HP

Heatpoint Oven for Nonlinear Crystals

Technical Description
User’s Manual

2023
Lithuania

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1.1. Warranty Statement

This Heatpoint Oven is protected by one-year warranty covering labor and parts. The warranty enters into validity since the shipment date. Any evidence of improper use or unauthorized attempts at repair leads to warranty cancellation.

1.2. Service Contact Information

In case of service required or any questions on warranty, please notify:

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Website: www.eksmaoptics.com

2.1. General Information

2.1.1. Model

HP15, HP30 and HP200.

2.1.2. About the Device

Heatpoint is a compact oven designed to keep nonlinear crystals at their optimal operational temperature, prevent moisture condensation and for thermo-stabilization of crystals with a low thermal acceptance.

2.1.3. Main Components

Table 1. Main components

Component	*Quantity*
Heatpoint oven	1
Thermocontroller	1
DC power supply (see Table 2 for requirements)	1

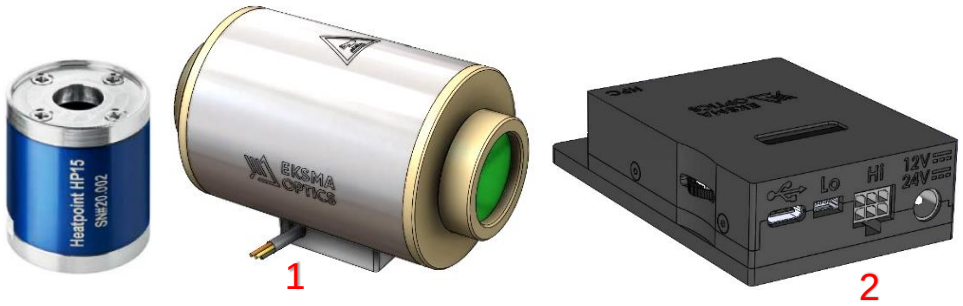

Figure 1. Heatpoint ovens (1), Thermocontroller (2)

2.2. Technical Specifications

Table 2. Technical specifications

Parameter	***Specifications***	
	HP15/HP30	***HP200***
Crystal dimensions, mm	3x3x15 … 6x6x30	3x3x30 … 12x12x30
Temperature tuning range, °C	25 - 70	25 - 220
Temperature tuning step, °C	0.1 (knob) 0.001 (remote)	
Long-term stability, °C	± 0.1	± 0.03*
Temperature ramp rate, °C/min	1 – 10 **	
Power supply, V	12	24
Power consumption, W	<8	<60
Oven-to-thermocontroller connector	Picoblade, Single row, 4 Circuit (“Lo”)	Micro-Fit 3.0, Dual Row, 6 Circuits (“Hi”)
Oven cable length, m	0.45	0.5
Power connector, mm	DC jack, 5.5 x 2.5	
Thermocontroller dimensions, mm	54 x 23 x 70	
Oven dimensions (HP15 / HP30), mm	Ø25.4 x 30.5 / Ø25.4 x 45.5	Ø50.8 x 65

* in enclosed environment

** by default, limited to 4 °C/min

Notes:

Power indicator icon shows the power delivered to the oven. If power indicator icon is constantly full during the oven operation - change the power supply to one with a higher voltage.

USB-C is used for communication only. It will power digital circuitry of termocontroller, however oven will not be powered.

Heater pulse-width modulation and temperature sample frequencies are fixed and equal to ~5 Hz.

2.3. Mechanical Dimensions

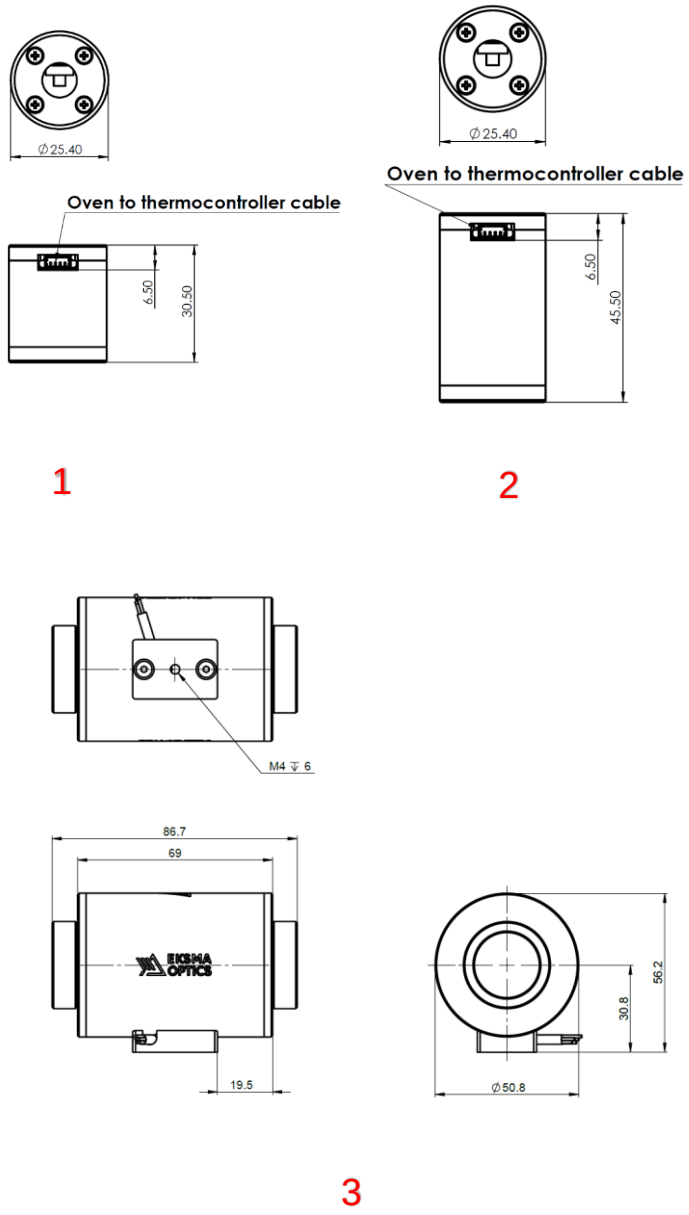

Figure 2. Outline drawing and dimensions of HP15 (1), HP30 (2), HP200(3) ovens

3.1. Unpacking

1. Inspect the shipping container for damage related to transportation. If any damage is present, inform EKSMA Optics and the transportation agency.
2. Moisture may damage the device. Prevent condensation forming on the device: allow packaging to warm up to room temperature (at least 4 hours).
3. Unpack and inspect contents for exterior damage related to transportation. If any damage is present, inform EKSMA Optics and the transportation agency.

3.2. Installation Procedure

Heatpoint oven comes to you pre-assembled for an easier mounting of your own crystal. No soldering will be needed to complete the assembly. Roman numerals in this guide represents assembly steps, and decimal numbers refer to specific components.

3.2.1. HP15/HP30 assembly steps

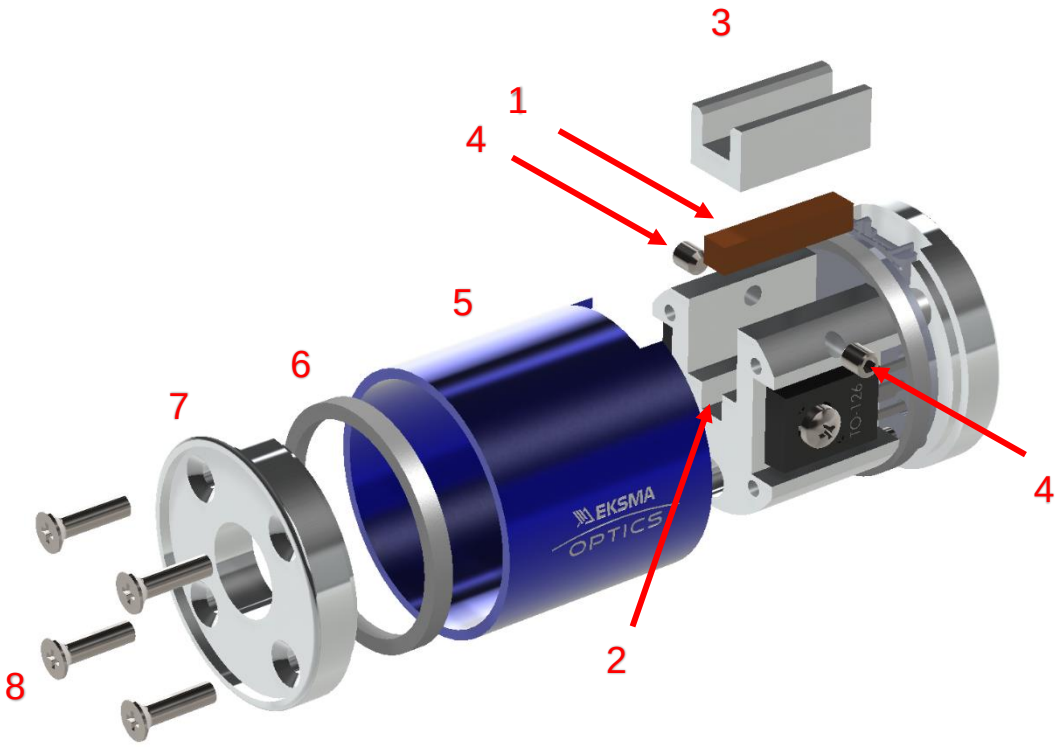

Figure 3. HP15/HP30 oven exploded view

I. A non-linear crystal (1) should be inserted into an adapter recess (2). A crystal cover (3) should be gently put on top of a crystal and secured with two headless set screws (4).

II. An adapter then needs to be inserted into a blue oven casing (5). Gently and slowly push the adapter into a casing (trying not to touch the optical surfaces of a crystal).

III. A Teflon gasket (6) should be inserted, before mounting an end cover (7). Please note, the **recess in a gasket** should be oriented **towards** an adapter inside the oven as shown in **Figure 4.**

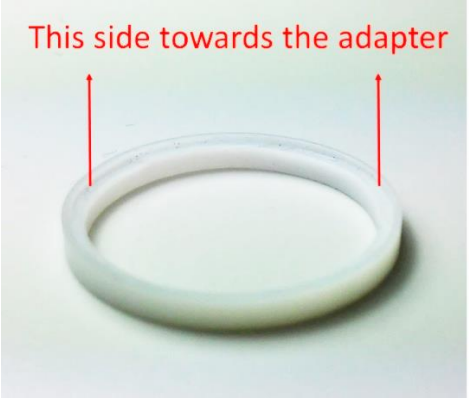

Figure 4. Orientation of Teflon gasket

IV. Mount end cover (7) and secure the cover in place with cap screws (8) to complete the assembly.

3.2.2. HP200 assembly steps

I. A non-linear crystal (1) should be inserted into an adapter recess (2). A crystal covers (3) and (4) should be gently put on top of a crystal and secured with two circlips (5) ant tension applied with two headless set screws (6).

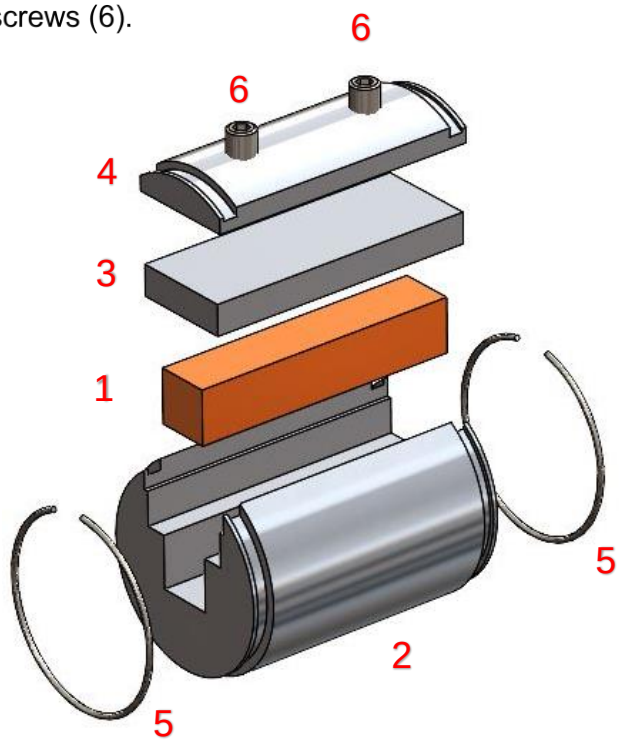

Figure 5. HP200 oven assembly step 1

II. An adapter then needs to be inserted into oven casing (7). Gently and slowly push the adapter into a casing (trying not to touch the optical surfaces of a crystal).

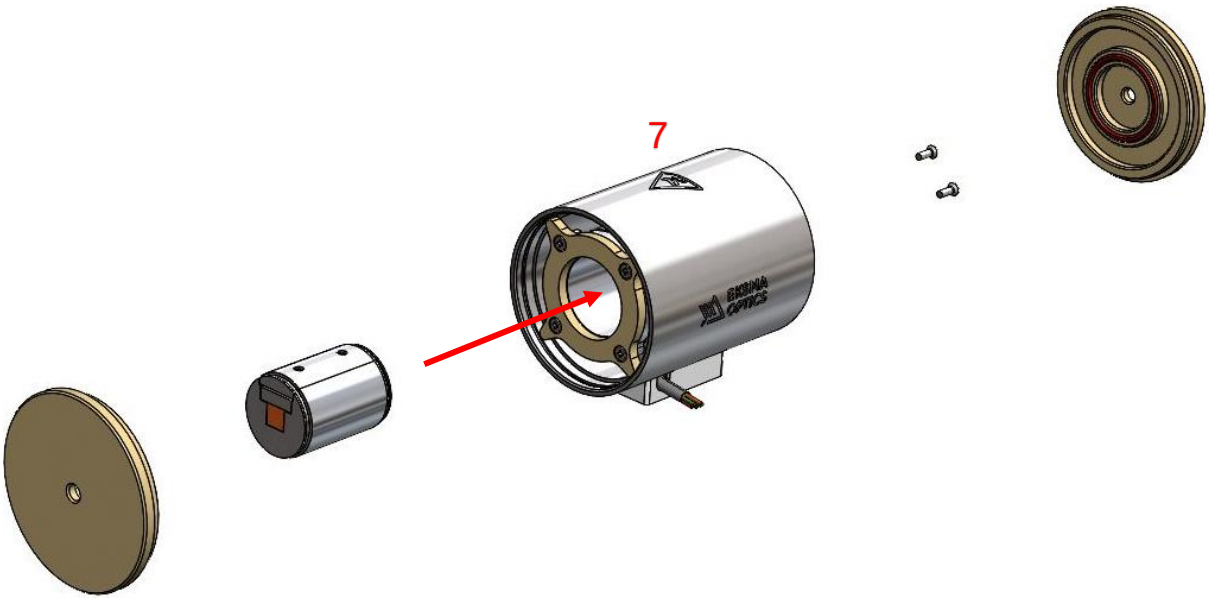

Figure 6. HP200 oven assembly step 2

III. The adapter must be fixed with two countersunk screws (8) through the back of oven casing (7).

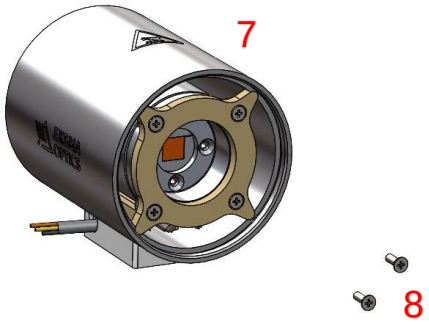

Figure 7. HP200 oven assembly step 3

IV. Mount end covers (9) by turning clockwise to complete the assembly.

Figure 8. HP200 oven assembly step 4

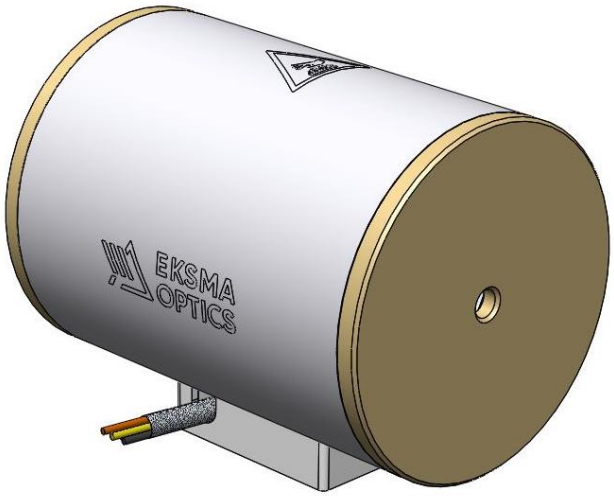

Figure 9. HP200 oven assembled

3.3. Powering and Temperature Adjusting

1. Connect the thermocontroller (see **Figure 11**) to HP15, HP30 oven via Picoblade connector (3) or HP200 oven via Micro-Fit connector (2).
2. Connect the DC 5.5/2.5mm plug of the power supply into the power jack (1) on the thermocontroller (see **Figure 11**).
3. Turn-on or turn-off the thermocontroller by long-pressing (~3s) the navigation button (4) (see **Figure 11**).
4. When device is turned on oven temperature is shown on the OLED display. Use navigation button (4) in up/down direction to adjust the temperature (see **Figure 11**).
5. When device is turned on, pressing (~1s) the navigation button will bring up a temperature ramp adjustment screen. Use navigation button (4) in up/down direction to adjust the temperature ramp speed.

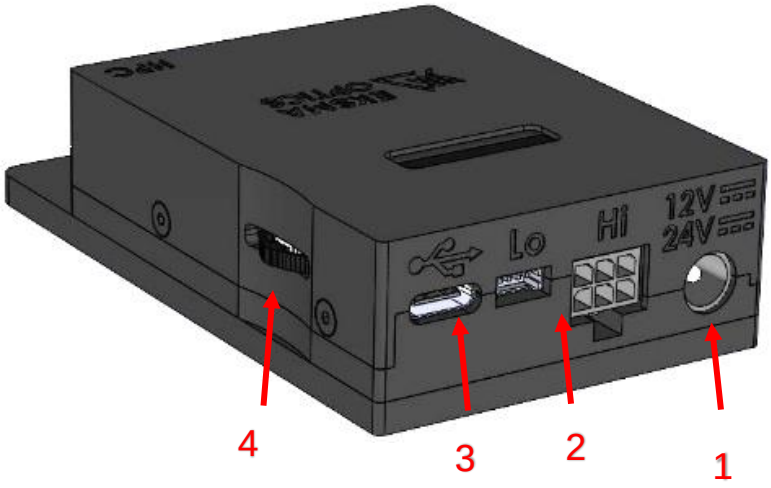

Figure 10. Thermocontroller

4.1. General information

Thermocontroller can be controlled via USB-C (Virtual COM Port) and/or Picoflex Ribbon-Cable Connector (CAN bus). Picoflex Ribbon-Cable Connector (1) and CAN terminator (2) can be accessed by opening backside cover of the thermocontroller (**Figure 12**).

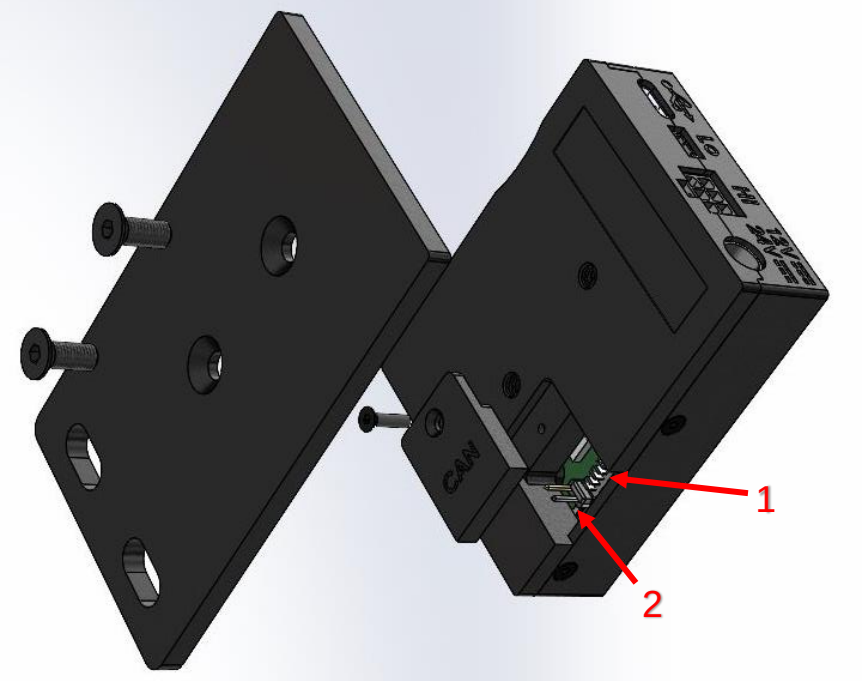

Figure 11. Access to CAN bus connector

Table 3. Registers

	USB (commands)	CAN bus			
Name	Keyword	Reg ID_{10}	Min $value_{10}$	Max $value_{10}$	Print format
Control	:CTRL	16	0	2	OFF, ON, Error
Temp ramp	:RAMP	17	1000	4000	%.3fdegC/min
Temp ramp limit	:LIMITRAMP	31	4000	20000	%.3fdegC/min
PID output	:PIDout	18	0	130000	%06u
Warnings	:INFO	29	0	255	%03u
Version	*IDN	30	0	255	%03u
Low temp oven					
Set temp	:SetLTO	19	25000	70000	%.3fdegC
Temp	:LTO	20	0	70000	%.3fdegC
Proportional	:LTOP	21	0	65535	%.2f
Integral	:LTOI	22	0	65535	%.2f
Derivative	:LTOD	23	0	65535	%.2f
LTO offset	:ClbrLTO	32	0	255	%.2f

High temp oven					
Set temp	:SetHTO	24	25000	220000	%.3fdegC
Temp	:HTO	25	0	250000	%.3fdegC
Proportional	:HTOP	26	0	65535	%.2f
Integral	:HTOI	27	0	65535	%.2f
Derivative	:HTOD	28	0	65535	%.2f
HTO offset	:ClbrHTO	33	0	255	%.2f
Other					
Change CAN ID	:CANID	-	1	62	-
	- for advanced users				

4.2. USB-C communication

USB communication is achieved by using mapped (virtual) COM port on the PC. HyperTerminal or other software may be used to communicate with the device. When communicating through the mapped COM port over USB, the baud rate for the communication port used by the USB chip must match the baud rate for the COM port on the PC. The baud rate of thermocontroller USB is fixed to 9600 bits/s.

The command string is parsed and executed after reading these characters. These characters are the “carriage return” and “linefeed”. They are ASCII char-acter set values 13 and 10 respectively (hex 0x0D and 0x0A).

When the device responds to a command, whether it is a query or a parameter change, it also appends its return strings with these characters. Coded applications could use this behavior to know when to stop reading from the unit.

The device responds to every communication string. If the communication string is a query, the unit responds with the queried response (or error code) followed by the line terminators. If the communication string is a parameter change, the response is “ok” (or error code) followed by the line terminators. For this reason, it is not recommended that multiple commands be stacked together into single strings as is common with some other types of instruments. It is recommended that the coded application send a single command in a string and follow immediately by reading the response from the unit. Repeat this sequence for multiple commands. Commands are not case sensitive.

4.2.1. IEEE 488.2 Common Command Format

The IEEE 488.2 Common Commands control and manage generic system functions such as identification. Common commands always begin with the asterisk (*) character and may include parameters. For Example:

*IDN?<cr><lf>

4.2.2. SCPI Command Format

SCPI commands control and set instrument specific functions such as setting the temperature, ramp rate or device state. SCPI commands composed of functional elements that include keywords, data parameters and terminators. For example:

SCPI Format

:CTRL?<cr><lf>

:RAMP 6<cr><lf>

:SetHTO 119.5<cr><lf>

Any parameter may be queried by sending the command with a question mark appended. For example:

- QUERY FORMAT

:CTRL?<cr><lf>

Will return: 0<cr><lf>

:LTO?<cr><lf>

Will return: 52.548<cr><lf>

:SetLTO 60.5<cr><lf>

Will return: ok<cr><lf>

4.2.3. Error Codes

The unit responds to all commands with either: ok<cr><lf> or ?n<cr><lf>

Where "n" is one of the following error codes:

1 Incorrect prefix, i.e. no colon or * to start command.

2 Missing command keyword.

3 Invalid command keyword.

4 Missing parameter.

5 Invalid parameter.

6 Query only, command needs a question mark.

4.2.4. Programming examples

Example 1)

High temperature oven (HTO) temperature 210.5 °C, temperature ramp rate 6°C/min, turn on device.

:SetHTO 210.5<cr><lf>	Set HTO temperature to 210.5 °C
:RAMP 6<cr><lf>	Set temperature ramp rate to 6 °C/min
:CTRL 1<cr><lf>	Turn on device

Example 2)

Low temperature oven (LTO) temperature 50.6 °C, temperature ramp rate 3.5°C/min, change CAN ID to 33.

:SetLTO 50.6<cr><lf>	Set LTO temperature to 50.6 °C
:RAMP 3.5<cr><lf>	Set temperature ramp rate to 3.5 °C/min
:CANID 33<cr><lf>	Set CAN ID to 33

4.3. CAN bus

CAN communication with a PC is achieved by connecting the device to CAN-USB converter and controlling it via „CAN browser“ software. Accusable registers via CAN bus can be found in table 3. CAN protocol is proprietary of EKSMA Optics. Protocol description is provided on request.