

# OPTRIS CT/CTL communication interface

## Serial interface parameters

<b>Baud rate:</b>	<b>9600...115200, set by user (factory default: 9600)</b>
<b>Data bits:</b>	<b>8</b>
<b>Parity:</b>	<b>none</b>
<b>Stop bits:</b>	<b>1</b>
<b>Flow control:</b>	<b>off</b>

## Protocol

The protocol of the OPTRIS CT is a binary protocol. Checksum is needed for set commands but not for read commands. The protocol has no additional overhead with CR, LR or ACK bytes. This makes the communication fast.

To get the current object temperature the user must send a simple 01<sub>hex</sub> byte and the CT will respond with the two byte temperature. To get the temperature as floating value subtract 1000 and divide by 10.

## Checksum's

If the device is setup to use checksums any SET command must have a checksum suffix. The checksum can be switched off with command AD. After every "Power on" the device will expect the checksum again. The checksum byte is build by the arithmetical XOR of all command bytes except of the address prefix.

To switch off the checksums with the SET command AD you must send the checksum.

To switch on the checksums with the SET command AD you must not send the checksum.

## Addressing RS485

This is relevant for communication with the RS485 bus only. OPTRIS CT's with RS232 or USB communication will respond to any address. If you use the RS485 interface board you must use the multidrop addresses.

A multidrop address is a simple prefix byte to the command. The byte is build by adding the hexadecimal value B0 to the device address. B5 01 will read the temperature from the device with the address 5.

The address of any device can be set by the device user interface ("M\_\_01") or by the communication interface with the command 90.

A special case is address prefix B0 for set commands. Because there is no multidrop address 0 this addresses no certain device. But a SET command with prefix broadcast the command to all devices at the RS485 bus.

Note: The command is executed immediatly on any of the devices even if they do not respond to the command. That is because all are slaves and can't talk at the same time.

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# 1 Basic Functions

DECIMAL	HEX	Command	Data	Answer	Result	Unit
1	0x01	READ Temp. - process	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C
2	0x02	READ Temp. - Head	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C
3	0x03	READ Temp. - Box	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C
129	0x81	READ Temp. - Act.	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C

## 1.1 IR- Settings

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
4	0x04	READ Epsilon	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2}) / 1000$		no
132	0x84	SET Epsilon	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2}) / 1000$		yes
5	0x05	READ Transmission	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2}) / 1000$		no
133	0x85	SET Transmission	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2}) / 1000$		yes

## 1.2 Aiming

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
37	0x25	READ Spot Illumination	none	byte1	= ON if byte1 =1 , OFF if byte1=0		no
165	0xA5	SET Spot Illumination	byte1	byte1	= ON if byte1 =1 , OFF if byte1=0		yes

# 2 Signal Processing

## 2.1 Averaging

Smart averaging stops averaging if big temperature changes are occurring. For more information see manual.

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
6	0x06	READ AVG Time	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2}) / 10$	seconds	no
134	0x86	SET AVG Time	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2}) / 10$	seconds	yes
28	0x1C	READ AVG Mode (smart averaging)	none	byte1	1 = smart averaging, 0 = normal		no
156	0x9C	SET AVG Mode (smart averaging)	byte1	byte1	1 = smart averaging, 0 = normal		yes

## 2.2 Hold Functions

To set peak or valley hold set a value >0 seconds. Valley hold disables peak hold and vice versa. Note, that the peak pick function is only available on short wavelength sensors (1M, 2M, 3M, ratio), see manual.

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
8	0x08	READ Peak Hold Time	none	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2}) / 10$	seconds	no
136	0x88	SET Peak Hold Time	byte1 byte2	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2}) / 10$	seconds	yes
7	0x07	READ Valley Hold Time	none	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2}) / 10$	seconds	no
135	0x87	SET Valley Hold Time	byte1 byte2	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2}) / 10$	seconds	yes
29	0x1D	READ Advanced Hold Mode	none	byte1	0 = off , 1 = Peak , 2 = Valley		no
157	0x9D	SET Advanced Hold Mode	byte1	byte1	0 = off , 1 = Peak , 2 = Valley		yes
30	0x1E	READ Advanced Hold threshold	none	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2} - 1000) / 10$		no
158	0x9E	SET Advanced Hold Threshold	byte1 byte2	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2} - 1000) / 10$		yes
34	0x22	READ Adv. Hold Hysterese	none	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2}) / 10$		no
162	0xA2	SET Adv. Hold Hysterese	byte1 byte2	byte1 byte2	$=(\text{byte1} * 256 + \text{byte2}) / 10$		yes
65	0x41	READ Pick Mode	none	byte1	0 - off , 1 - Peak Pick 2 - Valley Pick		no
174	0xAE	SET Pick Mode	byte1	byte1	0 - off , 1 - Peak Pick 2 - Valley Pick		yes

## 3 Analog output settings

For the analog output there are the output channels 1 and 2. They are to be set up with the ALARMx. An output which is set up to digital is an alarm output. Details are shown in the tables below. For further information see the examples.

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
40	0x28	READ ALARMx Mode	byte1	byte1 byte2	See following discription		no
168	0xA8	SET ALARMx Mode	byte1 byte2	byte1 byte2	See following discription		yes

First byte defines the output channel to be set up.

Byte1	Alarm
0	Alarm 1
1	Alarm 2
2	Output channel 2 (ambient / head temperature)
3	Output channel 1 (IR / Object temperature)

Byte 2 is the sum of bit0-bit7

Bit	Description	valence
Bit7	Source for the alarm is the box temperature	128
Bit6	Source for the alarm is the head temperature	64
Bit5	Source for the alarm is the object temperature	32
Bit4	0 = contact is normally closed, 1 = contact is normally open	16
Bit3	1 = Output is digital, 0 = output is analog (if not used for alarm)	8

Bit2, Bit1 and Bit0 decode binary the value 0 to 5:

- 0 = Output as 0...10mV
- 1 = Output as 0...5V
- 2 = Output as 0...20mA
- 3 = Output as 4...20mA
- 4 = Output as TCK
- 5 = Output as TCJ

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
24	0x18	READ Low End for outputs	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	no
152	0x98	SET Low End for outputs	byte1 byte 2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes
25	0x19	READ High End for outputs	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	no
153	0x99	SET High End for outputs	byte1 byte 2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes
17	0x11	READ Skal_Out_Min	none	byte1 byte2	mV or µA		no
145	0x91	SET Skal_Out_Min	byte1 byte2	byte1 byte2	mV or µA		yes
18	0x12	READ Skal_Out_Max	none	byte1 byte2	mV or µA		no
146	0x92	SET Skal_Out_Max	byte1 byte2	byte1 byte2	mV or µA		yes

## 4 Alarm Settings

The optris CT / optris CTlaser has 4 alarms, AL 1 sets the blue LED of the electronic box. AL 2 sets the red LED and the open collector output AL2. AL3 sets the ambient temperature output (OUT-AMB) to an alarm output. Note that the (OUT-AMB) only provides voltages and is only available on optris CTLT and optris CTlaserLT sensors. AL4 sets the analog output (out-mV/mA) to an alarm output.

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
10	0x0A	READ AL1 value	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	no
138	0x8A	SET AL1 value	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes
11	0x0B	READ AL2 value	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	no
139	0x8B	SET AL2 value	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes
12	0x0C	READ AL3 value	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	no
140	0x8C	SET AL3 value	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes
13	0x0D	READ AL4 value	none	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	no
141	0x8D	SET AL4 value	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes

## 5 Advanced Settings

### 5.1 Sensor Information/ Calibration

If sensor head or electronic is exchanged it is necessary to set the right head code. With the tweak function the sensor can be linear recalibrated.

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
14	0x0E	READ Serial number	none	byte1 byte2 byte3	=byte1*65536 + byte2*256 + byte3		no
15	0x0F	READ FW Rev.	none	byte1 byte2	=byte1*256 + byte2		no
69	0x45	READ Sensor information	none	byte1 - byte6	byte1,byte2 = Modelword , byte3,byte4 = lower temperature , byte5,byte6 = upper temperature		no
36	0x24	READ Head Code	byte1	byte1 byte2 byte3 byte4	byte1 = Block Nr. , byte 2-4 = Headcode (5 bit per character)		no
164	0xA4	SET Head Code	byte1 byte2 byte3 byte4	byte1 byte2 byte3 byte4	byte1 = Block No. , byte 2-4 = Headcode (5 bit per character)		yes
38	0x26	READ Tweak Offset	none	byte1 byte2	= (byte1*256 + byte2 - 1000) / 10		no
166	0xA6	SET Tweak Offset	byte1 byte2	byte1 byte2	= (byte1*256 + byte2 - 1000) / 10		yes
39	0x27	READ Tweak Gain	none	byte1 byte2	= (1/2^15) * (byte1*256 + byte2)		no
167	0xA7	SET Tweak Gain	byte1 byte2	byte1 byte2	= (1/2^15) * (byte1*256 + byte2)		yes

### 5.2 Advanced IR-Settings

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
19	0x13	READ Amb. Temp. Source	none	byte1	1 = ext. Analog , 2 = ext. FIX 3 = Head Temp		no
147	0x93	SET Amb. Temp. Source	byte1	byte1	1 = ext. Analog , 2 = ext. FIX 3 = Head Temp		yes
20	0x14	READ Amb. Temp. Fix Value	none	byte1 byte2	= (byte1*256 + byte2 - 1000) / 10		no
148	0x94	SET Amb. Temp. Fix Value	byte1 byte 2	byte1 byte2	= (byte1*256 + byte2 - 1000) / 10		yes
21	0x15	READ Eps. Source	none	byte1	1 = ext. Analog , 2 = ext. FIX 3 = table		no
149	0x95	SET Eps. Source	byte1	byte1	1 = ext. Analog , 2 = ext. FIX 3 = table		yes

### 5.3 Advances Digital Communication Settings

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
45	0x2D	READ if check sum expected	none	byte1	0 - without check sum 1 - with check sum		no
173	0xAD	SET check sum expected	byte1	byte1	0 - CT expects no check sum 1 - CT expects check sum		yes
80	0x50	Read out Burst String		byte1 byte2 byte3 byte4	Burstmode Description below		no
81	0x51	Set Burst String	byte1 byte2 byte3 byte4	byte1 byte2 byte3 byte4			yes
82	0x52	Set Burstmode	byte1	byte1	1 = start , 0 = stop		yes
130	0x82	SET Baudrate	byte1		Parameter byte1 = 0 - 9600 1 - 19200 2 - 38400 3 - 57600 4 - 115200		yes

## 5.4 Loop Maintenance

In order to simulate hot objects in the scene and double check the analog circuits the loop maintenance makes the analog output sending fixed values. Note: It is necessary to reset DAC percentage to get back to measure mode.

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
26	0x1A	READ Out value for IR-DAC percentage	none				no
154	0x9A	SET IR DAC percentage	byte1	byte1	0..100		yes
27	0x1B	READ Out value for Amb. DAC percentage	none				no
155	0x9B	SET AMB. DAC percentage	byte1	byte1	0..100		yes
143	0x8F	RESET the DAC percentage output	keine				yes

## 5.5 Emissivity Determination

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
159	0x9F	SET Emissivity determination target temp	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes
160	0xA0	SET Emissivity determination actual temp	byte1 byte2	byte1 byte2	$= (\text{byte1} * 256 + \text{byte2} - 1000) / 10$	°C	yes
161	0xA1	SET Emissivity determination status	byte1	byte1	0 = off , 1 = on	°C	yes

## 5.6 Further Advanced Settings

DECIMAL	HEX	Command	Data	Answer	Result	Unit	Check sum
169	0xA9	SET DEFAULT	none	byte1	Set CT default Data (as MODE + DOWN button)		yes
67	0x43	READ PANEL LOCK	none	byte1	0 - Keys available 1 - Keys locked		no
68	0x44	SET PANEL LOCK	byte1	byte1	0 - Keys available 1 - Keys locked		yes
9	0x09	READ temp. Unit	none	byte1	°C if byte1 =1 °F if byte1 =1		no
137	0x89	SET Temp. Unit	byte1	byte1	°C if byte1 =1 °F if byte1 =1		yes
112	0x70	SET Save Settings after changing	byte1	byte1	1 = Data are not written in flash anymore 0 = Data are written in flash		yes
113	0x71	READ Save Settings after changing	byte1	byte1	1 = Data are not written in flash anymore 0 = Data are written in flash		no

## 6 Examples

Read Commands	Send	Receive	
Reading a target temperature	01	04 D3	$(04D3_{\text{hex}} - 1000)/10 = (1235 - 1000)/10 = 23.5^{\circ}\text{C}$
Reading a target temp. with device address 5	B5 01	04 D3	23.5°C
Reading emissivity	04	03 B6	$03B6_{\text{hex}}/1000 = 950/1000 = 0.950$
Reading serial number	0E	3D CC 5D	$3DCC5D_{\text{hex}} = 4050013$
Query whether the device uses checksums	2D	01	01 = Device uses checksums

Set Commands	Send *)	Receive	
Setting the alarm 1 value	8A 04 D3 [5D]	04 D3	$(04D3_{\text{hex}} - 1000)/10 = (1235 - 1000)/10 = 23.5^{\circ}\text{C}$
Setting the alarm 1 value with device address 5	B5 8A 04 D3 [5D]	04 D3	23.5°C
Setting the emissivity to 0.95	84 03 B6 [31]	03 B6	$03B6_{\text{hex}}/1000 = 950/1000 = 0.950$
Giving the device with address 5 the new address 6	B5 90 06 [96]	06	After this command you have to use B6 as address prefix
Switch the checksums off, if the device uses checksums	AD 00 [AD]	00	
Switch the checksums on, if the device does not use checksums	AD 01	01	
Setting the baud rate of all devices at the same time to 115200 baud	B0 82 04 [86]		After this the communication baud rate is set to 115200 and the master device must change its own baud rate too.

\*) Checksum in square brackets

Line mode commands	Send	Receive	
Reading the target temperatures from the devices with addresses 1..5 one time:	2E 05	04 D3 04 4C 04 B0 05 14 05 78	Address 1 = $04D3_{\text{hex}} = 23.5^{\circ}\text{C}$ Address 2 = $044C_{\text{hex}} = 10.0^{\circ}\text{C}$ Address 3 = $04B0_{\text{hex}} = 20.0^{\circ}\text{C}$ Address 4 = $0514_{\text{hex}} = 30.0^{\circ}\text{C}$ Address 5 = $0578_{\text{hex}} = 40.0^{\circ}\text{C}$
Reading the target temperatures from the devices with addresses 1..5 continuously with a cycle time of 50ms, timer is device 3	B3 2F 32 05	2E 05 04 D3 04 4C 04 B0 05 14 05 78	2E 05 is the continuously repeated command of time device 3 temperatures: (23.5°, 10°, 20°, 30°, 40°)
Stopping the continuously line mode of timer device 3	B3 2F 00 00	-	This stops line mode of timer device 3. Note: If you setup a big number of devices with a short cycle time it is possible that the line mode can't be stopped.

### 6.1 Head Code

The head code commands (read 24, set A4) must be sent for any of the three blocks of the head code.

The first byte of the command is the head code block number.

The three following data bytes of any of the three commands encode the four digits of any block in a 5-bit-format.

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte2					d3.4	d3.3	d3.2	d3.1
Byte3	d3.0	d2.4	d2.3	d2.2	d2.1	d2.0	d1.4	d1.3
Byte4	d1.2	d1.1	d1.0	d0.4	d0.3	d0.2	d0.1	d0.0

dx.4 .. dx.0 encodes the bytes of the block in a 5-bit-format (the ASCII-numbers followed by the ASCII-letters):

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111
0	1	2	3	4	5	6	7	8	9	A	B	C	C	E	F

10000	10001	10010	10011	10100	10101	10110	10111	11000	11001	11010	11011	11100	11101	11110	11111
G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V

Example: (head code is B6JG M2IM 0IKC):

Send the two bytes 24 01 to retrieve the second block of the Head code:

The command responds: 01 0B 0A 56

This is binary: 00000001 00001011 00001010 01010110

With other words: 10110 00010 10010 10110 => M2IM



Read/Set Head Code	Send *)	Receive	
Read head code block 1	24 00	00 05 9A 70	B6JG
Read head code block 2	24 01	01 0B 0A 56	M2IM
Read head code block 3	24 02	02 00 4A 8C	0IKC
Set head code block 1 to B6JG	A4 00 05 9A 70 [4B]	00 05 9A 70	B6JG
Set head code block 2 to M2IM	A4 01 0B 0A 56 [F2]	01 0B 0A 56	M2IM
Set head code block 3 to 0IKC	A4 02 00 4A 8C [60]	02 00 4A 8C	0IKC

\*) Checksum in square brackets

## 6.2 Alarm mode

The OPTRIS CT has 4 alarms. These alarm modes can be controlled by the Alarm mode command (read 28, set A8).

To read or set an alarm mode a byte must follow the command byte that specifies the alarm:

Byte1	Alarm
0	Alarm 1
1	Alarm 2
2	Output channel 2 (ambient / head temperature)
3	Output channel 1 (IR / Object temperature)

The data byte (byte2) contains the following information

Bit	Description	Relevant for alarm				
		0	1	2	3	
Bit7	Source for the alarm is the box temperature	x	x	x	-	
Bit6	Source for the alarm is the head temperature	x	x	x	-	
Bit5	Source for the alarm is the object temperature	x	x	x	x	
Bit4	0 = contact is normally closed, 1 = contact is normally open	x	x	x	x	
Bit3	1 = Output is digital, 0 = output is analog (if not used for alarm)	-	-	x	x	
Bit0...2	0 = Output as 0...10mV	1 = Output as 0...5V	-	-	x	x
	2 = Output as 0...20mA	3 = Output as 4...20mA	-	-	-	x
	4 = Output as TCK	5 = Output as TCJ				

Note: not every setting is relevant for all alarms. For example the IR-Output cant watch the box temperature, but it is the only one that can configured as Thermocouple J.

Read/Set alarm examples	Send *)	Receive	
Read alarm mode, alarm 1	28 00	00 80	Source=TBox, normally closed
Read alarm 1 value	0A	04 1A	5°C
Read alarm mode, alarm 2	28 01	01 90	Source=TBox, normally open
Read alarm 2 value	0B	05 DC	50°C
Read alarm mode, ambient output	28 02	02 51	Source=THead, normally open, digital
Read ambient output alarm value	0C	06 A5	70.1°C
Read alarm mode, IR output	28 03	03 23	Source=TObj, normally closed, digital, 4..20mA
Read IR output alarm value	0D	0B B8	200°C
Set alarm mode, IR output	A8 03 03 [88]	03 23	Source=TObj, normally closed, digital, 4..20mA
Set IR output alarm value	8D 07 D0 [5A]	07 D0	100°C

\*) Checksum in square brackets

### 6.3 Material table

The material table is organized in 8 rows and 4 columns. The rows correspond with the 8 entries in the table and the columns are defined as follow:

Column	Content	
0	Epsilon	= (byte2*256 + byte3) / 1000
1	Alarm value A	= (byte2*256 + byte3 - 1000) / 10
2	Alarm value B	= (byte2*256 + byte3 - 1000) / 10
3	Device (is the same for all 8 entries)	Higher 4 bit of byte3: source of alarm A Lower 4 bit of byte3: source of alarm B Alarm sources: 0 = alarm 1 (blue backlight) 1 = alarm 2 (red backlight) 2 = output channel 2 (ambient output) 3 = output channel 1 (IR output) 4 = alarm is not used by material table

Also see the OPTRIS CT manual for material table editing.

To read or set a value in the material table a byte must follow the command byte that specifies row and column in the table.

The higher 4 bit of this byte determines the table entry number (0..7).

The lower 4 bit determines the column (0 = Eps., 1 = Alarm A, 2 = Alarm B, 3 = Device).

Read/Set material table	Send *)	Receive	
Read material table entry 0, epsilon	23 00	00 03 C0	03C0 <sub>hex</sub> /1000 = 960/1000 = 0.96
Read material table entry 0, alarm A	23 01	01 04 B0	(04B0 <sub>hex</sub> - 1000)/10 = (1200-1000)/10 = 20°C
Read material table entry 0, alarm B	23 02	02 07 D0	(07D0 <sub>hex</sub> - 1000)/10 = (2000-1000)/10 = 100°C
Read material table entry 0, device	23 03	03 00 31	Source for alarm A: 3 = IR output Source for alarm B: 1 = alarm 2
Set material table entry 7, epsilon	A3 70 03 D4 [04]	70 03 D4	ε = 0.98
Set material table entry 7, alarm A	A3 71 17 70 [B5]	71 17 70	500°C
Set material table entry 7, alarm B	A3 72 1F 40 [8D]	72 1F 40	700°C
Set material table entry 7, device	A3 73 00 31 [E1]	73 00 31	Source for alarm A: 3 = IR output Source for alarm B: 1 = alarm 2

\*) Checksum in square brackets

### 6.4 Burst mode

The burst string consists of 8 "half bytes".

Half byte	Value
1	Target temperature
2	Head temperature
3	Box temperature
4	Current target temperature
5	Emissivity
6	Transmissivity
7-15	not used
0	End of burst string

Read/Set Burst examples	Send *)	Receive	
Command for read out of burst string	50	12 34 56 78	reads the burst string
Set burst string	51 12 00 00 00	12 00 00 00	sets burst string to target and head temperature
Start burst mode	52 01	AA AA xx xx xx xx xx xx ...	starts the burst mode; AA AA is for synchronisation, will be send in front of each new burst
Stop burst mode	52 00		stops the burst mode

## 7 Contact information

If you plan your own software to query and control the OPTRIS CT sensor and you have further questions please contact:

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