Sample Series SD 32-bit Modbus Packet

Sent to Read (32-bit) Process Value

Binary	Hex	Decimal	Purpose
00000001	01	1	Controller Address
00000011	03	3	Function Read
00000000	00	0	Read Starting at Register High Byte (Process Temp is Register 20 & 21)
00010100	14	20	Read Starting at Register Low Byte (Process Temp is Register 20 & 21)
00000000	00	0	Read number of consecutive registers - High Byte (Always 0)
00000010	02	2	Read number of consecutive registers - Low Byte
00001101	84	132	Low byte of CRC
10000100	0F	15	High byte of CRC

The CRC (also a 16 bit wide value) is sent in reverse order, low byte then high byte.

Received from the Read Process Value 1250.116 °F (32-bit)

Binary	Hex	Decimal	Purpose	
00000001	01	1	Controller Address	
00000011	03	3	Function Read	
00001000	08	8	Number of data bytes returned	
00000000	00	0	Data High Byte of 1st register Read - MSB of MSW	consecutive registers
00010011	13	19	Data Low Byte of 1st register Read - LSB of MSW	consecutive registers
00010011	13	19	Data High Byte of 2nd register Read - MSB of LSW	consecutive registers
01000100	44	68	Data Low Byte of 2nd register Read - LSB of LSW	consecutive registers
11110101	F5	245	Low byte of CRC	
00000110	06	6	High byte of CRC	

Note: Some values will be rounded off to fit in the four-character display of the Series SD. Full values can be read via Modbus. All temperature parameters are in °F through Modbus by default. To change communications temperature units via Modbus, write a 0 for °F or 1 for °C to 16-bit register 18. Notice that the display may be in different temperature units than communication via Modbus. To change the display units, write a 0 for °F or 1 for °C to 16-bit register 40.

For 32-bit values - Low register numbers contain the two higher bytes (most significant word); high register numbers contain the two lower bytes (least significant word) of the four-byte integer. All values are integers and decimal precision is implied at three decimal places unless otherwise noted.

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Sample Series SD 32-bit Modbus Packet

Example: To read a 32-bit value in decimal format;

Note: The process value of the Series SD is contained in two 16-bit registers. Register 20 contains the two higher bytes (most significant word, MSW) while register 21 contains the two lower bytes (least significant word, LSW). The 16-bit value returned from register 20 is multiplied by 65,535 and added to register 21 when working with decimal numbers. To place the decimal point, divide the results by 1,000. Each register, a 16-bit value, contains a most significant byte, MSB and a least significant byte, LSB. Negative numbers are sent in two's complement format.

In this example, Register 20 MSB = 0 and Register 20 LSB = 19. Register 21 MSB = 19 and Register 21 LSB = 68. To convert to a 32-bit value perform the following calculation.

32-bit Process Value			
Register 20= MSW, a 16-bit value		Register 21 = LSW, a 16 bit value	
MSB, a 8-bit value	LSB, a 8-bit value	MSB, a 8-bit value	LSB, a 8-bit value
0	19	19	68
(MSB x 256) + LSB = MSW	(0 x 256) + 19 = 19	(MSB x 256) + LSB = LSW	(19 x 256) + 68 = 4932
MSW = 19		LSW = 4932	
Integer Answer = (MSW x 65536) + LSW	(19 x 65536) + 4932 = 1250116		
Final Answer = Integer Answer / 1000	1250116 / 1000 = 1250.116		

The answer is 1250.116 degrees.

Sample Series SD 32-bit Modbus Packet

Sent to Write (32-bit) Set Point of 1,250 °F (1,250,000)

Binary	Hex	Decimal	Purpose	
00000001	01	1	Controller Address	
00010000	10	16	Function Multiple Write	
00000000	00	00	Write Starting at Register High Byte (Set Point is Register 27 & 28)	
00011011	1B	27	Write Starting at Register Low Byte (Set Point is Register 27 & 28)	
00000000	00	0	Write number of consecutive registers - High Byte (Always 0)	
00000010	02	2	Write number of consecutive registers - Low Byte	
00000100	04	4	Number of Bytes to Write	
00000000	00	00	Data High Byte of 1st register Write - MSB of MSW	consecutive registers
00010011	13	19	Data Low Byte of 1st register Write - LSB of MSW	consecutive registers
00010010	12	18	Data High Byte of 2nd register Write - MSB of LSW	consecutive registers
11010000	D0	208	Data Low Byte of 2nd register Write - LSB of LSW	consecutive registers
11101001	E9	233	Low byte of CRC	
01001111	4F	79	High byte of CRC	

The CRC (also a 16 bit wide value) is sent in reverse order, low byte then high byte.

Received from Writing Set Point of 1,250 °F (1,250,000)

Binary	Hex	Decimal	Purpose
00000001	01	1	Controller Address
00010000	10	16	Function Multiple Write
00000000	00	00	High Byte of Register 27 decimal – Start writing at register
00011011	1B	27	Low Byte of Register 27 decimal – Start writing at register
00000000	00	0	High Byte – number of registers written
00000010	02	2	Low Byte – number of registers written
11001111	CF	207	Low byte of CRC
00110001	31	49	High byte of CRC

Example: To write a 32-bit value in decimal format;

The set point value of the Series SD is contained in two 16-bit registers. Register 27 contains the two higher bytes while register 28 contains the two lower bytes. The reverse of a read is performed. To write a set point of 1,250 degrees (which is really 1,250.000) multiple the set point value (SP) by 1,000. Add 65,536 to negative numbers. This produces the set point (SP) we want to send. To determine the most significant word (MSW), divide the SP by 2^16 or 65,536. To determine the least significant word (LSW), subtract from the SP the result of multiplying the MSW by 2^16.

SP = 1250 * 1000 = 1250000
MSW = 1250000 / 2^16 = 19
LSW = 1250000 - (19 * 2^16) = 4816

Register 27 is written with MSW of 19
Register 28 is written with LSW of 4816

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Sample Series SD 32-bit Modbus Packet

Set Point Value is a 32-bit value			
Register 20= MSW, a 16-bit value		Register 21 = LSW, a 16 bit value	
MSB, a 8-bit value	LSB, a 8-bit value	MSB, a 8-bit value	LSB, a 8-bit value
0	19	18	208
(MSB x 256) + LSB = MSW	(0 x 256) + 19 = 19	(MSB x 256) + LSB = LSW	(18 x 256) + 208 = 4816
MSW = 1		LSW = 4816	
Integer Answer = (MSW x 65536) + LSW	1245184 + 4816 = 1250000		
Final Answer = Integer Answer / 1000	1250000 / 1000 = 1250.000		

1250 x 1000 = 1250000			
0	19	18	208
19 x 65536 = 1245184		4816	
(0 x 256) + 1 = 1		(18 x 256) + 208 = 4816	
MSB, a 8-bit value	LSB, a 8-bit value	MSB, a 8-bit value	LSB, a 8-bit value
Register 27= MSW, a 16-bit value		Register 28 = LSW, a 16 bit value	
Set point Value is a 32-bit value			

Note: Some values will be rounded off to fit in the four-character display of the Series SD. Full values can be read via Modbus. All temperature parameters are in °F through Modbus by default. To change communications temperature units via Modbus, write a 0 for °F or 1 for °C to 16-bit register 18. Notice that the display may be in different temperature units than communication via Modbus. To change the display units, write a 0 for °F or 1 for °C to 16-bit register 40.

Low register numbers contain the two higher bytes (most significant word); high register numbers contain the two lower bytes (least significant word) of the four-byte integer. All values are integers and decimal precision is implied at three decimal places unless otherwise noted.

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