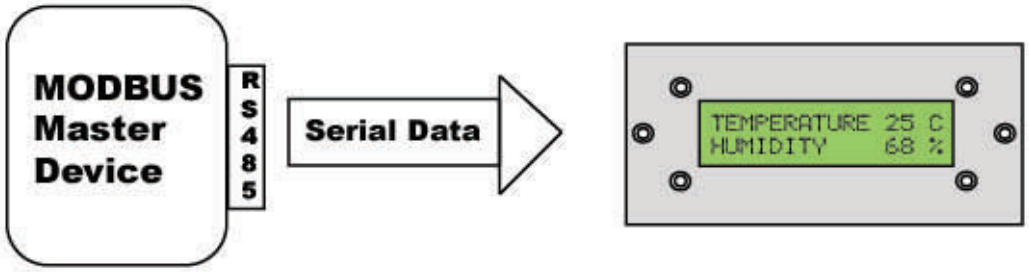
SILICON CRAFT

SC1602MBS Version 2.0
16x2 Characters MODBUS RTU Slave LCD Module

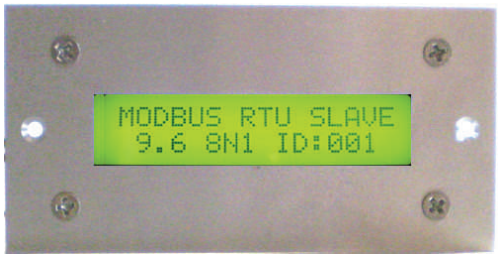


SC1602MBS is a LCD Display that receives and displays MODBUS RTU messages delivered to its serial port. Data can be ASCII texts , integer or BCD.

Features:

- 16x2 Alphanumeric characters
- RS232 or RS485 Interface
- MODBUS RTU Protocol
- Programmable baud rate (9600 to 38400 bps)
- 8 Data Bits, 1 or 2 Stop bit, None or Even parity
- Programmable Address (1 to 247)
- Display ASCII text, signed and unsigned 16 bits integer numbers, BCD Numbers
- 6 User's Programmable fixed messages
- Programmable fixed decimal point location (d.dddd, dd.ddd, ddd.dd, dddd.d or ddddd)
- One multipurpose transistor output
- Controllable LED Backlight
- Support MODBUS function code 05,06 and 16

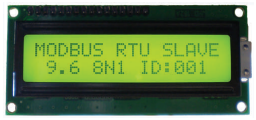
Available Accessories



Aluminum Front Panel Mounting Kit

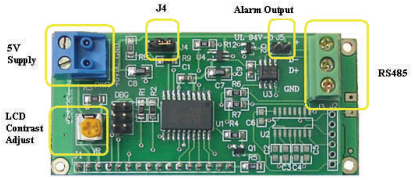
ABS IP65 Enclosure with mounting kits

Display Option:



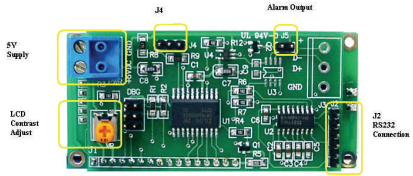
SC1602MBS-YG

SC1602MBS-B



RS485

Or



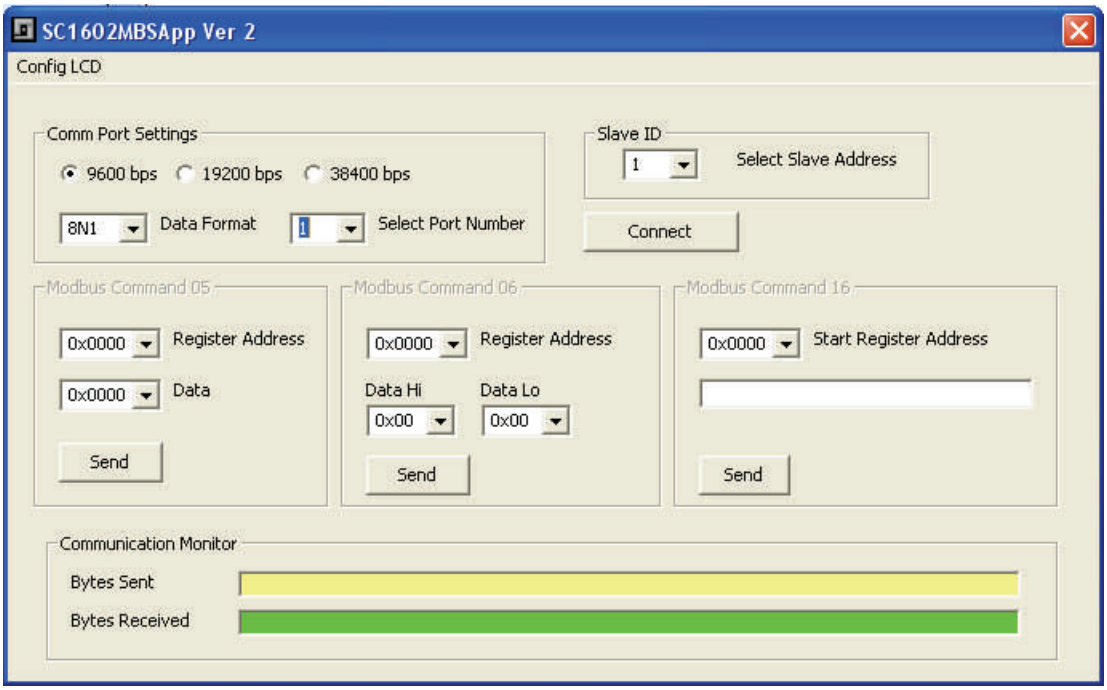
RS232

Configuring the LCD

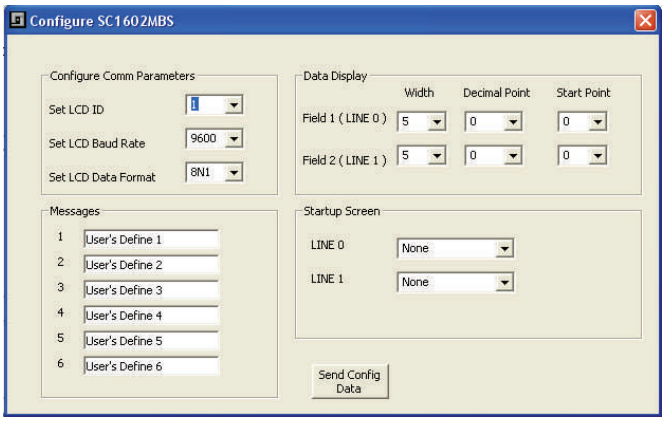
SC1602MBSApp software is needed to configure the LCD. It can be downloaded from www.siliconcraft.net/download.htm

Install J4 jumper to set the LCD to setting mode. Connect to the computer and turn on the power. (RS232 to RS485 converter may be required for the PC to communicate with the module).
Power up the LCD. "**SETTING MODE**" will be displayed on row 0

Caution: Ensure that the polarity is correct and the voltage is 5V before turning on the power. Reverse polarity or over voltage will damage the LCD



Select the correct port number and click on Config LCD



On the configuration screen, set the LCD address, the baud rate and data format (8N1,8N2 or 8E1).

Key in the 6 messages (each is max. 16 characters) These messages will be stored in the LCD memory and can be retrieved and displayed with MODBUS command.

You can select two of the messages as startup screen. The startup screen is the text displayed upon power up.

Data Display Field:

This is the area where the LCD will display the integer data it received. Two fields are available each on row 0 and row 1.
Data width is the max. number of digits to be displayed. For example: if data field is set at 3, max display value would be 999.
Decimal point is fixed. If decimal point is set at 0 , no decimal is displayed. If set at 1 , "dd.d" is displayed (assuming data width is 3)

Start location is the column position where the Most significant digit is displayed. Column 0 is the leftmost column

Note: Data field can be used to display ASCII text , however, the text will be overwrite when it received the integer data.

When all settings are done, click on "Send Config Data" , if setting is successful "**SETTING DONE**" should shows up on row 1.

Turn off the power and remove J4 jumper. The LCD is now configured

Displaying ASCII Text

Holding registers 40001 to 40016 hold the ASCII data to be displayed. Each register hold two ASCII characters. Register 40001 holds the two ASCII characters to be displayed at row 0, column 0 and column 1.

Example:
Write 0x3132 (Hex) to 40001 to display "12" on row 0, column 0 and column 1

Modbus Command

[Slave ID] [0x06] [0x00] [0x00] [0x31] [0x32] [CRC HI] [CRC LO]

Example:
Write 0x5465 0x7374 to address 40009 will display "Test" at the beginning of row 1.

[Slave ID] [0x10] [0x00] [0x08] [0x00] [0x02] [0x04][0x54][0x65][0x73][0x74] [CRC HI][CRC LO]

Using the MODBUS Function Code 16, you can send up to 32 characters to the LCD

Display the stored messages

Frequently use messages can be defined and stored using the SC1602MBSApp software discussed earlier. Writing to register 40024 and 40025 causes the stored message to be display on row 0 and row 1 respectively.

Example:

If message “System Error” is stored in location 1, writing data 0x0000 to register 40024 causes “System Error” displayed on row 0

[Slave ID] [0x06] [0x00] [0x17] [0x00] [0x00] [CRC HI] [CRC LO]

Message location	Data
1	0x00
2	0x01
3	0x02
4	0x03
5	0x04

Display Integer Values

SC1602MBS support 16 bits integer data , both signed and unsigned.
How it interprets the data depends on which register is written.

Register	Display
40017	Unsigned integer on Data Field of row 0
40018	Unsigned integer on Data Field of row 1
40019	Signed integer on Data Field of row 0
40020	Signed integer on Data Field of row 1

Example: Display “60163” on data field row 1

[Slave id] [0x06] [0x00] [0x11] [0xEB] [0x03] [CRC HI] [CRC LO]

Note : If data width set for data field row 0 is less than 5 , then only the least significant digits will be displayed
Example, if data width is set at 3 then “163” is displayed instead of “60163”

If decimal point is set at 1 , “ 6016.3” is displayed.

Trailing zero is automatically erased.

Display Binary Coded Decimal numbers (BCD)

SC1602MBS support 4 digits BCD to be displayed on its data field

Register 40021	BCD on data field row 0
Register 40022	BCD on data field row 1

Example: Display “1009” on data field row 0

[Slave ID] [0x06] [0x00] [0x14] [0x10] [0x09] [CRC HI] [CRC LO]

The startup Screen

At power up, LCD will shows
"MODBUS RTU SLAVE"
" 9.6 8N1 ID:001"

This will appear for 2 seconds to indicate current LCD settings. Thereafter the screen will go blank and waits for the MODBUS command from the host.

User can set predefine messages to be displayed after the current setting screen.

Clear Screen Command

Write any value to register 40023 clear the LCD screen

[Slave ID] [0x06] [0x00] [0x16] [0xXX] [0xXX] [CRC HI] [CRC LO]

Controlling the LCD Backlight

Backlight is turn on or off using MODBUS function code 05.
Backlight is on after power up

To turn off send command

[Slave ID] [0x05] [0x00] [0x00] [0x00] [0x00] [CRC HI] [CRC LO]

To turn on send command

[Slave ID] [0x05] [0x00] [0x00] [0xFF] [0x00] [CRC HI] [CRC LO]

Controlling Transistor Output at J5

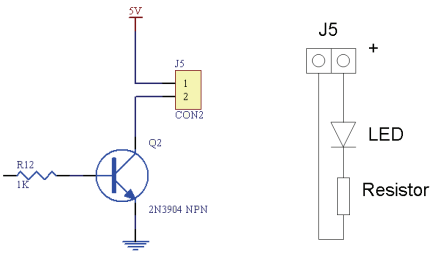
To turn off send command

[Slave ID] [0x05] [0x00] [0x01] [0x00] [0x00] [CRC HI] [CRC LO]

To turn on send command

[Slave ID] [0x05] [0x00] [0x01] [0xFF] [0x00] [CRC HI] [CRC LO]

Maximum sinking current 250 mA



Resisters Summany

Register Address	Data Value	Function
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 1 , column 0-1
0x0009 (40010)	2 Bytes ASCII	LCD row 1 , column 2-3
0x000A (40011)	2 Bytes ASCII	LCD row 1 , column 4-5
0x000B (40012)	2 Bytes ASCII	LCD row 1 , column 6-7
0x000C (40013)	2 Bytes ASCII	LCD row 1 , column 8-9
0x000D (40014)	2 Bytes ASCII	LCD row 1 , column 10-11
0x000E (40015)	2 Bytes ASCII	LCD row 1 , column 12-13
0x000F (40016)	2 Bytes ASCII	LCD row 1 , column 14-15
0x0010 (40017)	Unsigned Int.	Unsigned Integer at row 0
0x0011 (40018)	Unsigned Int.	Unsigned Integer at row 1
0x0012 (40019)	Signed Int.	Signed Integer at row 0
0x0013 (40020)	Signed Int.	Signed Integer at row 1
0x0014 (40021)	2 Bytes BCD	4 Digits BCD at row 0
0x0015 (40022)	2 Bytes BCD	4 Digits BCD at row 1
0x0016 (40023)	any	Clear LCD Screen
0x0017 (40024)	0 to 5	Predefine Message at row 0
0x0018 (40025)	0 to 5	Predefine Message at row 1

Modbus Command Format

Function Code 05 (Force Single Coil)

Query

Slave Address | 05 | Address Hi | Address Lo | Data Hi | Data Lo | CRC Hi | CRC Lo

Response

Slave Address | 05 | Address Hi | Address Lo | Data Hi | Data Lo | CRC Hi | CRC Lo

Function Code 06 (Preset Single Register)

Query

Slave Address | 06 | Address Hi | Address Lo | Data Hi | Data Lo | CRC Hi | CRC Lo

Response

Slave Address | 06 | Address Hi | Address Lo | Data Hi | Data Lo | CRC Hi | CRC Lo

Function Code 16 (Preset Multiple Registers)

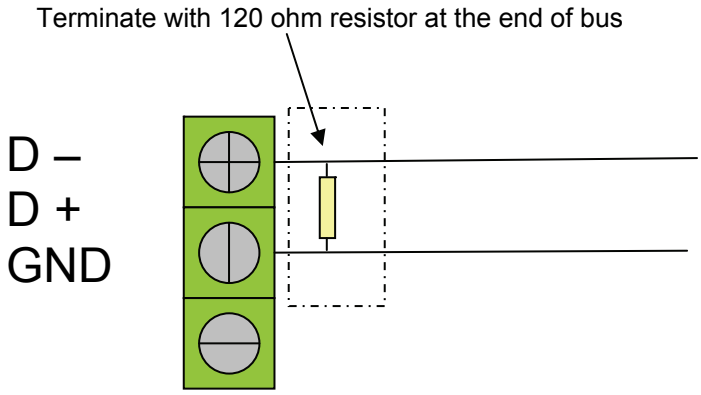
Query

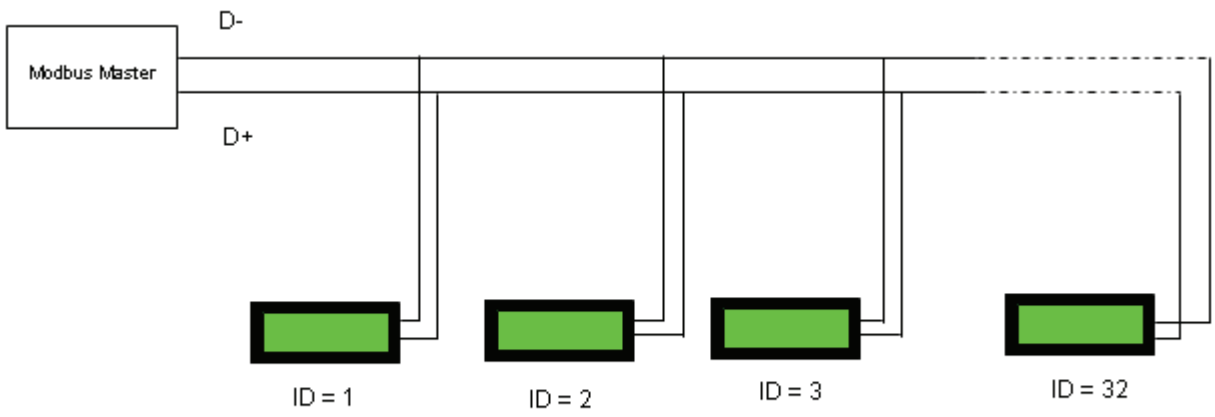
Slave Address | 16 | Address Hi | Address Lo | No. of Reg Hi | No. of Reg Lo | Byte Count |Data | CRC Hi | CRC Lo

Response

Slave Address | 16 | Address Hi | Address Lo | No of Reg Hi | No. of Reg Lo | CRC Hi | CRC Lo

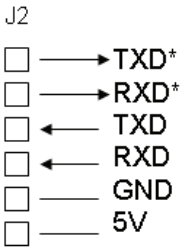
RS485 Connection





Up to 32 LCD connected in a RS 485 bus

RS232 Connection



Note: TXD* and RXD* is the TTL level I/O, do not connect to RS232

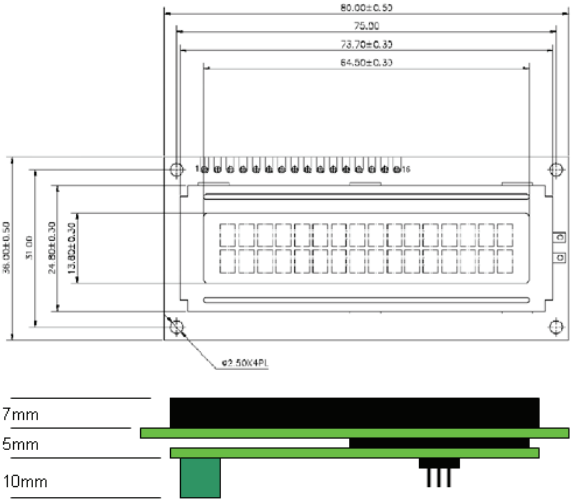
Note: You can also connect the 5V and GND here to power the LCD instead of PWR connector

RS232 cable for SC1602MBS—RS232 Version is available.
(Sold Separately)

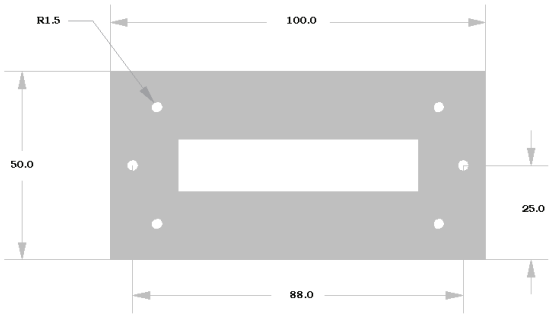
Specification

Power Supply: min 4.5VDC max 5.5VDC (5.0VDC nominal)
Current Consumption: 100mA typical
Operating Temperature: 0ºC to 50ºC
Connection: Screw terminals accept 12 to 26 AWG
Non Volatile Memory Write Cycle: Min 100,000
Non Volatile Memory Data Retention: Min 100 years
Output Maximum sink current: 250mA

LCD
View Angle: 6 o'clock
Characters: 16 x 2
View Area: 64.5mm x 13.8mm
Backlight: Yellow Green or Blue LED



LCD Dimension



Mounting Kit Dimension (mm)
Thickness 1.5mm

Optional Accessories

Optional Accessories (IP 65 Enclosure)