Highcross NetString

Data Exchange Protocol (version 2.10)

The data exchange between a main controller and Highcross devices occurs as Telnet-like plain text messages via TCP/IP. Each command, request or message has the termination chars CR+LF (0x0D and 0x0A).

message **DEVICE**

The message **DEVICE** is sent by every device to a controller after the connection is established.
Syntax: **DEVICE<space>=<space><device name>**

Example: `DEVICE = IO16`

request and message **PING** **PING_REPLY**

After receiving the request **PING** from a controller every device sends the message **PING_REPLY** if it is active

messages **PUSH–RELEASE** **PUSHED–RELEASED**

The pair messages **PUSH** and **RELEASE** are sent by a device when a digital input is activated.
(**PUSH** – is an event of closure of **Normally Opened** input or opening of **Normally Closed** input, **RELEASE** is an opposite event).
Syntax: **PUSH[<input number>], RELEASE[<input number>]**

Example:
```
PUSH[9]
RELEASE[9]
```

The pair messages **PUSHED–RELEASED**, in turn, specify the current state of inputs and are sent automatically after conecting to the controller or as a reply to request "?"
Syntax: **PUSHED[<input number>], RELEASED[<input number>]**

Example:
```
PUSHED[9]
RELEASED[9]
```

Command **PULSE**

Used to turn on the digital output temporarily.

Syntax: **PULSE[<output number>]** (default time is 0.5 sec). **PULSE[<output number>]T<time>** (time is set in tenths of seconds)

Example: `PULSE[9]T15`
(Turn on the output number 9 for 1.5 seconds)

If the output is turned on at the moment of command, it will turn off after a set time.

commands **ON — OFF**

Used to turn digital outputs of devices ON and OFF
Syntax: **ON[<output number>] , OFF[<output number >]**

Example:
```
ON[9]
OFF[9]
```

Note: The ECM-IO16 module will send also PUSH and RELEASE messages, since inputs and outputs are physically the same.

After disconnection from a controller a device will switch off all outputs that were "ON" at that moment, if the option "Remember the state of digital output" was not checked in the configuration menu.

command **INV**

Used to invert the state of digital output
Example: `INV[9]`

request **?**

Used to get the current state of the device.
Syntax: **?**
?<modifier> where modifier can be "IN", "OUT" or "ALL"
?<modifier>[<number>]

Examples: `?` `?ALL` `?IN` `?IN[9]` `?OUT` `?OUT[9]`

Error messages

The following error messages are sent by devices as an answer to incorrect commands:

ERR_UNKNOWN_COMMAND
ERR_INCORRECT_COMMAND
ERR_ILLEGAL_PORT
ERR_ILLEGAL_OUTPUT
ERR_ILLEGAL_INPUT
ERR_ILLEGAL_LEVEL
ERR_INPUT_BUFFER_OVERFLOW

Other device-specific commands and messages are described in the following sections.

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EPM-DM3D	3 dimmer outputs (220V, adjustment range 0-255) 6 digital inputs
ECM-LD4D	4 outputs for PWM LED modulation (max. 24V, adjustment range 0-255) 8 digital inputs
ECM-AO4D	4 analog outputs (0-10V, adjustment range 0-255) 8 digital inputs

CONTROLLER COMMANDS	DEVICE MESSAGES
Messages sent after establishing of the connection	
	DEVICE<space>=<space>DM3 DEVICE<space>=<space>LD4 DEVICE<space>=<space>AO4
	LEVEL[<output number>]<space>=<space><level>
	ON[<output number>] or OFF[<output number>]
Messages sent after changing of the device state	
	LEVEL[<output number>]<space>=<space><level>
	ON[<output number>] or OFF[<output number>]
Messages sent as a reply to the controller command	
PING *Example:* ***PING***	PING_REPLY
ON[<output number>] *Example:* ***ON[3]***	If the channel was OFF: LEVEL[<output number>]<space>=<space><level> ON[<output number>] If the channel was ON: ON[<output number>]
OFF[<output number>] *Example:* ***OFF[3]***	If the channel was ON: LEVEL[<output number>]<space>=<space>0 OFF[<output number>] If the channel was OFF: OFF[<output number>]
LEVEL[<output number>]<space>=<space><level> *Example:* ***LEVEL[3] = 127*** *(Set channel 3 to 50%)*	LEVEL[<output number>]<space>=<space><level>
? *Example:* ***?***	For all outputs: LEVEL[<output number>]<space>=<space><level> ON[<output number>] or OFF[<output number>]
?OUT[<output number>] *Example:* ***?OUT[3]***	LEVEL[<output number>]<space>=<space><level> ON[<output number>] or OFF[<output number>]

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ECM-IO16D	16 universal digital inputs/outputs
EPM-RL6D	6 power relay outputs 6 digital inputs
ECM-RL12LVD	12 signal relay outputs 0 digital inputs

CONTROLLER COMMANDS	DEVICE MESSAGES
Messages sent after establishing of the connection	
	DEVICE<space>=<space>IO16 DEVICE<space>=<space>RL6 DEVICE<space>=<space>RL12
	For all inputs: PUSHED[<input number>] or RELEASED[<input number>]
	For all outputs: ON[<output number>] or OFF[<output number>]
Messages sent after changing of the device state	
	For all inputs: PUSH[<input number>] or RELEASE[<input number>]
	For all outputs: ON[<output number>] or OFF[<output number>]
Messages sent as a reply to the controller command	
PING *Example:* ***PING***	PING_REPLY
ON[<output number>] *Example:* ***ON[3]***	ON[<output number>] Also for ECM-IO16D: PUSH[<input number>] or RELEASE[<input number>]
OFF[<output number>] *Example:* ***OFF[3]***	OFF[<output number>] Also for ECM-IO16D: PUSH[<input number>] or RELEASE[<input number>]
PULSE[<output number>] *Example:* ***PULSE[3]***	ON[<output number>] Also for ECM-IO16D: PUSH[<input number>] or RELEASE[<input number>]
PULSE[<output number>]T<time> *Example:* ***PULSE[3]T5***	ON[<output number>] Also for ECM-IO16D: PUSH[<input number>] or RELEASE[<input number>]
INV[<output number>] *Example:* ***INV[3]***	ON[<output number>] or OFF[<output number>] Also for ECM-IO16D: PUSH[<input number>] or RELEASE[<input number>]
? *Example:* ***?***	For all inputs: PUSHED[<input number>] For all outputs: ON[<output number>]
?ALL *Example:* ***?ALL***	For all inputs: PUSHED[<input number>] or RELEASED[<input number>] For all outputs: ON[<output number>] or OFF[<output number>]
?IN *Example:* ***?IN***	For all inputs: PUSHED[<input number>] or RELEASED[<input number>]
?OUT *Example:* ***?OUT***	For all outputs: ON[<output number>] or OFF[<output number>]
?IN[<input number>] *Example:* ***?IN[3]***	PUSHED[<input number>] or RELEASED[<input number>]
?OUT[<output number>] *Example:* ***?OUT[3]***	ON[<output number>] or OFF[<output number>]

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EPM-BS3D	6 relay outputs coupled in 3 channels 6 inputs for direct control

CONTROLLER COMMANDS	DEVICE MESSAGES
Messages sent after establishing of the connection	
	DEVICE<space>=<space>BS3
	For output channels: OPENING[<channel>] or CLOSING[<channel>] or STOPPED[<channel>] For output relays: ON[<relay number>] or OFF[<relay number>]
Messages sent after changing of the device state	
	For output channels: OPENING[<channel>] or CLOSING[<channel>] or STOPPED[<channel>] For relays: ON[<relay number>] or OFF[<relay number>]
Messages sent as a reply to the controller command	
PING *Example:* ***PING***	PING_REPLY
ON[<output number>] *Example:* ***ON[3]***	ON[<relay number>]
OFF[<output number>] *Example:* ***OFF[3]***	OFF[<relay number>]
OPEN[<channel>] *Example:* ***OPEN[3]***	OPENING[<channel>]
OPEN[<channel>]T<time> *Example:* ***OPEN[3]T5***	OPENING[<channel>] The time T is in tenths of second
CLOSE[<channel>] *Example:* ***CLOSE[3]***	CLOSING[<channel>]
CLOSE[<channel>]T<time> *Example:* ***CLOSE[3]T5***	CLOSING[<channel>] The time T is in tenths of second
STOP[<channel>] *Example:* ***STOP[3]***	STOPPED[<channel>]
?OUT *Example:* ***?OUT***	For output channels: OPENING[<channel>] or CLOSING[<channel>] or STOPPED[<channel>] For relays: ON[<relay number>] or OFF[<relay number>]
?OUT[<channel>] *Example:* ***?OUT[3]***	For output channels: OPENING[<channel>] or CLOSING[<channel>] or STOPPED[<channel>] For relays: ON[<relay number>] or OFF[<relay number>]

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ECM-IR4B	4 / 5 IR ports 255 channels per port

CONTROLLER COMMANDS	DEVICE MESSAGES
Messages sent after establishing of the connection	
	DEVICE<space>=<space>IR4
	For all ports: If the port is configured as transmitting: PORT<port>: ON[<channel>] or PORT<port>: OFF If the port is configured as receiving: PORT<port>: PUSHED[<channel>] or PORT<port>: RELEASED
Messages sent after changing of the device state	
	If the port is configured as transmitting: PORT<port>: ON[<channel>] or PORT<port>: OFF[<channel>] If the port is configured as receiving: PORT<port>: PUSH[<channel>] or PORT<port>: RELEASE[<channel>]
Messages sent as a reply to the controller command	
PING *Example:* ***PING***	PING_REPLY
PORT<space><port>:<space>ON[<channel>] *Example:* ***PORT 3: ON[1]***	Stops the transmission (if any) of the IR-command at any channel of the port: PORT<port>: OFF[<transmitting channel>] And starts the transmission of IR-command at defined port and channel PORT<port>: ON[<channel>]
PORT<space><port>:<space>OFF *Example:* ***PORT 3: OFF***	Stops any transmission of an IR-command at defined port: PORT<port>: OFF[<transmitting channel>]
PORT<space><port>:<space>OFF[<channel>] *Example:* ***PORT 3: OFF[1]***	Stops the transmission of an IR-command at specified port and channel. PORT<port>: OFF[<channel>] If any other channel was transmitting, it will be stopped as well: PORT<port>: OFF[<transmitting channel>]
PORT<space><port>:<space>? *Example:* ***PORT 3: ?***	If the port is configured as transmitting: PORT<port>: ON[<channel>] else PORT<port>: OFF If the port is configured as receiving: PORT<port>: PUSHED[<channel>] else PORT<port>: RELEASED
? *Example:* ***?***	For all ports: If the port is configured as transmitting, defines the transmitting channel: PORT<port>: ON[<channel>] else PORT<port>: OFF If the port is configured as receiving, defines the receiving channel: PORT<port>: PUSHED[<channel>] else PORT<port>: RELEASED
PORT<space><port>:<space>PULSE[<channel>] *Example:* ***PORT 3: PULSE[1]***	Stops the transmission (if any) of the IR-command at any channel of the port: PORT<port>: OFF[<transmitting channel>] and transmits the IR-command at specified port and channel during 0.5 sec PORT<port>: ON[<channel>]
PORT<space><port>:<space>PULSE[<channel>]T<time> *Example:* ***PORT 3: PULSE[1]T7***	Stops the transmission (if any) of the IR-command at any channel of the port: PORT<port>: OFF[<transmitting channel>] and transmits the IR-command at the port and channel during the time T (in tenths of second) PORT<port>: ON[<channel>]
PORT<space><port>:<space>IRP<channel>,<time on>,<time off> *Example:* ***PORT 3: IRP1,3,7***	Adds the IR command to the command queue (up to 8). The messages PORT<port>: ON[<channel>] and PORT<port>: OFF[<channel>] will be sent as they are executed in the queue.
PORT<space><port>:<space>IRCLR *Example:* ***PORT 3: IRCLR***	Stops the execution of the queue: PORT<port>: OFF[<channel>].

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ECM-UTM4D	4 universal analog inputs 3 relay outputs

CONTROLLER COMMANDS	DEVICE MESSAGES
MESSAGES SENT AFTER ESTABLISHING OF THE CONNECTION	
	DEVICE<space>=<space>UTM4
	TI[<channel>]<space>=<space><temperature value>
	SP[<channel>]<space>=<space><setpoint value>
	I[<channel>]<space>=<space><temperature value>
	MODE[<channel>]<space>=<space><mode value> (See description of modes in section "MODE")
	BLOCKING[<channel>]<space>=<space><blocking value> The "blocking value" can be "EMPTY", "BLOCKED_OFF", "BLOCKED_ON" and corresponds to the blocking state of digital inputs
	Relay state: ON[<relay number>] or OFF[<relay number>]
	VI[<channel>]<space>=<space><voltage value> CI[<channel>]<space>=<space><current value> RI[<channel>]<space>=<space><resistance value>
Messages sent after changing of the device state	
	TI<channel>]<space>=<space><temperature value> BLOCKING[<channel>]<space>=<space><blocking value> VI[<channel>]<space>=<space><voltage value> CI[<channel>]<space>=<space><current value> RI[<channel>]<space>=<space><resistance value> ON[<relay number>] or OFF[<relay number>]
Messages sent as a reply to the controller command	
PING *Example:* ***PING***	PING_REPLY
SP[<channel>]<space>=<space><setpoint value> *Example:* ***SP[3] = 23***	SP[<channel>]<space>=<space><setpoint value>
MODE[<channel>]<space>=<space><mode value> *Example:* ***MODE[3] = AUTO***	MODE[<channel>]<space>=<space><mode value> The "mode value" can be: "OFF", "AUTO", "FORCED_OFF", "FORCED_ON" Mode "OFF" has protection against freezing Mode "FORCED_OFF" has no protection against freezing
? *Example:* ***?***	For all channels: TI[<channel>]<space>=<space><temperature value> SETPOINT[<channel>]<space>=<space><setpoint value>
?ALL *Example:* ***?ALL***	TI<channel>]<space>=<space><temperature value> SP[<channel>]<space>=<space><setpoint value> MODE[<channel>]<space>=<space><mode value> BLOCKING[<channel>]<space>=<space><blocking value> VI[<channel>]<space>=<space><voltage value> CI[<channel>]<space>=<space><current value> RI[<channel>]<space>=<space><resistance value> ON[<relay number>] or OFF[<relay number>]
?TI[<channel>] *Example:* ***?TI[3]***	TI[<channel>]<space>=<space><temperature value>
?SP[<channel>] *Example:* ***?SP[3]***	SP[<channel>]<space>=<space><setpoint value>
?MODE[<channel>] *Example:* ***?MODE[3]***	MODE[<channel>]<space>=<space><mode value>
?BLOCKING[<channel>] *Example:* ***?BLOCKING[3]***	BLOCKING[<channel>]<space>=<space><blocking value>
?OUT[<channel>] *Example:* ***?OUT[3]***	ON[<relay number>] or OFF[<relay number>]
?IN[<channel>] *Example:* ***?IN[3]***	VI[<channel>]<space>=<space><voltage value> CI[<channel>]<space>=<space><current value> RI[<channel>]<space>=<space><resistance value>

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ECM-DTS16D	8 channels in direct connection 16 channels in bus connection

CONTROLLER COMMANDS	DEVICE MESSAGES
MESSAGES SENT AFTER ESTABLISHING OF THE CONNECTION	
	DEVICE<space>=<space>DTS16
	TI[<channel>]<space>=<space><temperature value>
Messages sent after changing of the device state	
	TI[<channel>]<space>=<space><temperature value>
Messages sent as a reply to the controller command	
PING *Example:* ***PING***	PING_REPLY
? *Example:* ***?***	For all channels: TI[<channel>]<space>=<space><temperature value>
?TI[<channel>] *Example:* ***?TI[3]***	TI[<channel>]<space>=<space><temperature value>

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