QUCM SEAbus

Installation and Programming Manual

This Manual describes the QUCM application for interfacing Siemens SEAbus devices to a POWERLOGIC system.

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1
Introduction

The Niobrara QUCM is a TSX Quantum® compatible module that is capable of running multiple applications for performing communication translations between serial protocols. This document covers an application that places Siemens SEAbus™ and SEAbus Plus™ devices on a Square D POWERLOGIC® network as Modbus/TCP compatible devices. This setup allows existing Siemens equipment to be integrated into the POWERLOGIC System Manager Software system via Modbus/TCP Ethernet.

Two applications are required to be loaded into the QUCM: app1.qcm is the SEAbus serial driver and Modbus/TCP server, app2.qcm is the web server used for configuration and data display. Both of these applications must be running for the system to properly perform.

Port 1 of the QUCM is to be connected to an RS-232 to 2-wire RS-485 converter to provide the interface to the SEAbus network. The QUCM-LE may directly suppport the 2-wire RS-485 network if set to RS-485 mode; an NR&D BB85 adapter is suggested for the 2-wire connection. Up to 100 SEAbus devices may be configured within the QUCM for access through port 1 and/or port 2. The QUCM supports most SEAbus devices including 4300™ Power Meters, 4700™ Power Meters, SCOR™ Relays, ISGS™, SAMMS™, Statis Trip III™, and SB Energy-Comm™ Breakers. These devices are accessed via Modbus/TCP by selecting the Destination Index assigned to each slave (1-100).

Port 2 may be configured as a combination PNIM/Modbus RTU master to support a string of PowerLogic and/or Modbus RTU slaves. Up to 32 slaves may attached to the QUCM. They must be assigned unique drop numbers between 1 and 32. These devices are accessed by Modbus/TCP Destintion Indices 101 through 132.

Port 2 may also be configured as a SEAbus Slave port so another SEAbus master may be connected to the QUCM and poll the devices along with the QUCM itself.

A Modicon two (or more) slot Quantum rack and appropriate Quantum power supply is needed for mounting the QUCM.

The SMS server is connected to the QUCM via Modbus/TCP Ethernet. The QUCM-SE will support up to 6 simultaneous Modbus/TCP clients for access to the SEAbus data and PowerLogic/Modbus data.

2
Installation

Module Installation

1 Mount the QUCM in an available slot in the register rack. Secure the screw at the bottom of the module.

Software Installation

The application files for the QUCM are included in the SEAbus.ZIP file. This file must be unzipped using PKUNZIP.EXE. A copy of PKUNZIP is included on the standard NR&D software disk and is also available at www.niobrara.com. The latest version of the SEAbus.ZIP file is located at

ftp://ftp.niobrara.com/qucm/seabus/seabus.zip

or

http://www.niobrara.com/ftp/qucm/seabus/seabus.zip

The latest version of this document in pdf format is located at:

fttp://ftp.niobrara.com/qucm/seabus/seabus.pdf

or

http://www.niobrara.com/ftp/qucm/seabus/seabus.pdf

The SEAbus communications protocol is available from Siemens at:

www.sea.siemens.com/access

Serial Connections to the QUCM-S

Port 1 to DDC2I

Port 1 of the QUCM-SE is RS-232 while the SEAbus devices are 2-wire RS-485. The Niobrara DDC2I may be used to connect up to 32 SEAbus devices to a single port of the QUCM-SE. Use a straight-through cable such as the Niobrara MM0 between the QUCM and the DDC2I. The DDC2I will be powered by the QUCM so the external power supply is not needed. Set all 6 DIP switches on the DDC2I ON; this will set it to 2-wire, Slave, with bias and termination. Connect the RX+ connector on the

DDC2I to all of the (+) connections on the SEAbus devices. Connect the RX- connector on the DDC2I to all of the (-) connections on the SEAbus devices. Connect the Shield of the DDC2I to the Shields on the slaves.

Port 1 to Isolated Multi-Drop Converter

The Siemens Isolated Multi-Drop™ Converter may be used to connect a large number of SEAbus devices to a single QUCM-SE serial port.. Set the TX Control switches to RTS and MAN. Set the Baud Rate to match the connected devices. Use the Niobrara MM4 cable to connect the QUCM-SE to the Converter (See Figure 2-1).

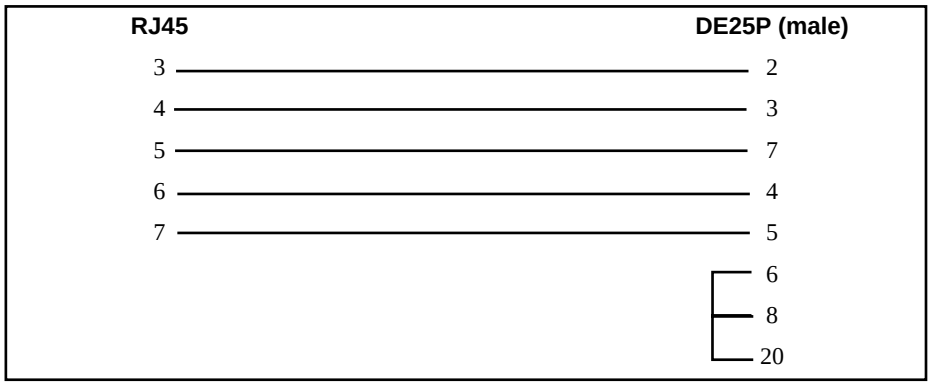


Figure 2-1 QUCM-S to RS-232 DTE Port (25-pin) (MM4 Cable)

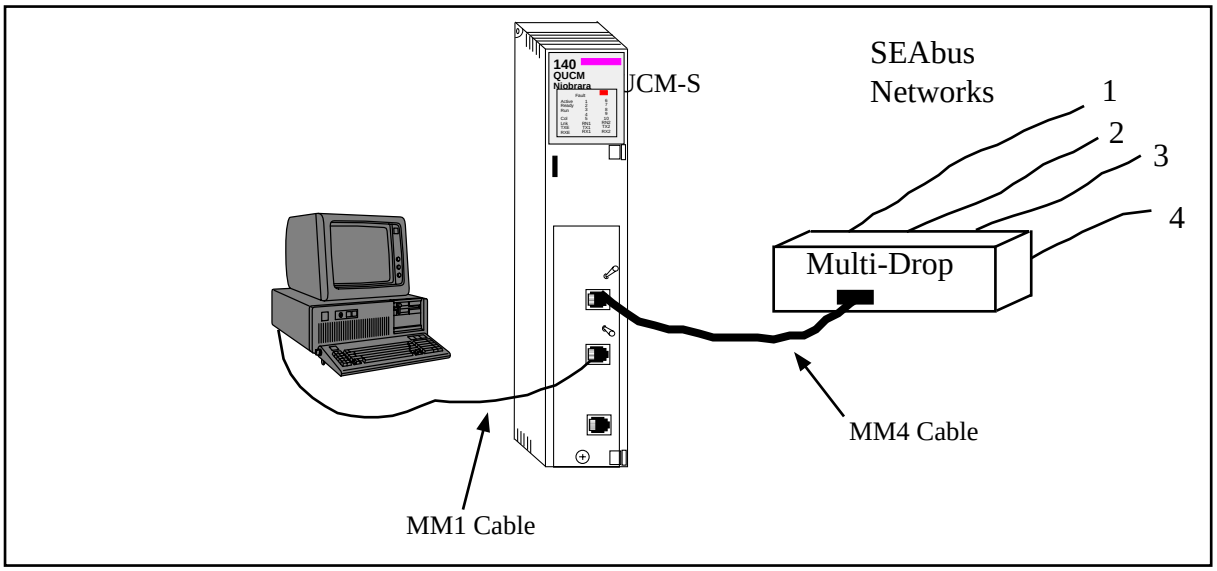


Figure 2-2 QUCM-SE Layout

Port 2 to the Personal Computer

A physical connection must be made from the personal computer to the QUCM in order to download the applications. This link may be a serial connection from a COM port on the personal computer to the RS-232 port on the QUCM-S. The Niobrara MM1 cable may be used for this connection. This cable is shown in Figure 2-3.

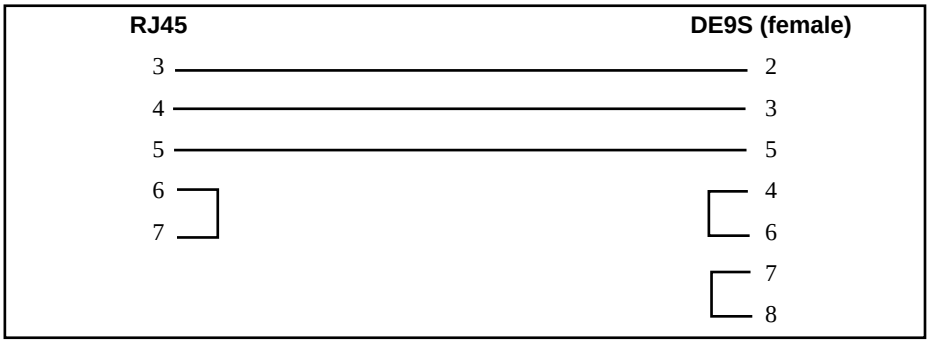


Figure 2-3 QUCM-SE to RS-232 PC DCE Port (9-pin) (MM1 Cable)

Loading the Applications into the QUCM

The QUCM is rapidly evolving so be sure to upgrade the firmware in the module before loading the latest version of APP1.QCC. Most likely the QCOMPILE.EXE has been updated so be sure to use the newest version. Firmware upload is as follows:

1 Remove the module form the rack.

2 Move the RUN/LOAD switch on the back of the module to LOAD.

3 Replace the module in the rack and apply power.

4 Only the 3 light should be on. (The Link and RX E-net lights may be on if the E-net port is connected and there is traffic.)

5 Connect the PC to QUCM Port 1 with a MM1 cable.

6 From the command line enter

> fwload qucmtcp.fwl com1:

Be sure to have the colon after the PC's com port name. The download will only take a few minutes and will inform when finished.

7 Remove the module from the rack and change the switch back to RUN.

8 It is a good idea to press the RESET button after a firmware change.

It is recommended to use the Ethernet capabilities of QLOAD to load APP1.QCC and APP2.QCC into the QUCM. Set up the IP parameters of the module by the following method:

1 Move Switch 1 to Halt.

2 Connect the PC to QUCM Port 1 with a MM1 cable.

3 From the command line enter

>zapreg32 com1:9600,e,8,1 255 -b

This will start zapreg32 in Modbus RTU mode to slave address 255. Use the arrow and Page Up/Down keys to move to register 46. The IP parameters are shown below for a unit with the IP = 206.223.51.150 subnet Mask = 255.255.255.0, Default Gate = 206.223.51.1, Modbus/TCP port number = 503, Telnet Port number = 24:

Register Description Example (decimal)

46	IP MSByte	206
47	IP	223
48	IP	51
49	IP LSByte	150
50	SN Mask	255
51	SN Mask	255
52	SN Mask	255
53	SN Mask	0
54	Def. Gate	206
55	Def. Gate	223
56	Def. Gate	51
57	Def. Gate	1
58	TCP Control	7 (leave this at 7)
59	Reserved	0
60	Reserved	0
61	Reserved	0
62	TCP backstep	100 (leave this at 100)
63	Modbus Port	503 (this defaults to 502)
64	Telnet Port	24 (this defaults to 23)
65	Quiet Timer	900 (leave this at 900)
66	Clients	-1 (leave this at -1)

4 After entering the IP parameters, attempt to ping the module to verify the settings.
> ping 206.223.51.150

5 Verify a connection to the internal Modbus/TCP server with zapreg32.
> zapreg32 206.223.51.150:503 255
Should connect to the QUCM on port 503 with Destination index 255.

6 Load the APP1 file with qload.
> qload 1 app1 206.223.51.150:503 -a
Will load the file into application 1's flash and set the program to automatically start on power-up.

7 Load the APP2 file with qload.
> qload 2 app2 206.223.51.150:503 -a
Will load the file into application 2's flash and set the program to automatically start on power-up.

8 Place Switch 1 in RUN. The RN1 light should come on and light 1 will probably blink rapidly.

9 Place Switch 2 in RUN. The RN2 light should come on.

Configure the application by connecting a web broswer to the IP address of the QUCM-SE

SEAbus Device Register Lists

The data from the SEAbus devices is presented as Modbus Holding Registers (4x). Modbus function codes 03, 100, 06, and 16 are supported for reading and writing this

data. Register 4 is the only register that may be written and it is a bit-map for clearing accumulated counters.

Most data is presented as signed 16-bit integers. Values with two holding registers are 32-bit integers where the first register is bits 0-15 and the second register is bits 16-31.

Power Factor is stored in standard POWERLOGIC format with an implied 3 decimal places and the sign bit signaling the leading/lagging.

Model 4300 Power Meter

Table 2-1 4300 Power Meter Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	1 = 4300 Power Meter
2	SEAbus Plus Address	
3	Reset KWH, Max Demand	bit 0 = reset KW hours bit 1 = reset Max Demand
4	Power Factor	POWERLOGIC standard format
5,6	Voltage A-N	
7,8	Voltage B-N	
9,10	Voltage C-N	
11,12	Avg. L-N Voltage	
13,14	Voltage A-B	
15,16	Voltage B-C	
17,18	Voltage C-A	
19,20	Avg. L-L Voltage	
21,22	KW	
23,24	KW Demand	
25,26	Max. KW Demand	
27,28	KW hours	
29	Current A	
30	Current B	
31	Current C	
32	Avg. Current	
33	Frequency	times 10
34,35	KVA	
36,37	KVAR	

Model 4700 Power Meter

Table 2-2 4700 Power Meter Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	2 = 4700 Power Meter
2	SEAbus Address	
3	Reset KWH, Max Demand	bit 0 = reset KW hours bit 1 = reset Max Demand
4,5	Voltage A-N	
6,7	Voltage B-N	
8,9	Voltage C-N	
10,11	Avg. Voltage L-N	
12,13	Voltage A-B	
14,15	Voltage B-C	
16,17	Voltage C-A	
18,19	Avg. Voltage L-L	
20	Current A	
21	Current B	
22	Current C	
23	Avg. Current	
24	Current Input	
25,16	KW A-B	
27,28	KW B-C	
29,30	KW C-A	
31,32	KW Total	
33,34	KVA A-B	
35,36	KVA B-C	
37,38	KVA C-A	
39,40	KVA Total	
41,42	KVAR A-B	
43,44	KVAR B-C	
45,46	KVAR C-A	
47,48	KVAR Total	
49,50	KW Demand	
51	Power Factor	POWERLOGIC format
52	Frequency	times 10
53,54	Aux. Voltage	
55	Current Demand	
56,57	KW Hours Forward	
58,59	KW Hours Reverse	
60,61	KVAR Hours Forward	
62,63	Alarm Status Bits	
64	Alarm Event Counter	
65,66,67,68	Alarm Discrete Input Counter	
67,70	KVAR Hours Reverse	

Table 2-3 4700 Power Meter Minimum Values Register List

Modbus/TCP Register	Discription	Notes
71,72	Min. Voltage A-N	
73,74	Min. Voltage B-N	
75,76	Min. Voltage C-N	
77,78	Min. Avg. Voltage L-N	
79,80	Min. Voltage A-B	
81,82	Min. Voltage B-C	
83,84	Min. Voltage C-A	
85,86	Min. Avg. Voltage L-L	
87	Min. Current A	
88	Min. Current B	
89	Min. Current C	
90	Min. Avg. Current	
91,92	Min. KW Total	
93,94	Min. KVA Total	
95,96	Min. KVAR Total	
97,98	Min. KW Demand	
99	Min. Power Factor	POWERLOGIC standard format
100	Min. Frequency	times 10
101,102	Min. Aux. Voltage	
103	Min. Current Demand	
104	Min. Current Input	

Table 2-4 4700 Power Meter Maximum Values Register List

Modbus/TCP Register	Discription	Notes
105,106	Max. Voltage A-N	
107,108	Max. Voltage B-N	
109,110	Max. Voltage C-N	
111,112	Max. Avg. Voltage L-N	
113,114	Max. Voltage A-B	
115,116	Max. Voltage B-C	
117,118	Max. Voltage C-A	
119,120	Max. Avg. Voltage L-L	
121	Max. Current A	
122	Max. Current B	
123	Max. Current C	
124	Max. Avg. Current	
125,126	Max. KW Total	
127,128	Max. KVA Total	
129,130	Max. KVAR Total	
131,132	Max. KW Demand	
133	Max. Power Factor	POWERLOGIC standard format
134	Max. Frequency	times 10
135,136	Max. Aux. Voltage	
137	Max. Current Demand	
138	Max. Current Input	

Model 4720 Power Meter

Table 2-5 4720 Power Meter Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	8 = 4700 Power Meter
2	SEAbus Address	
3	Reset KWH, Max Demand	bit 0 = reset KW hours bit 1 = reset Min/Max & Demand
4,5	Average Voltage L-N	
6,7	Voltage A-N	
8,9	Voltage B-N	
10,11	Voltage C-N	
12,13	Average Voltage L-L	
14,15	Voltage A-B	
16,17	Voltage B-C	
18,19	Voltage C-A	
20,21	Average Current	
22,23	Current A	
24,25	Current B	
26,27	Current C	
28,29	Current N	
30,31	kW Demand	
32,33	kW Total	
34,35	kW A	
36,37	kW B	
38,39	kW C	
40,41	kVAR Total	
42,43	kVAR A	
44,45	kVAR B	
46,47	kVAR C	
48,49	kVA Total	
50,51	kVA A	
52,53	kVA B	
54,55	kVA C	
56	Power Factor Total	POWERLOGIC format
57	Power Factor A	POWERLOGIC format
58	Power Factor B	POWERLOGIC format
59	Power Factor C	POWERLOGIC format
60	Frequency	times 100
61,62	kW Hours	
63,64	kVAR Hours	
65,66	kVA Hours	

Table 2-6 4720 Power Meter Minimum Register List

Modbus/TCP Register	Discription	Notes
71,72	Min. Voltage A-N	
73,74	Min. Voltage B-N	
75,76	Min. Voltage C-N	
77,78	Min. Voltage A-B	
79,80	Min. Voltage B-C	
81,82	Min. Voltage C-A	
83,84	Min. Current A	
85,86	Min. Current B	
87,88	Min. Current C	
89,90	Min. Current N	
91,92	Min. kW Demand	
93,94	Min. kW Total	
95,96	Min. kVAR Total	
97,98	Min. kVA Total	
99	Min. Power Factor Total	POWERLOGIC format
100	Min. Frequency	times 100

Table 2-7 4720 Power Meter Maximum Register List

Modbus/TCP Register	Discription	Notes
71,72	Max. Voltage A-N	
73,74	Max. Voltage B-N	
75,76	Max. Voltage C-N	
77,78	Max. Voltage A-B	
79,80	Max. Voltage B-C	
81,82	Max. Voltage C-A	
83,84	Max. Current A	
85,86	Max. Current B	
87,88	Max. Current C	
89,90	Max. Current N	
91,92	Max. kW Demand	
93,94	Max. kW Total	
95,96	Max. kVAR Total	
97,98	Max. kVA Total	
99	Max. Power Factor Total	POWERLOGIC format
100	Max. Frequency	times 100

ISGS

Table 2-8 ISGS Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	3 = ISGS
2	SEAbus Slave Address	
3	Reset KW, Min/Max	
4	Input Status	bit 0, breaker position: 0=closed, 1=open bit 1, trip solenoid status: 0=ok, 1=error bit 2, trip source impedance: 0=ok, 1=error bit 3, breaker position error: 0=ok, 1=error bit 4, BI1 status: 0=inactive, 1=active bit 5, BI2 status: 0=inactive, 1=active bit 6, BI3 status: 0=inactive, 1=active bit 7, BI4 status: 0=inactive, 1=active
5	Output Status	bit 0, relay fail asserted: 0=no, 1=yes bit 1, device in pickup: 0=no, 1=yes bit 2, relay trip LED: 0=ok, 1=error bit 3, TRIP 1 status: 0=inactive 1=active bit 4, TRIP 2 status: 0=inactive, 1=active bit 5, TRIP 3 Status: 0=inactive, 1=active bit 6, BO1 status: 0=inactive, 1=active bit 7, BO2 status: 0=inactive, 1=active
6	Log Status	bit 0, max log changed since last check: 0=no, 1=yes bit 1, min log changed since last check: 0=no, 1=yes bit 2, events in event log: 0=no, 1=yes
7	Current A	
8	Current B	
9	Current C	
10	Current N	
11	Avg. Current	
12	Demand Current A	
13	Demand Current B	
14	Demand Current C	
15	Avg. Demand Current	
16	Reserved	
17,18	Voltage A-N	
19,20	Voltage B-N	
21,22	Voltage C-N	
23,24	Avg. Voltage L-N	
25,26	Voltage A-B	
27,28	Voltage B-C	
29,30	Voltage C-A	
31,32	Avg. Voltage L-L	
33,34	KVA	
35,36	KW	
37,38	KW Demand	
39,40	KW hours	
41,42	KVAR	
43,44	KVAR Hours	

45	Power Factor	POWERLOGIC standard format
46	Frequency	times 10
47	Voltage THD	times 100
48	Current THD	times 100

Table 2-9 ISGS Minimum Values Register List

Modbus/TCP Register	Discription	Notes
49	Min. Current A	
50	Min. Current B	
51	Min. Current C	
52	Min. Current N	
53	Min. Avg. Current	
54	Min. Demand Current A	
55	Min. Demand Current B	
56	Min. Demand Current C	
57	Min. Avg. Demand Current	
58,59	Min. Voltage A-N	
60,61	Min. Voltage B-N	
62,63	Min. Voltage C-N	
64,65	Min. Avg. Voltage L-N	
66,67	Min. Voltage A-B	
68,69	Min. Voltage B-C	
70,71	Min. Voltage C-A	
72,73	Min. Avg. Voltage L-L	
74,75	Min. KVA	
76,77	Min. KW	
78,79	Min KW Demand	
80,81	Min. KVAR	
82	Min. Power Factor	POWERLOGIC standard format
83	Min. Frequency	times 10
84	Min. Voltage THD	times 100
85	Min. Current THD	times 100

Table 2-10 ISGS Msximum Values Register List

Modbus/TCP Register	Discription	Notes
86	Max. Current A	
87	Max. Current B	
88	Max. Current C	
89	Max. Current N	
90	Max. Avg. Current	
91	Max. Demand Current A	
92	Max. Demand Current B	
93	Max. Demand Current C	
94	Max. Avg. Demand Current	
95,96	Max. Voltage A-N	
97,98	Max. Voltage B-N	
99,100	Max. Voltage C-N	
101,102	Max. Avg. Voltage L-N	
103,104	Max. Voltage A-B	
105,106	Max. Voltage B-C	
107,108	Max. Voltage C-A	
109,110	Max. Avg. Voltage L-L	
111,112	Max. KVA	
113,114	Max. KW	
115,116	Max KW Demand	
117,118	Max. KVAR	
119	Max. Power Factor	POWERLOGIC standard format
120	Max. Frequency	times 10
121	Max. Voltage THD	times 100
122	Max. Current THD	times 100

SAMMS

Table 2-11 SAMMS Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	4 = SAMMS
2	SEAbus Slave Address	
3	Reset KW, Min/Max	
4,5	Last Trip Current	
6	Motor Elasped Running Time	
7	Number of Motor Starts	
8	Number of Overload Trips	
9	Time to Restart	
10	Thermal Memory	
11	Flashing LED Status	bit 1 Ground fault LED: 0=off, 1=flashing bit 3 External trip LED: 0=off, 1=flashing bit 4 Phase unbalance LED: 0=off, 1=flashing bit 5 Overload trip LED: 0=off, 1=flashing bit 7 Impending trip LED: 0=off, 1=flashing
12	LED and Contactor Status	bit 0 Contactor 3: 0=off, 1=on bit 1 Ground fault LED: 0=off, 1=on bit 2 CPU fault LED: 0=off, 1=on bit 3 External trip LED: 0=off, 1=on bit 4 Phase unbalance LED: 0=off, 1=on bit 5 Overload trip LED: 0=off, 1=on bit 6 Imcomplete sequence LED: 0=off, 1=on bit 7 Impending trip LED: 0=off, 1=on bit 8 Contactor 2: 0=off, 1=on bit 9 Contactor 1: 0=off, 1=on bit 10 Auto LED: 0=off, 1=on bit 11 Off LED: 0=off, 1=on bit 12 Hand LED: 0=off, 1=on bit 13 Reverse/High/Left LED: 0=off, 1=on bit 14 Forward/Low/Right/Run/On: 0=off, 1=on bit 15 Stop/Off LED: 0=off, 1=on
13	NEMA size in effect	low voltage: 1=1A, 2=1B, 3=1C, 4=2A, 5=2B, 6=3, 7=4, 8=5, 9=6 medium voltage: 1=H3A, 2=H3B, 3=H3C, 4=H6
14,15	Current A	
16,17	Current B	
18,19	Current C	
20,21	Current G	
22	Phase Unbalance	
23	Input Status	bit 2 Remote Input 4: 0=off, 1=on bit 3 Remote Input 3: 0=off, 1=on bit 4 Remote Input 2: 0=off, 1=on bit 5 Remote Input 1: 0=off, 1=on
24	5A Current Transformer Ratio for OLR1	
25	5A Current Transformer Ratio for OLR2	
26	Device Type	
27	NEMA Size for OLR1	
28	NEMA Size for OLR2	
29	Full-load Current Setting for OLR1	
30	Full-load Current Setting for OLR2	

31	Programmable Timer 1 Setting	
32	Programmable Timer 2 Setting	
33	Process Current Setting	
34	Input Status 1&2	
35	Timer Active and Timeout Status	

SCOR

Table 2-12 SCOR Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	5 = SCOR
2	SEAbus Slave Address	
3	Reset KW, Min/Max	
4	Phase CT Primary Ratio	
5	Phase CT Secondary Ratio	
6	Ground CT Primary Ratio	
7	Ground CT Secondary Ratio	
8,9	Current A	
10,11	Current B	
12,13	Current C	
14,15	Current N	
16,17	Avg. Current	
18,19	Demand 1 Current A	
20,21	Demand 1 Current B	
22,23	Demand 1 Current C	
24,25,26	Demand 1 Time	POWERLOGIC 3 Register Format
27,28	Demand 2 Current A	
39,30	Demand 2 Current B	
31,32	Demand 2 Current C	
33,34,35	Demand 2 Time	POWERLOGIC 3 Register Format
36,37	Demand 3 Current A	
38,39	Demand 3 Current B	
40,41	Demand 3 Current C	
42,43,44	Demand 3 Time	POWERLOGIC 3 Register Format
45,46	Demand 4 Current A	
47,48	Demand 4 Current B	
49,50	Demand 4 Current C	
51,52,53	Demand 4 Time	POWERLOGIC 3 Register Format
54	Demand Period	
55,56,57	Date/Time	POWERLOGIC 3 Register Format
58,59,60	Outage Date/Time	POWERLOGIC 3 Register Format

61	Breaker Position/Status	Bit 0 Breaker Status: 0=closed, 1=open Bit 1 Hardware Write Failure Bit 2 Hardware Read Failure Bit 3 Software Failure Bit 4 EEPROM Failure Bit 5 RAM Failure Bit 6 A/D Failure Bit 7 RMS Calculation Overflow Bit 8 CAL Calculation Overflow Bit 9 Burdon Resistor Calculation Overflow Bit 10 FP CAL constant conversion overflow Bit 11 bad sytle number Bit 12 Instantaneous Relay 1 ON Bit 13 Instantaneous Relay 2 ON Bit 14 Timed Trip Relay 2 ON Bit 15 Breaker Failure
62	Target/LED Status	Bit 0 Reserved Bit 1 INST 2 Target Bit 2 INST 1 Target Bit 3 Timed Trip Target Bit 4 Phase A Target Bit 5 Phase B Target Bit 6 Phase C Target Bit 7 N Target Bit 8 Phase A timing LED Bit 9 Phase B timing LED Bit 10 Phase C timing LED Bit 11 Phase A inhibit Bit 12 Phase B inhibit Bit 13 Phase C inhibit Bit 14 N timing Bit 15 Status

SCOR Min-Msx Values Register List

Modbus/TCP Register	Discription	Notes
63,64	Max. Current A	
65,66	Max. Current B	
67,68	Max. Current C	
69,70	Max. Current N	
71,72	Min. Current A	
73,74	Min. Current B	
75,76	Min. Current C	
77,78	Min. Current N	
79,80,81	Max. Current A Time/Date	POWERLOGIC 3 Register Format
82,83,84	Max. Current B Time/Date	POWERLOGIC 3 Register Format
85,86,87	Max. Current C Time/Date	POWERLOGIC 3 Register Format
88,89,90	Max. Current N Time/Date	POWERLOGIC 3 Register Format
91,92,93	Min. Current A Time/Date	POWERLOGIC 3 Register Format
94,95,96	Min. Current B Time/Date	POWERLOGIC 3 Register Format
97,98,99	Min. Current C Time/Date	POWERLOGIC 3 Register Format
100,101,102	Min. Current N Time/Date	POWERLOGIC 3 Register Format

Static Trip III

Table 2-13 Static Trip III Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	6 = Satic Trip III/CPNX
2	SEAbus Slave Address	
3	Reset Min/Max, KWH	
4	Current A	
5	Current B	
6	Current C	
7	Current G	
8	Current N	
9	Avg. Current	
10	COM Board Status	Bit 0 Breaker Position: 0=open, 1=closed Bit 1 CP Configuration Changed: 0=inactive, 1=active Bit 2 COMM Power-up Reset: 0=inactive, 1=active Bit 3 COMM Close breaker status: 0=inactive, 1=active Bit 4 COMM Phase Unbalance: 0=inactive, 1=active Bit 5 Current Unpbalance Pickup: 0=inactive, 1=active Bit 6 COMM Trip: 0=inactive, 1=active Bit 7 Trip Fail: 0=inactive, 1=active Bit 8 Min/Max since reset: 0=inactive, 1=active Bit 9 Remote Trip: 0=inactive, 1=active Bit 10 Voltage Unbalance Pickup: 0=inactive, 1=active Bit 11 Under Voltage Pickup: 0=inactive, 1=active Bit 12 Over Voltage Pickup: 0=inactive, 1=active Bit 13 Under Frequency Pickup: 0=inactive, 1=active Bit 14 Over Frequency Pickup: 0=inactive, 1=active Bit 15 Reverse Power Pickup: 0=inactive, 1=active
11	Breaker Status	Bit 0 Long-Time Pickup: 0=inactive, 1=active Bit 1 Current Unbalance Target: 0=inactive, 1=active Bit 2 Zone Interlock OUT: 0=inactive, 1=active Bit 3 Voltage Unbalance Target: 0=inactive, 1=active Bit 4 Ground Fault: 0=inactive, 1=active Bit 5 Short Circuit Target: 0=inactive, 1=active Bit 6 Long-time Overload Target: 0=inactive, 1=active Bit 7 Watchdog Traget: 0=inactive, 1=active Bit 8 Static Trip Reset: 0=Not Reset, 1=Reset Bit 9 Local Trip: 0=inactive, 1=active Bit 10 Instantaneous bypass Trip: 0=inactive, 1=active Bit 11 Under Voltage Target: 0=inactive, 1=active Bit 12 Over Voltage Target: 0=inactive, 1=active Bit 13 Under Frequency Target: 0=inactive, 1=active Bit 14 Over Frequency Target: 0=inactive, 1=active Bit 15 Reverse Power Target: 0=inactive, 1=active

12,13	Alarm Status	Undefined by Siemens
14	Voltage A-N	
15	Voltage B-N	
16	Voltage C-N	
17	Avg. Voltage L-N	
18	Voltage A-B	
19	Voltage B-C	
20	Voltage C-A	
21	Avg. Voltage L-L	
22	KVA	
23	KW	
24	KW Demand	
25,26	KW Hours	
27,28	KW Hours Reverse	
29	KVAR	
30,31	KVAR Hours	
32	Power Factor	POWERLOGIC standard format
33	Frequency	Times 10

Table 2-14 Static Trip III Minimum Values Register List

Modbus/TCP Register	Discription	Notes
34	Min. Current A	
35	Min. Current B	
36	Min. Current C	
37	Min. Current G	
38	Min. Current N	
39	Min. Avg. Current	
40	Min. Voltage A-N	
41	Min. Voltage B-N	
42	Min. Voltage C-N	
43	Min. Avg. Voltage L-N	
44	Min. Voltage A-B	
45	Min. Voltage B-C	
46	Min. Voltage C-A	
47	Min. Avg. Voltage L-L	
48	Min. KVA Total	
49	Min. KW	
50	Min. KW Demand	
51	Min. KVAR	
52	Min. Power Factor	POWERLOGIC standard format
53	Min. Frequency	Times 10

Table 2-15 Static Trip III Maximum Values Register List

Modbus/TCP Register	Discription	Notes
54	Max. Current A	
55	Max. Current B	
56	Max. Current C	
57	Max. Current G	
58	Max. Current N	
59	Max. Avg. Current	
60	Max. Voltage A-N	
61	Max. Voltage B-N	
62	Max. Voltage C-N	
63	Max. Avg. Voltage L-N	
64	Max. Voltage A-B	
65	Max. Voltage B-C	
66	Max. Voltage C-A	
67	Max. Avg. Voltage L-L	
68	Max. KVA Total	
69	Max. KW	
70	Max. KW Demand	
71	Max. KVAR	
72	Max. Power Factor	POWERLOGIC standard format
73	Max. Frequency	Times 10

SB Energy-Comm

Table 2-16 SB Energy-Comm Register List

Modbus/TCP Register	Discription	Notes
1	SEAbus Device Type	6 = Satic Trip III/CPNX
2	SEAbus Slave Address	
3	Reset Min/Max, KWH	
4	Current A	
5	Current B	
6	Current C	
7	Avg. Current	
8	Current G	
9	Current N	
10	Voltage A-N	
11	Voltage B-N	
12	Voltage C-N	
13	Avg. Voltage L-N	
14	Voltage A-B	
15	Voltage B-C	
16	Voltage C-A	
17	Avg. Voltage L-L	
18	Crest Factor A	
19	Crest Factor B	
20	Crest Factor C	
21	Power Factor A	POWERLOGIC standard format
22	Reserved	
23	Power Factor B	POWERLOGIC standard format
24	Reserved	
25	Power Factor C	POWERLOGIC standard format
26	Reserved	
27	Frequency	times 10
28	Demand Current	
29,30	Demand W	
31	Demand W Unit	
32	Demand W Direction	
33	Minutes Remaining in Demand Period	
34	Seconds Remaining in Demand Period	
35,36	W	
37	W Units	
38	W Direction	
39,40	VAR	
41	VAR Units	
42	VAR Direction	

Table 2-17 SB Energy-Comm Continued

Modbus/TCP Register	Discription	Notes
43,44	VA	
44	VA Units	
46,47	Forward Watt Hours	
48	Forward Watt Hours Unit	
49,50	Revers Watt Hours	
51	Reverse Watt Hours Unit	
52,53	Forward VAR Hours	
54	Forward VAR Units	
55,56	Reverse VAR Hours	
57	Reverse VAR Units	
58	Current Balance A	
59	Current Balance B	
60	Current Balance C	
61	Voltage Balance A	
62	Voltage Balance B	
63	Voltage Balance C	
117	Breaker Position	0=Open, 1=Closed
118	Alarm Function Status	Bit 0 Over Current Alarm Bit 1 Ground Over Current Alarm Bit 2 Over Amp Demand Alarm Bit 3 Over KW Alarm Bit 4 Over KW Demand Alarm Bit 5 Over KVA Alarm Bit 6 Over KVAR Alarm Bit 7 Over PF Leading Alarm Bit 8 Over PF Lagging Alarm Bit 9 Harmonic Distortion Alarm
119	Protective Relay Function Alarm Status	Bit 0 Neutral Overcurrent Alarm Bit 1 Current Unbalance Alarm Bit 2 Undervoltage Alarm Bit 3 Voltage Unbalance Alarm Bit 4 Overvoltage Alarm Bit 5 Reverse Power Alarm Bit 6 Over Frequency Alarm Bit 7 Under Freaquency Alarm
120	System Error Flags	0 = No errors 1= EEPROM write error 2 = status update error 3 = clear Trip Log error 4 = new Trip Log entry error 5 = breaker test error 6 = trip error

Table 2-18 SB Energy-Comm Maximum Values Register List

Modbus/TCP Register	Discription	Notes
64	Max. Crest Factor A	
65	Max. Crest Factor B	
66	Max. Crest Factor C	
67	Max. Voltage A-N	
68	Max. Voltage B-N	
69	Max. Voltage C-N	
70	Max. Avg. Voltage L-N	
71	Max. Voltage A-B	
72	Max. Voltage B-C	
73	Max. Voltage C-A	
74	Max. Avg. Voltage L-L	
75	Max. Frequency	times 10
76	Max. Current A	
77	Max. Current B	
78	Max. Current C	
79	Max. Avg. Current	
80	Max. Current N	
81	Max. Current G	
82,83	Max. Forward Watts	
84,85	Max. Reverse Watts	
86,87	Max. Forward VAR	
88,89	Max. Reverse VAR	
90,91	Max. Apparent Power	
92,93	Max. Forward Demand Watts	
94,95	Max. Reverse Damand Watts	
96	Max. Demand Current	

Table 2-19 SB Energy-Comm Minimum Values Register List

Modbus/TCP Register	Discription	Notes
97	Min. Crest Factor A	
98	Min. Crest Factor B	
99	Min. Crest Factor C	
100	Min. Voltage A-N	
101	Min. Voltage B-N	
102	Min. Voltage C-N	
103	Min. Avg. Voltage L-N	
104	Min. Voltage A-B	
105	Min. Voltage B-C	
106	Min. Voltage C-A	
107	Min. Avg. Voltage L-L	
108	Min. Frequency	times 10
109	Min. Leading Power Factor A	
110	Min. Leading Power Factor B	
111	Min. Leading Power Factor C	
112	Min. Avg. Leading Power Factor	
113	Min. Lagging Power Factor A	
114	Min. Lagging Power Factor B	
115	Min. Lagging Power Factor C	
116	Min. Avg .Lagging Power Factor	

3

Web Server

Main Page

The Main page displays a summary of the configured SEAbus devices. The table will display the Modbus/TCP Destination Index, Device Type, SEAbus network address, and Device Status. If a device is not responding to queries from the QUCM then the Status table entry will have a gray background and display the text "Offline". If the device is responding to queries then the cell will display "Online". The Online message is a hypertext link that will display the "Actual" data for that device.

Figure 3-1 shows an example page with Port 2 set for SEAbus Slave mode with a 4300 Power Meter online. Devices 2 through 7 are presently configured as "Out of Service".

At the bottom of the Main page are links to Niobrara's WWW site, Statistics on this QUCM, and a page for configuring this QUCM.

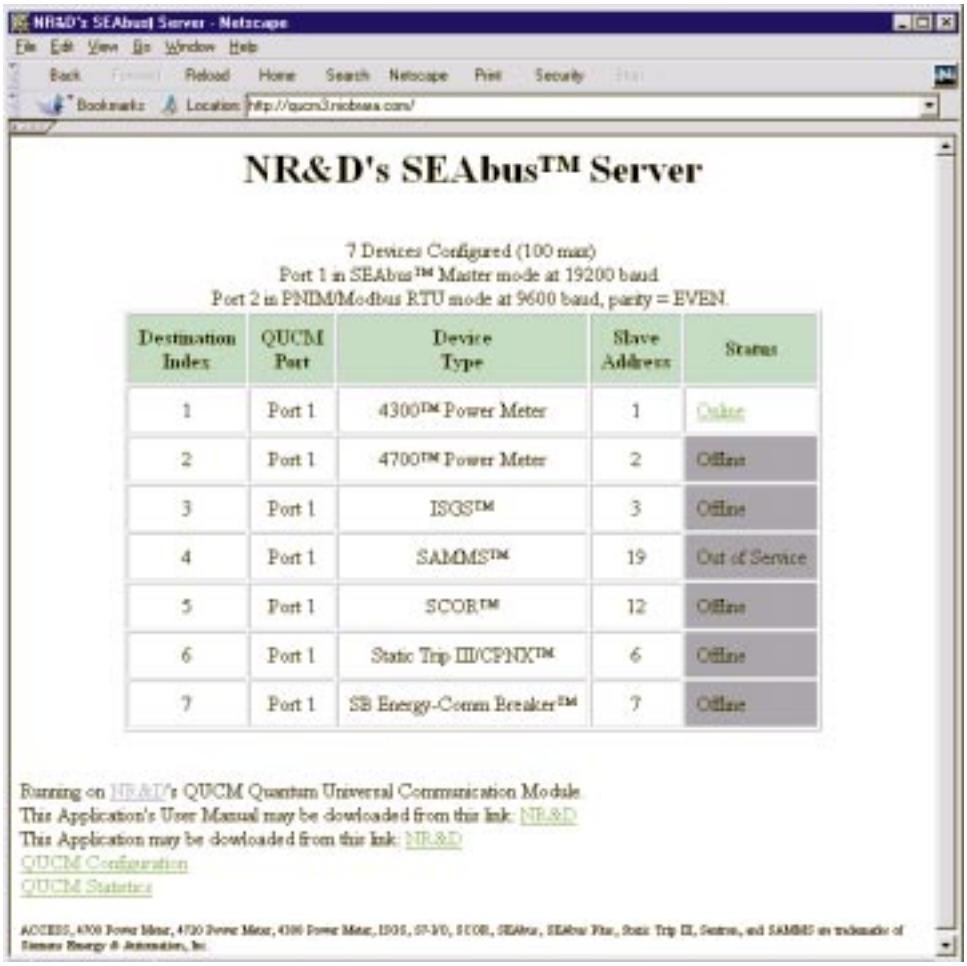
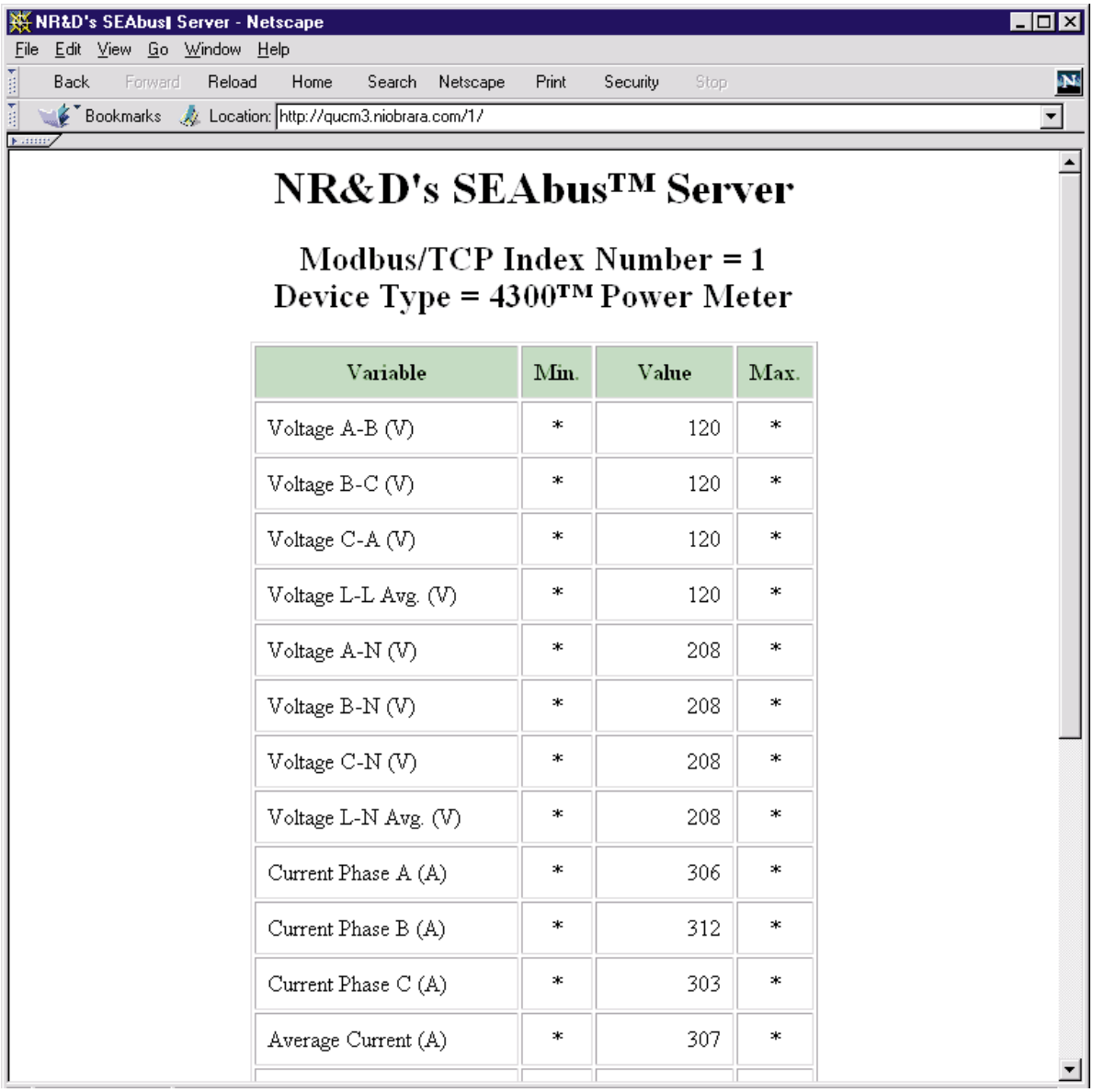


Figure 3-1 Main Web Page

Actual Data Page

Following one of the "Online" links will display a table of the metered data for the particular SEAbus device. Figure 3-2 shows a table for a 4300 Power Meter.



NR&D's SEAbus™ Server

Modbus/TCP Index Number = 1
Device Type = 4300™ Power Meter

Variable	Min.	Value	Max.
Voltage A-B (V)	*	120	*
Voltage B-C (V)	*	120	*
Voltage C-A (V)	*	120	*
Voltage L-L Avg. (V)	*	120	*
Voltage A-N (V)	*	208	*
Voltage B-N (V)	*	208	*
Voltage C-N (V)	*	208	*
Voltage L-N Avg. (V)	*	208	*
Current Phase A (A)	*	306	*
Current Phase B (A)	*	312	*
Current Phase C (A)	*	303	*
Average Current (A)	*	307	*

Figure 3-2 Web Server Actual Data Page

Configure QUCM

At the bottom of the Main page is a link to configure the QUCM. (See Figure). The password may need to be entered before access to this page is granted. The default password is "master" and is case sensitive. The password may be altered from the "Configure Serial Port" page. Light 9 will come on while the password timer is active.

A link is provided for altering the password. The current password must be verified before the new password is edited. The new password must be entered twice for verification. If it has been longer than three minutes since a password protected setting has been altered then the user will be prompted to enter the password.

NOTE: This password protection is not very secure and is only intended to prevent accidental modification to the QUCM configuration. The user should implement

other more stringent protection such as firewalls and isolated networks to ensure the safety of the metered system.

NOTE: Once a password has been accepted by the QUCM, any connection is allowed to modify settings until the timer expires; not just the user who entered the password.

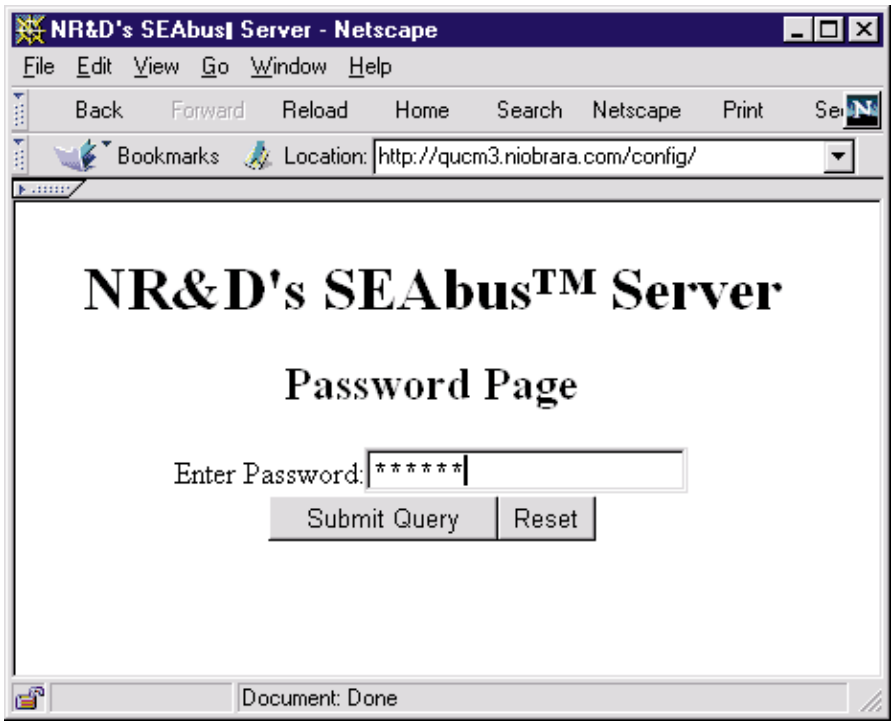


Figure 3-3 Enter Password Page

After entering a successful passoword a screen like Figure is displayed. Each SEAbus device configured is shown with a link to edit the device paramters or remove the device. Links below are given to add a new device, alter the serial port configuration, change the password, and save the configuration to FLASH.

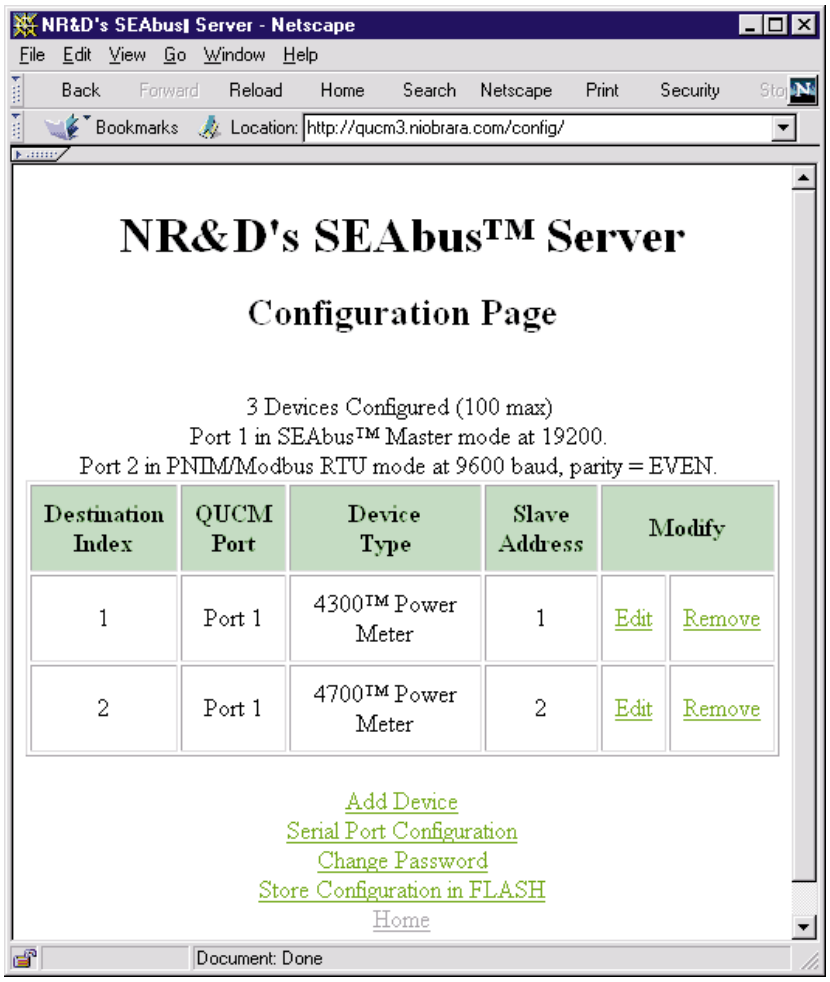


Figure 3-4 Configuration Page

Add Device

The Add Device link is used to add a new SEAbus device to the list. A screen like Figure is displayed. There is a pull-down menu item for the Modbus/TCP Destination Index. This menu will only display unused values.

There is a pull down field for the QUCM port number. Port 2 must be in SEAbus Master mode or the devices configured for Port 2 will not actually be polled.

There is a pull down field for the Device Type.

There is a text field for the SEAbus Slave Address. Addresses must be unique for a given device type. For example, it is not permitted to have two Model 4300 meters set to address 03, but it is allowed to set a Model 4300 to address 03 and a Model 4700 to address 03. Niobrara recommends setting each device to a unique address to avoid later confusion.

There is a check box for "In Service". Clearing this check box keeps the device in the QUCM's configuration but prohibits the QUCM from actually polling it. This may be desirable if a particular device is to be powered off for extended periods of time because the QUCM will not waste bandwidth trying to poll a device that is not present.

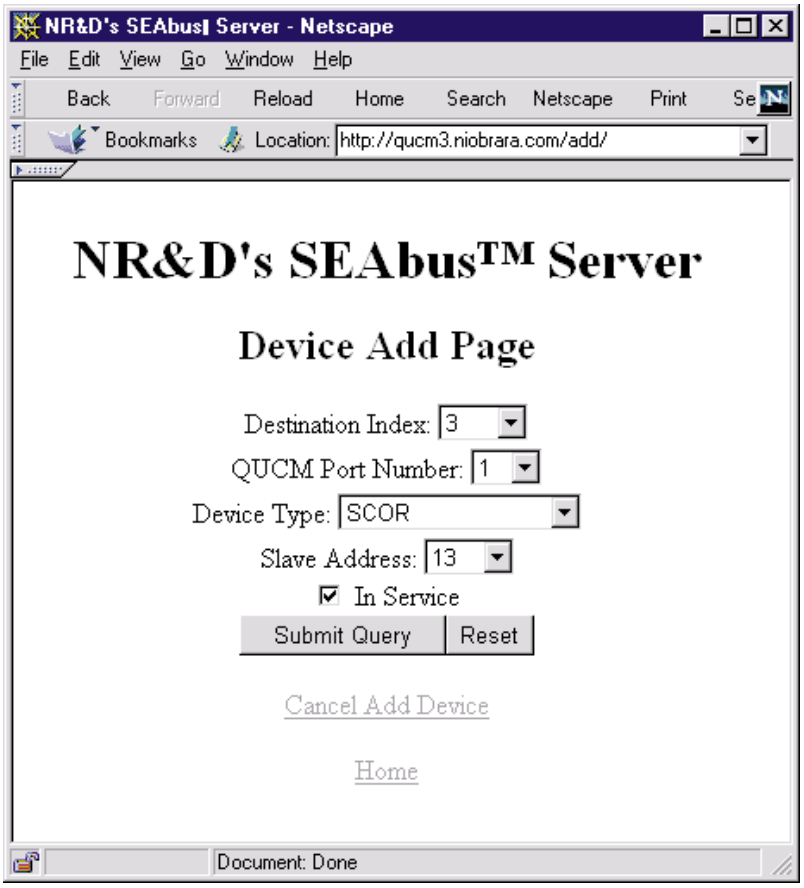


Figure 3-5 Add Device Page

Serial Port Configuration

The Serial Port Configuration page allows the altering of the baud rates of QUCM port 1 and 2, the Protocol of Port 2, and the Parity of Port 2.

Port 1 is fixed as an SEAbus Master. Its parity is fixed at NONE. Its baud rate may be set to 1200, 2400, 4800, 9600, or 19200. 9600 is recommended.

Port 2 may be set to SEAbus Master, SEAbus Slave or PNIM/Modbus RTU Master, PNIM Master, Modbus RTU Master, PLOGIC Master, or Modbus/RTU Slave. As an SEAbus Master or Slave its parity is fixed at NONE and its baud rates may be set to 1200, 2400, 4800, 9600, or 19200. As a PNIM/RTU/PLOGIC Master/Slave, its parity may be set to EVEN or NONE and its baud rate may be set to 1200, 2400, 4800, 9600, or 19200

When Port 2 is in PNIM/RTU, it accepts Modbus/TCP queries to Destination Idices 101 through 132 and passes the messages out to either PNIM or Modbus RTU slaves 1 through 32. The QUCM will automatically determine the proper protocol for the each of the possible 32 slaves.

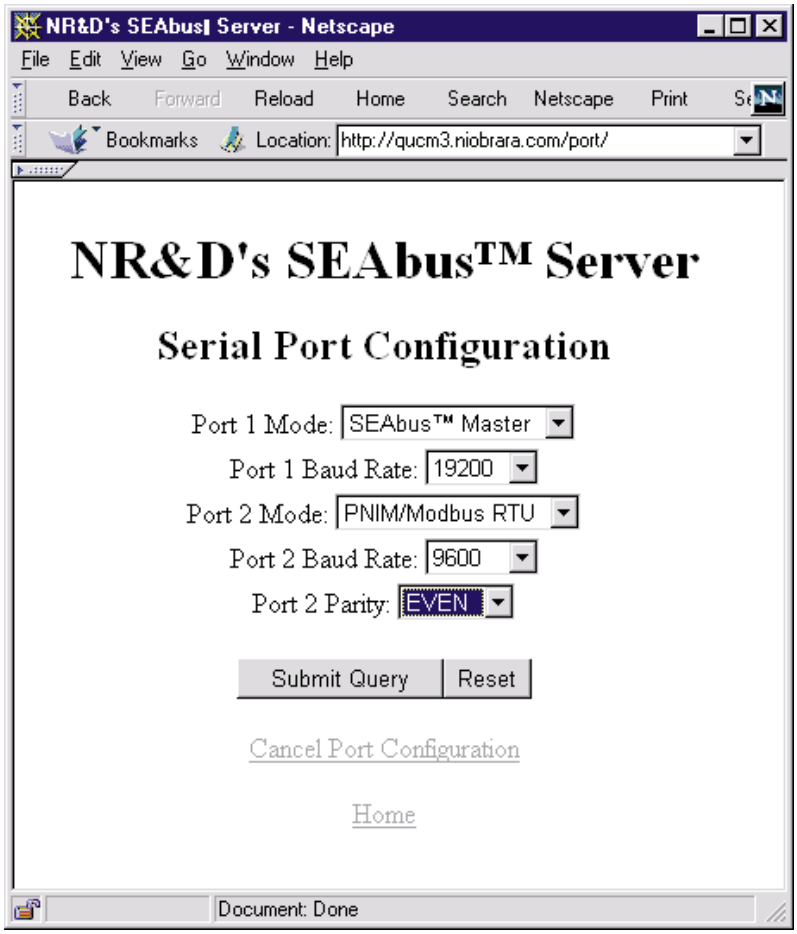


Figure 3-6 Serial Port Page

Save Settings to FLASH

After completion of the configuration, be sure to save the settings to flash. Otherwise the modifications will be lost on the next power cycle of the QUCM. Once the settings are saved to flash, the QUCM's configuration, including its IP settings, will be safe indefinately.

Statistics Page

At the bottom of the Main page is a link to some statistical information about this QUCM. (See Figure 3-7)

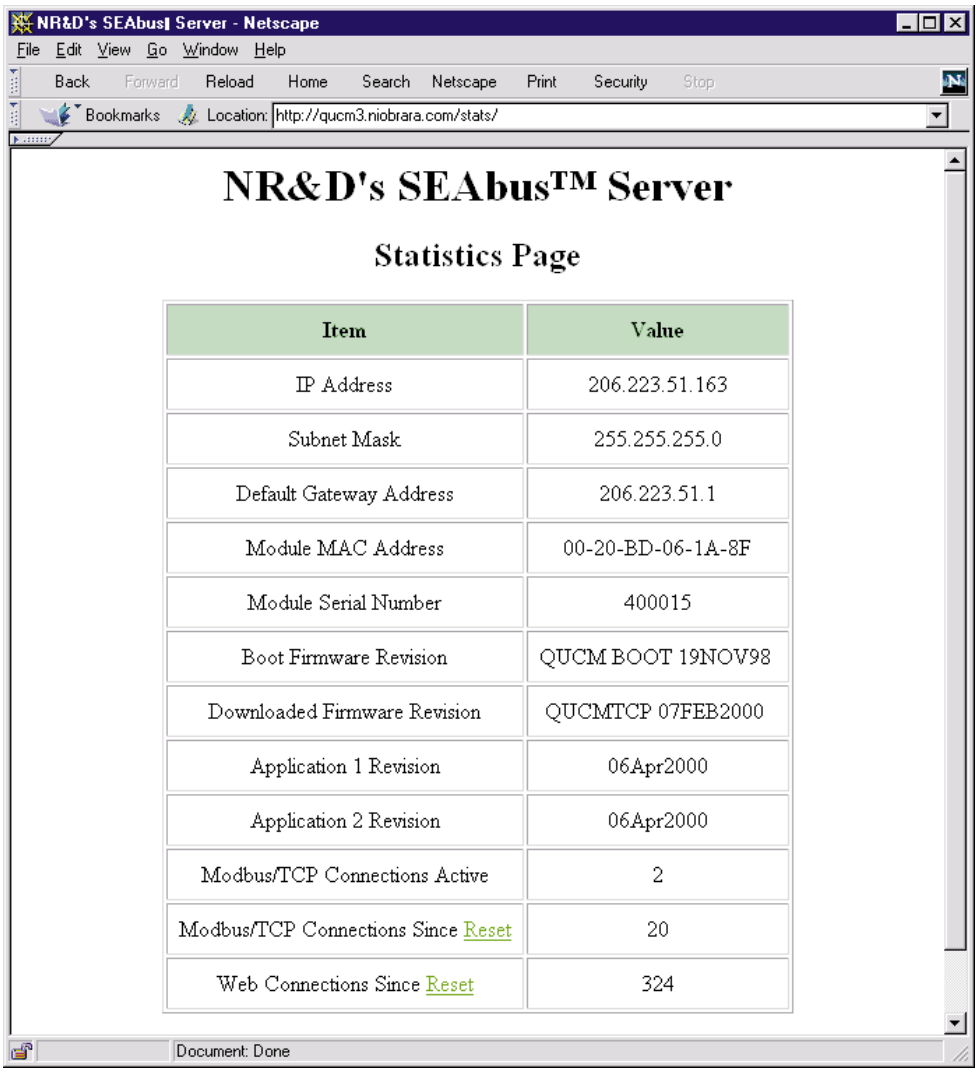


Figure 3-7 Statistics Web Page

4

FTP Server

Application 2 contains an FTP server as well as the web server. The FTP server allows the storage and retrieval of the FLASH setup parameters used by Application 1 and 2 from any computer with an FTP client. The user flash areas are presented by the QUCM's FTP server as a single file called "flash.bin". The user may use "get" to retrieve this file from the QUCM and "put" or "send" to copy this file to the QUCM. At this time, the login name is not required and the password is the same as the Web server password (defaults to "master"). When the file is copied to the QUCM (using put or send), the QUCM is rebooted after the FTP session is "quit" to allow the module to restart and load the new settings from FLASH.

Example Login, DIR, and "get"

```
>ftp 206.223.51.163
Connected to 206.223.51.163.
220 QUCM FTP Service (Version 07Jul2000)
User (206.223.51.163):(none)):
331 User okay; need password.
password:
230 User logged in; proceed.
ftp> dir
200 PORT Command Successful.
150 Opening ASCII mode data connection for /bin/ls.
flash.bin
226 PORT Command Successful.
11 bytes received in 0.01 seconds (1.10 Kbytes/sec)
ftp> get flash.bin
200 PORT Command Successful.
150 Opening ASCII mode data connection for flash.bin(16384 bytes).
226 Transfer complete.
16384 bytes received in 2.72 seconds (6.01 Kbytes/sec)
ftp> quit
221 Connection Closing. goodbye.
```

5
Examples

Example 1

Figure 5-1 displays an example SEAbus network with a QUCM-SE with a pair of 4300 Power Meters connected to Port 1 through a DDC2I. The meters are configured for addresses 10 and 12. Meter #10 will be accesses by SMS using Modbus/TCP Index 1 while Meter 12 will be reached at Index 2.

Port 2 of the QUCM is configured for PNIM/RTU mode at 9600 baud, EVEN parit.y A Niobrara DDC2I RS-232<>RS-485 converter is connected to the QUCM port through an MM0 cable. The DDC2I's RS-485 port has a network with a CM-2350 and a Modicon Momentum PLC connected. The CM is set to drop 1 in PNIM mode while the PLC speaks Modbus RTU at drop 2. The CM may be reached by Modbus/TCP Index 101 and the PLC by Index 102.

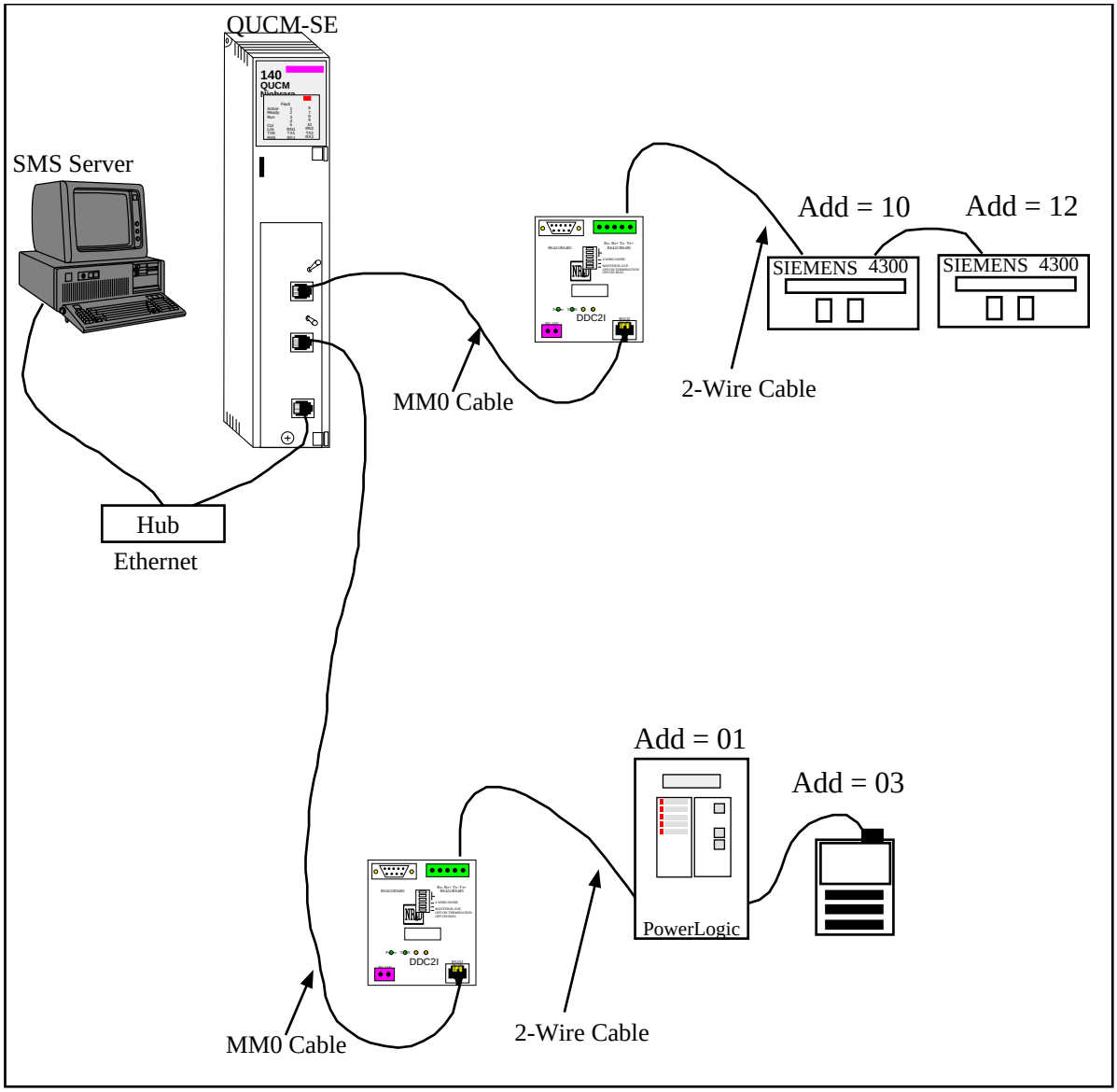


Figure 5-1 Network Example

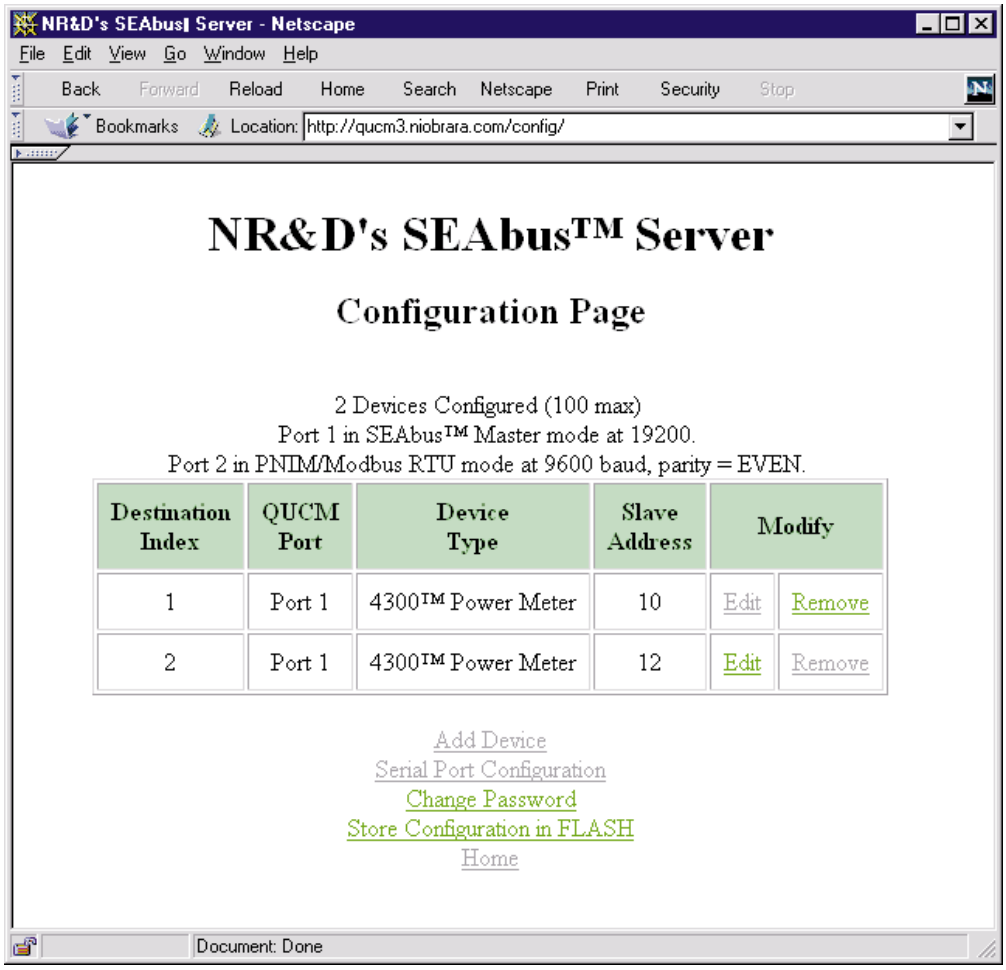


Figure 5-2 Example 1 Configuration Screen

6
Troubleshooting

Module Lights

The QUCM-SE has several lights that indicate the status of the module. Table 6-1 shows the meanings of these lights.

Table 6-1 Module Lights

Light	Meaning
Fault	The module has a catastrophic fault.. Call the factory.
Active	This light will be on if the module is in a traffic-copped slot in a Quantum PLC system and the PLC is in RUN.
Ready	This light should always be on (as long as it isn't in firmware load).
Run	This light will be on if the module is in a traffic-copped slot in a Quantum PLC system and the PLC is in RUN.
Col	Comes on when an Ethernet collision occurs.
Lnk	Is on when LINK is established on the 10BaseT port.
TXE	Comes on when the module is transmitting on the Ethernet port.
RXE	Comes on when the module is receiving on the Ethernet port.
RN1	This light should be on to indicate app1 is running.
TX1	Comes on when the module is transmitting on serial port 1.
RX2	Comes on when the module is receiving on serial port 1.
RN2	This light should not come on since there is no app2 loaded.
TX1	Comes on when the module is transmitting on serial port 1.
RX2	Comes on when the module is receiving on serial port 1.

User Lights

The QUCM-SE has 10 application driven lights numbered 1-10. The meaning of these lights while the APP1 program is running is shown in Table 6-2.

Table 6-2 User Light Definitions

Light	Meaning
1	SEAbus network not configured if rapidly blinking (5/sec).
2	Modbus/TCP session open on thread 2.
3	Modbus/TCP session open on thread 3
4	Modbus/TCP session open on thread 4
5	Modbus/TCP session open on thread 5
6	Modbus/TCP session open on thread 6
7	TELNET Server Running when ON
8	Good SEAbus message received when toggled.
9	Timeout on SEAbus message when ON.
10	WEB server connection active when ON.