

# Nexus Machines

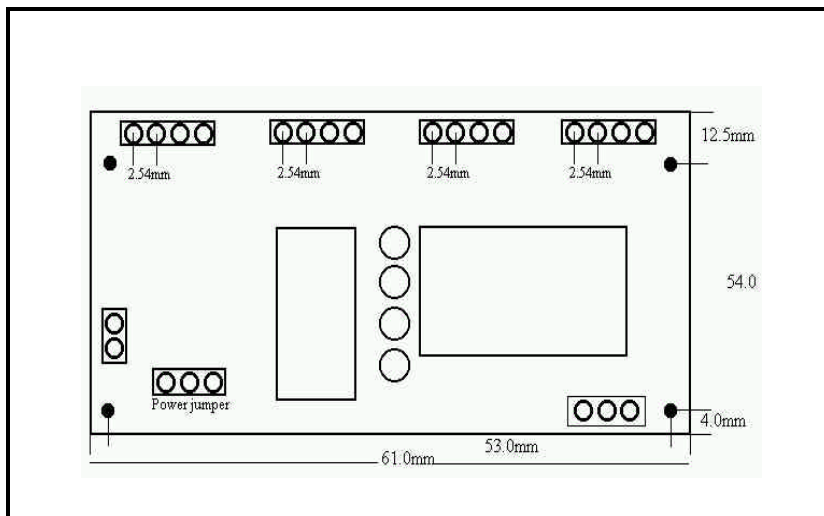
## RS 232 Decoder for BxxCDM Dot matrix LED Series

### BIFQ1/Q2

#### General Description

The BIFQ1/2 decoders provides a simple method of interfacing to the BxxCDM family of 8 by 8 dot matrix displays. The Q1 allows numeric digits (hex and code B) whilst the Q2 provides alphanumeric and some punctuation. Each decoder can support 4 CDM displays. They provide the necessary formatting of the data and the SPI interface to the driver chip. The decoder supports digital dimming, decimal points and an undecoded mode. The on board regulator allows powering from a +9v supply or can be bypassed if +5v is available.

By connecting the RS232 interface to a PC serial port the displays can be driven by a simple software programme or the keyboard via a terminal emulation programme. A fixed 2400 baud 8 bit ,1 start, 1 stop signalling is employed. All bit mapping is carried out by the decoder thus greatly simplifying the software requirement and development time. Applications include message displays, clocks and counters.



#### Header Pinouts:

##### RS232

<b>1</b>	<b>2</b>	<b>3</b>
<b>TX</b>	<b>0V</b>	<b>RX</b>

##### LED connector

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Data</b>	<b>CLK</b>	<b>CS</b>	<b>0V</b>

##### Power selector jumper

<b>1</b>	<b>2</b>	<b>3</b>
<b>+5 V</b>	<b>Com</b>	<b>+ 9 V</b>

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<b>Command protocol</b>
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The RS232 interface features a simple non-handshake mode of operation. The BIFQ will output a prompt character ">" when it is ready to receive the start of a command - all commands are two bytes in length (except for the undecoded mode) and should be sent in the order command byte, data byte. The LEDs indicate if the device is waiting for commands or a command entry is in progress. If the green LED is on then it is waiting for the start of a command. The red LED remains on until all the command bytes are received. Once the last byte is received by the BIFQ it will decode the command and action the request. Data sent to the unit during the time that the unit is actioning the previous request will be ignored and lost. The unit issues the command prompt once the action is complete. During the command sequence the returned prompt changes to indicate which command byte the unit expects to receive next.

All data sent to the unit is sent as ASCII and this includes data. For example the first byte is usually the number 0 to 3 indicating which display is going to be written to. This is sent as 30H to 33H, i.e. 0 to 3 in ASCII. For data and commands all characters must be in upper case. During data input (for example in undecoded mode the actual bit map to send is in ASCII hex, i.e. 10011001b would be sent as 99 which is 39H, 39H in ASCII).

The action/Data commands are as follows:

Command Byte	Data Byte	Action
<b>DECODED MODE</b>		
0 – 3 (30H to 33H)	0 – F or HELP -	BIFQ1 outputs character bitmap to addressed digit
0 – 3 (30H to 33H)	Any alphanumeric character	BIFQ2 outputs character Bitmap to addressed digit
<b>INTENSITY MODE</b>		
I	0 – F (Intensity)	Selects output intensity. This can be varied between 0 (off) to Fh (15) fully on. (BIFQ1/Q2)
<b>DECIMAL POINT ON</b>		
S	0 – 3 (Digit address)	A dot in the bottom right hand corner of a character illuminates to give a decimal point. Used mainly with digits
<b>DECIMAL POINT OFF</b>		
R	0 – 3 (Digit address)	A dot in the bottom right hand corner of the character is turned off.
<b>UNDECODED MODE</b>		
W	0 – 3 (digit address) 0 – 7 (column address) 0 – F (MSB of ASCII hex data) 0 – F (LSB of ASCII hex data)	Undecoded mode. The first value is the digit address. The second is the column within the digit and the third and fourth the data in ASCII hex

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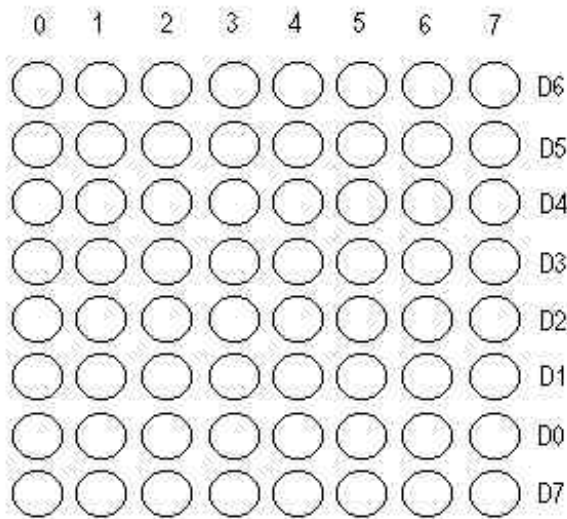
**Cursor return prompts.**

The LED indicate if the unit is in command mode or waiting for data from the host. The prompts also indicate the mode of operation.

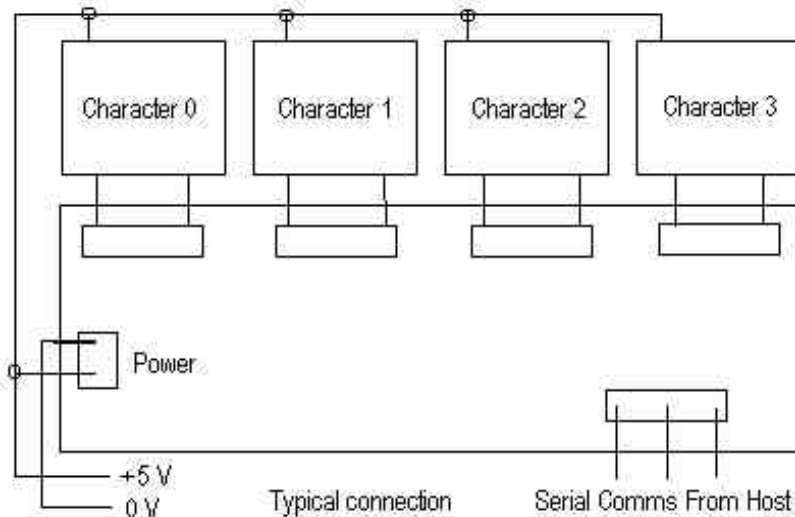
Prompt received Meaning

- > This indicates that the unit is waiting for the 1<sup>st</sup> command byte
- ? This indicates a decode command is in progress and the unit is waiting for data from the host to decode and display.
- S The unit is waiting for a number from 0 to 3 indicating which decimal point to illuminate.
- R The unit is waiting for a number from 0 to 3 indicating which decimal point to reset to off.
- W The unit is in undecoded mode and is waiting for data. There are four data bytes needed for each undecoded mode entry.

In undecoded mode the data represents the dots in a column. There are 8 columns within a single display and these are addressed as 0 – 7 in the W command. Below is a map of the columns and the bit number verses the dot that the bit references. In this device a 1 in the bit sets the dot on and a 0 turns it off.



Column designation and data bit verses row number for undecoded mode (BxxCDM module)



Typical connection for 4 character display - **WARNING** The header to the BxxCDM displays is NOT 1:1 See the connector pin out for details

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## Technical Specification

Supply voltage	5 or 9-12 volts (user jumper)	Note 1
Supply current	35mA	
Number of SPI ports	4	
SPI clock rate	40Khz	
RS232 signal levels	+2.0 to +12 V	
RS232 baud rate	2400 baud	
Start bits	1	
Stop bits	1	
Parity	none	
Data bits	8	
TTL level inputs	0.8 max 3.6 min	
Dimming levels	16	
Total addressable chrs	4	
Operating temperature	-10 C to +70 C	

Note 1: The dot matrix display driver requires a single + 5 volt supply. The regulator on the BIFQ is only designed to power the decoder unit NOT the display. A separate +5 volt supply is required for the LED display.

### Manufacturers Part number

BIFQ1  
BIFQ2

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