

# amBIENT XC RS232 Control Command Specification

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## Goal

The RS232 protocol allows :

- Override the schedule with a certain mode
- Return to the scheduled mode

## COM port properties

To communicate over RS232 with the amBIENT XC, the following COM port properties should be set:

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1

## Initialisation of RS232 communication

To initialize the RS232 communication, the first packet that should be sent to the amBIENT XC should be the initialise packet (see below), with 10 data bytes, all set to zero. The amBIENT XC will not send a response to this message.

### Initialise packet

Description	Length	Value
Destination	1 byte	0x63 ('c' )
Message type	1 byte	0x49 ('I')
Data length	1 byte	0x0A
Data bytes 1 – 10	10 bytes	0x00 (10 times)

# Determine the protocol version

The packet below allows an application to determine the RS232 protocol version of the product:

## GetDeviceInfo packet

Description	Length	Value
Destination	1 byte	0x47 ('G')
Message type	1 byte	0x47 ('G')
Data length	1 byte	0x00

## Response

Description	Length	Value
Destination	1 byte	0x52 ('R')
Message type	1 byte	0x47 ('G')
Data length	1 byte	0x01
Protocol version	1 byte	0x02

# Control Protocol

## Message format

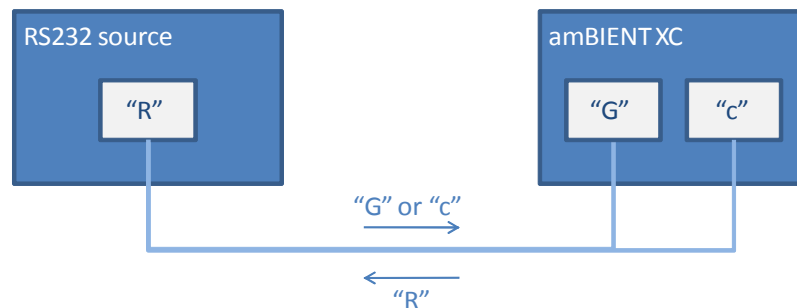
Description	Length
Destination	1 byte
Message type	1 byte
Data length	1 byte
Data	0-58 bytes
CRC	1 byte

The CRC is a byte by byte X-OR of the total packet (header+data).

## Destinations

Destination	Value
RS232 source (PC/crestron/lutron controller)	0x52 ('R')
amBX network layer – CTRL interface	0x63 ('c')
General	0x47 ('G')

The destinations are clarified in more detail in the picture below. Commands that are sent from the controlling device (e.g. a PC or a touch panel) should use "G" or "c" as destination (which one to use is detailed in the message structures below). Responses, sent from amBIENTXC to the controlling device use "R" as destination.



## Message types

Message type	Value
Reserved	0x58 ('X')
Connect	0x43 ('C')
Disconnect	0x44 ('D')
SetOverride	0x6F ('o')

## Connect

Description	Length	Value
Destination	1 byte	0x63 ('c')
Message type	1 byte	0x43 ('C')
Data length	1 byte	0x01
CRC	1 byte	0x21

## Response

Description	Length	Value
Destination	1 byte	0x52 ('R')
Message type	1 byte	0x43 ('C')
Data length	1 byte	0x02
Result	1 byte	
CRC	1 byte	

### Result

- OK
- Error
- CRC incorrect

Result codes: see page 9.

## Disconnect

Description	Length	Value
Destination	1 byte	0x63 ('c' )
Message type	1 byte	0x44 ('D')
Data length	1 byte	0x01
CRC	1 byte	0x26

## Response

Description	Length	Value
Destination	1 byte	0x52 ('R')
Message type	1 byte	0x44 ('D')
Data length	1 byte	0x02
Result	1 byte	
CRC	1 byte	

Result:

- OK
- Error
- NotConnected
- CRC incorrect

Result codes: see section .

## SetOverride

Description	Length	Value
Destination	1 byte	0x63 ('c' )
Message type	1 byte	0x6F ('o')
Data length	1 byte	0x07
ModelID	1 byte	ModelID
Transition time	4 bytes	
Start conditions	1 byte	
CRC	1 byte	For CRC values see Table 1

ModelID values: 0x00 – 0x0C (0 to 12).

ModelID=0x00 means 'return to the schedule'.

Mode 1 to 12 relate to the amBIENT XC on screen modes, as depicted in Figure 1.

Transition time: 0x00000000 (currently not supported)

Start conditions: Boolean. False = 0x00, TRUE = 0x01 (typically TRUE)

If set to false, the start conditions of the mode effects are ignored.

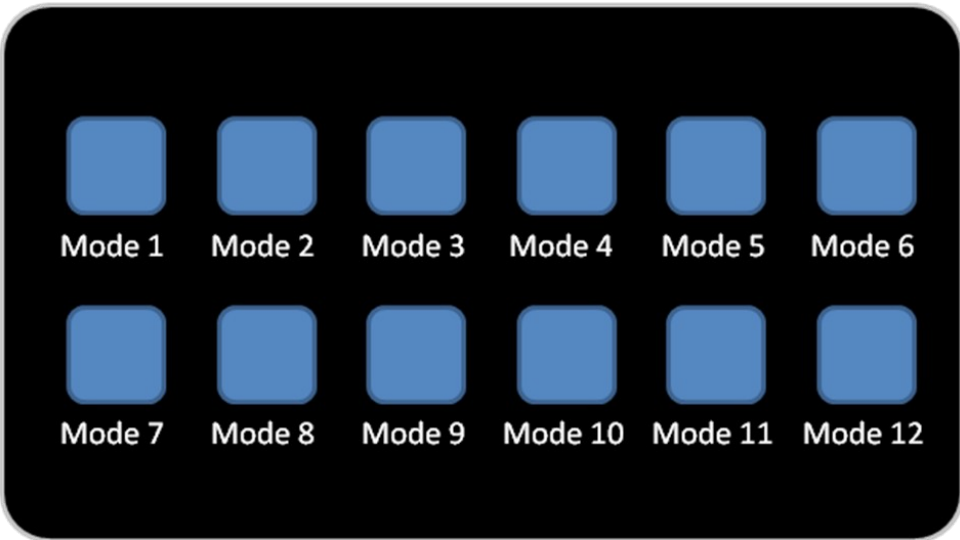


Figure 1: amBIENT XC modes

## Response

Description	Length	Value
Destination	1 byte	0x52 ('R')
Message type	1 byte	0x6F ('o')
Data length	1 byte	0x02
Result	1 byte	
CRC	1 byte	

### Result

- OK
- Error
- NotConnected
- ModeDoesNotExist
- CRC incorrect

Result codes: see page 9.

Mode	Start condition	CRC	Mode	Start Condition	CRC
0x00	0x00	0x0b	0x07	0x00	0x0c
0x01	0x00	0x0a	0x07	0x01	0x0d
0x01	0x01	0x0b	0x08	0x00	0x03
0x02	0x00	0x09	0x08	0x01	0x02
0x02	0x01	0x08	0x09	0x00	0x02
0x03	0x00	0x08	0x09	0x01	0x03
0x03	0x01	0x09	0x0a	0x00	0x01
0x04	0x00	0x0f	0x0a	0x01	0x00
0x04	0x01	0x0e	0x0b	0x00	0x00
0x05	0x00	0x0e	0x0b	0x01	0x01
0x05	0x01	0x0f	0x0c	0x00	0x07
0x06	0x00	0x0d	0x0c	0x01	0x06
0x06	0x01	0x0c			

Table 1: CRC values for setOverride

## Result codes

Description	Value
OK	0x00
Error	0x01
NotConnected	0x04
ModeDoesNotExist	0x07
CRC incorrect	0x08

## amBIENT XC behaviour

After disconnecting, the amBIENT XC can be in different states, dependent on commands that have been called.

<b>XC state before connecting</b>	<b>Commands</b>	<b>XC state after connecting</b>
XC runs according to the timetable	Connect Disconnect	XC runs according to the timetable
XC runs according to the timetable	Connect Setoverride 0x01 – 0x0C Disconnect	XC runs in override mode (until a (scheduled) reboot happens).
XC runs according to the timetable	Connect Setoverride 0x01 – 0x0C SetOverride 0x00 Disconnect	XC runs according to the timetable
XC is in override mode	Connect Disconnect	XC is in override mode
XC is in override mode	Connect Setoverride 0x01 – 0x0C Disconnect	XC is in override mode
XC is in override mode	Connect Setoverride 0x01 – 0x0C SetOverride 0x00 Disconnect	XC runs according to the timetable

Note that after a reboot, the amBIENT XC automatically runs according to the time table. Reboots occur after uploading modes, uploading new firmware, and at the daily reboot time.

## Implementation remarks

Note: the current implementation of the amBIENT XC RS232 protocol has minor deviations from the specification of “Determine the protocol version“, above

- The destination field in the responses can be both “R” and “U”.
- The protocol version can be different than 0x02.

## Examples

In the examples below the command sent to the XC is in the **Command bytes** column. Each byte is represented by two hex digits; ten decimal being shown as 0a for example. These bytes are sent (as binary data not ascii) via the RS232 link to the XC. The XC will respond as shown in the **Response bytes** column across the same link.

### Change the Current Lightscape

Suppose it is required to change the current lightscape to number **5**, then to lightscape **12**.

First a connection must be established:

Command	Command bytes (in hex)	Response bytes (in hex)
<b>Connect</b>	63 43 01 21	52 43 02 00 13

Now the lightscape can be selected.

<b>Select lightscape</b>	63 6f 07 <b>05</b> 00 00 00 00 01 0f	52 6f 02 00 3f
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The lightscape in slot 5 will now be controlling the lights.

To change to lightscape to number 12 (0c hex) the following command can be issued (note there is no need to repeat the connect command unless a disconnect command has already been issued).

<b>Select lightscape</b>	63 6f 07 0c 00 00 00 00 01 06	52 6f 02 00 3f
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The lightscape in slot 12 will now be controlling the lights.

To return control to the front-panel user a disconnect command is issued:

<b>Disconnect</b>	63 44 01 26	52 44 02 00 14
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