

Thermal Solutions



Modbus Testing

Tech Features

Introduction

To test SLATE Modbus communication it is simplest to use a Modbus utility. Baseblock ComTest Pro for Modbus Devices is one viable option. You can download this (free) program at www.baseblock.com/PRODUCTS/comtestpro.htm. ComTest Pro allows users to test and troubleshoot Modbus RTU or Modbus TCP communication. The software offers comprehensive data-logging, data-formatting and error checking features. It is available for Windows, OS X, iOS and Android.

In the following example we show how to use this program to make sure SLATE Modbus communication is enabled and working properly over Modbus/TCP.

Please keep in mind that SLATE is a Modbus "slave" and thus requires a Modbus "master" be present on the bus for Modbus communication to be successful.

Following are the steps for testing SLATE Modbus:

Enable Modbus on the SLATE Base Module:

At the SLATE Base...

Click the "Menu" button Scroll to "Base setup". Click "OK" button. Scroll to "Network". Click "OK" button. Scroll to "Ethernet". Click "OK" button. Scroll to "Modbus TCP". Click "OK" button. Scroll to "Configuration" (note the port# 502). Click "OK" button. Scroll to "None" and use the side arrows to select "Modbus/TCP". Scroll to "OK" and click "OK" button.

The SLATE Base Module is now Modbus TCP/IP enabled and ready to test.

Now that the SLATE Base Module is ready to test, the next step is to access a register set to use. We used the Demo Case (DSP3983/U) program registers. You can use other programs you may have available.

Following are the steps to get to the registers for your SLATE Device:

In Niagara AX, open your SLATE Device. Make sure this device has been built so the registers are visible in the report. Also make sure to unhide any (internal) registers you may want to access using the "Network Visibility" button.

NOTE: All SLATE registers' default state is "hidden". All Designer registers (inputs and outputs created in the wire sheet using "NetworkInput" blocks) are visible.

In Niagara AX having already accessed your SLATE Device:

Click the "Reports" button.

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	Module Selection odule Configuration Wire Sheet		
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	ext Configuration		
	Network Visibility		
	evice Information		
	Reports		
	Build System		
	Web Editor		

Click the "Modbus Interface Report" button.

S SLATE Report Tool Version 0.7	×
The following reports are only valid to the last System Build. Run "Build System" from Slate AX to update reports.	
Build System Error Report	
Wiresheet I/D Block Resource Report	
BACnet Interface Report	
Modbus Interface Report	
Close	

The list below shows the outwardly facing registers in the "Registers" column that are required for testing. Register information is shown in the "Register Name" column. It's important to keep track of the register data to insure the

information transmitted/received during testing is accurate for that register.

S Modbus 1	S Modbus Interface Report										
Registers	Register Name		Resource	Data Type	Data Size	Units	Min Value	Max Value	Enumerations		
1 - 2	m1ControlProgram_OpSetpoint		m1r1000	F32	4	deg F	-3.402823E+38	3.402823E+38	-		
3 - 4	m1ControlProgram_InterlockContr		m1r1002	F32	4	float	-3.402823E+38	3.402823E+38			
5 - 6	m1ControlProgram_AutoManualBMSSe	lect	m1r1003	F32	4	float	-3.402823E+38	3.402823E+38			
7 - 8	m1ControlProgram_BMSThrottle		m1r1004	F32	4	%	-3.402823E+38	3.402823E+38			
9 - 10	m1ControlProgram_Prop		m1r1005	F32	4	deg F	-3.402823E+38	3.402823E+38			
11 - 12	m1ControlProgram_Int		m1r1006	F32	4	float	-3.402823E+38	3.402823E+38			
13 - 14	m1ControlProgram_Der		m1r1007	F32	4	float	-3.402823E+38	3.402823E+38			
15 - 16	m1ControlProgram_LFH_Threshold		m1r1008	F32	4	deg F	-3.402823E+38	3.402823E+38			
17 - 18	m1ControlProgram_LFH_Time		m1r1009	F32	4	s	-3.402823E+38	3.402823E+38			
21 - 22	m1ControlProgram_Trim_Control		m1r1011	F32	4	%	-3.402823E+38	3.402823E+38			
23 - 24	m1ControlProgram_BMS_Demand		m1r1012	F32	4	float	-3.402823E+38	3.402823E+38			
25 - 26	m1ControlProgram_PID_Output		m1r1013	F32	4	%	-3.402823E+38	3.402823E+38			
27 - 28	m1ControlProgram_TempControlDema	nd	m1r1014	F32	4	float	-3.402823E+38	3.402823E+38			
29 - 30	m1ControlProgram_EStop_Out		m1r1015	F32	4	float	-3.402823E+38	3.402823E+38			
31 - 32	m1ControlProgram_InterlockState		m1r1016	F32	4	deg F	-3.402823E+38	3.402823E+38			
33 - 34	m1ControlProgram_LFH_Sens_Out		m1r1017	F32	4	deg F	-3.402823E+38	3.402823E+38			
35 - 36	m1ControlProgram_Sensor_Output		m1r1018	F32	4	deg F	-3.402823E+38	3.402823E+38			
37 - 38	m1ControlProgram_LimitOutput		m1r1019	F32	4	deg F	-3.402823E+38	3.402823E+38			
39 - 40	m1ControlProgram_LimitThresh1		m1r1020	F32	4	deg F	-3.402823E+38	3.402823E+38			
41 - 42	m1ControlProgram_LimitThresh2		m1r1021	F32	4	deg F	-3.402823E+38	3.402823E+38			
43 - 44	m1ControlProgram_Flame_Signal_Out		m1r1022	F32	4	float	-3.402823E+38	3.402823E+38			
45 - 46	m1ControlProgram_ThrottleOut		m1r1023	F32	4	%	-3.402823E+38	3.402823E+38			
47 - 48	m1ControlProgram_LFH_Active		m1r1024	F32	4	deg F	-3.402823E+38	3.402823E+38			
	Save to .csv File										

Demo Case program registers; data type = floating.

Example: Register 1: OpSetpoint (writeable) Register 35: SensorOutput



Open ComTest Pro:

Select the Ethernet tab. Make sure the IP address is set correctly and the port is the same as the SLATE port. The Device value is unused when connecting to SLATE via Ethernet.

	Baseblock ComTest Pro for Modbus Devices																
E	ile <u>E</u> dit ⊻iev	v <u>H</u> elp															
	Step 1	✓ Seria	il Itocol		🥒 Ethe	rnet	Addres	9		Port	_	Delay (ms)	Timeout	(ms)		
		Modbus TCP			▼ 192	.168.92.2	10		50	2	5			100			
	Step 2	Device Command # Registers Function 1 • Read Holding Register(s) 2 3 Image: Command Register • Write Single Holding Register 6 Image: Command 1 • Write Holding Register(s) 1 16															
		Valid Response(s) Error Response(s)									esponse(s) Timeout(s)						
		017032: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Step 3	033048: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.000 0	049064: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		065080: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		081096: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		097112: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		113125: 0	0	0	0	0	0	0	0	0	0	0	0	0			
		✓ Hexadecimal															

In the initial test we will change the burner set-point from its current value to 150F. If the current value is already 150F, select another set-point value to insure Modbus communication is functioning.

From the register list we can see the set-point register is register 1-2 (OpSetpoint). Set the ComTest Pro utility is to display in Hexadecimal. Next we want to convert the OPSetpoint of 150.0 to its floating point hexadecimal representation. For this we can use a conversion calculator. We downloaded IEEE Calc. to convert floats to Hexadecimal.

https://sourceforge.net/projects/ieeecalc/files/latest/download.

This calculator allows us to convert float data types to Hexadecimal.

IEEE	Floating Point Cale	culator	<u>_ </u>
Number		Show	● float ○ Hex
Float - Value			1
Hex			
Dec	S Exp	 Mantissa	
Double	e		
Value			
Hex			
Dec			
	S Exp	Mantissa	About

Convert 150 to Hex...

150 is a float that we need converted to its floating point hexadecimal representation.

Type in 150 in the "Number" field.

Insure the type is a float

Click the "Show" button

Result: 150 converted to Hexadecimal = 43160000

IEEE	Floal	ting Poin	t Calculato	r	_ 🗆 ×
Number	1	150		Show	 float C Hex ✓ Stay On Top
Float -					
Value	431	60000			
Hex	0	86	160000		
Dec	0	134 - 12	7 = 7	1441792	
	S	Ехр		Mantissa	
Double	e —				
Value	406	2000000	00000		
Hex	0	406	2C000000	00000	
Dec	0	1030 - 1	023 = 7	77405618595430	4
	S	Ехр		Mantissa	About

Now that we have our floating point Hexadecimal value for 150, we can use ComTest Pro to write the new value to the setpoint register.

Select "Write Single Holding Register" or "Write Holding Register(s)".

Select the "Write Registers" tab.

Look up the appropriate register showing the "Setpoint" value. From the Modbus report we see the register with the "Setpoint" value is register 1-2 (OpSetpoint).

Type in the Hexadecimal value of the new set-point in the first register field followed by "h" representing Hexadecimal.

Click the "Start" button.

Verify that the "Setpoint" on the Main page now shows 150.





Next, we will read the sensor value from the Main page of the demo.

To read data from a register using ComTest Pro:

Select "Read Holding Register(s)"

Look up the appropriate register showing the "Sensor" value. From the Modbus report we see the register with the "Sensor" value is register 35 (Sensor_Output).

Select the "Read Registers" tab.

Fill in the Register field with appropriate register (35).

Make sure the Hexadecimal box is checked.

Click the "Start" button

🠷 E	Baseblock ComTest Pro for Modbus Devices												
Eile	Elle Edit Yjew Help												
S	itep 1	Serial Protocol Modbus TCP		ithernet IP 192.168.92.71	Address	5	Port 02	5	Delay (m:	s) T 10	Timeout (1 10	ns)	
s	itep 2	Device Command # Registers Function 1 • Read Holding Register(s) 2 3 • Register • Write Single Holding Register(s) 6 • 35 • Write Holding Register(s) 1 16 •											
s	step 3	Start Start Read Registers 001016 4298h E564h 017032 - - - 033048 - - - 049064 - - - 081096 - - - 097112 - - - 113125 - - -	Stop Image: Constraint of the state of the	Valid R C Alignment of the second sec	esponse(s)	Reset	Er - - - - - - - - - - - - -	ror Respondent	Inse(s)	eset	- - - - - - - - - - - - - - - - - - -	Time:	 Reset
10000	w hasehlor	k com											

Record the register readings and plug them in the IEEE calculator. As this value is a Hexadecimal value, select the "Hex" option radial button in the calculator.

Click the "Show" button.

Under Float, the decimal conversion is shown which should match the reading on the Main Demo page.

IEEE	Floa	ting Point Calculator		_ 🗆 🗙
Number	[4298e564		O floa <mark>:⊙ Hex</mark>
Eloat -			Show	Stay On Top
Value	76.	44803		
Hex	0	85 18E564		
Dec	0	133 - 127 = 6	1631588	
	S	Ехр	Mantissa	
Double	e —			
Value	5.5	202767446643E-315		
Hex	0	0 4298E564		
Dec	0	0 - 1023 = -1023	1117316452	
	S	Ехр	Mantissa	About



Repeat these steps to receive and transmit other values if desired.

NOTE: Integer based registers such as Booleans or Enums (see Data Type column of the Modbus Interface Report) require simple Hex to Decimal conversion, not the IEEE calculator used for converting float data types.

For More Information

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Safety, Honeywell Combustion Service, Eclipse, Exothermics, Hauck, Kromschröder and Maxon. To learn more about our products, visit <u>www.ThermalSolutions.honeywell.com</u> or contact your Honeywell Sales Engineer.

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