

1. TGP communication protocol

1.1. 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

1.2. 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

1.3. Parameter encoding

1x long	$\text{long0} = \text{pp0} + \text{pp1} \ll 16$
3x int	$\text{int0} = \text{pp0},$ $\text{int1} = \text{pp1},$ $\text{int2} = \text{pp2}$

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

Any combination of types can be used.

1.4. Object specifications

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

1.5. Cybro-to-Display

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

1.6. Display-to-Cybro

event	ep0	ep1	ep2	description
0	0	0	0	none
1	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

1.7. 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