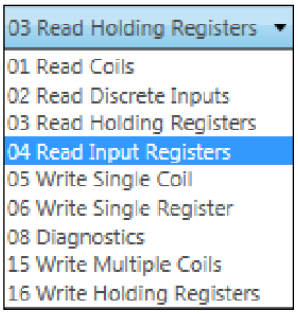
Modbus RTU

Use a Modbus RTU program to read out the data. This is done via the **Read Holding Register** and **Read Input Register**.

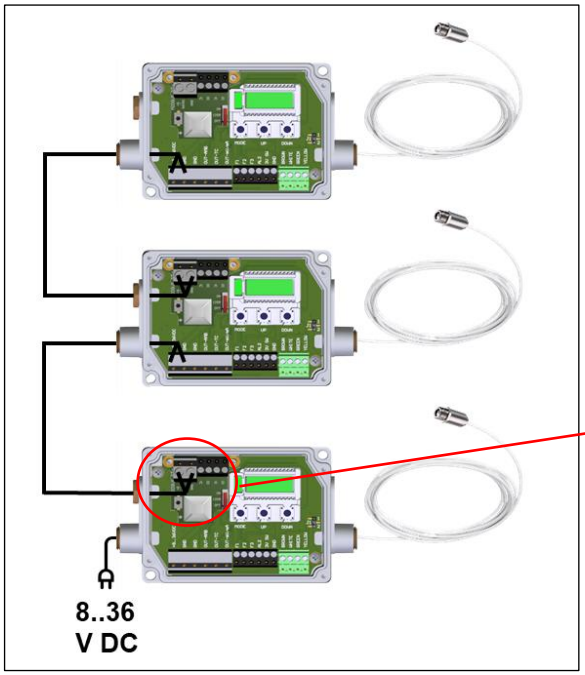
Changing the settings of the device is done over the **Write Holding Register**.



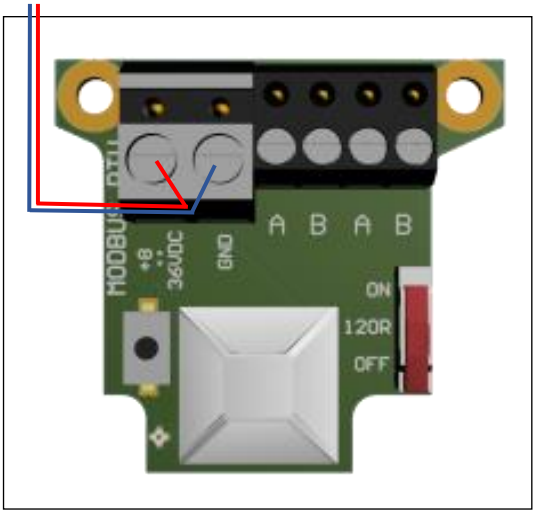


Connection of multiple devices

Insert the Modbus RTU interface on the CT electronic board and power the first electronic box with 8-36 V DC. Connect the A pin from the Modbus interface of the first electronic box to the A pin from the Modbus interface of the second electronic box and the same for the B pin. For powering the second electronic box connect the 8..36 VDC pin from the Modbus interface of the first electronic box to the power supply pin 8..36 VDC of the second electronic box and the same for the Ground (GND). Go ahead with the third electronic box and so on.



To the next CT electronic box



The 120R-switch must be turned to ON for the last connected CT unit.

For the assignment of the Modbus ID of the individual devices, the devices must be connected one after the other. By default the Modbus ID is for every device **1**. In order to communicate, each device needs its own ID. The numbers 1 to 247 can be selected.

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Troubleshooting

If you get wrong temperatures (or **0** instead of temperature values) in your Modbus tool, it can happen, that the CT is being in the Burst mode and sends data to his USB interface.

To stop the Burst mode connect the CT with USB to your PC and start the CompactPlus Connect/Compact Connect. Go to **settings → Advanced settings →** and click on **Factory defaults**. Afterwards click on **stop** (Stop) while receiving data and close CompactPlus Connect/Compact Connect while USB is still connected. Close the software CompactPlus Connect/Compact Connect. Disconnect the USB cable after closing CompactPlus Connect/Compact Connect.
Alternatively you can reset your CT by pressing the **Mode** and **Down** button for at least 3 seconds.

Now connect the ACCTRS485USBK to your computer and start your Modbus tool. Make sure, that you have The RS422 mode with the baud rate of 115,2 kBaud on your CT and 9600 Baud in your Modbus tool software.

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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
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

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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

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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

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	

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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

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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
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

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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
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

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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

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

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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

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