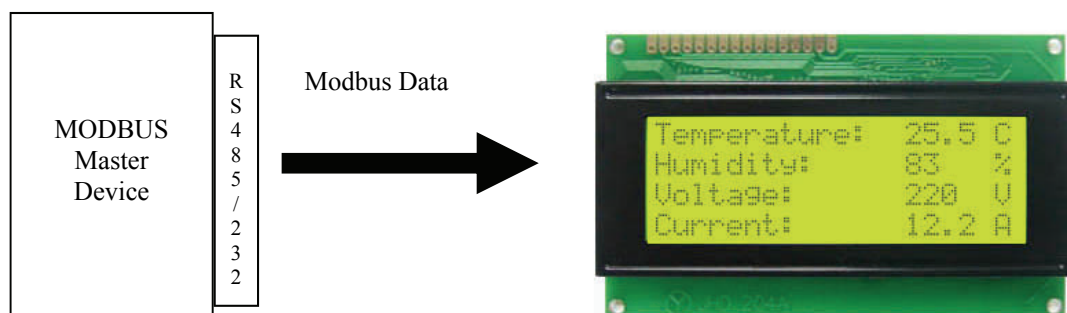


SC2004MBS is a MODBUS slave device that receives data from a Master MODBUS device and display them on the LCD panel.

The LCD is 20 x 4 characters in size and each character place has an unique MODBUS registers address. Writing ASCII text to these registers will cause the text to be displayed on the LCD.

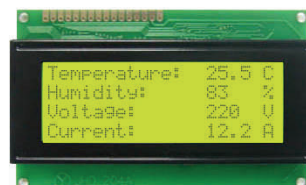
In addition, it has 4 data fields that can be defined on each of the four rows of the LCD screen. These data fields display 16 bits signed or unsigned integers values as it ASCII representation on the LCD screen.

SC2004MBS is available in RS485 or RS232 version.

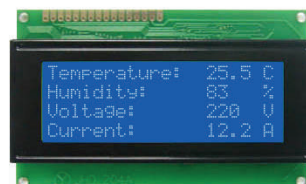


Features

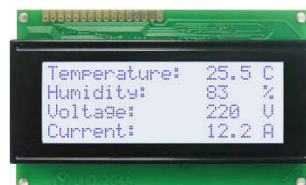
- 20x4 Characters
- RS485 or RS232 communication port
- MODBUS RTU protocol
- 10 memory spaces for user's define messages
- 2 Analog Input Ports (0 to 5V)
- 8 Programmable I/O Ports
- 4 Data Fields for 16 bits Signed/Unsigned Integer or 4 Digits BCD Numbers.
- Programmable fixed decimal point for the data fields (dddd.d , ddd.dd , dd.ddd , d.dddd)
- Programmable Slave Address
- Programmable baud rate (9.6, 19.2 , 38.4)
- LCD backlight control.
- Programmable start screen.
- 5 V or 12V Input Supply
- MODBUS function code 4,5,6 and 16



SC2004MBS-YG



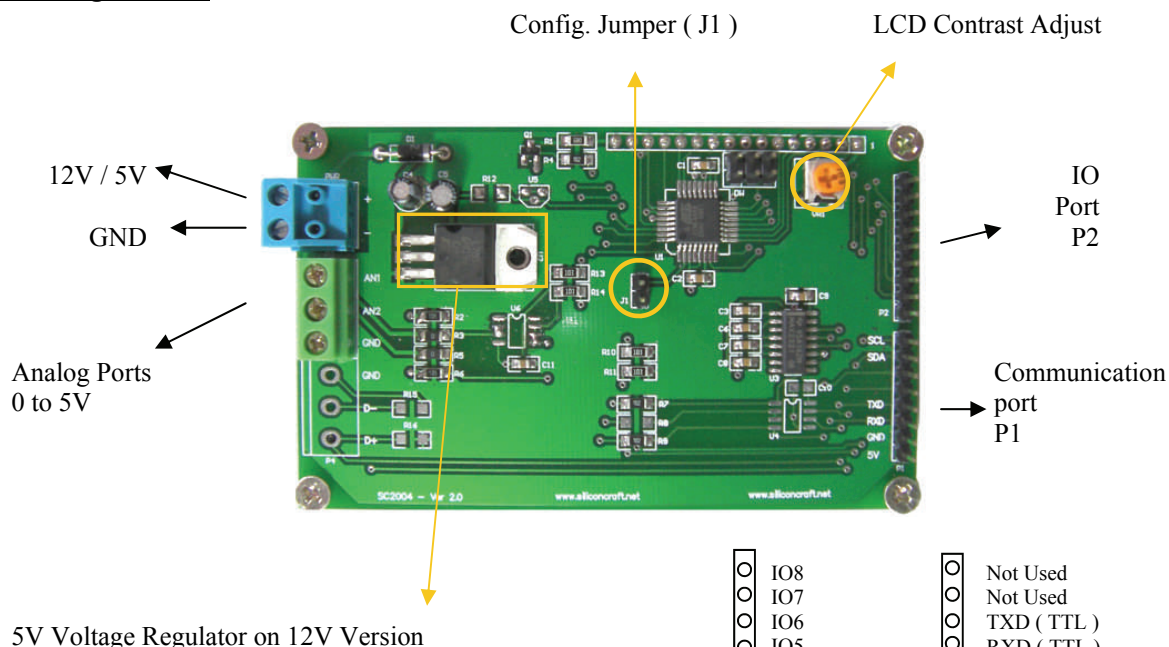
SC2004MBS-B



SC2004MBS-W

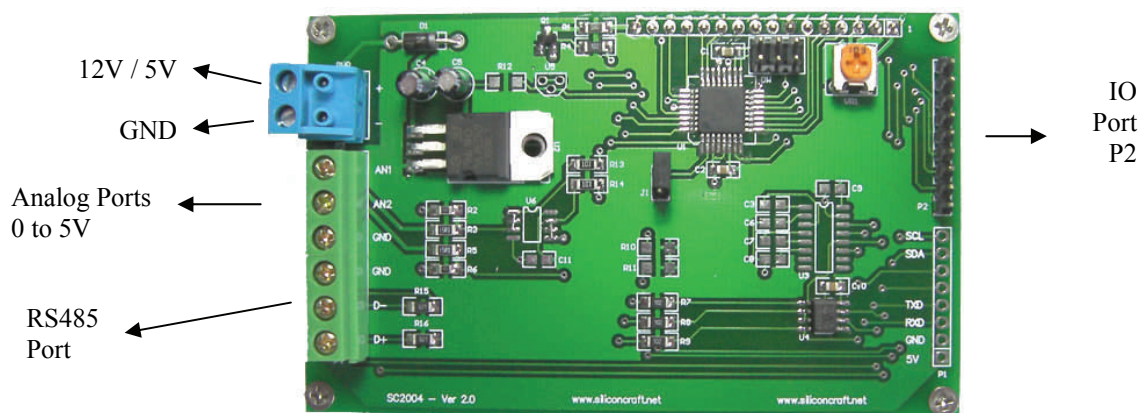
Display Option

Connecting the LCD



SC2004MBS Back View (RS232 Version)

IO8	Not Used
IO7	Not Used
IO6	TXD (TTL)
IO5	RXD (TTL)
IO4	TXD (RS232)
IO3	RXD (RS232)
IO2	COM
IO1	5V
GND	



SC2004MBS Back View (RS485 Version)

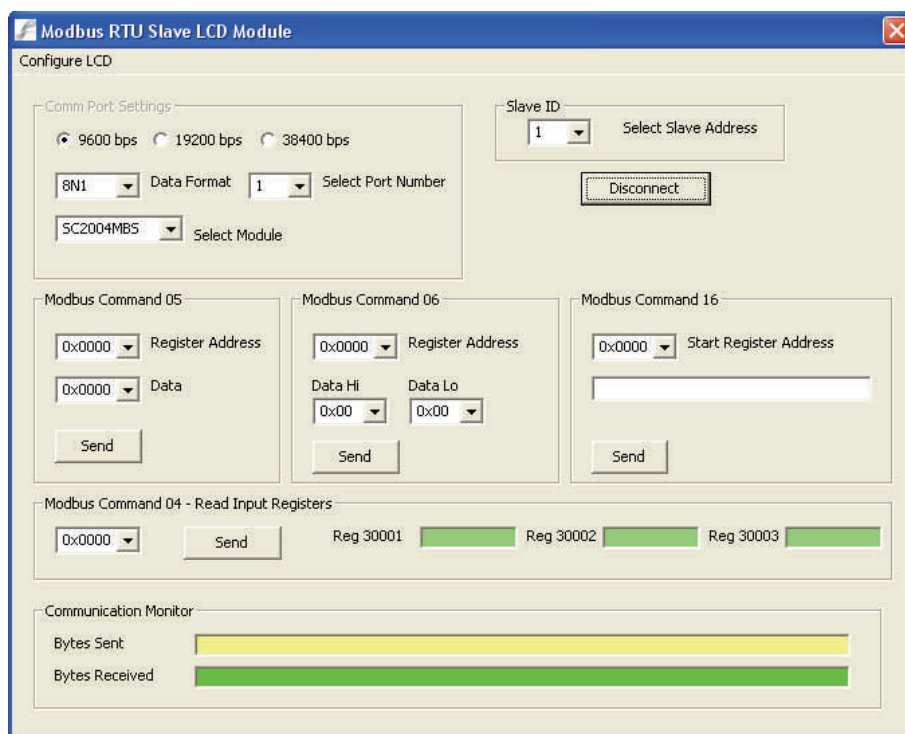
Configure the LCD

You need to download the software MODBUSSlaveLCD from our website at www.siliconcraft.net/download.htm in order to configure the LCD. This software is also a MODBUS master simulator which you can test the LCD by sending the MODBUS command to it.

At the configuration window, you can set the LCD address, the baud rate , I/O port directions , the start page and the data fields parameters.

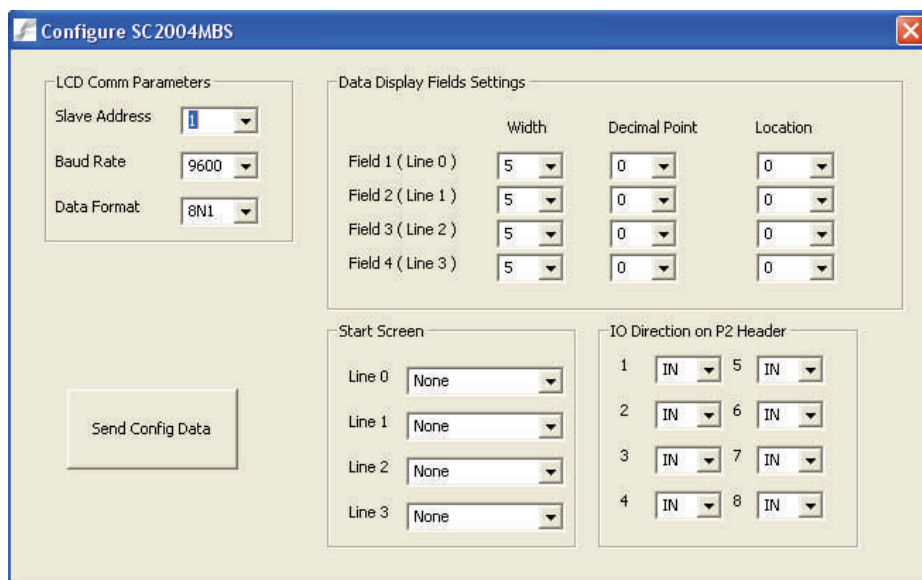
To configure the LCD , install MODBUSSlaveLCD software, close J1 jumper on the back of the LCD, connect the power and the communication port to the Computer running MODBUSSlave software.

When you turn on the power to the LCD, the first row should display “ **SETTING MODE** ”.



Select SC2004MBS and the correct COM port number, then click on “Connect” button.

Then, click on “Configure LCD” menu to open the configuration window.



At the configuration window, set your desired parameters and click “Send Config Data” to send the configuration data to the LCD.

If this is done correctly, LCD should display “**SETTING DONE**”

Message on the second row.

Turn off the power and remove jumper on J1.

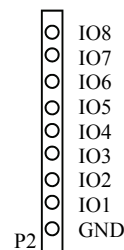
The LCD should have the new setting.

Modbus Command 05 (Force Single Coil)

Use MODBUS command 5 to

- Turn on or off the LCD backlight
- Turn on or off IO port at P2 connector. (Note: Only pin configured as outputs can be controlled)

<u>Register Address</u>	<u>Data Value</u>	<u>Action</u>
0x0000	0x0000	Turn Off LCD Backlight
0x0000	0xFF00	Turn On LCD Backlight
0x0001	0x0000	Turn Off IO 1
0x0001	0xFF00	Turn On IO 1
0x0002	0x0000	Turn Off IO 2
0x0002	0xFF00	Turn On IO 2
0x0003	0x0000	Turn Off IO 3
0x0003	0xFF00	Turn On IO 3
0x0004	0x0000	Turn Off IO 4
0x0004	0xFF00	Turn On IO 4
0x0005	0x0000	Turn Off IO 5
0x0005	0xFF00	Turn On IO 5
0x0006	0x0000	Turn Off IO 6
0x0006	0xFF00	Turn On IO 6
0x0007	0x0000	Turn Off IO 7
0x0007	0xFF00	Turn On IO 7
0x0008	0x0000	Turn Off IO 8
0x0008	0xFF00	Turn On IO 8



Each IO output is 5V and 20mA (max.)

Command Query

[Slave ID] [0x05] [Address Hi] [Address Lo] [Data Hi] [Data Lo] [CRC Hi] [CRC Lo]

Response

[Slave ID] [0x05] [Address Hi] [Address Lo] [Data Hi] [Data Lo] [CRC Hi] [CRC Lo]

Modbus Command 04 (Read Input Registers)

When IO at connector P2 is set as input port, it is automatically pulled high. It is used to connect to volt free contact such as switches.

The status of the input port is stored at registers 30001 and read by function code 04.

Both Analog Port 1 and 2 are 10 bits ADC ports with range of 0 to 5V. ADC representation is 0 for 0V and 1023 for 5V.

The value of Analog 1 and Analog 2 is stored at register 30003 and 30002 respectively

Read Input Port Query

[Slave ID] [0x04] [0x00] [0x00] [0x00] [0x01] [CRC Hi] [CRC Lo]

Response

[Slave ID] [0x04] [0x02] [0x00] [Data Lo] [CRC Hi] [CRC Lo]

Each bit at Data Lo byte represent the status of the input port. i.e BIT0 represents IO1 etc.

Read Analog Port Value

[Slave ID] [0x04] [0x02] [0x00] [0x01 or 0x02] [0x00] [0x01] [CRC Hi] [CRC Lo]

Response

[Slave ID] [0x04] [0x02] [ADC Data Hi] [ADC Data Lo] [CRC Hi] [CRC Lo]

Modbus Command 06 (Preset Single Register)

Data Field is the area where the LCD will displays the integer or BCD data it received. One data field is available on each row.

User's can configure the width of the data field, it start location on each row and decimal point location.

Data width of the data field is the maximum digit to be displayed. For example , it data field width is set to 3 and the received data is 1024 , then only "024 " is displayed.

Start location is the column number where the most significant digit to be displayed. 0 is the left most column

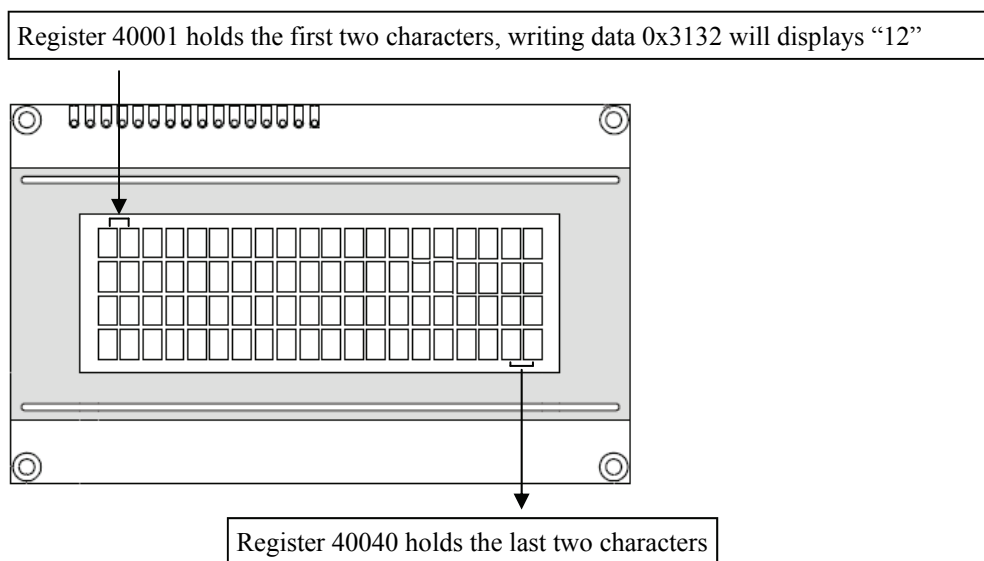
Decimal point will be inserted is configured. For example , is decimal point is set to 1 and received data is 100 then 10.0 is displayed.

Trailing zeros will be automatically blanked off.

There are a total of 4 data fields one on each row.

Displaying ASCII Text

Holding registers 40001 to 40040 hold the ASCII characters to be displayed. Each registers hold two ASCII characters



Modbus Command Example , display " 12 " at the first two locations.

Query

[Slave ID] [0x06] [0x00] [0x00] [0x31] [0x32] [CRC Hi] [CRC Lo]

Response

[Slave ID] [0x06] [0x00] [0x00] [0x31] [0x32] [CRC Hi] [CRC Lo]

Display Integer/BCD Number

Registers 40041 to 40044 hold the Unsigned integer value for data field 1 to 4.
Writing integer data to these registers will result in the data to be displayed.

Signed integer is held in registers 40045 to 40048.

The “ - ” sign is inserted at the most significant digits if the value is negative

4 Digits BCD data is held in registers 40049 to 40052

<u>Register Address</u>	<u>Data Field</u>
0x0028 (40041)	row 0—Unsigned Integer
0x0029 (40042)	row 1— Unsigned Integer
0x002A (40043)	row 2—Unsigned Integer
0x002B (40044)	row 3—Unsigned Integer
0x002C (40045)	row 0—Signed Integer
0x002D (40046)	row 1— Signed Integer
0x002E (40047)	row 2—Signed Integer
0x002F (40048)	row 3—Signed Integer
0x0030 (40049)	row 0—BCD
0x0031 (40050)	row 1— BCD
0x0032 (40051)	row 2—BCD
0x0033 (40052)	row 3—BCD

Display “16442” (0x403A) on data field row 0 command example.

Query

[Slave ID] [0x06] [0x00] [0x28] [0x40] [0x3A] [CRC Hi] [CRC Lo]

Response

[Slave ID] [0x06] [0x00] [0x28] [0x40] [0x3A] [CRC Hi] [CRC Lo]

Display “-453” (0xFE3B) on data field row 1 command example.

Query

[Slave ID] [0x06] [0x00] [0x2D] [0xFE] [0x3B] [CRC Hi] [CRC Lo]

Response

[Slave ID] [0x06] [0x00] [0x2D] [0xFE] [0x3B] [CRC Hi] [CRC Lo]

Erasing the LCD Screen

Writing to register 40053 erase the LCD screen.

Data Value 0x0000	Erase the whole screen.
Data Value 0x0001	Erase row 1 only
Data Value 0x0002	Erase row 2 only
Data Value 0x0003	Erase row 3 only
Data Value 0x0004	Erase row 4 only

User's Defined Messages

SC2004MBS provides 10 memory spaces, each 20 characters wide for storing user's defined messages.

The messages is saved onto the EEPROM using modbus command 16 which will be explained later.

The saved messages is retrieved with modbus command 06 using registers 40054 to 40057 for row 0 to 3
Data value 0 to 9 represents which saved messages to be displayed on selected row.

Example if message " User's Message 1" is stored in memory location 1. To display it on row 0 send command

[Slave ID] [0x06] [0x00] [0x35] [0x00] [0x00] [CRC Hi] [CRC Lo]

Modbus Command 16 (Preset Multiple Registers)

Use Modbus command 16 to send long ASCII string to the LCD.

Registers 40001 to 40040 holds the ASCII characters to be displayed.

Command 16 is also used to saved messages to memory location 0 to 9.

<u>Memory Location</u>	<u>Start Registers</u>
0	0x0028 (40040)
1	0x0032 (40050)
2	0x003C (40060)
3	0x0046 (40070)
4	0x0050 (40080)
5	0x005A (40090)
6	0x0064 (40100)
7	0x006E (40110)
8	0x0078 (40120)
9	0x0082 (40130)

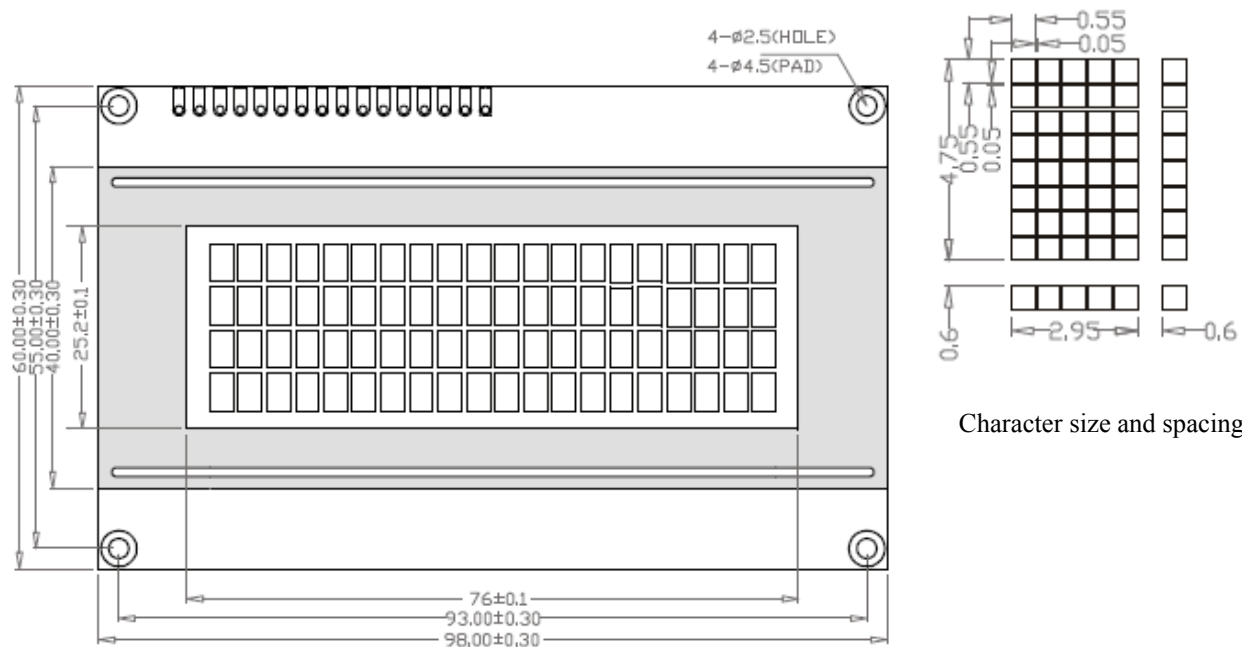
The Start Screen

The saved messages can be made to be displayed at Power up using the configuration Software.

Registers Summary

<u>Register Address</u>	<u>Data Value</u>	<u>Function</u>
0x0000 (40001)	2 Bytes ASCII	LCD row 0 , column 0-1
0x0001 (40002)	2 Bytes ASCII	LCD row 0 , column 2-3
0x0002 (40003)	2 Bytes ASCII	LCD row 0 , column 4-5
0x0003 (40004)	2 Bytes ASCII	LCD row 0 , column 6-7
0x0004 (40005)	2 Bytes ASCII	LCD row 0 , column 8-9
0x0005 (40006)	2 Bytes ASCII	LCD row 0 , column 10-11
0x0006 (40007)	2 Bytes ASCII	LCD row 0 , column 12-13
0x0007 (40008)	2 Bytes ASCII	LCD row 0 , column 14-15
0x0008 (40009)	2 Bytes ASCII	LCD row 0 , column 16-17
0x0009 (40010)	2 Bytes ASCII	LCD row 0 , column 18-19
0x000A (40011)	2 Bytes ASCII	LCD row 1 , column 0-1
0x000B (40012)	2 Bytes ASCII	LCD row 1 , column 2-3
0x000C (40013)	2 Bytes ASCII	LCD row 1 , column 4-5
0x000D (40014)	2 Bytes ASCII	LCD row 1 , column 6-7
0x000E (40015)	2 Bytes ASCII	LCD row 1 , column 8-9
0x000F (40016)	2 Bytes ASCII	LCD row 1 , column 10-11
0x0010 (40017)	2 Bytes ASCII	LCD row 1 , column 12-13
0x0011 (40018)	2 Bytes ASCII	LCD row 1 , column 14-15
0x0012 (40019)	2 Bytes ASCII	LCD row 1 , column 16-17
0x0013 (40020)	2 Bytes ASCII	LCD row 1 , column 18-19
0x0014 (40021)	2 Bytes ASCII	LCD row 2 , column 0-1
0x0015 (40022)	2 Bytes ASCII	LCD row 2 , column 2-3
0x0016 (40023)	2 Bytes ASCII	LCD row 2 , column 4-5
0x0017 (40024)	2 Bytes ASCII	LCD row 2 , column 6-7
0x0018 (40025)	2 Bytes ASCII	LCD row 2 , column 8-9
0x0019 (40026)	2 Bytes ASCII	LCD row 2 , column 10-11
0x001A (40027)	2 Bytes ASCII	LCD row 2 , column 12-13
0x001B (40028)	2 Bytes ASCII	LCD row 2 , column 14-15
0x001C (40029)	2 Bytes ASCII	LCD row 2 , column 16-17
0x001D (40030)	2 Bytes ASCII	LCD row 2 , column 18-19
0x001E (40031)	2 Bytes ASCII	LCD row 3 , column 0-1
0x001F (40032)	2 Bytes ASCII	LCD row 3 , column 2-3
0x0020 (40033)	2 Bytes ASCII	LCD row 3 , column 4-5
0x0021 (40034)	2 Bytes ASCII	LCD row 3 , column 6-7
0x0022 (40035)	2 Bytes ASCII	LCD row 3 , column 8-9
0x0023 (40036)	2 Bytes ASCII	LCD row 3 , column 10-11
0x0024 (40037)	2 Bytes ASCII	LCD row 3 , column 12-13
0x0025 (40038)	2 Bytes ASCII	LCD row 3 , column 14-15
0x0026 (40039)	2 Bytes ASCII	LCD row 3 , column 16-17
0x0027 (40040)	2 Bytes ASCII	LCD row 2 , column 18-19

0x0028 (40041)	Unsigned Int.	Unsigned Integer at row 0
0x0029 (40042)	Unsigned Int.	Unsigned Integer at row 1
0x002A (40043)	Unsigned Int.	Unsigned Integer at row 2
0x002B (40044)	Unsigned Int.	Unsigned Integer at row 3
0x002C (40045)	Signed Int.	Signed Integer at row 0
0x002D (40046)	Signed Int.	Signed Integer at row 1
0x002E (40047)	Signed Int.	Signed Integer at row 2
0x002F (40048)	Signed Int.	Signed Integer at row 3
0x0030 (40049)	2 Bytes BCD	4 Digits BCD at row 0
0x0031 (40050)	2 Bytes BCD	4 Digits BCD at row 1
0x0032 (40051)	2 Bytes BCD	4 Digits BCD at row 2
0x0033 (40052)	2 Bytes BCD	4 Digits BCD at row 3
0x0034 (40053)	0x0000	Clear LCD Screen
	0x0001	Clear row 0 only
	0x0002	Clear row 1 only
	0x0003	Clear row 2 only
	0x0004	Clear row 3 only
0x0035 (40054)	0 to 9	Predefine Message at row 0
0x0036 (40055)	0 to 9	Predefine Message at row 1
0x0037 (40056)	0 to 9	Predefine Message at row 2
0x0038 (40057)	0 to 9	Predefine Message at row 3

Mechanical Dimension (millimeter)

Character size and spacing

Electrical Specification

Power Supply	12V Version	Max (15V) Nominal (12V) Min (9V)	
	5V Version	Max (5.5 V) Nominal (5V) Min (4.5V)	
Current Consumption	Backlight Off	25mA	
	Backlight On	Max (300mA) , Min (150mA)	SC2004MBS-YG
	Backlight On	Max (50 mA) , Min (30mA)	SC2004MBS B/W
Operating Temperature	0°C to 50°C		
Storage Temperature	-10°C to 60°C		
Maximum Sink/Source Current at each output pin (P2)	20mA		
Maximum Voltage at Analog Input	5.5 V		

Available Accessories (Sold Separately)



RS232 cable , DB9 Female to P1 Header



Aluminum Front Panel Mounting Plate