

# TGP communication protocol

## Data model

- project consists of multiple pages
- each page contains a list of objects
- each object may have one or more associated parameters
- a parameter can be of type: bit, nibble, byte, integer, or long
- sending page command displays the page with objects and their values
- changing an object sends event with parameter index and new value

## Message frame

- uart parameters: 115200 8n1
- integers are little endian (low byte first)

A0h	device	page	pp0_lo	pp0_hi	pp1_lo	pp1_hi	pp2_lo	pp2_hi	checksum
0	1	2	3	4	5	6	7	8	9

- A0h - page frame, cybro-to-display
- device - device receiving the message (00h-broadcast, 01h..FFh-device number)
- page - request to display specified page
- pp0..pp2 - parameters (optional)
- checksum - sum of all bytes before the checksum mod 256

A1h	device	event	ep0_lo	ep0_hi	ep1_lo	ep1_hi	ep2_lo	ep2_hi	checksum
0	1	2	3	4	5	6	7	8	9

- A1h - event frame, display-to-cybro
- device - device sending the message (00h-not defined, 01h..FFh-device number)
- event - event triggered by user
- ep0..ep2 - parameters (optional)
- checksum - sum of all bytes before the checksum mod 256

## Parameter encoding

<b>1x long</b>	$long0 = pp0 + pp1 \ll 16$
<b>3x int</b>	int0 = pp0, int1 = pp1, int2 = pp2

<b>6x byte</b>	byte0 = pp0lo, byte1 = pp0hi, byte2 = pp1lo, byte3 = pp1hi, byte4 = pp2lo, byte5 = pp2hi
<b>12x nib</b>	nib0 = pp0n0, nib1 = pp0n1, nib2 = pp0n2, nib3 = pp0n3, nib4 = pp1n0, nib5 = pp1n1, ...
<b>48x bit</b>	bit0 = pp0b0, bit1 = pp0b1, bit2 = pp0b2, bit3 = pp0b3, bit4 = pp0b4, bit5 = pp0b5, ...

Any combination of types can be used.

## Object specifications

	<b>page</b>	<b>event</b>
<b>decimal number</b>	enable, value	none
<b>multi-state indicator</b>	enable, value	none
<b>push button</b>	enable	1 = press, 2 = release, 3 = long press
<b>toggle button</b>	enable, value	value
<b>slider input</b>	enable, value	value (on change, max 200ms)
<b>numeric input</b>	enable, value	value (update on enter)

## Cybro-to-Display

<b>page</b>	<b>pp0</b>	<b>pp1</b>	<b>pp2</b>	<b>description</b>
<b>0</b>	0	0	0	none
<b>1</b>	0	0	0	ping, used to check the connection
<b>2</b>	parameter index	parameter value	0	generic write when the page has too many parameters
<b>10+</b>				project-specific pages

## Display-to-Cybro

<b>event</b>	<b>ep0</b>	<b>ep1</b>	<b>ep2</b>	<b>description</b>
<b>0</b>	0	0	0	none
<b>1</b>	0	0	0	ping, used to check the connection

event	ep0	ep1	ep2	description
2	page	0	0	page request
10+ page	object index	object value	0	object change

## Example

A0	00	page=22	pp0=220 (setpoint)	pp1=-1 (disable)	pp2=-1 (disable)
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⇒ set page 22, setpoint 22.0°C, disable fan, disable ventilator

A1	00	page=22	ep0=0 (setpoint)	ep1=225 (value)
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⇒ setpoint changed to 22.5°C