DS232
RS232 to DMX Converter V2.00

ELM Video Technology's
RS232 to DMX
Converter / Controller

RS232 Source

DMX Device: Dimmers, Moving Heads,
LED Pars, Splitters, Relays, etc.
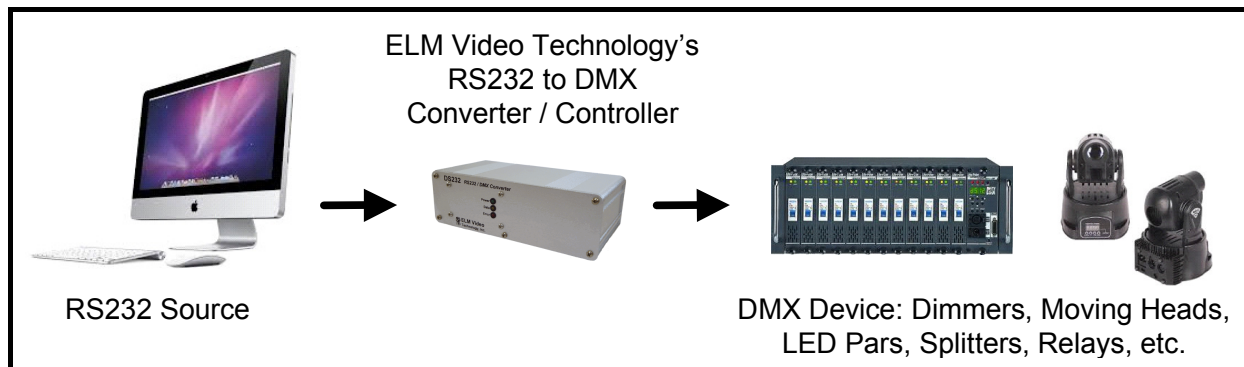
OVERVIEW

The DS232 is an RS232 to DMX controller/driver. Connect an RS232 terminal or computer port to the DS232 unit and drive 512 channels of DMX controlled dimmers and devices. A set of commands and auto fade rates offer power and flexibility for controlling DMX equipment. Use any RS232 terminal application to create command strings to: turn on, off, fade up, and fade down dimmer channels. Or set a single channel or range (or a multiple set) of channels to a specific value, and add or subtract values to existing levels. Any of the command strings can have a fade rate up to 59.9 seconds, and all 512 dimmer channels can have an independent and simultaneous fade rate up or down. With the global fade rate command, any existing fades can be updated to a new rate, finalize, or to immediately end any fades. Software V2.00 (released March 2016) has additional commands: "Echo" sends received data back to the DTE (Data Terminal Equipment), and "M=B" command sends a full DMX buffer data block with error log back to the DTE for verification or analyses.

CONNECTIONS

Connect an RS232 serial output device to the DS232's RS232 input connector using a standard 9 pin male to female through cable. Setup the serial terminal for: 9600-8-N-1 (baud rate of 9600, 8 data bits, parity of None, and 1 stop bit). There are 4 connections:
Pin 2 - RX (optional)
Pin 3 - TX data (from DTE to the DS232 unit)
Pin 5 - Signal Ground
Pin 8 - CTS (Clear to Send) (optional)

Connect the DMX(512) controlled device(s) to the XLR output. The 'data' LED will flash when an RS232 character is received. The 'error' LED will illuminate solid if an invalid character, or if an invalid string character is received. A

blinking 'error' LED indicates an internal DMX transmission or RS232 overrun error has occurred and input data commands could have been lost. Both errors can be cleared with a power reset, 'R' or 'C' command.

NOTE: Insure that the DMX512 daisy chain is terminated at the end device, up to a maximum of 32 devices, and never 'T' a DMX daisy chain.

OPERATION

Once powered the DS232 will immediately send a DMX signal (512 channels). To control the dimmer channel values, send command strings from a serial terminal application. The command string can contain up to 96 characters and must be entered with the proper syntax (shown below). An error will occur (indicated by a solid red LED) if an invalid character is entered or a character in the incorrect order within a string. Each command string is not executed until the 'G command is sent. Wait a minimum of 100mS after each string (G command).

NOTE - Wait a minimum of 100mS between strings (G command) to allow the unit time to calculate the previous string, otherwise an OVERRUN error could occur.

The CTS (Clear to Send) signal is available from the DS232 to the sending source informing the flow control that the unit can receive a new string. If this function is desired insure the sending source's flow control CTS option is selected. If the CTS signal is set then the DTE (Data Terminal Equipment) is clear to send.

If a fade rate (up or down) is desired any command string can end with a fade command and all the dimmer channels included in the string will fade to the intended value at the fade rate from their current value(s). All 512 dimmer channels can have simultaneous and independent fade times up or down. A global fade rate command can be sent that will override any existing fades to a new value to lengthen, shorten, or end fades. The fade command must be entered in the range of F00.0 through F59.9 seconds.

The default dimmer channel values are entered as percentage values in the range of 0 to 100%. If specific values are needed (levels 0 - 255), the input level mode can be changed by setting the NON VOLATILE memory setting by sending a mode change of "M=L". When a mode change is received the red LED will flash indicating the mode change is stored. (Re power if desired to verify the mode change.) This will allow dimmer channel values in commands and string of commands to be entered in the range of 0-255.

**NOTE - This is a non volatile memory setting, a power reset or loss will not change this setting. It is recommended to initially setup the unit in the desired mode. DO NOT RUN PROGRAMS THAT WILL CHANGE THIS SETTING (as non volatile memory has a limited number of changes - see specs).

LED Indicators:

Green=Power	+5 volt power source is present	
Yellow=Data	Flashes for each character that is	
Red=Error	On solid: an unknown character was received.	
	Blinking: An overrun error occurred on the RS232 input and data was lost.	

A overrun error will override a character error. A clear "C" or reset "R" will remove both errors.

NOTE: Insure your program is free of any errors to insure proper operation.

Command Characters Accepted:

0-9, B, C, D, E, e, F, G, L, M, R, @, <, >, =, +, -, ., %, space, LF (line feed), and CR (carriage return)

Character Definitions:

'**0-9**'	numeric values
'**D**'	'Dimmer' command - any dimmer range commanded start with 'D'
'**F**'	Fade command string can optionally end with a fade command, or can be entered independently followed with a Any existing fades on any channel(s) will be overridden with any new command string with fade rate or global fade rate command. The new fade rate is calculated from the existing channel

level at the time the new fade rate is received. Each dimmer (512) can have an independent fade rate in either direction (up or down) with an accuracy of -250mS.

'M', **'L'**, **'%'** (Mode, Level, Percentage) used to change the level entry type of % or 'L' Level. Send independently (not within a string). 'M=L' sets the level mode - dimmer channel levels will be interpreted as specific level values in the range of 0-255. 'M=%' sets the level mode to percentage - dimmer channel levels will be interpreted as percentage values in the range of 0-100%. *NOTE - This is a non volatile memory setting, a power reset or loss will not change this setting. It is recommended to initially setup the unit in the desired mode. DO NOT RUN PROGRAMS THAT WILL CHANGE THIS SETTING (as non volatile memory has a limited number of writes - see specs).*

'B' Buffer read - will return 513 data *(see mode commands below)*

'C' [single command] Clear command - clears any existing errors and does not affect dimmer levels. Can also be used to end fades at the current levels at the time the C command was received. (e.g. If a 59.9 second fade is started from 0 to 100%, and a C command is sent at 30 seconds, then the fade(s) would halt at the current values of apx 50%).

'E' Turns ON echo mode *(see mode commands below)*

'e' Turns OFF echo mode *(see mode commands below)*

'G' [single command] Go or execute command - used to execute a string or global fade command

'R' [single command] Reset command - will clear all errors and set all channel levels to zero

'space', **'LF'**, **'CR'** (line feed) (carriage return) are ignored (nor stored) and won't generate an error

Command Ranges:

'**+**' is an 'and' range e.g. D5+127+201, commands dimmers 5 and 127 and 201

'**-** ' is a 'through' range e.g. D37-50, commands dimmers 37 through 50.

Note - with the through range command the channel values must be in the range of 1 through 512 and 1st channel must be less in value than the 2nd channel.

Command Actions:

'**@**' sets the dimmer range to the level commanded e.g. D10@55, commands dimmer 10 to go to 55% (string fade time optional) *Note - If a string commands a duplicate channel or range of channels within the same string - the 1st segment of the string overrides the latter value(s) within the string.*

'**<**' is the 'increase' action and will increase a dimmer channel(s) by a specified level up to 100%, e.g. (current dimmer 12 is at 50%) D12<10 will increase dimmer 12 to 60% (string fade time optional).

'**>**' is the 'decrease' action and will decrease a dimmer channel(s) by a specified level down to 0%, e.g. (current dimmer 7 is at 42%) D7>15 will decrease dimmer 7 to 27% (string fade time optional).

Note - For the '<' and '>' actions - if a *segment within a string commands a duplicate channel or range of channels in another segment within the same string, the values are accumulated one at a time from latest to earliest e.g. if dimmer 5 is at 50% and the following command string is sent [D2-6<10D2+5+10>2%] then dimmer 5 would 1st decrease by 2% equaling 48% then the 1st segment of the string will increase the value by 10% for a final value of 58%.

Mode Commands:

M=L Mode = Level: Dimmer values are in the range of 0-255
Permanent memory change (not for program use, initial setup recommended - see note**)

M=% Mode = Percentage: Dimmer values are in the range of 0-100%
Permanent memory change (not for program use, initial setup recommended - see note**)

M=E Mode = Echo ON: All data bytes sent to the DS232 are echoed back to the DTE
Note: This is a echo function only, indicating the DS232 is communicating and doesn't indicate the function is being processed or completed.
Permanent memory change (not for program use, initial setup recommended - see note**)

M=e Mode = echo OFF: No data bytes are echoed back to the DTE
Permanent memory change (not for program use, initial setup recommended - see note**)

M=B Mode = Buffer Read: 513 data bytes are sent to the DTE of the current values at the time the command was received. i.e. If a fade command is in progress the values will read the current values. The first 512 bytes

represent the 512 DMX channel levels. The buffer read function is useful to verify that the DMX levels are as intended, and the error status of the DS232. If the DTE used is remote accessible, this data could be useful for remote verification and status. The 513th byte is an error log byte. Convert into binary data bits will indicate:

bit 0 - String Error: A unrecognized character received, in the incorrect order, or byte length exceeded 96 ("C" clears)
bit 1 - RS232 Port Error: Parity error ("R" reset required to clear)
bit 2 - RS232 Port Error: Unexpected data error ("R" reset required to clear)
bit 3 - RS232 Port Error: Overrun error, excessive data was received and couldn't process ("C" clears)
bit 4 - RS232 Port Error: An error has occurred since last power, reset, or clear ("R" reset required to clear)
bit 5 - Factory use: Ignore ("R" reset required to clear)
bit 6 - Factory use: Ignore ("R" reset required to clear)
bit 7 - Factory use: Ignore ("R" reset required to clear)

Command String:

The command string length can be up to 96 characters and all will execute when the 'G' command is sent. Duplicate dimmer channel segments are allowed within a string and all are executed from last to first. For an '@' action the earliest segment will be the final result. For the '<' and '>' actions, each segment will be calculated latest to earliest. *see example below.* NOTE-Wait a minimum of 100mS between strings to allow the unit time to calculate the previous string. If a string is sent to quickly an overrun error will occur indicated by the red LED blinking.

> *NOTE - Wait a minimum of 100mS between strings (G command) to allow the unit time to calculate the previous string, otherwise an OVERRUN error could occur.*

Command String Examples:

D52@95   [Dimmer 52 is prepared for 95%]

G   [Go - command string is executed i.e. dimmer 52 is then set to 95%]

D20+45+99@50G   [Dimmers 20, 45, and 99 are immediately set to 50%]

D100-275@10G   [Dimmers 100 through 275 are immediately set to 10%]

D2@75F01.5G   [Dimmer 2 will fade to 75% (from it's current value) in 1.5 seconds]

D2+4+512<10D5-10>50G   [Dimmers 2, 4, and 512 will increase by 10%, dimmers 5 through 10 will decrease by 50%, both from their current value at the time the 'G' command is sent]

**D10+42+50<10D40-44>5G   [Dimmers 40 through 44 are increased by 5%, and *then* dimmers 10, 42, and 50 are decreased by 10%.] Note - Dimmer 42 is executed in both segments, the latter is executed 1st and will be decreased by 5% and then be increased by 10% so the final result will be an increase of 5%. *Segments within a string are executed from last to first.*

D5@10F10.5G   [Dimmer 5 will fade to 10% in 10.5 seconds.]

D3+1+100<10D5-10>50D105-110@5D400-500@97F59.9G   [Dimmers 3, 1, and 100 will fade increase by 10%, dimmers 5-10 will fade decrease by 50%, dimmers 105 through 110 will fade to 5%, dimmers 400-500 will fade to 97%, in 59.9 seconds from their current values.] During this fade time if a new command string is received commanding any of these dimmer channels with a fade rate, the new fade time will override the existing fade values. For example, if at 30 seconds of this fade, dimmer 3 is currently at 5% and increasing, and a new command D3@50F01.0G is sent then dimmer 3 will now fade to 50% in 1 second from 5%.

D77-100@99F50.0G   [Dimmers 77 through 100 will fade to 99% in 50 seconds, if at 30 seconds of this fade a command string of D78+80@10G is sent then dimmers 78 and 80 will immediately go to 10% and the fade will be option will be turned off for these two channels, the remaining channels 77, 79, and 81 through 100 will continue fading as commanded.

F10.0G [If an independent fade rate is sent followed by the G command, all if any existing fades will now recalculate and fade from their existing level values at the time the command was sent to go to their intended values in 10 seconds.]

F00.0G [If an independent fade rate of 0 is sent, all if any existing fades will terminate and the respective dimmer values will immediately go to their intended values.]

**M=L   [Level mode is set] All channel level values must be entered in a range from 0-255. For example D2+4+10@200G, will set dimmers 2, 4, and 10 to a specific value of 200.

**M=%   [Percentage mode is set] All channel level values must be entered in a range from 0-100.

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*SEGMENT - Multiple portions of a command string are composed of segments e.g. "D2@50"

SPECIFICATIONS

DMX CONTROL WARNING: NEVER use DMX data devices where human safety must be maintained.
NEVER use DMX data devices for pyrotechnics or similar controls.

Manufacturer:	ELM Video Technology, Inc.
Description:	RS232 to DMX Converter
Ext. P/S Model Number:	DS232-5V3/5P
5V Version UPC:	616453087958
Functional description:	The DS232 is an RS232 (terminal or computer port) to DMX converter that will control and drive DMX controlled dimmers and devices.
Operating temperature:	32°F to 100°F
Storage temperature:	0°F to 120°F
Humidity:	Noncondensing
Non-Volatile Memory Writes:	Minimum 100K, Typical 1M
Non-Volatile Memory Retention:	Minimum 40 Yrs, Typical 100 Yrs
Chassis:	Anodized Aluminum .093" thick RoHS compliant.
5V Current:	apx 115mA - under full DMX load (60mA)
RS232 Input:	9 Pin female serial connector at 9600-8-N-1 (baud rate of 9600, 8 data bits, parity of None, and 1 stop bit).

DB9 Connections	Pin 2 - RX (optional)
	Pin 3 - TX data (from DTE to the DS232 unit)
	Pin 5 - Signal Ground
	Pin 8 - CTS (Clear to Send) (optional)
	Use a 9 pin male straight through cable
Command String Length:	96 characters
Command String Execute Timing:	100mS recommended
DMX Control Channels:	All 512
Data Output:	DMX512 output 250 kHz, 5 and/or 3 pin female XLR
	Pin 1 - Power supply common, Pin 2 Data -, Pin 3 Data +
Dimensions:	3.7 x 6.7 x 2.1 inches
Weight:	1.5 pounds
Internal Fuse:	RS232 Converter PCB - 500mA PCB mount through hole
External Power Supply:	+5VDC wall mount
Voltage Input:	100 ~ 132 (or 240) VAC
Current Output:	1A Typical
Power:	5 Watts Typical
Polarization:	Positive Center
Output Connector:	Barrel Plug, 2.5mm I.D. x 5.5mm O.D. x 9.5mm