D-BOX

RS-232 / UDP / TCP/IP

REMOTE CONTROL
COMMUNICATION PROTOCOL

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INTRODUCTION

The RS-232 remote control communication protocol has been designed for HEMC units equipped with RS-232 serial communication ports (please check the rear panel of the unit to see if a port labelled RS-232 is present). Such a remote (with a serial port) can be a personal computer or a dedicated system such as those made by any automation devices with RS-232 capabilities.

The UDP and TCP/IP remote control supports the same commands as the RS-232 using the Ethernet port or a Wi-Fi connection. Such a remote can be a personal computer, a cell phone or a tablet with a UDP/TCP communication program.

WAKE-ON-LAN

Wake-on-LAN can be used if your HEMC unit is black and it is connected using the Ethernet port (not Wi-Fi). It allows you to turn the unit back on after a power off (the unit must have been powered at least once without losing power). A standard *Magic Packet* can be used to wake the HEMC. It is a broadcast frame containing anywhere within its payload 6 bytes of all 255 (FF FF FF FF FF FF in hexadecimal), followed by sixteen repetitions of the 48-bit MAC address, for a total of 102 bytes.

HARDWARE INTERFACE

The electrical interface is EIA232. The DB-9 pinout is the same as on a regular PC. Therefore connecting the HEMC unit from a standard PC requires a Null-Modem cable.

PIN	FUNCTION
1	Carrier Detect (unused)
2	Rx
3	Tx
4	Data Terminal Ready (unused)
5	Ground
6	Data Set Ready (unused)
7	Request to Send (unused)
8	Clear to send (unused)
9	Ring indicator (unused)

TRANSMISSION FORMAT

The transmission format is as follows for RS232:

PARAMETER	VALUE
Configuration	Full-Duplex
Baud Rate	19200
Number of Data Bits	8
Parity	None
Number of Stop Bits	1
Flow Control	None

The configuration is as follows for UDP and TCP/IP communication:

PARAMETER	VALUE
TCP Port	61555
UDP Port	61556
IP address	IP of the HEMC

PROTOCOL ORGANIZATION

The remote control sends commands to which the HEMC responds.

There are some exception cases:
1. If the command is not well formed (not properly framed between terminators, separators missing, etc.), the HEMC will ignore the command and not respond at all.
2. If the command is well formed, but the command mnemonic is not recognized, then the HEMC sends back a NAK, instead of the normal ETX.
3. If the target is not available or it is impossible to use the parameters provided, then the HEMC sends back a NAK, instead of the normal ETX.
4. If too many parameters are sent, the extra parameters are simply ignored.

For many commands a simple acknowledgement is sent back. This is the case of all the WRITE commands. The remote control does not absolutely need to monitor the responses. However, it is the only way to make sure that the HEMC has processed the command.

COMMAND STRUCTURE

Commands are structured as follows:

ELEMENT	VALUE / FORMAT	SEQUENCE	HYPERTERMINAL
Start of block	STX (02h)	ALT + 02	☻
End of block	ETX (03h)	ALT + 03	♥
Record separator	RS (1Eh)	ALT + 030	▲
Enquiry	ENQ (05h)	ALT + 05	

The **Target Number** represents the actual destination of the command in ASCII code and it is always used after the *Start of block* (STX). The target number is zero when the destination is the HEMC unit itself or a number from 1 to N when the target is a motion platform. It is optional in the command message and if absent, it defaults to zero (directed to the HEMC unit itself).

Commands and parameters are separated by a *Record-Separator* ASCII code (1Eh). There is no need for a separator before the first parameter and after the last parameter (the *End-of-Block* code is sufficient after the last parameter). If too many parameters are passed, the extra parameters are ignored.

Commands are represented by a 5-character mnemonic. The first letter (R or W) indicates if the command is a READ command (the remote control requests information from the HEMC), or a WRITE command (the remote control sends a command or parameter to the HEMC).

The *Enquiry* ASCII code (05h) is optional and can be used before the *End-of-Block* code. When it is present, the response includes the original request.

Example targeting the first motion platform (in ASCII):
USAGE: <STX>1WMUTE<RS>0<ETX>

Example targeting the first motion platform, also asking for the original request (in ASCII):
USAGE: <STX>1WMUTE<RS>0<ENQ><ETX>

RESPONSE STRUCTURE

For a recognized command mnemonic, responses are structured as follows:

ELEMENT	VALUE / FORMAT	REQUIRED	HYPERTERMINAL
Parameter(s)	Command-Dependent	No	data
Separator	RS (1Eh)	No	▲
End of Block	ETX (03h)	Yes	♥
Request separator	GS (1Dh)	No	

For an unrecognized command mnemonic, the Motion Controller sends back a single NAK:

ELEMENT	VALUE / FORMAT	REQUIRED	HYPERTERMINAL
Negative acknowledge	NAK (15h)	Yes	§

The request separator is used to separate the original request from the response (when ENQ is used).

Example targeting the first motion platform (in ASCII):
USAGE: <STX>1WMUTE<RS>0<ETX>
NORMAL RESPONSE: <ETX>

Example targeting the first motion platform, also asking for the original request (in ASCII):
USAGE: <STX>1WMUTE<RS>0<ENQ><ETX>
ENQ RESPONSE: <STX>1WMUTE<RS>0<GS><ETX>

COMMAND SET

The following information applies to all command settings:
- The types of separators are represented as: <STX>, <RS>, <GS> and <ETX>. They should be replaced by the corresponding characters in the command or response line.
- When used, parameters are symbolized as <Parameter>.
- When ENQ is used, the response is the same except that it starts with <STX>Request<GS>. The replied request doesn't contain ENQ and ETX.

COMMAND: WMOTL

FUNCTION: Changes the motion intensity level of the targeted platform.
USAGE :   <STX>#WMOTL<RS><Parameter><ETX>

PARAMETERS:
The intensity is expressed in dB (decibels) and should be set between -20 (minimum) and 0 (maximum).
Valid examples are "0", "-5.5", "-20".
NORMAL RESPONSE: <ETX>

COMMAND: WVIBL

FUNCTION: Changes the vibration level of the targeted platform.
USAGE :   <STX>#WVIBL<RS><Parameter><ETX>

PARAMETERS: The vibration level is expressed in dB (decibels) and should be set between -20 and 0.
Valid examples are "0", "-5.5", "-20".
NORMAL RESPONSE: <ETX>

COMMAND: WMUTE

FUNCTION: Activates or deactivates the mute function of the targeted platform.
USAGE : <STX>#WMUTE<RS><Parameter><ETX>
PARAMETERS:
- 0 :   Mute is deactivated
- 1 :   Mute is activated
NORMAL RESPONSE: <ETX>

COMMAND: WNAME

FUNCTION: Sets the name of the HEMC.
USAGE: <STX>WNAME<RS><Parameter><ETX>
PARAMETERS: Name of the HEMC
NORMAL RESPONSE: <ETX>

COMMAND: WDLAY

FUNCTION: Sets the motion delay in ms.
USAGE: <STX>WDLAY<RS><Parameter><ETX>
PARAMETERS: Motion delay in ms
NORMAL RESPONSE: <ETX>

COMMAND: WTOLR

FUNCTION: Sets the recognition tolerance in seconds.
USAGE: <STX>WTOLR<RS><Parameter><ETX>
PARAMETERS: Tolerance in seconds
NORMAL RESPONSE: <ETX>

COMMAND: WSTOP

FUNCTION: Shuts down the unit.
USAGE: <STX>WSTOP<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <ETX>

COMMAND: RPCNT

FUNCTION: Requests the number of motion platforms connected to the HEMC.
USAGE: <STX>RPCNT<ETX>
NORMAL RESPONSE: <platform count><ETX>

COMMAND: RFILM

FUNCTION: Requests the current media status of the HEMC.
USAGE: <STX>RFILM<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <Parameter A><RS><Parameter B><RS><Parameter C><RS><Parameter D>
<RS><Parameter E><RS><Parameter F><RS><Parameter G><ETX>
Parameter A: (Source Status)
- 0:   Off (LED)
- 1:   Green (LED)
- 2:   Yellow (LED)

- 3: Red (LED)

Parameter B: (Source Status Description)
Parameter C: (Motion Code Status)
- 0: Off (LED)
- 1: Green (LED)
- 2: Yellow (LED)
- 3: Red (LED)

Parameter D: (Motion Code Status Description)
Parameter E: Media Title (blank if no media detected)
Parameter F: Current media timecode (seconds, 0 if no media detected)
Parameter G: Total media duration (seconds, 0 if no media detected)
Valid example: 1▲Source Detected▲1▲Motion Available▲Star Wars▲3615▲7200♥

COMMAND: RMOTL

FUNCTION: Requests the motion intensity level of the targeted platform.
USAGE: <STX>#RMOTL<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <Level><ETX>
The intensity is expressed in dB (-20 minimum and 0 maximum).

COMMAND: RVIBL

FUNCTION: Requests the value of the vibration level of the targeted motion platform.
USAGE: <STX>#RVIBL<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <Vibration level><ETX>
The vibration level is expressed in dB (decibels) and should be set between -20 and 0.

COMMAND: RMUTE

FUNCTION: Requests the setting of the mute control of the targeted platform.
USAGE: <STX>#RMUTE<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <Mute><ETX>
The mute value is 1 when the platform is deactivated and 0 when it is activated.

COMMAND: RFLNB

FUNCTION: Requests the number of films in the database starting with the specified character.
USAGE: <STX>RFLNB<RS><Parameter><ETX>
PARAMETERS:
- "*": All titles in the list.
- "#" Titles beginning with a number.
- "A-Z" Titles beginning with a specific letter.

Valid example: <STX>RFLNB<RS>A<ETX>
Note: The parameter defaults to "" (All titles) when absent.*
NORMAL RESPONSE: <Count><ETX> representing the number of titles starting with the specified
parameter in the database.

COMMAND: RNAME

FUNCTION: Requests the name of the HEMC.
USAGE: <STX>RNAME<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <Name><ETX>
The name of the HEMC unit.

COMMAND: RDLAY

FUNCTION: Requests the motion delay in ms.
USAGE: <STX>RDLAY<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <Delay><ETX>
The motion delay is in ms.

COMMAND: RTOLR

FUNCTION: Requests the recognition tolerance in seconds.
USAGE: <STX>RTOLR<ETX>
PARAMETERS: N/A
NORMAL RESPONSE: <Tolerance><ETX>
The tolerance is in seconds.