

RS232 LC-Display Adapter Manual

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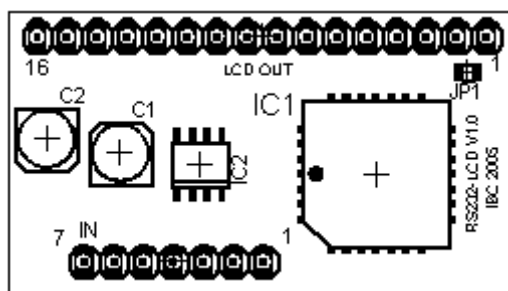
1. General discription

The RS232 LC-Display Adapter enables easy interfacing a LC-Display (HD44780) to a serial interface (RS232). Communication between a host and the RS232 LCD takes places via the two wire bi-directional serial interface. All parameter of a LC-Display are programmable via serial interface and could be saved to the controller EEPROM.

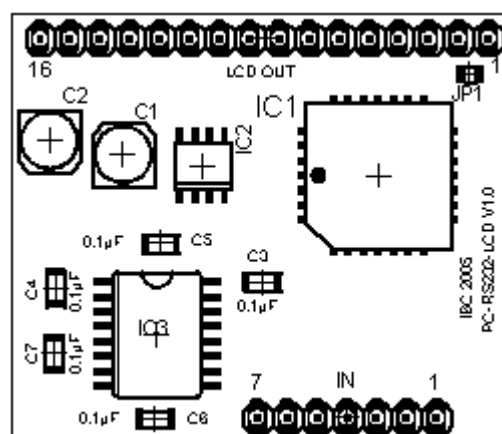
Features:

- 5 V supply voltage
- RS232-LCD-Adapter: TTL-Level to connect to a microcontroller
- PC-RS232-LCD-Adapter : RS232-Level to connect to a PC
- Serial interface:
 - fixed 9600 baud rate
 - 8 bits
 - 1 stop bit
 - No parity

2. Pinning Information



RS232 – LCD – Adapter



PC – RS232 – LCD – Adapter

IN (1 – 7):

Pin		Description
1	TXD	Transmit data
2	RXD	Receive data
3	GND	0V Ground
4	V _{DD}	5V Supply voltage
5	VO	Input voltage for LCD (Pin 3) ; contrast
6	SLA	light anode for LCD (Pin 15)
7	SLK	light cathode for LCD (Pin 16)

LCD OUT (1 – 16):

Pin		Description
1	VSS	0V Ground
2	VDD	5V Supply voltage for Logic
3	VO	Input voltage for LCD
4	RS	H: Data signal, L: Instruction signal
5	R / W	H: Read mode, L: Write mode
6	E	Chip enable signal
7	DB0	Data Bit 0
8	DB1	Data Bit 1
9	DB2	Data Bit 2
10	DB3	Data Bit 3
11	DB4	Data Bit 4
12	DB5	Data Bit 5
13	DB6	Data Bit 6
14	DB7	Data Bit 7
15	SLA	light anode
16	SLK	light cathode

3. Command Overview

Function	Code			Description / Example
	Hex	Char.	Parameter	
Clear Display	0x66	f		#27+'f'+#13+#10
Return Home	0x72	r		#27+'r'+#13+#10
Set Cursor	0x6F	o	p1	#27+'o'+#5+#13+#10 ;address 5 equivalent to 1. row 6. column
Display ON/OFF	0x64	d	p1	#27+'d'+#0+#13+#10 ;Display OFF #27+'d'+#1+#13+#10 ;Display ON
CursorSettings	0x63	c	p1	#27+'c'+#0+#13+#10 ;Cursor OFF #27+'c'+#1+#13+#10 ;Blinking #27+'c'+#2+#13+#10 ;Line #27+'c'+#3+#13+#10 ;Line + Blinking
Shift	0x73	s	p1	#27+'s'+#0+#13+#10 ;move cursor left #27+'s'+#1+#13+#10 ;move cursor right #27+'s'+#2+#13+#10 ;shift display left #27+'s'+#3+#13+#10 ;shift display right
SetEntryMode	0x6D	m	p1	<u>Display</u> / <u>Cursor Move</u> #27+'m'+#0+#13+#10 ;Not shifted / decrease #27+'m'+#1+#13+#10 ;shifted / decrease #27+'m'+#2+#13+#10 ;Not shifted / increase #27+'m'+#3+#13+#10 ;shifted / increase
SetFunction	0x6C	l	p1	#27+'l'+#0+#13+#10 ;1 Line / 5x7 Dots #27+'l'+#1+#13+#10 ;1 Line / 5x10 Dots #27+'l'+#2+#13+#10 ;2 Lines / 5x7 Dots #27+'l'+#3+#13+#10 ;2 Lines / 5x10 Dots
GetChar	0x7A	z		#27+'z'+#13+#10; reads a character at cursor address
GetCursorAdr	0x78	x		#27+'x'+#13+#10 ; reads act. cursor address
SaveLCDIni	0x69	i		#27+'i'+#13+#10 ; saves DisplayON/OFF, Cursorsettings, EntryMode, Function
WriteUserDefChar	0x75	u	p1...p9	#27+'u'+#0+#8Datenbytes+#13+#10 ; defines a character. p1: #0..#7 Address; p2..p9: character-data, 8 data bytes passed in ASCII as Hex '01'+#0F'... 'F2'.
SaveUserDefChar	0x74	t	p1	#27+'t'+#0+#13+#10 ; saves the predefined character with the address p1. p1 = #0..#7.

4. Write a text on LCD

In order to write a text on the LC-Display just send the string and finalize it with carriage return (#13) and feed line (#10):

e.g.: 'Hello World'+#13+#10

5. User defined characters

5.1 WriteUserDefChr

To create a user defined characters and to load them to the CGRAM of a LCD. A LC-Display allows 8 users defined characters to be loaded to the CGRAM. These are the first 8 characters (0x00–0x07) in the standard character pattern of a LCD.

The character number ist a number between 0x00 and 0x07.

WriteUserDefChr command (0x75) ('u')									
Byte	content	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	ESC (#27)	0	0	0	1	1	0	1	1
1	WriteUserDefChr 'u'	0	1	1	1	0	1	0	1
2	Character address #0..#7	X	X	X	X	X	Char.Nr. (3:0)		
3	Character Byte 0	X	X	X	5 dots (4:0)				
4	Character Byte 1	X	X	X	5 dots (4:0)				
5	Character Byte 2	X	X	X	5 dots (4:0)				
6	Character Byte 3	X	X	X	5 dots (4:0)				
7	Character Byte 4	X	X	X	5 dots (4:0)				
8	Character Byte 5	X	X	X	5 dots (4:0)				
9	Character Byte 6	X	X	X	5 dots (4:0)				
10	Character Byte 7	X	X	X	5 dots (4:0)				

X	Do not care
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e.g. send the following to define the 0. character as a '+':

#27+'u'+#0+'00'+ '04'+ '04'+ '1F'+ '04'+ '04'+ '00'+ '00'+ #13+#10 **OR**

#27+'u'+#0+'0004041F04040000'+ #13+#10

4.2 SaveUserDefChr

After loading a user defined character to the LCD, the character could be saved, and after a startup the 8 characters will be automatically loaded to the CGRAM. In order to save a character issue this command and send the character number (0x00 – 0x07) to the controller.

SaveUserDefChr command (0x74) ('t')									
Byte	content	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	ESC (#27)	0	0	0	1	1	0	1	1
1	SaveUserDefChr 't'	0	1	1	1	0	1	0	0
2	Character address #0..#7	X	X	X	X	X	Char.Nr. (3:0)		

X	Do not care
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e.g. send the following to save the 0. character and on next start up this character will be automatically loaded to the LCD:

#27+'t'+#0+#13+#10