

SUPERtrol II

RS-485 Option with Modbus RTU Protocol



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Introducing SUPERtrol II with RS-485 & Modbus RTU Protocol

When the SUPERtrol II 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 II), 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 II 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 II will construct the reply message and send it using Modbus RTU protocol.

RTU Mode

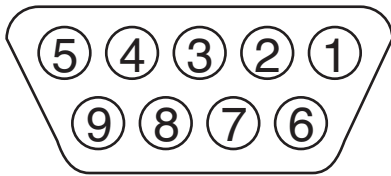
The SUPERtrol II with RS-485 communications option supports the Modbus RTU (Remote Terminal Unit) mode only. The Modbus ASCII mode is not supported. The main advantage of the RTU mode is that its greater character density allows better data throughput than ASCII for the same baud rate. The Modbus RTU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

Control Functions

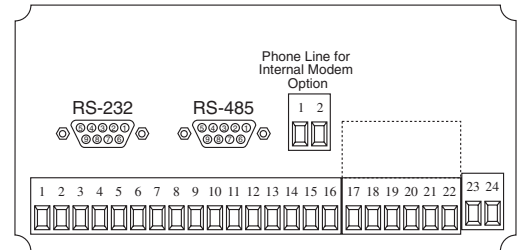
The SUPERtrol II with RS-485 communications option supports the following function codes:

<u>CODE</u>	<u>NAME</u>	<u>DESCRIPTION</u>
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 II RS-485 Port Pinout (recommended mating connector: DB-9M)

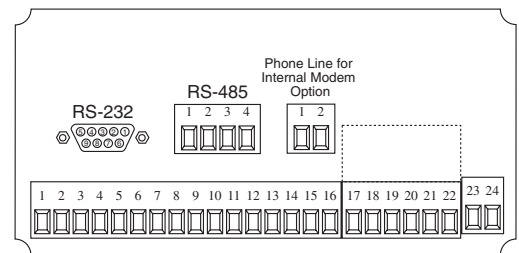


- 1 Ground
- 2 Ground
- 3 Ground
- 4 TX/RX (+)
- 5 TX/RX (-)
- 6 Do Not Use
- 7 Terminating Resistor (180 Ω)
- 8 TX/RX (+) (spare internally connected to 4)
- 9 TX/RX (-) (spare internally connected to 5)



SUPERtrol II RS-485 Port Pinout (Terminal Block Option)

- 1 Common
- 2 TX/RX (+)
- 3 TX/RX (-)
- 4 Terminating Resistor (180 Ω)



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 adaptor 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 II this is accomplished by connecting a jumper from the terminal labeled **Terminating Resistor (180 Ω)** to the terminal labeled **TX/RX(+)** at the RS-485 port. 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 II 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 II must have it's own Device ID and the same Baud Rate and Parity setting.

Terminal Layout for Wall Mount Option:

NEMA 12, 13 Terminal Designations

RS-232					
1	TX	2	RX	3	COM
4	BIAS	5	DCD	6	MP (+8 VDC)

RS-485			
1	TX/RX(+)	2	Terminating Resistor (180 ohms)
3	TX/RX(-)	4	Common

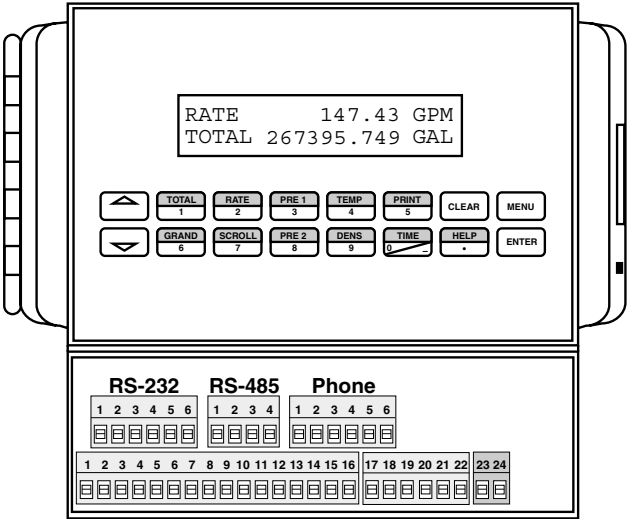
Phone					
1	TIP	2	RING	3	Not Used
4	Not Used	5	Not Used	6	Not Used

DC Power
3 Relay Option

1	DC OUTPUT	2	PULSE IN	3	-----	4	COMMON	5	RTD EXCIT (+)	6	RTD SENS (+)	7	RTD SENS (-)	8	DC OUTPUT	9	RTD EXCIT (+)	10	RTD SENS (+)	11	RTD SENS (-)	12	PULSE OUTPUT (+)	13	PULSE OUTPUT (-)	14	ANALOG OUTPUT 1 (+)	15	ANALOG OUTPUT 2 (+)	16	ANALOG OUTPUT COMMON (-)	17	NO RLY1	18	COM RLY1	19	NC RLY1	20	NC RLY2	21	COM RLY2	22	NO RLY2	23	AC LINE	24	AC LINE	25	DC (+)	26	DC (-)	27	POWER IN
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Specify Power Input When Ordering.

NEMA 12, 13 Terminal Layout



Register & Coil Usage

Register Usage (each register is 2 bytes) **NOTE:** The Float data type follows the IEEE format for a 32 bit float.

<u>SUPERtrol II Data</u>	<u>Register</u>	<u>Data Type</u>
Heat Flow	Reg 40001 & 40002	Float
Mass Flow	Reg 40003 & 40004	Float
STD Volume Flow	Reg 40005 & 40006	Float
Volume Flow	Reg 40007 & 40008	Float
Temperature 1	Reg 40009 & 40010	Float
Temperature 2	Reg 40011 & 40012	Float
Delta Temperature	Reg 40013 & 40014	Float
Process Pressure	Reg 40015 & 40016	Float
Diff. Pressure	Reg 40017 & 40018	Float
Density	Reg 40019 & 40020	Float
Specific Enthalpy	Reg 40021 & 40022	Float
Heat Total	Reg 40023 & 40024	Float
Mass Total	Reg 40025 & 40026	Float
STDVolumeTotal	Reg 40027 & 40028	Float
Volume Total	Reg 40029 & 40030	Float
Heat Grand Total	Reg 40031 & 40032	Float
Mass Grand Total	Reg 40033 & 40034	Float
STDVolumeGrandTotal	Reg 40035 & 40036	Float
Volume Grand Total	Reg 40037 & 40038	Float
Alarm Point 1	Reg 40039 & 40040	Float
Alarm Point 2	Reg 40041 & 40042	Float
Alarm Point 3	Reg 40043 & 40044	Float
Year	Reg 40045	Integer
Month	Reg 40046	Integer
Day	Reg 40047	Integer
Hours	Reg 40048	Integer
Min	Reg 40049	Integer
Sec	Reg 40050	Integer
Peak Demand	Reg 40051 & 40052	Float
Demand Last	Reg 40053 & 40054	Float
Viscosity	Reg 40055 & 40056	Float
Abs. Viscosity	Reg 40057 & 40058	Float
Reserved	Reg 40059 & 40060	Float
Power Lost Hour	Reg 40061	Integer
Power Lost Min.	Reg 40062	Integer
Reserved	Reg 40063 & 40064	Float
Reserved	Reg 40065 & 40066	Float
Reserved	Reg 40067 & 40068	Float
Reserved	Reg 40069 & 40070	Float
Reserved	Reg 40071 & 40072	Float
Reserved	Reg 40073 & 40074	Float
Reserved	Reg 40075 & 40076	Float
Time base	Reg 40077	Integer
Heat Flow Units	Reg 40078	Integer
Mass Flow Units	Reg 40079	Integer
STD Flow Units	Reg 40080	Integer
Vol. Flow Units	Reg 40081	Integer
Temperature Units	Reg 40082	Integer
Pressure Units	Reg 40083	Integer
Density Units	Reg 40084	Integer
Heat Total Units	Reg 40085	Integer
Mass Total Units	Reg 40086	Integer

Register & Coil Usage (continued)

Register Usage (each register is 2 bytes)

<u>SUPERtrol II Data</u>	<u>Register</u>	<u>Data Type</u>
STD Total Units	Reg 40087	Integer
Vol. Total Units	Reg 40088	Integer
Definition of Barrel	Reg 40089	Integer
Specific Enthalpy Units	Reg 40090	Integer
Length Units	Reg 40091	Integer
Calibration trail	Reg 40092	Integer
Configuration trail	Reg 40093	Integer
Tag Number	Reg 40094	Integer
Peak Year	Reg 40095	Integer
Peak Month	Reg 40096	Integer
Peak Day	Reg 40097	Integer
Peak Hours	Reg 40098	Integer
Peak Min	Reg 40099	Integer
Unused	Reg 40100	Integer
Unused	Reg 40101 & 40102	Float
Unused	Reg 40103 & 40104	Float
Unused	Reg 40105 & 40106	Float
Unused	Reg 40107 & 40108	Float
Unused	Reg 40109 & 40110	Float
Unused	Reg 40111 & 40112	Float
Unused	Reg 40113 & 40114	Float
Unused	Reg 40115 & 40116	Float
Unused	Reg 40117 & 40118	Float
Unused	Reg 40119 & 40120	Float
Unused	Reg 40121 & 40122	Float
Unused	Reg 40123 & 40124	Float

COIL USAGE (each coil is 1 bit)

<u>SUPERtrol II Data</u>	<u>Coil</u>	<u>Data Type</u>
System Alarm Power Failure	Coil 00001	bit
System Alarm Watchdog	Coil 00002	bit
System Alarm Communication Error	Coil 00003	bit
System Alarm Calibration Error	Coil 00004	bit
System Alarm Print Buffer Full	Coil 00005	bit
System Alarm Totalizer Error	Coil 00006	bit
Sensor/Process Alarm Wet Steam Alarm	Coil 00007	bit
Sensor/Process Alarm Off Fluid Table	Coil 00008	bit
Sensor/Process Alarm Flow In Over Range	Coil 00009	bit
Sensor/Process Alarm Input 1 Over Range	Coil 00010	bit
Sensor/Process Alarm Input 2 Over Range	Coil 00011	bit
Sensor/Process Alarm Flow Loop Broken	Coil 00012	bit
Sensor/Process Alarm Loop 1 Broken	Coil 00013	bit
Sensor/Process Alarm Loop 2 Broken	Coil 00014	bit
Sensor/Process Alarm RTD 1 Open	Coil 00015	bit
Sensor/Process Alarm RTD 1 Short	Coil 00016	bit
Sensor/Process Alarm RTD 2 Open	Coil 00017	bit
Sensor/Process Alarm RTD 2 Short	Coil 00018	bit
Sensor/Process Alarm Pulse Out Overrun	Coil 00019	bit
Sensor/Process Alarm Iout 1 Out Of Range	Coil 00020	bit
Sensor/Process Alarm Iout 2 Out Of Range	Coil 00021	bit
Sensor/Process Alarm Relay 1 Hi Alarm	Coil 00022	bit

Register & Coil Usage (continued)

COIL USAGE (each coil is 1 bit)

<u>SUPERtrol II Data</u>	<u>Coil</u>	<u>Data Type</u>
Sensor/Process Alarm Relay 1 Lo Alarm	Coil 00023	bit
Sensor/Process Alarm Relay 2 Hi Alarm	Coil 00024	bit
Sensor/Process Alarm Relay 2 Lo Alarm	Coil 00025	bit
Sensor/Process Alarm Relay 3 Hi Alarm	Coil 00026	bit
Sensor/Process Alarm Relay 3 Lo Alarm	Coil 00027	bit
Service Test 24Vdc Out Error	Coil 00028	bit
Service Test Pulse In Error	Coil 00029	bit
Service Test Input 1 Vin Error	Coil 00030	bit
Service Test Input 1 Iin Error	Coil 00031	bit
Service Test Input 2 Iin Error	Coil 00032	bit
Service Test Input 2 RTD Error	Coil 00033	bit
Service Test Input 3 Iin Error	Coil 00034	bit
Service Test Input 3 RTD Error	Coil 00035	bit
Service Test Pulse Out Error	Coil 00036	bit
Service Test Iout 1 Error	Coil 00037	bit
Service Test Iout 2 Error	Coil 00038	bit
Service Test Relay 1 Error	Coil 00039	bit
Service Test Relay 2 Error	Coil 00040	bit
Service Test RS-232 Error	Coil 00041	bit
Self Test A/D Malfunction	Coil 00042	bit
Self Test Program Error	Coil 00043	bit
Self Test Setup Data Lost	Coil 00044	bit
Self Test Time Clock Lost	Coil 00045	bit
Self Test Display Malfunction	Coil 00046	bit
Self Test Ram Malfunction	Coil 00047	bit
Language Select	Coil 00048	bit Write
Reset Totalizers	Coil 00049	bit Write with Caution
Reset All Error Codes	Coil 00050	bit Write
Reset Alarm 1	Coil 00051	bit Write
Reset Alarm 2	Coil 00052	bit Write
Reset Alarm 3	Coil 00053	bit Write
Print Transaction Document	Coil 00054	bit Write
Reset Peak Demand	Coil 00055	bit Write
Reset Accumulated Power Loss	Coil 00056	bit Write
Aux. Status Input	Coil 00057	bit
Reserved	Coil 00058	bit
Reserved	Coil 00059	bit
Reserved	Coil 00060	bit
Reserved	Coil 00061	bit
Reserved	Coil 00062	bit
Flowmeter Location	Coil 00063	bit
Unused	Coil 00064	bit