

PRODUCT GROUP: CODISPLAY RS 485 SERIAL

ARTICLE No.: 190002

DIP SELECTABLE AS EITHER 4 OR 6 DISPLAYED LED DIGITS

14MM 7-SEGMENT LEDs

RED CONTRAST FILTER

RS485 INTERFACE (SERIAL)

PANEL MOUNTING

FRONT IP65 PROTECTED



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1. DIP SWITCH SETTINGS:

SW1 FUNCTIONAL DIP SWITCH

SW1-1 and SW1-2 Baud Rate Settings

Baud rate	SW1 -1	SW1-2
9600 bps	OFF	OFF
19200 bps	ON	OFF
38400 bps	OFF	ON
57600 bps	ON	ON

SW1-3 (Not Used)

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 SETTINGS

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

SW2 ADDRESS SELECTOR DIP SWITCH

SW2 ADDRESS SET TABLE

SW2	0	1	2	3-254	255
1	OFF	ON	OFF	---	ON
2	OFF	OFF	ON	---	ON
3	OFF	OFF	OFF	---	ON
4	OFF	OFF	OFF	---	ON
5	OFF	OFF	OFF	---	ON
6	OFF	OFF	OFF	---	ON
7	OFF	OFF	OFF	---	ON
8	OFF	OFF	OFF	---	ON

Note: When the Host sends a command with address 00 the appropriate command is to all Codisplay modules independently of preset addresses.

Note: When the ASC II mode is selected via DIP Switch SW1-4 up to 99 Codisplay modules can be addressed.

SW3 LINE TERMINATION SWITCH.

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 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 20 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).

Byte	Description	Value/Range
1	Start	1Bh
2	Command	(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 (1a-8a).

Byte	Description	Value/Range
1	Start	*
2	Command Code	(1a-8a)

4. COMMAND SET

No	ASC II mode	HEX mode
1	*sl(xx)1val.(xx)a	1Bh sl(adh) 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 last valid PWM value. The changing of the PWM value changes the LED display light intensity directly. If after command code (31h) parameter missing, Codisplay sends to the Host the current value of PWM. If the 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 the current value of PWM.

HEX MODE: The first byte is the ESC character (1Bh), the second byte is the Codisplay Slave address number (from 00d to 99d), the third byte is the command code (31h) and the final byte is the PWM value (from 00h to 62h).

Byte	Description	Value/Range
1	Start	1Bh
2	Slave address	(00d-99d)
3	Command Code	31h
4	PWM number	(00h-62h)

EXAMPLE:

1B 01 31 16 this value will decrease the LED light intensity from the current value (default is 32h, 50d) New value will be 22d.

ASCII MODE: The first byte is * character (2Ah), two bytes are the Codisplay Slave address number (from 00d to 99d), fourth byte is command code (31h) and the final byte is PWM value (from 00d to 98d).

Byte	Description	Value/Range
1	Start	*
2&3	Slave address	(00d-99d)
4	Command Code	31h
5	PWM number	(00d-98d)

Note: In ASCII mode Codisplay accepts only decimal values for the Slave Address and PWM values.

EXAMPLE:

*01122 – Where * is a start sequence sign, 00 to 99 is Slave address, 1 is command code and 22 is PWM value

		MIN	TYPICAL	MAX
Hex Mode	Tint		3 µs	
ASCII Mode	Tint		10.5 µs	

No	ASC II mode	HEX mode
2	*sl(xxa)2(xxa)	1Bh sl(adh) 32h (xxh)
COMMAND CLEARS LED BUFFER		

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. The buffer fill value can be hexadecimal from 00h-FFh. If fill value is missing, command is terminated.

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

Byte	Description	Value/Range
1	Start	1Bh
2	Slave address	(00-99)
3	Command Code	32h
4	Clear Value	(00h-FFh)

EXAMPLES:

- 1B 01 32 01 will light up segments a on all indicators.
- 1B 01 32 FF will light up all segments and decimal points on all indicators.
- 1B 01 32 00 will light off all segments and decimal points on all indicators. Display is blank.

ASCII MODE: The first byte is * character (2Ah), two bytes are the Codisplay Slave address number (from 00d to 99d), the third byte is the command code 2 (32h) and the last byte is clear value (from 00a to FFa).

Byte	Description	Value/Range
1	Start	*
2&3	Slave address	(00d-99d)
4	Command Code	2
5	Clear Value	(00a-FFa)

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

EXAMPLES:

- *01201 will light up segments a on all indicators.
- *012FF will light up all segments and decimal points on all indicators.
- *01200 will switch off all segments and decimal points on all indicators. Display is blank.

		MIN	TYPICAL	MAX
Hex Mode	Tint		13.5 µs	
ASCII Mode	Tint		28.6 µs	

Note: Independently of the selected mode 4 digits or 6 LED digits (SW1-5) command is for all LED Indicators.

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

This command allows the User to write data directly into LED buffer, issuing address and data from Host (Master). The address can be in range from (00h) to (05h). When address exceeds (06h), Codisplay cancel completion of the command.

HEX MODE: The first byte is the ESC character (1Bh), the second byte is Codisplay Slave address number, the third byte is the command code (33h), the fourth byte is the Indicator number (from 0 to 6) and the last byte the data byte (from 00h to FFh).

Byte	Description	Value/Range
1	Start	1Bh
2	Slave address	(00-99)
3	Command Code	33h
4	Indicator number	(0h-6h)
5	Data	(00h-FFh)

EXAMPLES:

1B 01 33 00 01 will light up segment a on Indicator 0.

1B 01 33 04 80 will light up decimal point dp on indicator 5.

ASCII MODE: The first byte is * character (2Ah), the next two bytes are the Codisplay Slave number (from 00d to 99d), third one is command code 3 (33h), the next byte is the Indicator number (from 0 to 5) and the last byte the data byte (from 00a to FFa).

Byte	Description	Value/Range
1	Start	*
2&3	Slave address	(00d-99d)
4	Command Code	3
5	Indicator Number	(0-5)
6	Data	(00a-FFa)

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

*013001 will light up segment a on indicator 0.

*013480 will light up decimal point dp on indicator 5.

		MIN	TYPICAL	MAX
Hex Mode	Tint		2 µs	
ASCII Mode	Tint		40.8 µs	

No	ASC II mode	HEX mode
4	*sl(xxa)4dat(xxa..xxa)	1Bh sl(adh) 34h dat(xx..xxh)
COMMAND WRITES BLOCK OF BYTES INTO LED BUFFER		

Using this command the User can write a block of data directly into LED buffer via the transmitting data block. If the received block is a larger than LED buffer boundary, Codisplay will then cancel the received string and will cancel the command. The period between two data bytes must be lower than 20 ms. When the period is longer than 20 ms the command is automatically terminated and Codisplay is ready to accept a new command.

HEX MODE The first byte is ESC character (1Bh), the second byte is Codisplay Slave address number and the third byte is the command code (34h) data byte block (from 00h to FFh).

Byte	Description	Value/Range
1	Start	1Bh
2	Slave address	(00-99)
3	Command Code	34h
4	Data	(00h-FFh)

EXAMPLES:

1B 01 34 3F 06 5B 4F 66 6D displays (left to right) digits **012345**
 1B 01 34 7D 07 **0** and **1** are replaced by **6** and **7** other **2345** remain unchanged.

ASCII MODE: The First byte is * character (2Ah), the second and third bytes are the Codisplay Slave address number (from 00d to 99d), the next byte is command code 4 (34h) and the last is the data byte block (from 00a to FFa).

Byte	Description	Value/Range
1	Start	*
2&3	Slave address	(00d-99d)
4	Command Code	4
5	Data	(00a-FFa)

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

Examples:

*0143F065B4F666D displays (left to right) the digits **0123456**
 *0147D07 **0** and **1** are replaced by **6** and **7** the **2345** remain unchanged

		MIN	TYPICAL	MAX
Hex Mode	Tint	-	12 µs	-
ASCII Mode	Tint	-	28 µs	-

No	ASC II mode	HEX mode
5	*sl(xxa)5(xxa..xxa)	1Bh sl(adh) 35h (xxh..xxh)
COMMAND DUMPS DATA TO LED DISPLAY		

This command dumps the received data block to the LED display using the internal character generator (left to right). Command accepts HEX and ASCII symbols.

The Decimal Point: Sign . (2Eh) informs Codisplay that the next value is to be a decimal point which is set in to the preceding LED digit.

HEX mode The first byte is ESC character (1Bh), the second byte is Codisplay Slave address number, the third byte is the command code (35h) the data byte block (from 00h to FFh). This command use internal character generator to dump display (right to left).

Byte	Description	Value/Range
1	Start	1Bh
2	Slave address	(00-99)
3	Command Code	35h
4	Data	(00h-FFh)

EXAMPLES:

1B 01 35 01 02 03 04 05 2E 06 displays the digits **12345.6**

1B 01 35 36 37 **1** and **2** are replaced by **6** and **7** hence the display is **67345.6**

ASCII mode The first byte is * character (2Ah), followed by two bytes for the Codisplay Slave address number (from 00d to 99d), the next byte is the command code 5 (35h), finally the ASCII data block (00a to FFa).

Byte	Description	Value/Range
1	Start	*
2&3	Slave address	(00d-99d)
4	Command Code	5
5	Data	(00a-FFa)

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

EXAMPLES:

*01512345.6 displays (left to right) the digits **12345.6**

*015 DONE displays (left to right) digits **DOnE**

		MIN	TYPICAL	MAX
HEX mode	Tint	-	2 µs	-
ASCII mode	Tint	18 µs	-	48 µs

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.
 Example: Capital P is 70h.

	0h	1h	2h	3h	4h	5h	6h	7h	8h	9h	Ah	Bh	Ch	Dh	Eh	Fh
0h																
1h																
2h																
3h																
4h																
5h																
6h																
7h																
8h																
9h																
Ah																
Bh																
Ch																
Dh																
Eh																
Fh																

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

This command set the decimal point separately from received data string.

HEX mode – First byte is ESC character (1Bh), second is Codisplay address slave number, third one is command code (36h), and the last is digital point value (from 00h to 05h) for 6 digit mode and (00h-003h) in 4 digit mode. If value is 06h in 6 digit mode and 04h in 4 digit mode the DP is cleared.

Byte	Description	Value/Range
1	Start	1Bh
2	Slave address	(00-99)
3	Command Code	36h
4	DP position	(00h-05h)

Note: Displayed signs and digits are not changed.

EXAMPLES:

1B 01 36 01 dp lit on Indicator 1.
 1B 01 36 02 dp lit on Indicator 2.

ASCII mode – First byte is * character (2Ah), two bytes are Codisplay address slave number (from 00a to 99a), next one is command code (36h), and the last digital point value (from 0 to 5).

Byte	Description	Value/Range
1	Start	*
2&3	Slave address	(00a-99a)
4	Command Code	6
5	DP position	(0-5)

EXAMPLES:

*0161 dp lit on Indicator 1
 *0162 dp lit on Indicator 2

		MIN	TYPICAL	MAX
HEX mode	Tint	-	10 µs	-
ASCII mode	Tint	-	16 µs	-

No	ASC II mode	HEX mode
7	*sl(xxa)7	1Bh sl(adh) 37h
COMMAND WRITES CURRENT VALUE OF PWM AS DEFAULT VALUE.		

This command is used to store current value of PWM as the default value for luminosity after power up. The value is written into non-volatile memory.

HEX mode The first byte is ESC character (1Bh), the second byte is the Codisplay slave address number and the third byte is the command code (37h).

Byte	Description	Value/Range
1	Start	1Bh
2	Slave address	(00-99)
3	Command Code	37h

Note: The displayed signs and decimal point is not changed.

EXAMPLES:

1B 01 31 12 Changes PWM to 12h(18d).
 1B 01 37 Save the PWM value as default.

ASCII mode The first byte is * character (2Ah), followed by two bytes for the Codisplay address slave number (from 00d to 99d), and the last one is command code (37h).

Byte	Description	Value/Range
1	Start	*
2&3	Slave address	(00a-99a)
4	Command Code	37

EXAMPLES:

*01118 Changes PWM to 12h(18d).
 *017 Save the PWM value as default.

		MIN	TYPICAL	MAX
HEX mode	Tint	-	2820 µs	-
ASCII mode	Tint	-	2820 µs	-

No	ASC II mode	HEX mode
8	*sl(xxa)8	1Bh sl(adh) 38h
COMMAND RESTARTS LED CONTROLLER		

This command restarts the Codisplay controller.
 This command acts as power up reset. The LED Display Buffer is cleared.

		MIN	TYPICAL	MAX
HEX mode	Tint	-	120 µs	-
ASCII mode	Tint	-	120 µs	-

5. COMMAND SET TABLE

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

6. ASSIGNMENT OF X3: 9 PIN SUB-D SOCKET (RS485 – 2 WIRES)

X3/Pin 1 = RS485 – GND (0 V)
 X3/Pin 2 = Reserved
 X3/Pin 3 = RS485 - A
 X3/Pin 4 = Reserved
 X3/Pin 5 = RS485 – GND (0 V)
 X3/Pin 6 = Reserved
 X3/Pin 7 = Reserved
 X3/Pin 8 = RS485 – B
 X3/Pin 9 = Reserved

7. POWER SUPPLY

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

X1/1= Vin – + of DC source (square pad) - marked on PCB as +8...24V

X1/2= GND - of DC source (round pad) – marked on PCB as GND

X1/1 and X1/2:

Spring terminal connection for conductors with cross section of 0.14 mm² to 0.5 mm² / AWG 26 to AWG 20

Power supply consumption Codisplay RS232C			
	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. .

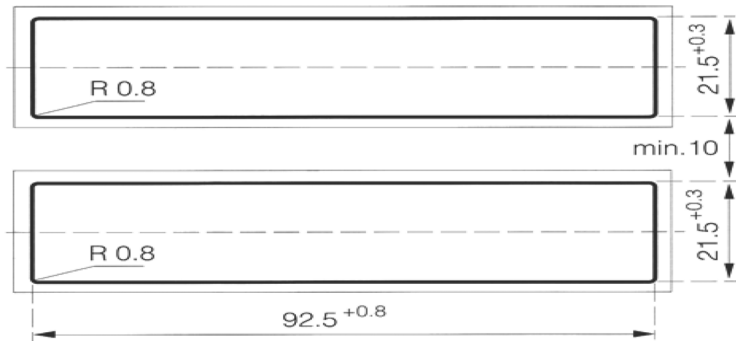
8. INDICATOR TEST -

Indicator test can be performed in any time using jumper JP3. Also Indicator test can be performed remotely using command No 3.

9. CE Conformity AND RoHS COMPLIANCE - Crameda AG declare that Codisplay 190002 respond to all requirements for CE conformity. All PCB boards, components and solder paste are manufactured via leadless technology and meet requirements for RoHS Environment friendly fabrication.

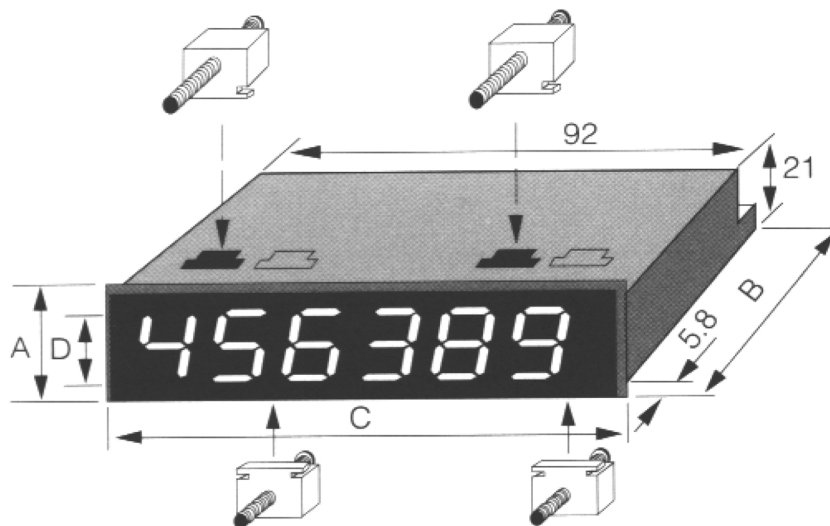
10. PANEL MOUNTING

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

All product specifications and data are subject to change without notice.