

PRODUCT GROUP: CODISPLAY RS 232C SERIAL

ARTICLE NO.: 190003

DIP SELECTABLE AS EITHER 4 OR 6 DISPLAYED LED DIGITS

14MM 7-SEGMENT LEDs

RED CONTRAST FILTER

RS232C INTERFACE (SERIAL)

PANEL MOUNTING

IP65F DEGREE OF PROTECTION



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**1. DIP SWITCH SETTINGS:****SW1      Functional DIP Switch****SW1-1 and SW1-2      Baud Rate settings**

<b>BAUD RATE</b>	<b>SW1-1</b>	<b>SW1-2</b>
9600 bps	OFF	OFF
19200 bps	ON	OFF
38400 bps	OFF	ON
57600 bps	ON	ON

**SW1-3      Literal or Single Byte Modes**

In the "Literal" Mode Codisplay responds with literal words such as "OK", "DONE", "Codisplay Respond" etc., which is extremely useful for User Test Commands and application programs such as Docklight (<http://www.docklight.de/>)

The Single Byte Mode is useful in the development of User Programs providing execution times of a few microseconds. The User can set a small delay between consecutive commands without the need to wait for a response from Codisplay.

**ON:** Literal Mode  
**OFF:** Single Byte Mode

**SW1-4      ASCII OR HEX MODE**

Hex Mode is as the ESC/Epson open protocol

**ON:** Hex Mode  
**OFF:** ASCII Mode

**SW1-5      4 or 6 displayed LED digits.**

**ON:** 4 displayed digits  
**OFF:** 6 displayed digits.

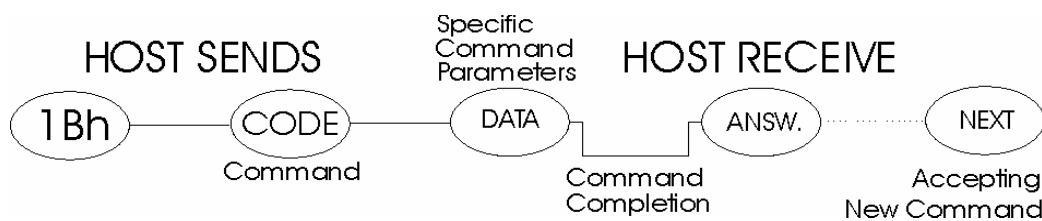
**SW1-6 DISPLAY INITIAL SETTING**

- ON:** All digits display 0 after power up.
- OFF:** Blank display after power up.

**Note:** The DIP Switch settings must only be changed when the power to the device is turned off. The DIP Switch settings come into effect on power up.

**2. COMMUNICATION PROTOCOL**

The Communication protocol is as shown by the schematic picture below.  
 The Codisplay module must receive in first byte sign ESC (1Bh) in HEX mode or \* (2Ah) in ASCII mode notifying Codisplay that the next byte is a valid command. The second byte is the command code.  
 The following bytes are the required data for the specific command.  
 When the internal cycle is completed Codisplay will send to the Host a message that the command is completed and Codisplay is ready to receive new commands. The period between two consecutive bytes must be not exceed 30 mS.



**3. COMMAND MODES**

Codisplay maintains two command modes, these are set via DIP Switch **SW1-4** :

**HEX mode:** expression of the command is in hexadecimal digits. This is the shortest command size. The first byte is the ESC (1Bh) sign that notifies Codisplay that a valid command sequence has been sent from Host. The second byte is a command code (30h-38h).

**ASC II mode:** expression of the command sequence is constructed from ASC II characters. The first byte is the \*(2Ah) sign that notifies Codisplay that a valid command sequence has been sent from Host. The second byte is a command code (0a-8a).

**4. COMMAND SET**

After power up Codisplay sends the message “**Codisplay-RS232C**” notifying the Host that it is ready to accept commands.

No	ASC II mode	HEX mode
1	*0a	1Bh 30h (xxh)
COMMUNICATION TEST		

This command tests two-way communication (receive and transmit) between Host and Codisplay. This command is used for cable, baud rate or the power supply check.

**HEX mode:** The first byte is the ESC character (1Bh), the second byte is command code (30h). When the command is received Codisplay will immediately respond with (74h – ta).

**EXAMPLE:**

**1B 30** sent by the Host

**Codisplay Respond** response from Codisplay

If the DIP Switch **SW1-3** is set to OFF Codisplay will answer all commands with a single byte.

**EXAMPLE:**

**1B 30** sent by the Host

**74** response from Codisplay (74h)( ta)

**ASCII mode:** The first byte is \* character (2Ah), the second byte is the command code 0a (30h).

When a valid command is received, Codisplay will immediately return with the message “**Codisplay Respond**”

**EXAMPLE:**

\*0 sent by the Host

**Codisplay Respond** response from Codisplay

No	ASC II mode	HEX mode
2	*1val.(xx)a	1Bh 31h (xxh)
COMMAND SETS VALUE OF PWM		

This command adjusts the light intensity of the LED display. It uses PWM for driving the LED anodes for an appropriate period for each refresh cycle. The value of parametric byte is between (00h) and (62h, 98d).

PWM=(00h) dark display (PWM=0%)

PWM=(62h) maximum Intensity (PWM=98%).

The value of PWM can also be saved in non-volatile memory. After power-up the LED controller will use the last saved value of PWM or factory default value (32h- 50%). Refer to command No 7. The Parametric byte can be in the range between 00h to 62h. All other values will be ignored. Codisplay will use the previous valid PWM value. The changing of the PWM value acts to the LED display intensity directly. If after command code (31h) parameter missing, Codisplay sends to Host the current value of PWM. If parameter value exceeds 62h Codisplay will send to the Host (57h – Wa) in HEX mode or “**WRONG VALUE**” in ASCII mode and terminate commands without changing present value of PWM.

**HEX mode:** The first byte is the ESC character (1Bh), the second byte is the command code (31h) and the last byte is the PWM value (00h to 62h).

**EXAMPLE:**

**1B 31 16** this value will decrease the LED light Intensity from the current value (default is 32h, 50d)  
New value will be 22d ( 22% ).  
**16** response from Codisplay.

**ASCII mode:** The first byte is \* character (2Ah), the second byte is the command code 1 (31h) and the last byte is the PWM value (00d to 98d).

Note: In ASCII mode Codisplay accepts only decimal values for PWM.

**EXAMPLE:**

**\*122** where \* is a start sequence sign, 1 is the command code and 22 is PWM value  
**22** response from Codisplay

No	ASC II mode	HEX mode
3	*2(xxa)	1Bh 32h (xxh)
<b>COMMAND CLEARS THE LED BUFFER</b>		

This command clears the value of LED display. Values after the command code can also be use for testing of connected segments of LED indicators. Fill value can be hexadecimal from 00h-FFh. Actually this command fill with value (xx) LED buffer. If fill value is missing, command is terminated.

**HEX mode:** The first byte is ESC character (1Bh), the second byte is the command code (32h) and the last byte is clear value (00h to FFh).

**EXAMPLES:**

**1B 32 01** will light up segments **a** on all indicators.  
**4F** response from Codisplay

**1B 32 FF** will light up all segments and decimal points on all LED indicators.  
**4F** response from Codisplay

**1B 32 00** will switch off all segments and decimal points on all indicators. The display is blank.  
**4F** response from Codisplay

**ASCII mode:** The first byte is a \* character (2Ah), the second byte is the command code 2 (32h) and the last byte is clear value (00a to FFa).

**EXAMPLES:**

**\*201** will light up segments **a** on all indicators.  
**OK** response from Codisplay

**\*2FF** will light up all segments and decimal points on all indicators.  
**OK** response from Codisplay

**\*200** will switch off all segments and decimal points on all indicators. The display is blank.  
**OK** response from Codisplay

**NOTE:** Independent of which mode is selected, 4 digits/6 digits (**SW1-5**) command acts for all LED Indicators.

No	ASC II mode	HEX mode
4	*3ad(0-5a)data(00- FFa)	1Bh 33h (xxh) ad(0-5h)data(xxh)
COMMAND WRITES BYTE INTO LED BUFFER		

This command allows the user to write data directly into the LED buffer, issuing address and data from the Host. The address can be in range from (00h) to (05h). When the address exceeds (06h), Codisplay will cancel completing of the command and send message, depending of position of DIP Switch **SW1-3** in HEX mode (41h – Aa), in Literal "**ADDRESS IS OUT OF RANGE**". When the command is completed In HEX mode, Codisplay respond with (4Fh – Oa) and in Literal mode with the message "**OK**". If address and/or data is missing Codisplay will respond in HEX mode with (**50h – Pa**) and ASCII mode with message "**PARAMETER MISSING**"

**NOTE:** Independent of which mode is selected, 4 digits/6 digits (**SW1-5**) command acts for all LED Indicators.

**HEX mode:** The first byte is the ESC character (1Bh), the second byte is the command code (33h), next is the Indicator number (0 to 5) and the last is data byte (00h to FFh).

**EXAMPLES:**

**1B 33 00 01** will light up segment **a** on indicator 0.  
**4F** response from Codisplay

**1B 33 05 80** will light up decimal point (**dp**) on indicator 5.  
**4F** response from Codisplay

**ASCII mode:** The first byte is \* character (2Ah), the second byte is the command code 3 (33h), the next one is the Indicator number (0 to 5) and the last byte (00a to FFa).

**EXAMPLE:**

\*3001 will light up segment **a** on indicator 0.

**OK** response from Codisplay

\*3580 will light up decimal point (**dp**) on indicator 5.

**OK** response from Codisplay

No	ASC II mode	HEX mode
5	* 4data(xxa..xxa)	1Bh 34h data(xx..xxh)
<b>COMMAND WRITES BLOCK OF BYTES INTO THE LED BUFFER</b>		

Using this command the user can write a block of data directly into the LED buffer. If the received block of data is larger than LED buffer boundary, Codisplay will cancel receiving string. The period between two data bytes must not exceed 20mS. When the period is larger than 20mS, receiving of string is automatically terminated and Codisplay dump LED display with received data. When the command is completed In HEX mode Codisplay responds with (4Fh – 0a) and in Literal mode with message “**OK**”.

**NOTE:** Independent of which mode is selected, 4 digits/6 digits (**SW1-5**) command acts for all LED Indicators.

**HEX mode:** The first byte is ESC character (1Bh), the second byte is the command code (34h), after that is data block (00h to FFh).

**EXAMPLES:**

**1B 34 3F 06 5B 4F 66 6D** displays (left to right) the digits **012345**

**4F** response from Codisplay

**1B 34 38 39** in place of 0 and 1 displays **L** and **C** other **2345** remain unchanged LED.

Display will now be: **LC2345**.

**4F** - response from Codisplay

**ASCII mode** The first byte is \* character (2Ah), the second and third byte is the Codisplay address slave number (00d to 99d), the fourth one is command code 4 (34h) and the last is data byte block (00a to FFa).

**NOTE:** Codisplay will accept ASCII values of 00a to FFa for data dump if other character than noted is send Codisplay send message **"INCORRECT VALUE"**

**EXAMPLES:**

\***43F065B4F666D** will display (left to right) the digits - **012345**  
**OK** response from Codisplay

\***47D07** in place of 0 and 1 will be **6** and **7** and the previously displayed **2345** remain unchanged.

LED display is now: **672345**.  
**OK** response from Codisplay

No	ASC II mode	HEX mode
6	*5(xxa..xxa)	1Bh 35h (xxh..xxh)
<b>COMMAND DUMPS DATA TO LED DISPLAY</b>		

Command dump received data block to LED display using internal character generator (left to right). This command accepts HEX and ASCII values. When the command is completed, in HEX mode Codisplay responds with (**4Fh – Oa**) and in Literal mode with message **"OK"**.

**DECIMAL POINT:**

The decimal point can be set in any position. If the string starts with (.a) (2Eh) Codisplay ignores point and dumps next character from string.

**HEX mode:** The first byte is the ESC character (1Bh), the second byte is the command code (35h), followed with a data block (00h to FFh). This command uses an internal character generator to dump the display (right to left). The decimal point position is defined with the byte after preceding character following the dp position.

**EXAMPLES:**

**1B 35 31 32 33 2E 35 36 37** displays (right to left) the digits **123.567**  
**4F** response from Codisplay

**1B 35 36 37** in place of the 1 and 2 must a 6 and 7 are displayed other characters remain unchanged.

The Display is now: **673.567**  
**4F** response from Codisplay

**1B 35 20 48 45 4C 50 20** – will display the message **HELP**

**ASCII mode:** The first byte is \* character (2Ah), the second byte is the command code 5 (35h) after that the ASCII data block (values from 00h to FFh). The decimal point position is defined with byte after preceding character following the dp position.

**EXAMPLES:**

**\*5123.567** displays (left to right) the digits **123.567**

**OK** response from Codisplay

**\*5 HELP** displays (left to right) the message **HELP**

**OK** response from Codisplay

The use of a limited number of alphabetical characters with the 7 segment LED allows Codisplay to communicate simple messages to Operators. Typical messages could be:

<b>ASCII CHARACTERS</b>	<b>HEX CODE</b>
HELP	48h45h4Ch70h
StArt	53h54h0Ah52h54h
StoP	53h54h6Fh70h
Error	45h52h52h6Fh
Run	52h75h6Eh

Please refer to character generator table.

The following table shows sign, format and position for internal character generator.  
The number at the top row is the upper nibble and on the left column the lower nibble of the character byte.  
Ex.: Capital P is 70h.

	0h	1h	2h	3h	4h	5h	6h	7h	8h	9h	Ah	Bh	Ch	Dh	Eh	Fh
0h	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1h	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
2h	2	3	4	5	6	7	8	9	A	B	C	D	E	F		
3h	3	4	5	6	7	8	9	A	B	C	D	E	F			
4h	4	5	6	7	8	9	A	B	C	D	E	F				
5h	5	6	7	8	9	A	B	C	D	E	F					
6h	6	7	8	9	A	B	C	D	E	F						
7h	7	8	9	A	B	C	D	E	F							
8h	8	9	A	B	C	D	E	F								
9h	9	A	B	C	D	E	F									
Ah	A	B	C	D	E	F										
Bh	B	C	D	E	F											
Ch	C	D	E	F												
Dh	D	E	F													
Eh	E	F														
Fh	F															

No	ASC II mode	HEX mode
7	*6(dpa)	1Bh 36h (dph)
SET DECIMAL POINT TO APPROPRIATE DIGIT		

This command sets the decimal point to the appropriate digit. In 6 digit mode the parameter is 06 and 4 digit mode 04, all decimal points will be cleared and all previous displayed characters remain unchanged.

**NOTE:** Using this command Codisplay set only one decimal point. If you need to set more than one DP you need to use the previous command.

**HEX mode** The first byte is the ESC character (1Bh), the second byte is the command code (36h) and the last byte is decimal point value (00h to 05h). A value of 06 will clear the decimal point.

**NOTE:** Displayed signs and digits are not changed.

**EXAMPLES:**

**1B 36 01** decimal point switched on, on Indicator 2.  
**4F** response from Codisplay

**1B 36 02** decimal point switched on, on Indicator 3.  
**4F** response from Codisplay

**ASCII mode** The first byte is the \* character (2Ah), the second byte is the command code (36h), and the last the decimal point value (0a to 5a). A value of 6a will clear the decimal point.

**EXAMPLES:**

**\*61** decimal point switched on, on Indicator 2  
**OK** response from Codisplay

**\*0162** decimal point switched on, on Indicator 3  
**OK** response from Codisplay

No	ASC II mode	HEX mode
8	*7	1Bh 37h
COMMAND WRITES CURRENT VALUE OF PWM AS DEFAULT VALUE.		

This command is used to store the current value of PWM as the default value for the power up luminosity preset condition. The value is written to the non-volatile memory. When the command is completed; in HEX mode the Codisplay responds with (44h – Da) and in ASCII mode with message “**DONE**”.

**HEX mode** The first byte is the ESC character (1Bh), the second byte is the command code (37h).

**NOTE:** Displayed characters and decimal point is not changed.

**EXAMPLES:**

**1B 31 12** changes PWM to 12h(18d) .  
**12** response from Codisplay

**1B 37** save current PWM value as default.  
**4D** response from Codisplay

**ASCII mode:** The first byte is the \* character (2Ah) and the second is command code (37h).

**EXAMPLES:**

**\*118** changes the PWM to 12h(18d) .  
**18** response from Codisplay

**\*7** save current PWM value as the default  
**DONE** response from Codisplay

No	ASC II mode	HEX mode
9	*8	1Bh 38h
<b>COMMAND RESTARTS LED CONTROLLER</b>		

This command restarts the Codisplay controller. This command acts as power up reset. The LED Display Buffer is cleared and Codisplay sends to the Host the message “**Codisplay-RS232C**” notifying that is ready to receive commands.

**5. COMMAND SET TABLE**

No	ASC II	HEX. VALUE	COMMAND DESCRIPTION
1.	*0	1Bh 30h	Communication Test
2.	*1	1Bh 31h	Sets value of PWM
3.	*2	1Bh 32h	Clear LED Buffers
4.	*3	1Bh 33h	Writes byte in LED Buffers
5.	*4	1Bh 34h	Writes block of bytes in LED Buffers
6.	*5	1Bh 35h	Dump data do display
7.	*6	1Bh 36h	Set decimal point
8.	*7	1Bh 37h	Save value of PWM
9.	*8	1Bh 38h	Restart LED controller

**6. ASSIGNMENT OF 9 PIN SUB-D SOCKET**

- Pin 1 = Reserved
- Pin 2 = Transmit
- Pin 3 = Receive
- Pin 4 = Reserved
- Pin 5 = GND (0 V)
- Pin 6 = Reserved
- Pin 7 = Reserved
- Pin 8 = Reserved
- Pin 9 = Reserved

**7. POWER SUPPLY**

The power supply must be in range from 8V up to 30V/1A DC. Codisplay is protected from improper power supply connection.

- 1= Vin +ve of DC source ( square pad ) marked on PCB as +8..24V
- 2= GND -ve of DC source ( round pad ) marked on PCB as GND

<b>Power supply consumption Codisplay</b>			
	PWM 0%	PWM 50%	PWM 98%
Voltage 8V	32 mA	96 mA	157 mA
Voltage 12V	27 mA	76 mA	123 mA
Voltage 24V	15 mA	38 mA	60 mA

Measurements were made with all LED segments and decimal points switched on. .

**8. INDICATOR TEST**

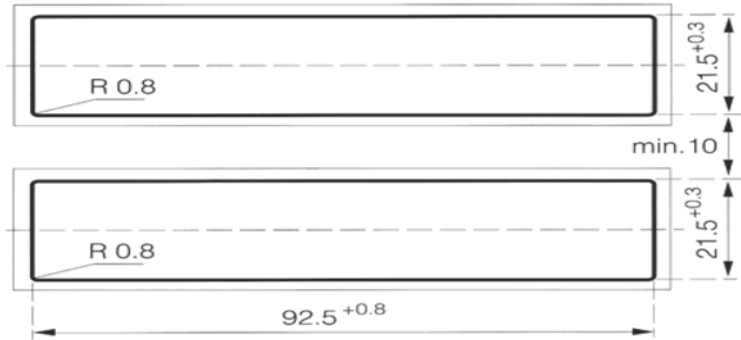
The Indicator test can be performed at any time using jumper **JP3**. Also the Indicator test can be performed remotely using command No 3.

**9. CE CONFORMITY AND ROHS COMPLIANCE**

Crameda Intersys AG declares that Codisplay 190003 complies with the requirements for CE conformity. All PCB boards, components and solder paste are manufactured with leadless technology and meet the requirements for RoHS Environment friendly fabrication.

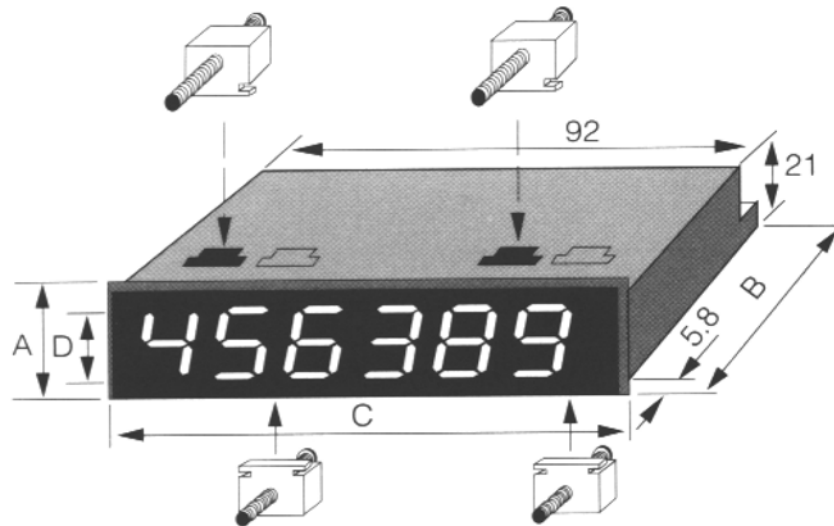
**10. PANEL MOUNTING**

**PANEL CUTOUT:**



Millimetres	Inches
92.5	3.642
21.5	0.846

**DIMENSIONS:**



Dimension	Description	Millimetres	Inches
A	Height	24	0.945
B	Depth	108	4.252
C	Width	96	3.780
D	LED	14	0.551

Weight approx. 130 grams