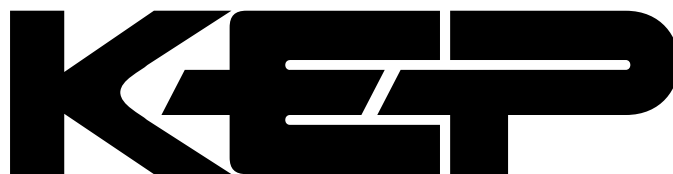


# **SUPERtrol-I**

## ***RS-485 Option with Modbus RTU Protocol***



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## Introducing SUPERtrol-I with RS-485 & Modbus RTU Protocol

When the SUPERtrol-I is equipped with the RS-485 communication option, the protocol it uses is the Modbus RTU protocol. This protocol defines a message structure that hosts and clients will recognize and use on the RS-485 network over which they communicate. It describes the process a master device (PC compatible) uses to request access to another device (SUPERtrol-I), how it will respond to requests from the other devices, and how errors will be detected and reported. It establishes a common format for the layout and contents of message fields.

During communications on a Modbus RTU network, the protocol determines how each SUPERtrol-I will know its device address, recognize a message addressed to it, determine the kind of action to be taken, and extract any data or other information contained in the message. If a reply is required, the SUPERtrol-I will construct the reply message and send it using Modbus RTU protocol.

### RTU Mode

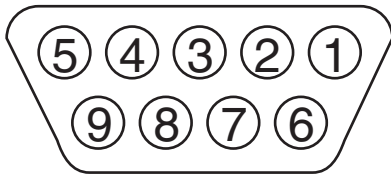
The SUPERtrol-I with RS-485 communications option supports the Modbus RTU (Remote Terminal Unit) mode only. The Modbus ASCII mode is not supported. The main advantage of the RTU mode is that its greater character density allows better data throughput than ASCII for the same baud rate. The Modbus RTU uses a Master-Slave Query-Response Cycle in which the SUPERtrol-I is the slave device.

### Control Functions

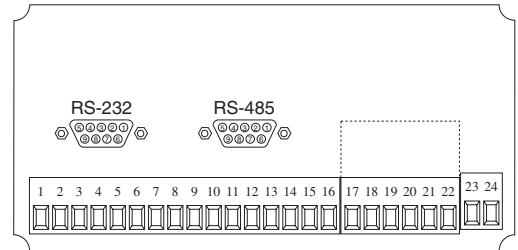
The SUPERtrol-I with RS-485 communications option supports the following function codes:

<b><u>CODE</u></b>	<b><u>NAME</u></b>	<b><u>DESCRIPTION</u></b>
01	Read Coil Status	Read a single coil
03	Read Holding Register	Read a range of holding registers
05	Force Single Coil	Forces a single coil (0x reference) to either ON or OFF
06	Preset Single Register	Presets a value into a single holding register (4x reference)
15	Force Multiple Coil	Forces each coil (0x reference) in a sequence of coils to either ON or OFF
16	Preset Multiple Registers	Presets values into a sequence of holding registers (4x reference)

## SUPERtrol-I RS-485 Port Pinout (recommended mating connector: DB-9M)

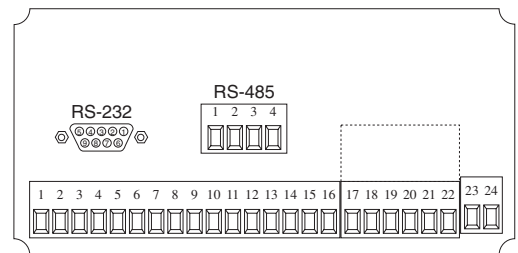


- 1 Ground
- 2 Ground
- 3 Ground
- 4 TX/RX (+)
- 5 TX/RX (-)
- 6 Do Not Use
- 7 Terminating Resistor (180  $\Omega$ )
- 8 TX/RX (+) (spare internally connected to 4)
- 9 TX/RX (-) (spare internally connected to 5)



## SUPERtrol-I RS-485 Port Pinout (Terminal Block Option)

- 1 Common
- 2 TX/RX (+)
- 3 TX/RX (-)
- 4 Terminating Resistor (180 $\Omega$ )



## Installation Overview

A two wire RS-485 may be multidropped up to 4000 ft. and up to 32 units may be chained together. A RS-485 to RS-232 interface adapter is required at the PC. An optically isolated type is recommended. Suitable wiring should be selected based on anticipated electrical interference. Terminators should be used to help improve the quality of electronic signals sent over the RS-485 wires. The RS-485 chain should be terminated at the beginning (RS-485 adaptor) and at the last device in the RS-485 chain and nowhere else. On the SUPERtrol-I this is accomplished by connecting a jumper from terminal 7 to terminal 4 or 8 at the RS-485 port when DB-9 connector is used. Place jumper between terminals 2 and 4 when the terminal block option is used. If lightning protection is required, a suitable surge protector should be used.

For additional information, refer to the technical requirements of EIA-485, interface adaptor user manual and the communication software user manual

## SUPERtrol-I Communication Setup Menu

The setup menu allows Modbus RTU Protocol communications parameters of: Device ID, Baud Rate, and Parity to be selected to match the parameters of your RS-485 network. Each SUPERtrol-I must have it's own Device ID and the same Baud Rate and Parity setting.

## Register & Coil Usage

### Register Usage (each register is 2 bytes)

<u>SUPERtrol-I Data</u>	<u>Register</u>	<u>Data Type</u>	<u>Access</u>
Volume Flow	Reg 40001 & 40002	Float	Read
CorVol or Mass Flow	Reg 40003 & 40004	Float	Read
Total	Reg 40005 & 40006	Float	Read
Grand Total	Reg 40007 & 40008	Float	Read
Temperature	Reg 40009 & 40010	Float	Read
Density	Reg 40011 & 40012	Float	Read
Preset 1	Reg 40013 & 40014	Float	Read/Write
Preset 2	Reg 40015 & 40016	Float	Read/Write
Preset 3	Reg 40017 & 40018	Float	Read/Write
Preset 4	Reg 40019 & 40020	Float	Read/Write
Year	Reg 40021	Integer	Read
Month	Reg 40022	Integer	Read
Day	Reg 40023	Integer	Read
Hours	Reg 40024	Integer	Read
Minutes	Reg 40025	Integer	Read
Seconds	Reg 40026	Integer	Read
Viscosity	Reg 40027 & 40028	Float	Read
Transaction Number	Reg 40029	Integer	Read
Unused	Reg 40030	–	–
Unused	Reg 40031 & 40032	–	–
Unused	Reg 40033 & 40034	–	–
Unused	Reg 40035 & 40036	–	–
Unused	Reg 40037 & 40038	–	–
Unused	Reg 40039 & 40040	–	–
Unused	Reg 40041 & 40042	–	–
Unused	Reg 40043 & 40044	–	–
Fluid Number	Reg 40045	Integer	Read/Write
Unused	Reg 40046	–	–
Unused	Reg 40047 & 40048	–	–
Unused	Reg 40049 & 40050	–	–
Unused	Reg 40051 & 40052	–	–
Unused	Reg 40053 & 40054	–	–
Unused	Reg 40055 & 40056	–	–
Unused	Reg 40057 & 40058	–	–
Unused	Reg 40059 & 40060	–	–
Unused	Reg 40061 & 40062	–	–
Unused	Reg 40063 & 40064	–	–

**NOTE:** The Float data type follows the IEEE format for a 32 bit float.

### COIL USAGE (each coil is 1 bit)

<u>SUPERtrol-I Data</u>	<u>Coil</u>	<u>Data Type</u>	<u>Access</u>
Error-Pulse Out Overflow	Coil 00001	bit	Read
Alarm-Flow Rate Alarm Low	Coil 00002	bit	Read
Alarm-Flow Rate Alarm High	Coil 00003	bit	Read
Alarm-Temp Alarm Low	Coil 00004	bit	Read
Alarm-Temp Alarm High	Coil 00005	bit	Read
Alarm-Density Alarm Low	Coil 00006	bit	Read
Alarm-Density Alarm High	Coil 00007	bit	Read
Unused	Coil 00008	–	–
Unused	Coil 00009	–	–
Unused	Coil 00010	–	–
Unused	Coil 00011	–	–
Unused	Coil 00012	–	–
Unused	Coil 00013	–	–

## Register & Coil Usage (continued)

<b>SUPERtrol-I Data</b>	<b>Coil</b>	<b>Data Type</b>	<b>Access</b>
Alarm-Batch Overrun Alarm	Coil 00014	bit	Read
Error-Software Error Reset	Coil 00015	bit	Read
Error-Extended PFI Lockup	Coil 00016	bit	Read
Unused	Coil 00017	–	–
Unused	Coil 00018	–	–
Error-Cal Checksum Error	Coil 00019	bit	Read
Error-Modem Not Found	Coil 00020	bit	Read
Error-Setup Checksum Error	Coil 00021	bit	Read
Error-Rate Overflow Error	Coil 00022	bit	Read
Error-A to D Not Converting	Coil 00023	bit	Read
Error-Aux Input Too Low	Coil 00024	bit	Read
Error-Aux Input Too High	Coil 00025	bit	Read
Error-Flow Input Too Low	Coil 00026	bit	Read
Error-Flow Input Too High	Coil 00027	bit	Read
Error-Pulse Security Error	Coil 00028	bit	Read
Error-RTD Out Of Range	Coil 00029	bit	Read
Warning-Battery Low Warning	Coil 00030	bit	Read
Error-Time Clock Error	Coil 00031	bit	Read
Warning-Totalizer Rollover	Coil 00032	bit	Read
Command-Reset Total	Coil 00033	bit	Read/Write
Command-Reset Errors	Coil 00034	bit	Read/Write
Command-Print Command	Coil 00035	bit	Read/Write
Status-Instrument Type Rate/Total or Batch	Coil 00036	bit	Read
Command-Start Batch Command*	Coil 00037	bit	Read/Write
Command-Stop Batch Command*	Coil 00038	bit	Read/Write
Command-Clear Batch Command*	Coil 00039	bit	Read/Write
Status-Batch Filling Status*	Coil 00040	bit	Read
Status-Batch Stopped Status*	Coil 00041	bit	Read
Status-Batch Idle Status*	Coil 00042	bit	Read
Command-Relay 1 Command**	Coil 00043	bit	Read/Write
Command-Relay 2 Command**	Coil 00044	bit	Read/Write
Command-Relay 3 Command**	Coil 00045	bit	Read/Write
Command-Relay 4 Command**	Coil 00046	bit	Read/Write
Status-Relay 1 Status	Coil 00047	bit	Read
Status-Relay 2 Status	Coil 00048	bit	Read
Status-Relay 3 Status	Coil 00049	bit	Read
Status-Relay 4 Status	Coil 00050	bit	Read
Status-Control 1 Status	Coil 00051	bit	Read
Status-Control 2 Status	Coil 00052	bit	Read
Status-Control 3 Status	Coil 00053	bit	Read
Unused	Coil 00054	–	–
Unused	Coil 00055	–	–
Unused	Coil 00056	–	–
Unused	Coil 00057	–	–
Unused	Coil 00058	–	–
Unused	Coil 00059	–	–
Unused	Coil 00060	–	–
Unused	Coil 00061	–	–
Unused	Coil 00062	–	–
Unused	Coil 00063	–	–
Unused	Coil 00064	–	–

\* Batch functions are only active if unit has been configured as a batcher in the setup menus.  
 “Instrument Type Rate/Total or Batch” status is 0 for RT, 1 for Batch.

\*\* Relay commands are only active if relays have been configured for “NA” (not assigned) in the setup menus.