

Document Name	Resource requirements for MODBUS SCL's
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Applicable Products	All MODBUS Master and Slave Libraries

Summary

The resource requirement calculations for the Master and Slave SCL's is dependent on several factors including code generation algorithms of the compiler used. This application note provides approximate code rom/ram requirements for using the MODBUS Master and Slave SCL's. The SCL's are highly configurable by means of macros using which one can selectively exclude unused functionalities from the code to reduce its size and also control the sizes of internal memory buffers effectively controlling the memory required by the stack. Below are some configurations to give the end user an approximation of the resource requirements of our SCL's.

Specification of the MODBUS Master (Approximate Calculation)

Data Memory Required : 1.5 KiloBytes max
 Program Memory Required : 15 KiloBytes
 Maximum MODBUS Frame Size : 256 Bytes

MODBUS Services Supported:

01 (0x01) Read Coils
 02 (0x02) Read Discrete Inputs
 03 (0x03) Read Holding Registers
 04 (0x04) Read Input Registers
 05 (0x05) Write Single Coil
 06 (0x06) Write Single Register
 07 (0x07) Read Exception Status (Serial Line only)
 08 (0x08) Diagnostics (Serial Line only)
 11 (0x0B) Get Comm Event Counter (Serial Line only)
 12 (0x0C) Get Comm Event Log (Serial Line only)
 15 (0x0F) Write Multiple Coils
 16 (0x10) Write Multiple registers
 17 (0x11) Report Slave ID (Serial Line only)
 20/6 (0x14/0x06) Read File Record
 21/6 (0x15/0x06) Write File Record
 22 (0x16) Mask Write Register
 23 (0x17) Read/Write Multiple registers
 24 (0x18) Read FIFO Queue
 43 (0x2B) Encapsulated Interface Transport
 14 (0x0E) Read Device Identification

Specification of the MODBUS Slave

a) Configuration-1: This is a typical configuration for the basic MODBUS commands with CRC calculation optimised for speed rather than size.

Data Memory Required : 1.2 KiloBytes
 Program Memory Required : 7 KiloBytes

Maximum MODBUS Frame Size: 253 Bytes

MODBUS Features Supported:

- Read Coils
- Read Discrete Input
- Read Holding Registers
- Write Single Coil
- Write Single Register
- Read Device identification
- Exception Response

Data Objects Supported:

- Discrete inputs (Single Bit-Read only) : 50 Nos.
- Coils (Single Bit-Read/Write) : 50 Nos.
- Input Registers (16 Bits-Read only) : 50 Nos.
- Holding Registers (16 Bits-Read/Write) : 50 Nos.
- Vendor Name Maximum Size : 17 Bytes
- Product Code Maximum Size : 8 Bytes
- Revision Maximum Size : 8 Bytes

b) Configuration-2: This configuration was fine tuned for a very small footprint by optimising the CRC calculation for size rather than speed and by limiting the frame size to 50 bytes by way of keeping the no. of registers small.

Data Memory Required : 300 Bytes
 Program Memory Required : 6 KiloBytes
 Maximum MODBUS Frame Size : 50 Bytes
 MODBUS Features Supported :

- Read Coils
- Read Discrete Input
- Read Holding Registers
- Write Single Coil
- Write Single Register
- Read Device identification
- Exception Response

Data Objects Supported:

- Discrete inputs (Single Bit-Read only) : 9 Nos.
- Coils (Single Bit-Read/Write) : 6 Nos.
- Input Registers (16 Bits-Read only) : 11 Nos.
- Holding Registers (16 Bits-Read/Write) : 21 Nos.
- Vendor Name Maximum Size : 17 Bytes
- Product Code Maximum Size : 8 Bytes
- Revision Maximum Size : 8 Bytes

c) Configuration-3: All MODBUS functions enabled

In this configuration all MODBUS functions are included in the SCL by defining the appropriate macros.

Data Memory Required : 1.3 KiloBytes
 Program Memory Required : 15 KiloBytes
 Maximum MODBUS Frame Size: 253 Bytes
 MODBUS Features Supported: All

Data Objects Supported:

- Discrete inputs (Single Bit-Read only) : 50 Nos.
- Coils (Single Bit-Read/Write) : 50 Nos.

- Input Registers (16 Bits-Read only) : 50 Nos.
- Holding Registers (16 Bits-Read/Write) : 50 Nos.
- Vendor Name Maximum Size : 17 Bytes
- Product Code Maximum Size : 8 Bytes
- Revision Maximum Size : 8 Bytes

Notes

1. In both Master and slave, the code size is directly proportional to the total number of function codes supported. Similarly, in the slave the data memory size is directly related to the total available number of coils, discrete inputs, Input Registers and Holding Registers and other user specific data. All the features were controlled by macros and hence the stack acquires a size based on the configuration required.
2. In all cases the CRC table was configured to be placed in ROM. If placed in RAM, add approximately 512 bytes extra for RAM requirements and deduct 512 bytes from program memory. If configured to be dynamically calculated, deduct approximately 600 bytes from program memory requirements.
3. The figures shown exclude any user specific application code and RAM requirements.
4. It is possible to fine tune the library to meet stringent memory requirements. Please contact us if you have such a requirement.