



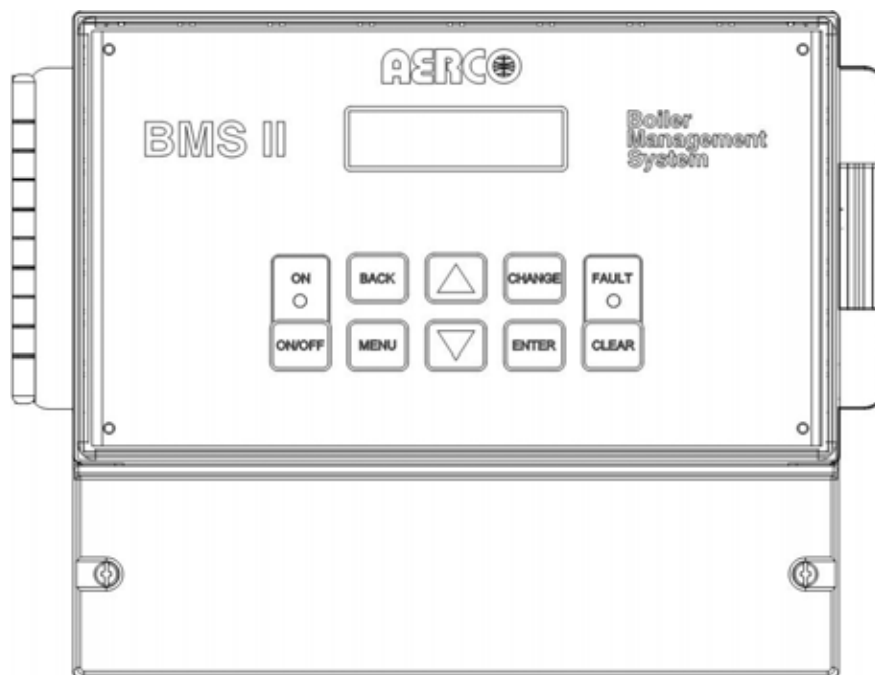
Instruction  
No.

**GF-124**

AERCO INTERNATIONAL, Inc., Northvale, New Jersey, 07647 USA

# Installation, Operation & Maintenance Instructions

## BMS II BOILER MANAGEMENT SYSTEM



JANUARY, 2009

## Telephone Support

## FOREWORD

# FORUM

## PHRASES, ABBREVIATIONS & ACRONYMS

## Phrases, Abbreviations and Acronyms

[illegible]

**CREW**

## Phrases, Abbreviations and Acronyms - Continued

[illegible]

## GF-124 – BMS II BOILER MANAGEMENT SYSTEM Operating & Maintenance Instructions

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CHAPTER 1 - GENERAL INFORMATION

1.1 SAFETY PRECAUTIONS & WARNINGS

1.2 INTRODUCTION

1.3 SYSTEM GENERAL DESCRIPTION

## GENERAL INFORMATION

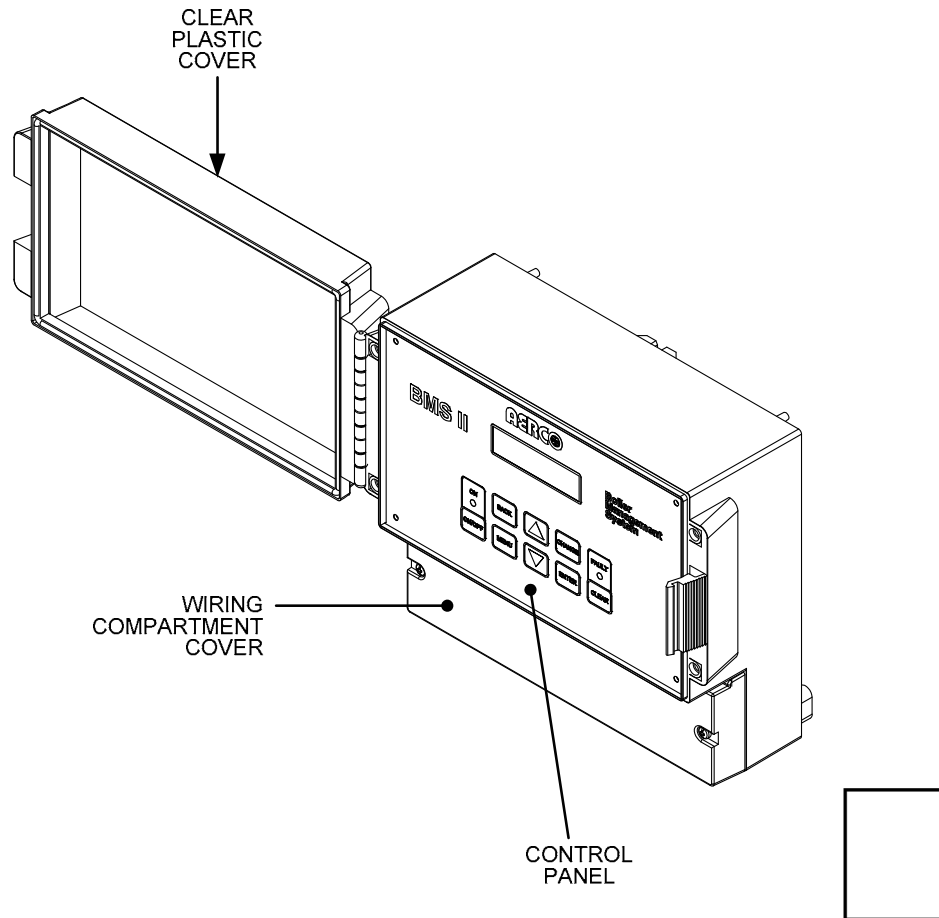


Figure 1-1. Boiler Management System II (BMS)

### 1.4 BMS II FEATURES

#### Simplified Start-Up Procedure

#### User-Defined On/Off Setpoints

## GENERAL INFORMATION

### ***Retention of Menu Option Settings***

### ***Application File Menu***

### ***Sequential or Parallel Operation***

Boilers can be programmed for either sequential or parallel operation using the BMS II keypad controls. When set for sequential operation, the boilers are brought on-line one at a time as needed. When set for parallel operation, the boilers are all brought on-line at one time when the demand signal is received.

### ***Accessories***

### ***Burner Interlocks***

### ***Fault Alarm Surveillance***

### ***BMS II Programming Year 2000 Port***





CHAPTER 2 - INSTALLATION

2.1 INTRODUCTION

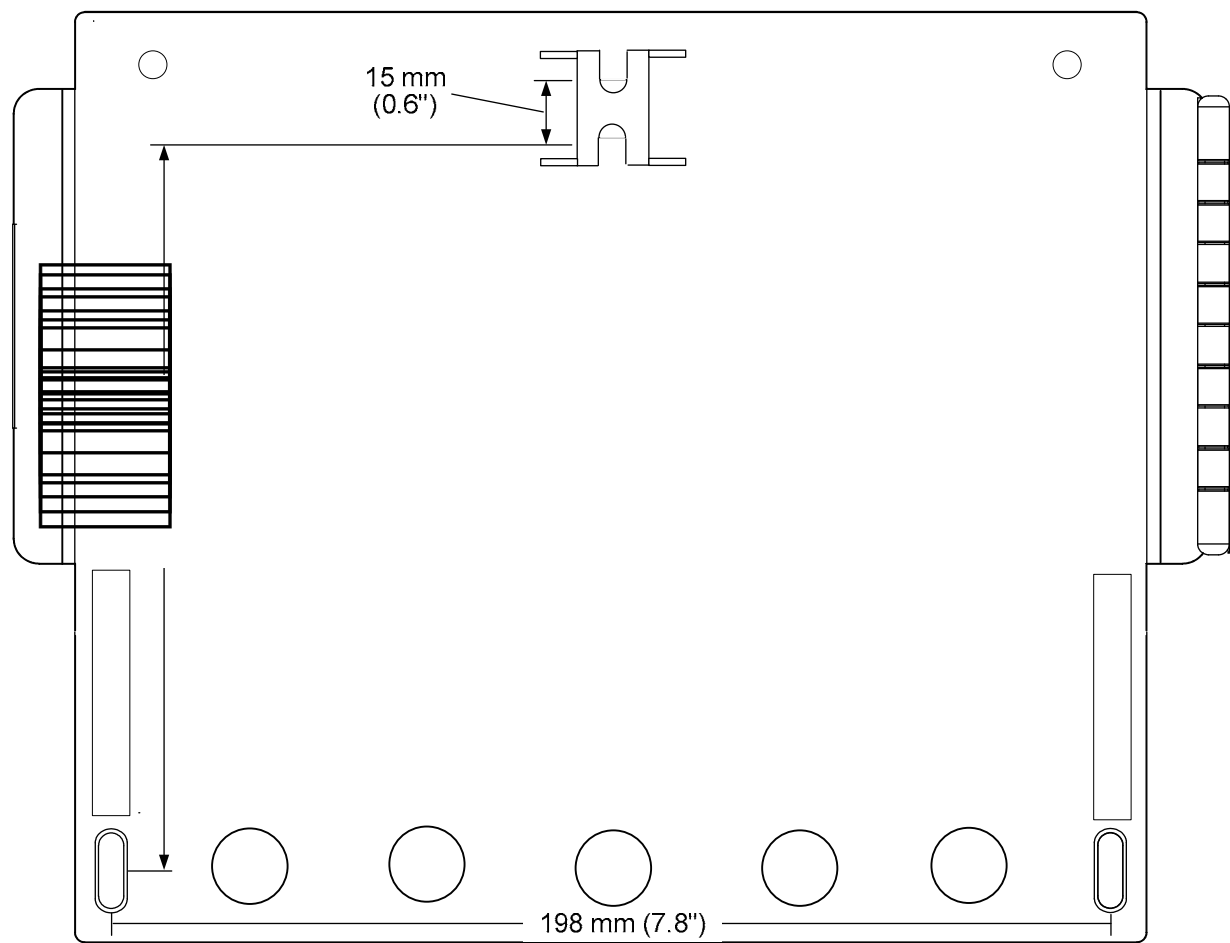
2.2 SITE SELECTION AND MOUNTING

- 
- 

*Mounting Rails*



INSTALLATION



REAR VIEW

**Figure 2-1. BMS II Mounting Provisions**

2.0 GENERAL INFORMATION

NOTE

WIRING

2.4 POWER WIRING

AERCO BMSII  
REV XXX

(Where XXX represents the revision level of the installed BMS II software)

HEADER TEMP  
SENSOR ERROR

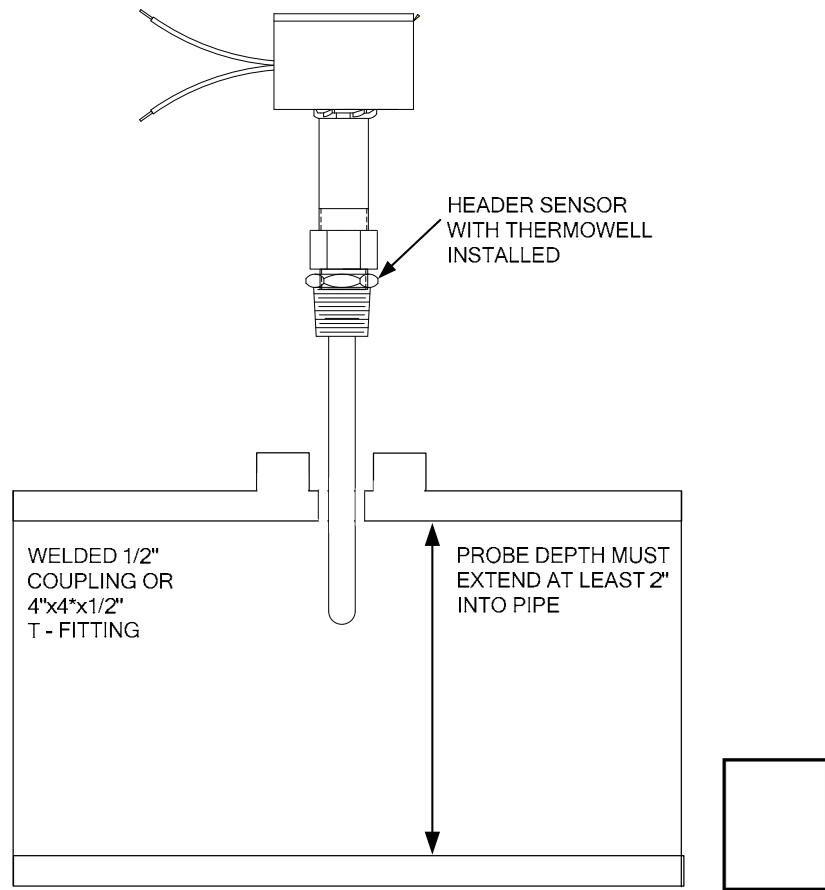
HEADER SENSOR  
ERROR

INSTALL			



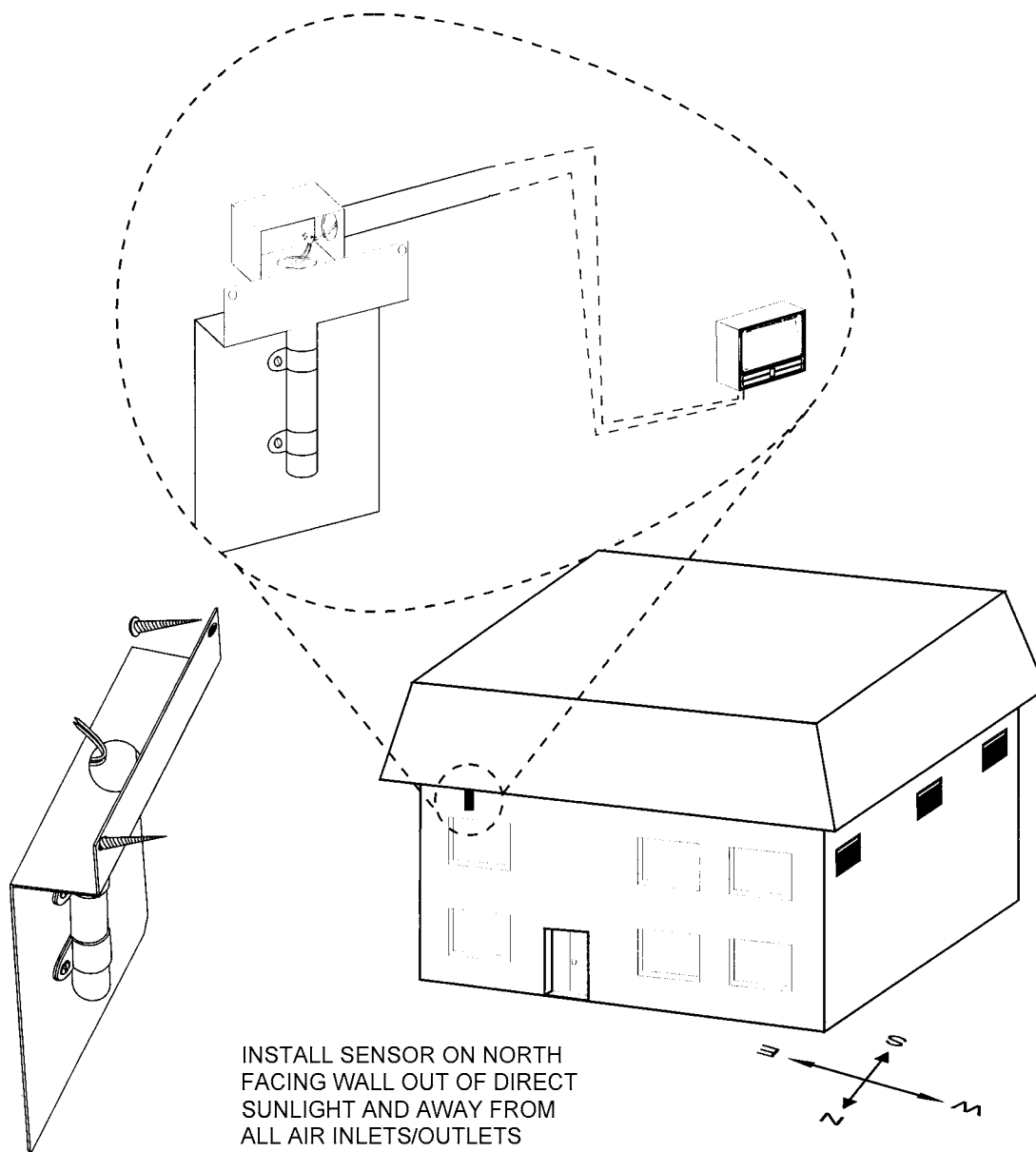
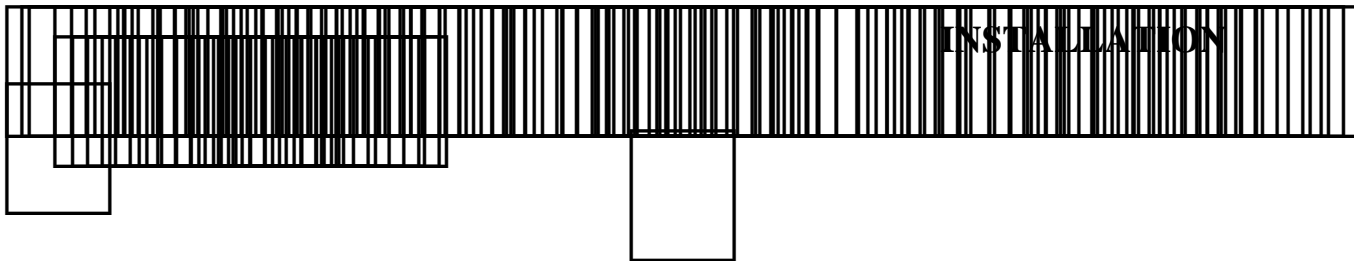
**2.5**

# INSTALLATION



*Figure 2-3 Header Sensor Installation Details*

Outdoor Sensor



**Figure 2-4. Outdoor Air Sensor Installation**

INSTALLATION

2.6 RS-485 MODELS WITH DRAIN RESISTORS

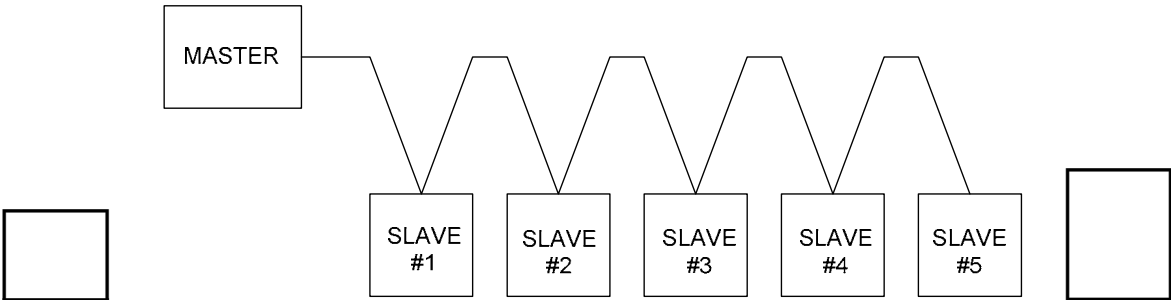
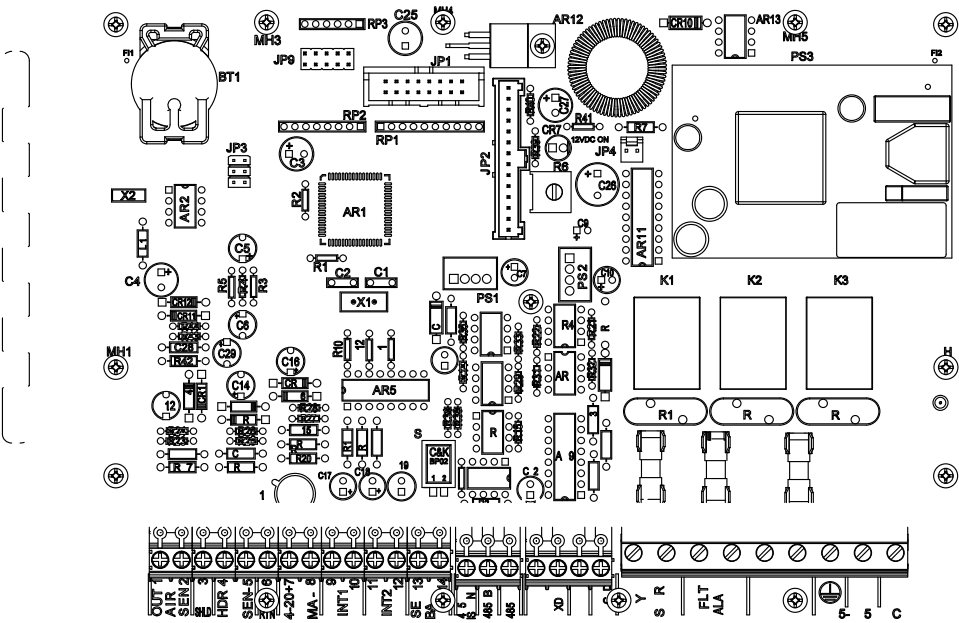


Figure 2-3: Typical Daisy Chain Modbus/RS-485 Network

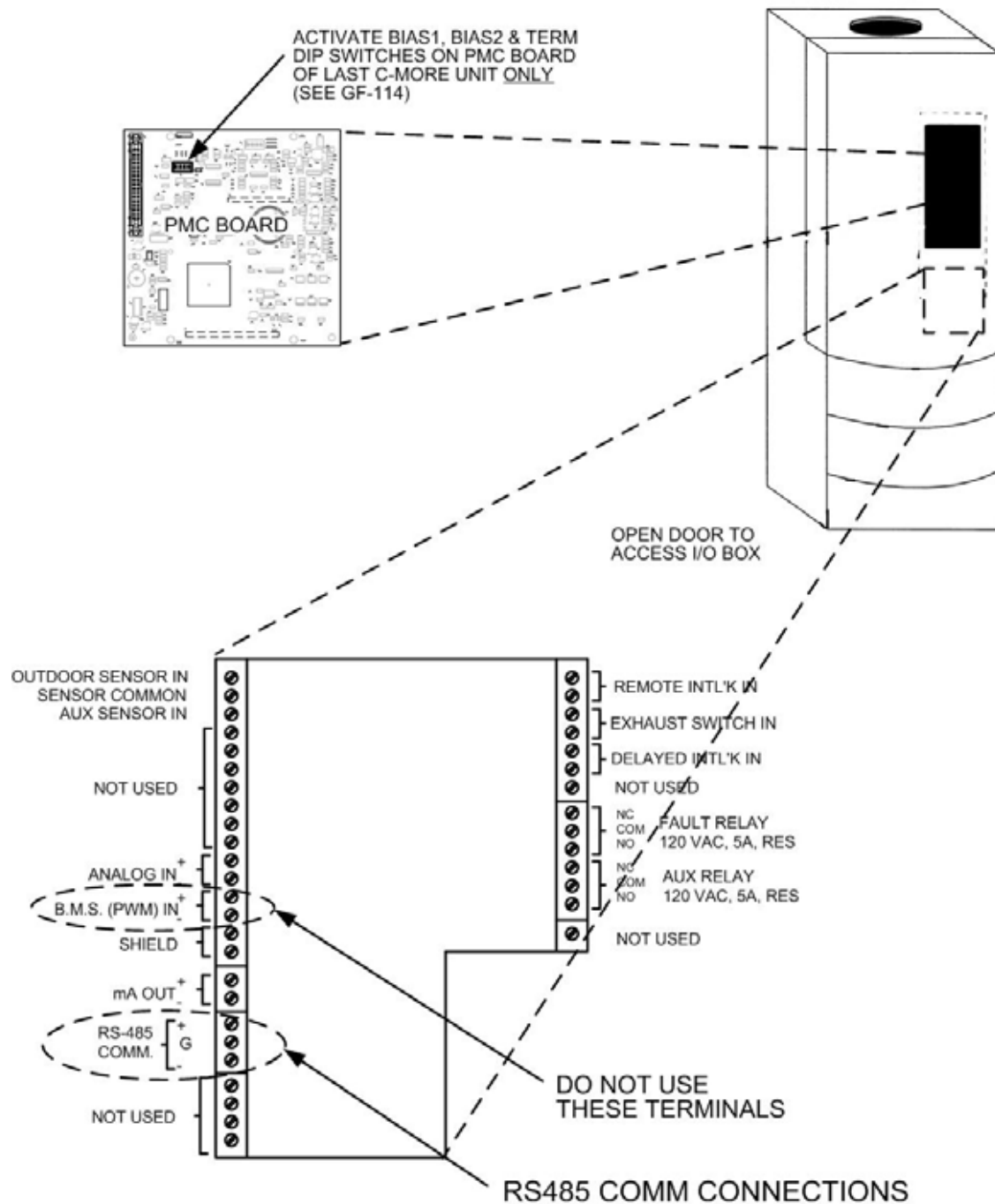
485 A+ 485 B+

BVS BVS BVS BVS

INSTALLATION



# INSTALLATION



**Figure 2-7. RS485 (Modbus) Wiring For Benchmark Series Boilers**

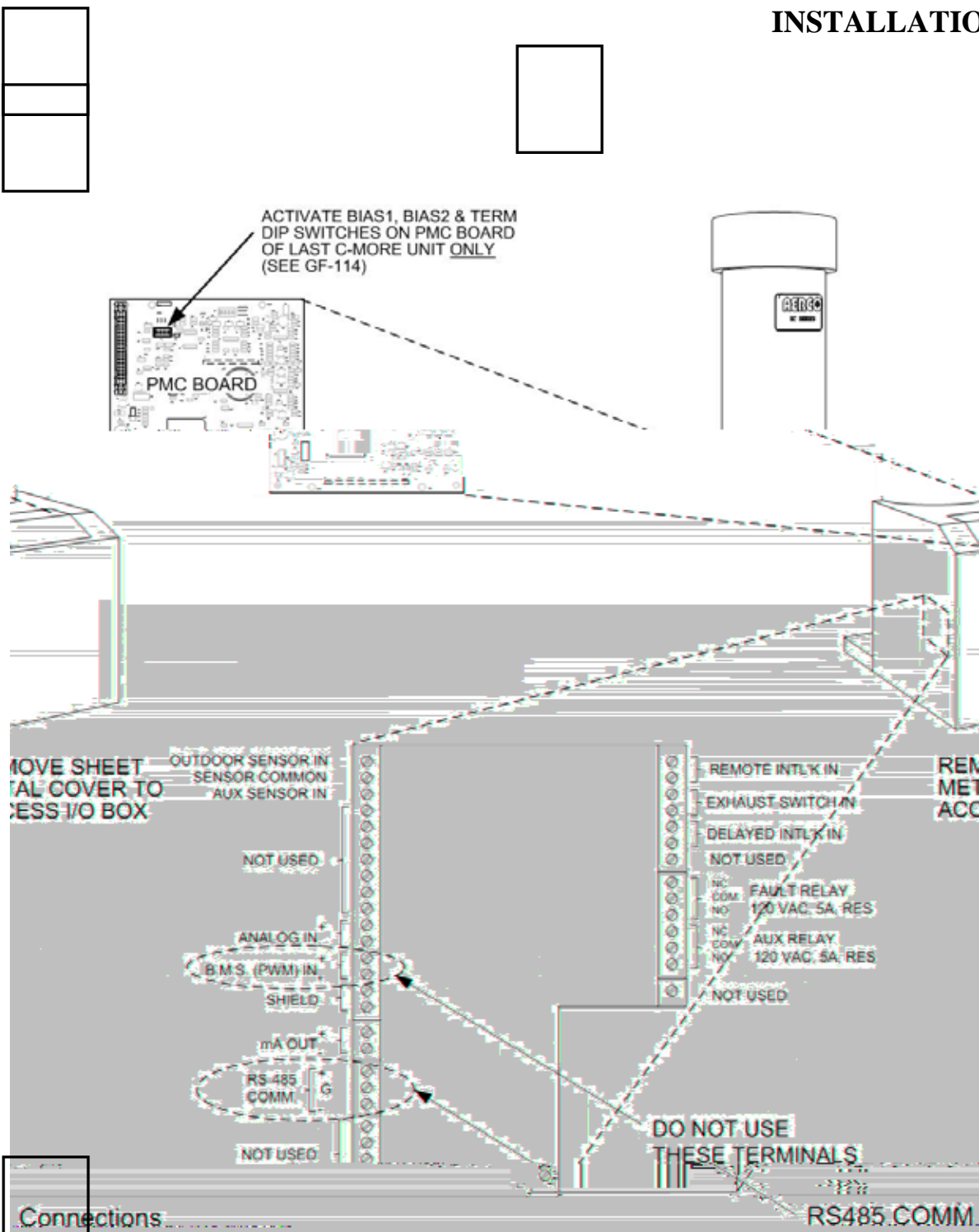
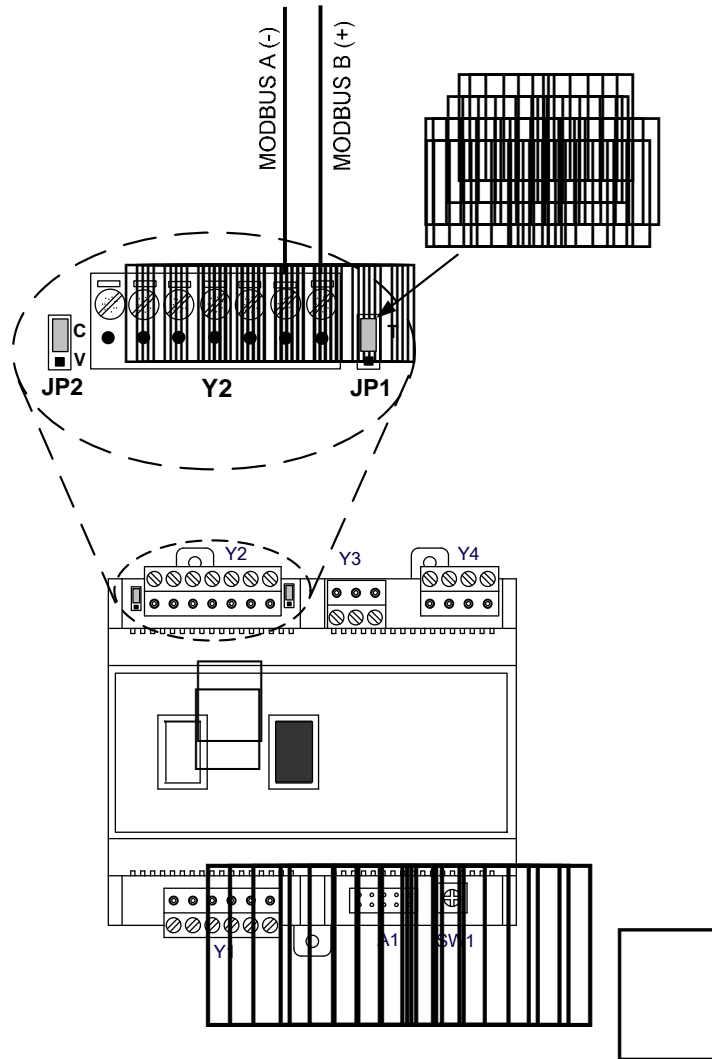


Figure 2-8. RS485 (Modbus) Wiring For KC1000 Boilers

RS485 Wiring for Modbus Series Boilers

# INSTALLATION

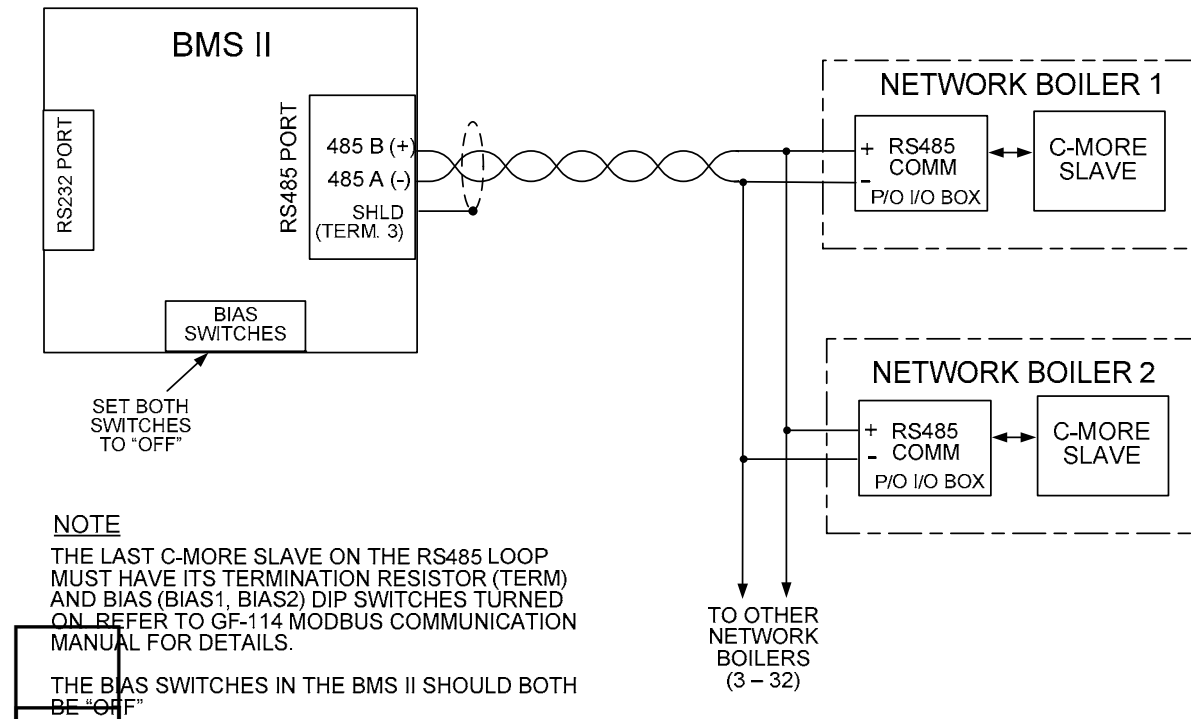


*Figure 2-9. RS485 (Modbus) Wiring For Modulex Series Boilers*

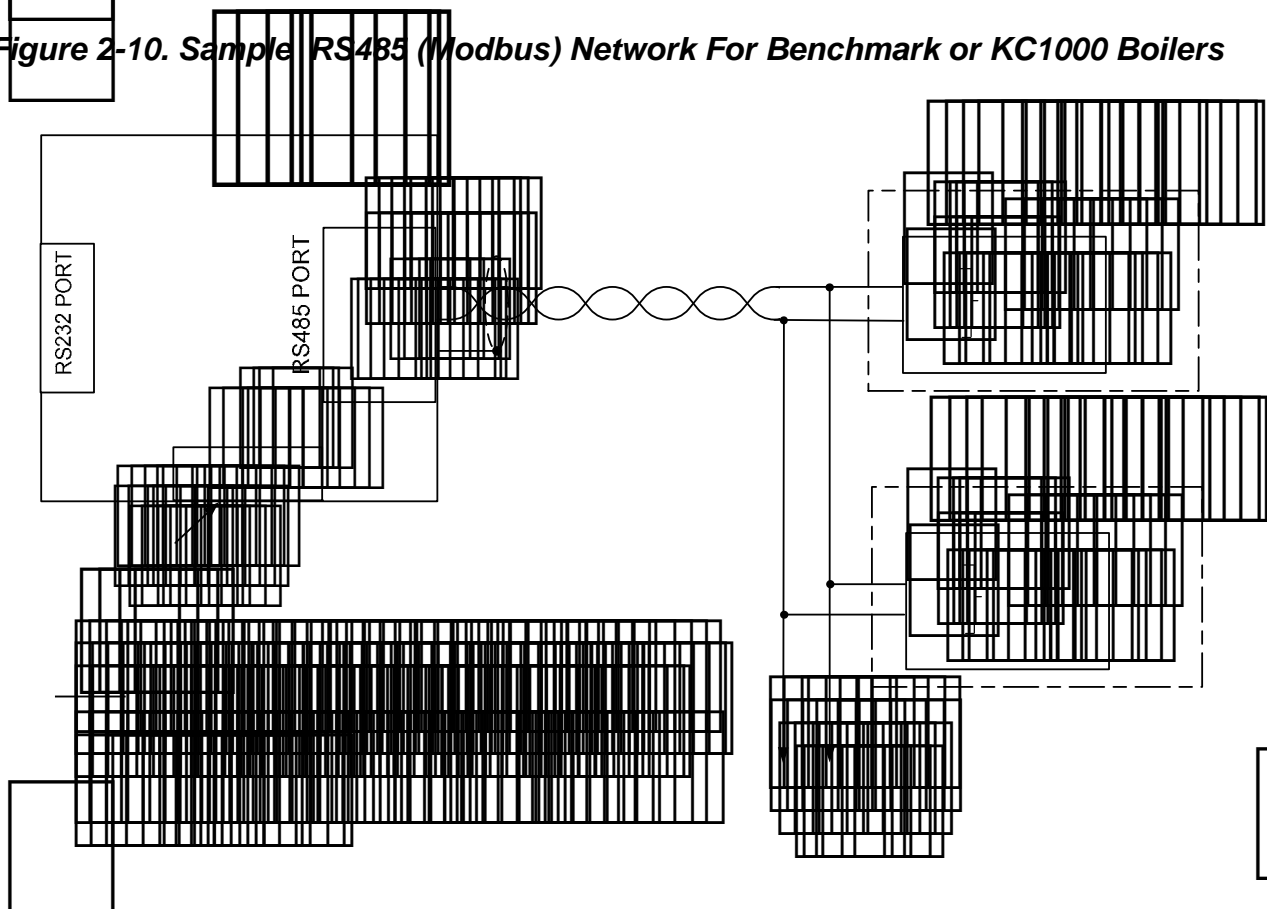
## 2.8 SAMPLE RS485 (MODBUS) NETWORK WIRING



## INSTALLATION



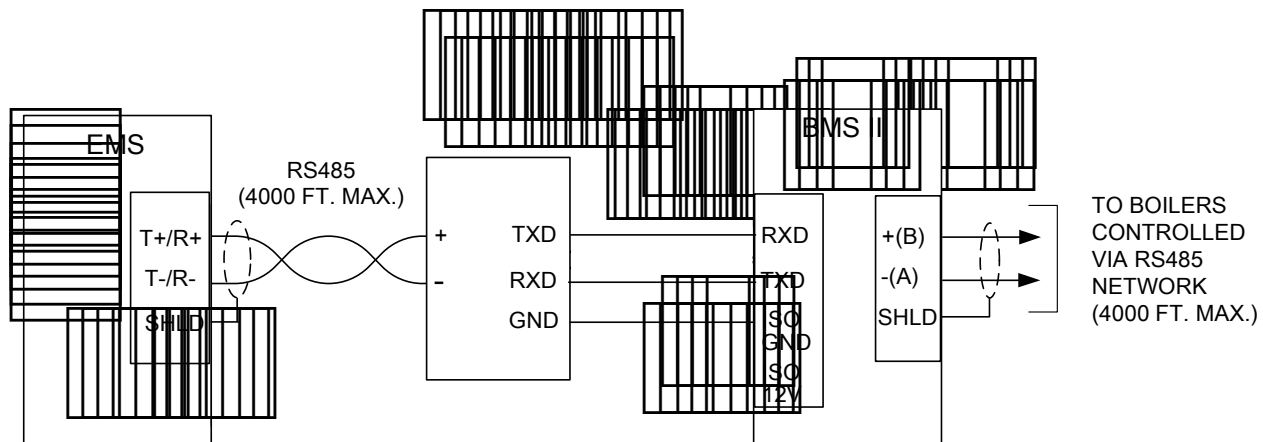
**Figure 2-10. Sample RS485 (Modbus) Network For Benchmark or KC1000 Boilers**



**Figure 2-11. Sample RS485 (Modbus) Network For Modulex Series Boilers**

PROTOCOL	ISSUE
RS232	29
RS485	15

## ISk



1

## INSTALLATION

### 2.10 INTERLOCKING

#### *Interlock 1 (N1) (N2)*

#### *Interlock 2 (N3) (N4)*

### 2.11 SETB ON WIRE

SETBACK

BACK

### 2.12 RELAY STATUS

## INSTALLATION


<p>  <b>UNIVERSITY OF NORTH CAROLINA</b>  <b>CHapel Hill</b> </p>		<p> <b>NOTE</b>          This document contains information that is exempt from public release under the Freedom of Information Act, 5 U.S.C. 552, and is not to be distributed outside the Department of Justice.       </p>	
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Figure 2 displays four heatmaps showing the distribution of system states (X-axis, 0 to 100) for different system sizes (Y-axis, 10, 20, 50, 100) and failure rates (Z-axis, 0.01, 0.05, 0.1, 0.2). The heatmaps illustrate the probability of the system being in a particular state (Y-axis, 0 to 1.0) for each combination of system size and failure rate. The distribution of states shifts towards higher failure counts as the failure rate increases and the system size decreases.

CHAPTER 3 - OPERATION

3.1 INTRODUCTION

3.2 FRONT PANEL OPERATING CONTROLS AND DISPLAYS

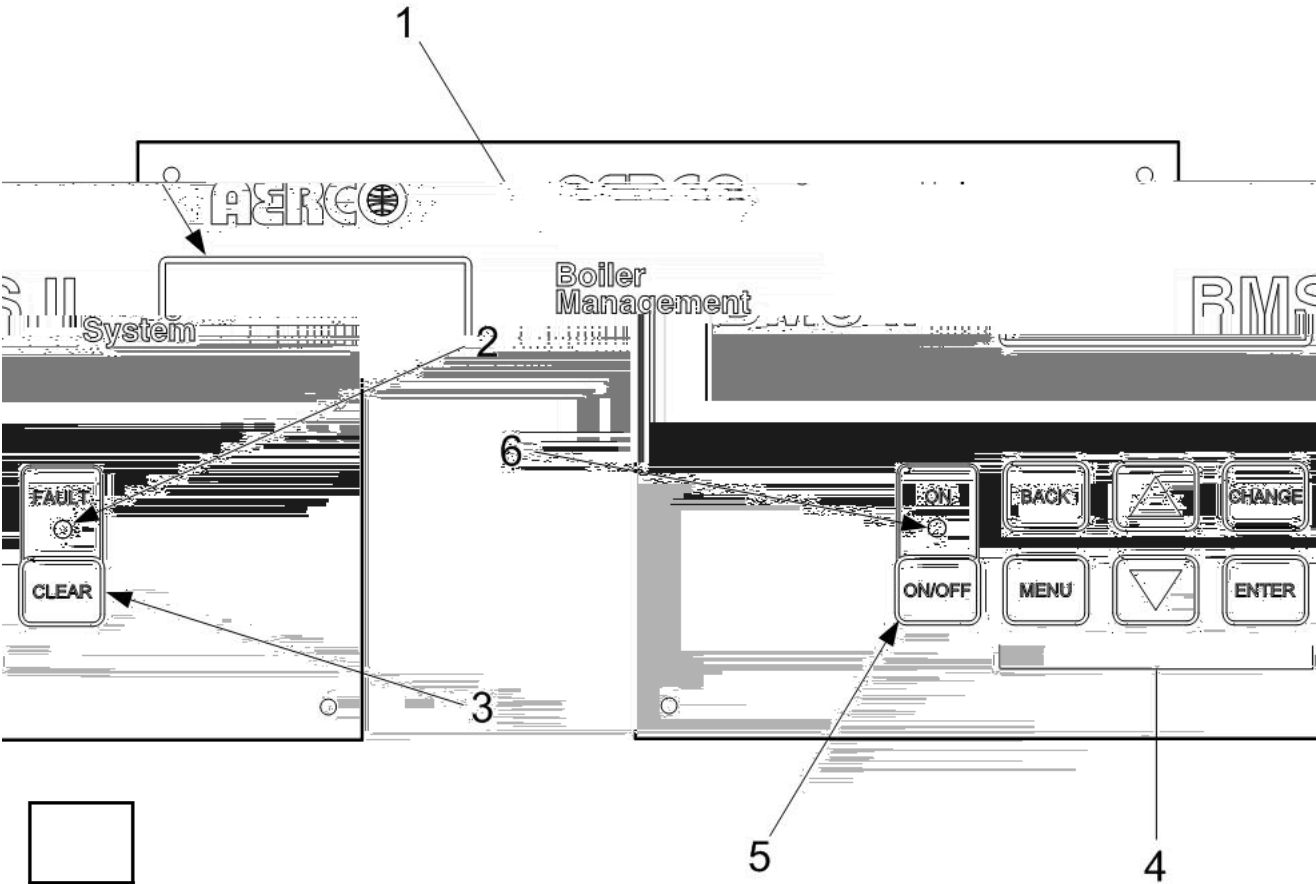
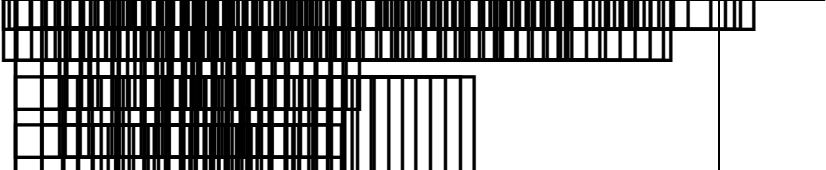
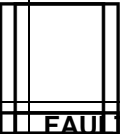
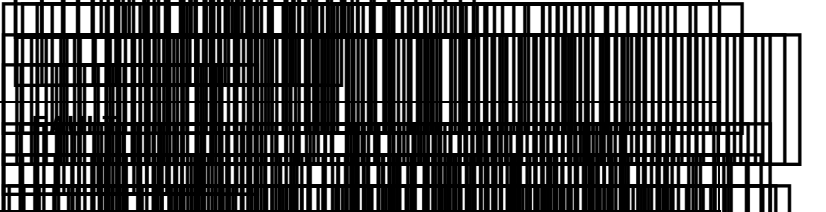


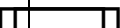

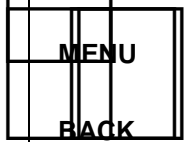

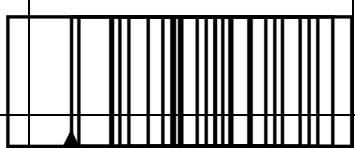
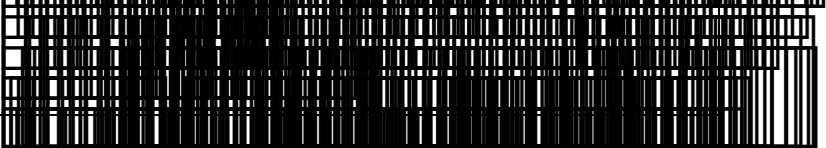
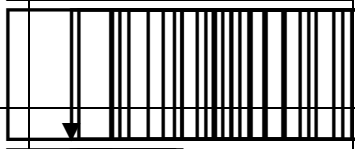
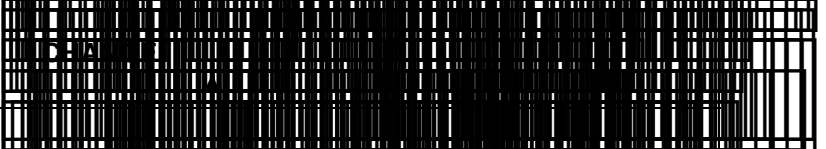

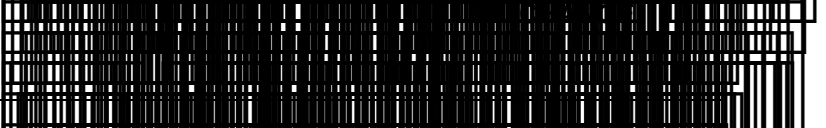
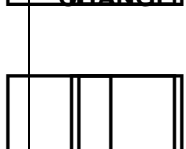


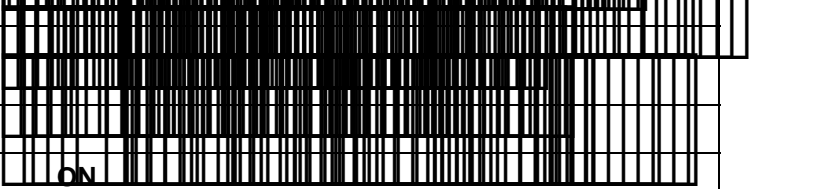


Figure 3-1. BMS II Front Panel Controls and Displays

# OPERATION

Table 3-1. BMS II Front Panel Controls and Displays

CONTROL, INDICATOR OR DISPLAY	
	
	
	
	
	
	
	
	
	
	

3.3 EMS MENU SCREENS

- 
- 

Menu Processing Procedure

ENTER

OPERATION

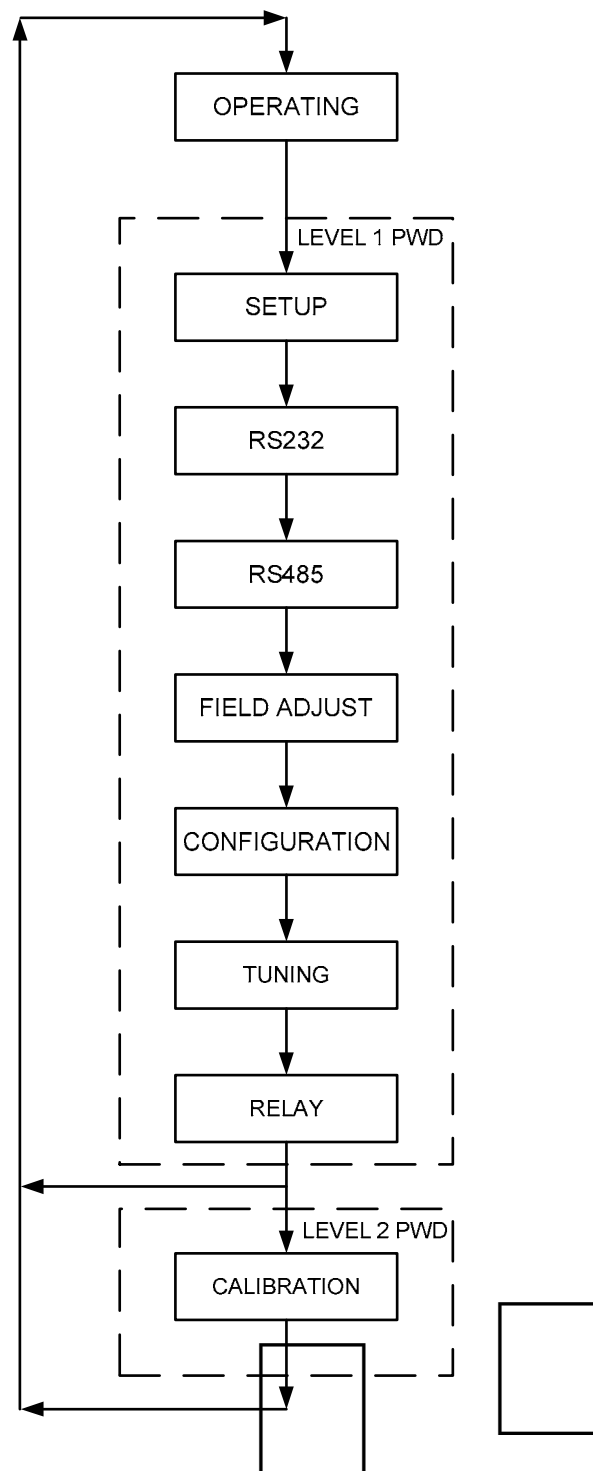


Figure 3-2. BMS II Menu Structure



A large grid of small squares, resembling a barcode or a data matrix, with varying shades of gray and black. The grid is composed of many small squares arranged in rows and columns, creating a complex, textured pattern. The squares are not uniform in color, with some being dark gray, some light gray, and some black, suggesting a binary or grayscale data representation. The overall effect is a dense, abstract visual field.

[illegible]

## OPERATION

I/O STATUS

I/O STATUS

RETURN KEY

RETURN KEY

3.5 SET MENU

ENTER PASSWORD

ENTER PASSWORD

*Date and Time Menu Options*

- SET MONTH 01 -12
- SET DATE 01 - 31
- SET YEAR 00 - 99
- SET HOUR 00 -23
- SET MINUTE 00 - 59
- SET DAY OF WEEK SUNDAY TO SATURDAY

3.6 RS232 MENU

RS232 MENU

RS232 MODE

RS232 BAUD RATE

MODBUS ADDRESS

MODBUS ADDRESS

NETWORK TIMEOUT

NETWORK TIMEOUT

MODBUS PASSWORD

3.7 RS485 MENU

## OPERATION

<b>RS485 BAUD RATE</b>	RS485 BAUD RATE
<b>MIN SLAVE ADDR</b>	MIN SLAVE ADDR
<b>MAX SLAVE ADDR</b>	MAX SLAVE ADDR
<b>NUMBER NETWORKS</b>	NUMBER NETWORKS
<b>MODBUS EXT. TYPE</b>	MODBUS EXT. TYPE
ROBIN	ROBIN
<b>NETWORK ADDRESS</b>	NETWORK ADDRESS
<b>3.8 FIELD ADDRESS</b>	3.8 FIELD ADDRESS
<b>HEADER SET MODE</b>	HEADER SET MODE
<b>HDB HIGH LIMIT</b>	HDB HIGH LIMIT
<b>HDB LOW LIMIT</b>	HDB LOW LIMIT

## OPERATION

### HDR LOW LIMIT

HDR LOW LIMIT

### INTERNAL SETPT

INTERNAL SETPT

HEADER SET MODE

HEADER SETPT

CONSTANT SETPT

CONSTANT SETPT

### RESET RATIO

RATIO

### BLDG REF TEMP

BLDG REF TEMP

OUTDOOR RESET

HEADER SET MODE

(BLDG REF TEMP)

### REMOTE SIGNAL

REMOTE SIGNAL

SETPT

HEADER SET MODE

REMOTE

### OFFSET ENABLE

OFFSET ENABLE

### Offset Menu Options

- OFFS TEMP
- ON HOUR (00 to 23)
- ON MINUTE (00 to 59)

- OFFS DLY (00 to 23)
- OFFS DAY (00 to 31)

[illegible]

[illegible]

## OPERATION

### 3.10 TUNING MENU

TUNING MENU

### PROPORTIONAL

### INTEGRAL



DERIVATIVE

HDR TEMP DEADBND

3.11 RELAY MENU

RELAY MENU

SYS START TIME

SYS START OPTION

SYS START OPTION: INTERLOCK 1 (default), INTERLOCK 2, INTERLOCK 1&2.

DEMAND LOAD

LOAD START PCT

SYS START INTLK

SYS START INTLK: START ENABLED, INTERLOCK 1 (default), INTERLOCK 2, INTERLOCK 1&2.

AUX RELAY OPEN

AUX RELAY OPEN

AUX RELAY CLOSE

## OPERATION

<b>FAULT ALARM RESET</b>	
<b>FAULTS</b>	
<b>INTERLOCK 1</b>	
<b>FAULT ALARM BLRS</b>	
<b>FAULT ALARM CLEER</b>	

### 3.12 CALIBRATION MENU

<b>NOTE</b>	
<b>HDR SENS OFFSET</b>	
<b>OUTD SENS OFFSET</b>	
<b>4-20 MA OFFSET</b>	
<b>REFN SENS OFFSET</b>	
<b>RAMP UP %/MIN</b>	

**RAMP DOWN 30MIN**

**LOAD START POT**

**LOAD STOP POT**

**BLR START LEVEL**

**BLR STOP LEVEL**

**RESET DEFAULTS**

Diagram illustrating the timing of BLR control signals. The signals are shown as pulses over time. The RAMP DOWN signal is active for 30 minutes. The LOAD START POT signal is active for 30 minutes. The LOAD STOP POT signal is active for 30 minutes. The BLR START LEVEL signal is active for 30 minutes. The BLR STOP LEVEL signal is active for 30 minutes. The diagram also shows the SYS START OPTION, TIME, and LOAD signals.

### 3.13 BMS II QUICK-START GUIDE

# OPERATION

## CONSTANT SETPT MODE (Default)

MENU & OPTION	ACTION
1. SETUP MENU	
↓	
ENTER PASSWORD	
↓	
2. RS485 MENU	
↓	
NUMBER NETW BOILERS	
↓	
NETW BOILER 01	
ADDRESS=001	
↓	
3. FIELD ADJUST MENU	
↓	
INTERNAL SETPT	
↓	
4. CONFIGURATION MENU	BLP START LEVEL=20% & BLP STOP LEVEL=16%
↓	
BLP START LEVEL	
↓	
BLP STOP LEVEL	
REMOTE SETPT MODE	

MENU & OPTION	ACTION
1. FIELD ADJUST MENU	
↓	
HEADER SET MODE	REMOTE SETPT
↓	
HDR HIGH LIMIT	
↓	
HDR LOW LIMIT	
↓	
REMOTE SIGNAL	
↓	
2. CONFIGURATION MENU	
↓	
FAIL SAFE MODE	CONSTANT SETPT
	(SHUTDOWN)

OUTDOOR RESET MODE

MENU & OPTION

1. FIELD ADJUST MENU



HEADER SET MODE



RESET RATIO



BLDG REE TEMP



2. CONFIGURATION MENU



EAM SAFE MODE



3. RELAY MENU



WYS START TEMP

ACTION

OUTDOOR RESET

CONSTANT SET PT

(SHUT DOWN)

WYS SAFE



## CHAPTER 4 - PROGRAMMING BMS II OPERATING MODES

## 4.1

#### **4.2.10 OUT OF ORDER**

- 

- 

- 

## Selecting Outdoor Reset Mode

[illegible]

## PROGRAMMING BMS II

ENTER

### Determining Basic Settings

#### Entering Basic Ratio And Building Reference Temperature

ENTER REF TEMP

BASIS RATIO

ENTER

ENTER

ENTER REF TEMP

ENTER REF TEMP

CHANGE

ENTER REF TEMP

ENTER

#### Selecting Basic Operating Mode

CONCENTRATION MENU

ENTER

ENTER

ENTER MODE

CHANGE

ENTER

ENTER





## PROGRAMMING FINISH

ENTER

FIELD

ADJUST MENU

### Entering Header High Limit And Low Limit Temperatures

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

### Selecting Remote Signal Type

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

ENTER

## Selecting Boiler On/Off Mode

1. Press <b>ENTER</b> to go to the MAIN MENU.	
2. Press <b>ENTER</b> to go to the CONFIGURATION MENU.	
3. Press <b>ENTER</b> to go to the SETPOINT MODE.	
4. Press <b>ENTER</b> to go to the SETPOINT MODE.	
5. Press <b>ENTER</b> to go to the SETPOINT MODE.	
6. Press <b>ENTER</b> to go to the SETPOINT MODE.	
7. Press <b>ENTER</b> to go to the SETPOINT MODE.	
8. Press <b>ENTER</b> to go to the SETPOINT MODE.	
9. Press <b>ENTER</b> to go to the SETPOINT MODE.	
10. Press <b>ENTER</b> to go to the SETPOINT MODE.	

## 4.4 CONSTANT SETPOINT MODE

- ☐ **CONSTANT SETPOINT MODE**
- ☐ **CONSTANT SETPOINT MODE**
- ☐ **CONSTANT SETPOINT MODE**
- ☐ **CONSTANT SETPOINT MODE**

## Selecting Constant Setpoint Mode

1. Press <b>ENTER</b> to go to the MAIN MENU.	
2. Press <b>ENTER</b> to go to the CONFIGURATION MENU.	
3. Press <b>ENTER</b> to go to the SETPOINT MODE.	
4. Press <b>ENTER</b> to go to the SETPOINT MODE.	
5. Press <b>ENTER</b> to go to the SETPOINT MODE.	
6. Press <b>ENTER</b> to go to the SETPOINT MODE.	
7. Press <b>ENTER</b> to go to the SETPOINT MODE.	
8. Press <b>ENTER</b> to go to the SETPOINT MODE.	
9. Press <b>ENTER</b> to go to the SETPOINT MODE.	
10. Press <b>ENTER</b> to go to the SETPOINT MODE.	

ADJUST MENU,

FIELD

## PROGRAMMING BMS II

## Selecting Indirect Setpoint Temperature

[illegible]

## Selecting Boiler Operating Mode

1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the situation.

2. Once the problem is identified, the next step is to define the objectives and goals of the project. This helps to clarify what is to be achieved and provides a clear direction for the team.

3. The third step is to develop a plan or strategy to address the problem. This involves breaking down the problem into smaller, manageable tasks and determining the resources needed to complete them.

4. The fourth step is to implement the plan. This involves putting the strategy into action and monitoring progress to ensure that the project is on track.

5. The final step is to evaluate the results of the project. This involves assessing the outcomes against the objectives and goals to determine the effectiveness of the intervention.

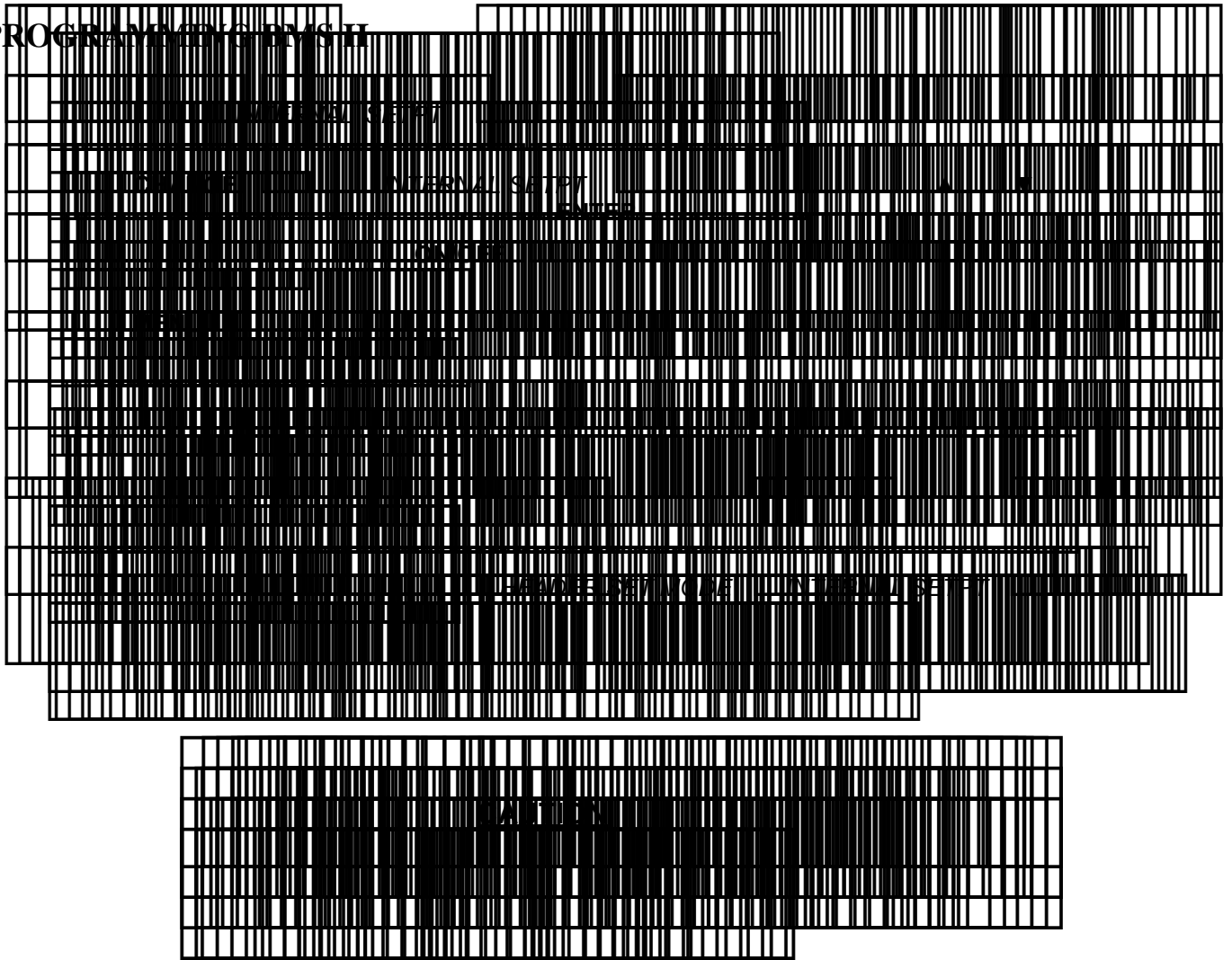
#### **4.6 THE MEANS OF PRODUCTION**

[illegible]

LOAD STOP PCT.



## PROGRAMMING BASICS



5. THE FACTORS THAT INFLUENCE THE DEVELOPMENT OF PROBLEMS:

The diagram illustrates a diagnostic process flow. It features three main components: a 'Fault Message' box on the left, a 'Description' box in the center, and a 'Possible Causes' box on the right. The 'Fault Message' box is connected to the 'Description' box by a line. The 'Description' box is connected to the 'Possible Causes' box by a line. Additionally, there are several arrows indicating the flow of information or the diagnostic process. The diagram is composed of a grid of lines, with the main components highlighted by thicker borders. The 'Fault Message' box contains the text 'Fault Message'. The 'Description' box contains the text 'Description'. The 'Possible Causes' box contains the text 'Possible Causes'. The diagram is a complex network of lines and arrows, representing a diagnostic process.

## TROUBLESHOOTING



### **Table 5-1. Fault Messages – Continued**

Fault Message	Description & Possible cause
1. Error 1: [illegible]	[illegible]
2. Error 2: [illegible]	[illegible]
3. Error 3: [illegible]	[illegible]
4. Error 4: [illegible]	[illegible]
5. Error 5: [illegible]	[illegible]
6. Error 6: [illegible]	[illegible]
7. Error 7: [illegible]	[illegible]
8. Error 8: [illegible]	[illegible]
9. Error 9: [illegible]	[illegible]
10. Error 10: [illegible]	[illegible]
11. Error 11: [illegible]	[illegible]
12. Error 12: [illegible]	[illegible]
13. Error 13: [illegible]	[illegible]
14. Error 14: [illegible]	[illegible]
15. Error 15: [illegible]	[illegible]
16. Error 16: [illegible]	[illegible]
17. Error 17: [illegible]	[illegible]
18. Error 18: [illegible]	[illegible]
19. Error 19: [illegible]	[illegible]
20. Error 20: [illegible]	[illegible]
21. Error 21: [illegible]	[illegible]
22. Error 22: [illegible]	[illegible]
23. Error 23: [illegible]	[illegible]
24. Error 24: [illegible]	[illegible]
25. Error 25: [illegible]	[illegible]
26. Error 26: [illegible]	[illegible]
27. Error 27: [illegible]	[illegible]
28. Error 28: [illegible]	[illegible]
29. Error 29: [illegible]	[illegible]
30. Error 30: [illegible]	[illegible]
31. Error 31: [illegible]	[illegible]
32. Error 32: [illegible]	[illegible]
33. Error 33: [illegible]	[illegible]
34. Error 34: [illegible]	[illegible]
35. Error 35: [illegible]	[illegible]
36. Error 36: [illegible]	[illegible]
37. Error 37: [illegible]	[illegible]
38. Error 38: [illegible]	[illegible]
39. Error 39: [illegible]	[illegible]
40. Error 40: [illegible]	[illegible]
41. Error 41: [illegible]	[illegible]
42. Error 42: [illegible]	[illegible]
43. Error 43: [illegible]	[illegible]
44. Error 44: [illegible]	[illegible]
45. Error 45: [illegible]	[illegible]
46. Error 46: [illegible]	[illegible]
47. Error 47: [illegible]	[illegible]
48. Error 48: [illegible]	[illegible]
49. Error 49: [illegible]	[illegible]
50. Error 50: [illegible]	[illegible]
51. Error 51: [illegible]	[illegible]
52. Error 52: [illegible]	[illegible]
53. Error 53: [illegible]	[illegible]
54. Error 54: [illegible]	[illegible]
55. Error 55: [illegible]	[illegible]
56. Error 56: [illegible]	[illegible]
57. Error 57: [illegible]	[illegible]
58. Error 58: [illegible]	[illegible]
59. Error 59: [illegible]	[illegible]
60. Error 60: [illegible]	[illegible]
61. Error 61: [illegible]	[illegible]
62. Error 62: [illegible]	[illegible]
63. Error 63: [illegible]	[illegible]
64. Error 64: [illegible]	[illegible]
65. Error 65: [illegible]	[illegible]
66. Error 66: [illegible]	[illegible]
67. Error 67: [illegible]	[illegible]
68. Error 68: [illegible]	[illegible]
69. Error 69: [illegible]	[illegible]
70. Error 70: [illegible]	[illegible]
71. Error 71: [illegible]	[illegible]
72. Error 72: [illegible]	[illegible]
73. Error 73: [illegible]	[illegible]
74. Error 74: [illegible]	[illegible]
75. Error 75: [illegible]	[illegible]
76. Error 76: [illegible]	[illegible]
77. Error 77: [illegible]	[illegible]
78. Error 78: [illegible]	[illegible]
79. Error 79: [illegible]	[illegible]
80. Error 80: [illegible]	[illegible]
81. Error 81: [illegible]	[illegible]
82. Error 82: [illegible]	[illegible]
83. Error 83: [illegible]	[illegible]
84. Error 84: [illegible]	[illegible]
85. Error 85: [illegible]	[illegible]
86. Error 86: [illegible]	[illegible]
87. Error 87: [illegible]	[illegible]
88. Error 88: [illegible]	[illegible]
89. Error 89: [illegible]	[illegible]
90. Error 90: [illegible]	[illegible]
91. Error 91: [illegible]	[illegible]
92. Error 92: [illegible]	[illegible]
93. Error 93: [illegible]	[illegible]
94. Error 94: [illegible]	[illegible]
95. Error 95: [illegible]	[illegible]
96. Error 96: [illegible]	[illegible]
97. Error 97: [illegible]	[illegible]
98. Error 98: [illegible]	[illegible]
99. Error 99: [illegible]	[illegible]
100. Error 100: [illegible]	[illegible]





### **Table 5-2 Common Problems**

[illegible]

# TROUBLESHOOTING

**Table 5-2 Common Problems - Continued**

Problem	Possible Causes	Solution
EMS cannot see BMSII	<ul style="list-style-type: none"> <li>• BMSII not started</li> <li>• BMSII not configured correctly</li> <li>• BMSII not connected to EMS</li> </ul>	<ul style="list-style-type: none"> <li>• Start BMSII</li> <li>• Check BMSII configuration</li> <li>• Check BMSII connection to EMS</li> </ul>
Boiler <i>RAMP UP</i> or <i>RAMP DOWN</i> too slow or too fast	<ul style="list-style-type: none"> <li>• <i>RAMP UP</i> or <i>RAMP DOWN</i> rate too slow or too fast</li> <li>• <i>RAMP UP</i> or <i>RAMP DOWN</i> rate too slow or too fast</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust <i>RAMP UP</i> or <i>RAMP DOWN</i> rate</li> <li>• Adjust <i>RAMP UP</i> or <i>RAMP DOWN</i> rate</li> </ul>
<i>HEADER TEMPERATURE</i> not reaching Setpoint	<ul style="list-style-type: none"> <li>• <i>HEADER TEMPERATURE</i> setpoint too low</li> <li>• <i>HEADER TEMPERATURE</i> setpoint too high</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust <i>HEADER TEMPERATURE</i> setpoint</li> <li>• Adjust <i>HEADER TEMPERATURE</i> setpoint</li> </ul>
Need to restore Factory Default Settings.	<ul style="list-style-type: none"> <li>• Factory Default Settings not restored</li> </ul>	<ul style="list-style-type: none"> <li>• Restore Factory Default Settings</li> </ul>
Boilers over-shooting setpoint or tripping aquastat	<ul style="list-style-type: none"> <li>• Boiler setpoint too high</li> <li>• Boiler setpoint too low</li> <li>• Boiler setpoint too high</li> <li>• Boiler setpoint too low</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust boiler setpoint</li> <li>• Adjust boiler setpoint</li> <li>• Adjust boiler setpoint</li> <li>• Adjust boiler setpoint</li> </ul>
Modbus Network faults encountered. Boiler plant not operating	<ul style="list-style-type: none"> <li>• Modbus Network not configured correctly</li> <li>• Modbus Network not connected to boiler plant</li> </ul>	<ul style="list-style-type: none"> <li>• Check Modbus Network configuration</li> <li>• Check Modbus Network connection to boiler plant</li> </ul>

## APPENDIX A

## BMS II MENUS

[illegible]

## APPENDIX A

MENU LEVEL & OPTION		AVAILABLE CHOICES OR LIMITS		DEFAULT
		MINIMUM	MAXIMUM	
<b>RS485 MENU</b>				
1	RS485 ADDRESS	1	255	1
2	RS485 Baud Rate	9600	115200	9600
3	RS485 Data Bits	8	8	8
4	RS485 Stop Bits	1	2	1
5	RS485 Parity	Even	Even	Even
6	RS485 Handshake	None	None	None
7	RS485 Timeout	1	10	1
8	RS485 Filter	0	1	0
9	RS485 Mode	Master	Master	Master
10	RS485 Polarity	Normal	Normal	Normal
<b>FIELD ADJUST MENU</b>				
11	Field Adjust Password	1	10	1
12	Field Adjust Mode	Normal	Normal	Normal
13	Field Adjust Timeout	1	10	1
14	Field Adjust Filter	0	1	0
15	Field Adjust Polarity	Normal	Normal	Normal
16	Field Adjust Mode	Normal	Normal	Normal
17	Field Adjust Timeout	1	10	1
18	Field Adjust Filter	0	1	0
19	Field Adjust Polarity	Normal	Normal	Normal
20	Field Adjust Mode	Normal	Normal	Normal
21	Field Adjust Timeout	1	10	1
22	Field Adjust Filter	0	1	0
23	Field Adjust Polarity	Normal	Normal	Normal
24	Field Adjust Mode	Normal	Normal	Normal
25	Field Adjust Timeout	1	10	1
26	Field Adjust Filter	0	1	0
27	Field Adjust Polarity	Normal	Normal	Normal
28	Field Adjust Mode	Normal	Normal	Normal
29	Field Adjust Timeout	1	10	1
30	Field Adjust Filter	0	1	0
31	Field Adjust Polarity	Normal	Normal	Normal
32	Field Adjust Mode	Normal	Normal	Normal
33	Field Adjust Timeout	1	10	1
34	Field Adjust Filter	0	1	0
35	Field Adjust Polarity	Normal	Normal	Normal
36	Field Adjust Mode	Normal	Normal	Normal
37	Field Adjust Timeout	1	10	1
38	Field Adjust Filter	0	1	0
39	Field Adjust Polarity	Normal	Normal	Normal
40	Field Adjust Mode	Normal	Normal	Normal
41	Field Adjust Timeout	1	10	1
42	Field Adjust Filter	0	1	0
43	Field Adjust Polarity	Normal	Normal	Normal
44	Field Adjust Mode	Normal	Normal	Normal
45	Field Adjust Timeout	1	10	1
46	Field Adjust Filter	0	1	0
47	Field Adjust Polarity	Normal	Normal	Normal
48	Field Adjust Mode	Normal	Normal	Normal
49	Field Adjust Timeout	1	10	1
50	Field Adjust Filter	0	1	0
51	Field Adjust Polarity	Normal	Normal	Normal
52	Field Adjust Mode	Normal	Normal	Normal
53	Field Adjust Timeout	1	10	1
54	Field Adjust Filter	0	1	0
55	Field Adjust Polarity	Normal	Normal	Normal
56	Field Adjust Mode	Normal	Normal	Normal
57	Field Adjust Timeout	1	10	1
58	Field Adjust Filter	0	1	0
59	Field Adjust Polarity	Normal	Normal	Normal
60	Field Adjust Mode	Normal	Normal	Normal
61	Field Adjust Timeout	1	10	1
62	Field Adjust Filter	0	1	0
63	Field Adjust Polarity	Normal	Normal	Normal
64	Field Adjust Mode	Normal	Normal	Normal
65	Field Adjust Timeout	1	10	1
66	Field Adjust Filter	0	1	0
67	Field Adjust Polarity	Normal	Normal	Normal
68	Field Adjust Mode	Normal	Normal	Normal
69	Field Adjust Timeout	1	10	1
70	Field Adjust Filter	0	1	0
71	Field Adjust Polarity	Normal	Normal	Normal
72	Field Adjust Mode	Normal	Normal	Normal
73	Field Adjust Timeout	1	10	1
74	Field Adjust Filter	0	1	0
75	Field Adjust Polarity	Normal	Normal	Normal
76	Field Adjust Mode	Normal	Normal	Normal
77	Field Adjust Timeout	1	10	1
78	Field Adjust Filter	0	1	0
79	Field Adjust Polarity	Normal	Normal	Normal
80	Field Adjust Mode	Normal	Normal	Normal
81	Field Adjust Timeout	1	10	1
82	Field Adjust Filter	0	1	0
83	Field Adjust Polarity	Normal	Normal	Normal
84	Field Adjust Mode	Normal	Normal	Normal
85	Field Adjust Timeout	1	10	1
86	Field Adjust Filter	0	1	0
87				

## APPENDIX A

## BMS II MENUS - Continued

DMS II MENUS - Continued			
MENU LEVEL & OPTION FIELD ADJUST MENU - Cont.	AVAILABLE CHOICES OR LIMITS		DEFAULT
	MINIMUM	MAXIMUM	
<u>CONFIGURATION MENU</u>			
<u>TUNING MENU</u>			

## APPENDIX A

[illegible]

## STATUS AND FAULT MESSAGES

[illegible]

[illegible]



APPENDIX C

METHODS FOR DETERMINING RESET SCHEDULE AND OUTDOOR RESET RATIO CHARTS

Using the Charts to Determine Reset Schedule

- 
- 
- 

Determining Reset Schedule w/ Formula

# APPENDIX

<i>Tab</i>

10°F	
15°F	
20°F	

<i>Tab</i>

[illegible]

## APPENDIX C

**Table C-3. Header Temperature for a Building Reference Temperature of 65°F**

Air Temp	RESET RATIO										
	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	
65°F											
60°F											
55°F											
50°F											
45°F											
40°F											
35°F											
30°F											
25°F											
20°F											
15°F											
10°F											
5°F											
0°F											
-5°F											
-10°F											
-15°F											
-20°F											

**Table C-4. Header Temperature for a Building Reference Temperature of 70°F**

Air Temp	RESET RATIO										
	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	
70°F											
65°F											
60°F											
55°F											
50°F											
45°F											
40°F											
35°F											
30°F											
25°F											
20°F											
15°F											
10°F											
5°F											
0°F											
-5°F											
-10°F											
-15°F											
-20°F											

## APPENDIX C \_\_\_\_\_

**Table C-5. Header Temperature for a Building Reference Temperature of 75°F**

[illegible]

**Table C-6. Header Temperature for a Building Reference Temperature of 80°F**

[illegible]



APPENDIX C

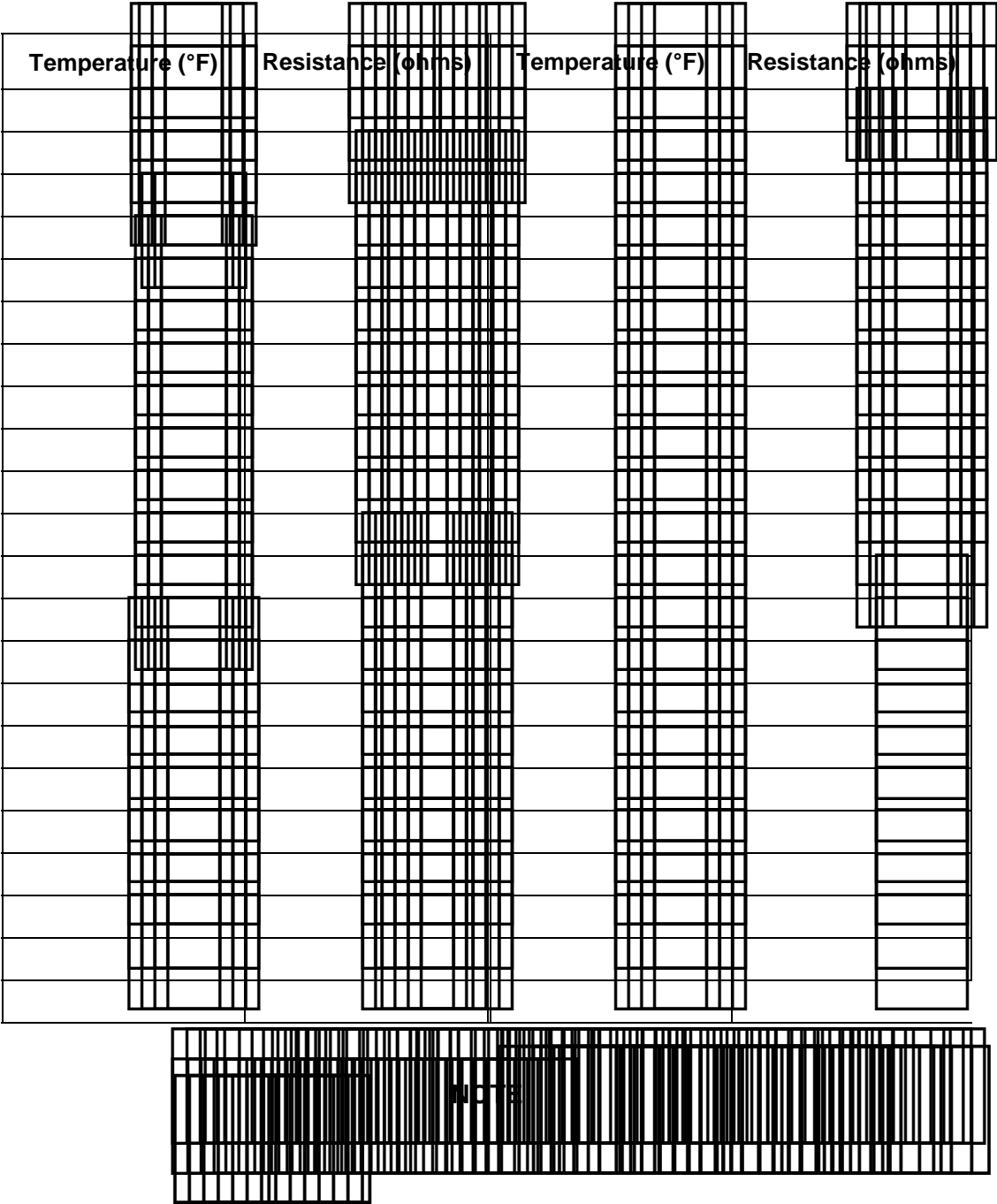
Table C-7. Header Temperature for a Building Reference Temperature of 90°F

Air Temp	RESET RATIO											
	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8
90°F												
85°F												
80°F												
75°F												
70°F												
65°F												
60°F												
55°F												
50°F												
45°F												
40°F												
35°F												
30°F												
25°F												
20°F												
15°F												
10°F												
5°F												
0°F												



APPENDIX D

NTC Temperature Sensor Resistance Chart

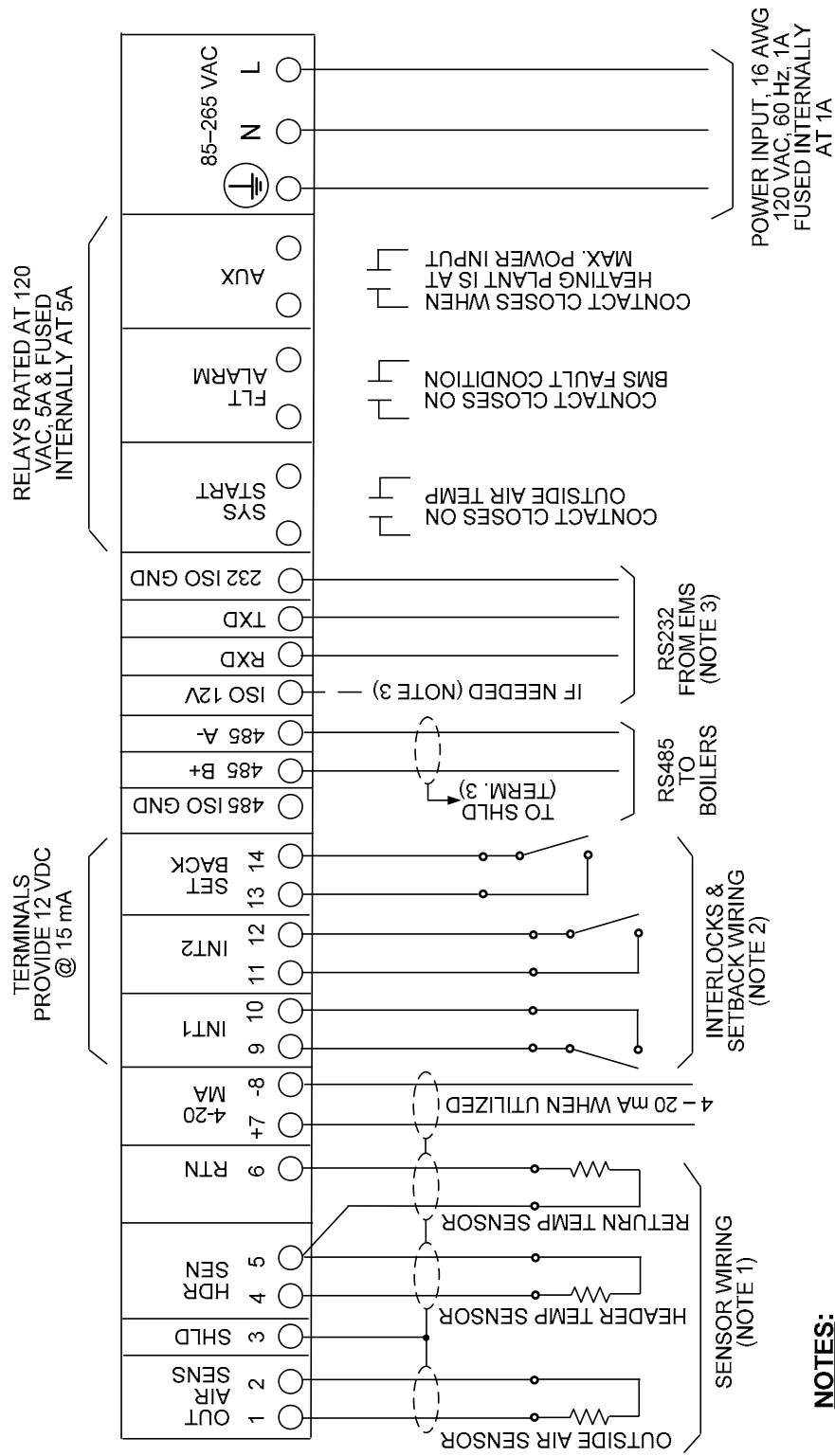






## APPENDIX E

## BMS II WIRING DIAGRAM

**NOTES:**

- AERCO RECOMMENDS USING TWO-CONDUCTOR, TWISTED, SHIELDED PAIR, 22 AWG CABLE (BELDEN 9841 OR EQUIV.)
  - TERMINATE SHIELDS AT BMS SHIELD (SHLD) TERMINAL ONLY.
  - DO NOT CONNECT SHIELDS AT SENSOR ENDS.
  - DO NOT RUN SENSOR WIRING WITH POWER WIRING.
- CONTACTS PROVIDED BY OTHERS: USE CONTACTS RATED FOR LOW SIGNAL LEVELS.
  - JUMPER INTERLOCKS (INT1, INT2) IF EXTERNAL CONTACTS ARE NOT USED.
- IF THE EMS BEING USED CONTAINS ONLY A RS485 PORT, A RS485-TO-RS232 CONVERTER IS REQUIRED. IF NECESSARY, A 12 VDC OUTPUT IS PROVIDED BY THE BMS II TO POWER THE RS485-TO-RS232 CONVERTER.



## APPENDIX F

## BMS II PARTS AND ACCESSORIES

[illegible]



## APPENDIX G

## PROGRAMMING THE BMS II USING RS-232 COMMUNICATION

## Introduction

## Setup

# MEN

## W E N

## RECOMMENDED

UNITED

MODERN

# PPENI

## APPENDIX G (cont.)

[illegible]

APPENDIX G (cont.)

Table G-1. BMS II COMMANDS

No.	COMMAND	ENTRY RANGE	FACTORY DEFAULT
1	1000	1000	1000
2	1001	1001	1001
3	1002	1002	1002
4	1003	1003	1003
5	1004	1004	1004
6	1005	1005	1005
7	1006	1006	1006
8	1007	1007	1007
9	1008	1008	1008
10	1009	1009	1009
11	1010	1010	1010
12	1011	1011	1011
13	1012	1012	1012
14	1013	1013	1013
15	1014	1014	1014
16	1015	1015	1015
17	1016	1016	1016
18	1017	1017	1017
19	1018	1018	1018
20	1019	1019	1019
21	1020	1020	1020
22	1021	1021	1021
23	1022	1022	1022
24	1023	1023	1023
25	1024	1024	1024
26	1025	1025	1025
27	1026	1026	1026
28	1027	1027	1027
29	1028	1028	1028
30	1029	1029	1029
31	1030	1030	1030
32	1031	1031	1031
33	1032	1032	1032
34	1033	1033	1033
35	1034	1034	1034
36	1035	1035	1035
37	1036	1036	1036
38	1037	1037	1037
39	1038	1038	1038
40	1039	1039	1039
41	1040	1040	1040
42	1041	1041	1041
43	1042	1042	1042
44	1043	1043	1043
45	1044	1044	1044
46	1045	1045	1045
47	1046	1046	1046
48	1047	1047	1047
49	1048	1048	1048
50	1049	1049	1049
51	1050	1050	1050
52	1051	1051	1051
53	1052	1052	1052
54	1053	1053	1053
55	1054	1054	1054
56	1055	1055	1055
57	1056	1056	1056
58	1057	1057	1057
59	1058	1058	1058
60	1059	1059	1059
61	1060	1060	1060
62	1061	1061	1061
63	1062	1062	1062
64	1063	1063	1063
65	1064	1064	1064
66	1065	1065	1065
67	1066	1066	1066
68	1067	1067	1067
69	1068	1068	1068
70	1069	1069	1069
71	1070	1070	1070
72	1071	1071	1071
73	1072	1072	1072
74	1073	1073	1073
75	1074	1074	1074
76	1075	1075	1075
77	1076	1076	1076
78	1077	1077	1077
79	1078	1078	1078
80	1079	1079	1079
81	1080	1080	1080
82	1081	1081	1081
83	1082	1082	1082
84	1083	1083	1083
85	1084	1084	1084
86	1085	1085	1085
87	1086	1086	1086
88	1087	1087	1087
89	1088	1088	1088
90	1089	1089	1089
91	1090	1090	1090
92	1091	1091	1091
93	1092	1092	1092
94	1093	1093	1093
95	1094	1094	1094
96	1095	1095	1095
97	1096	1096	1096
98	1097	1097	1097
99	1098	1098	1098
100	1099	1099	1099

## APPENDIX G (cont.)

[illegible]



## APPENDIX G (cont.)

**Table C 1 BMS COMMANDS (Continued)**

[illegible]

---

**Table C 1. BMS-II COMMANDS (Continued)**

[illegible]

## APPENDIX G (cont.)

### Table C 1. BMS II COMMANDS (Continued)

Table C-1. BMS II COMMANDS (Continued)		
No.	COMMAND	FACTORY DEFAULT
1	...	...
2	...	...
3	...	...
4	...	...
5	...	...
6	...	...
7	...	...
8	...	...
9	...	...
10	...	...
11	...	...
12	...	...
13	...	...
14	...	...
15	...	...
16	...	...
17	...	...
18	...	...
19	...	...
20	...	...
21	...	...
22	...	...
23	...	...
24	...	...
25	...	...
26	...	...
27	...	...
28	...	...
29	...	...
30	...	...
31	...	...
32	...	...
33	...	...
34	...	...
35	...	...
36	...	...
37	...	...
38	...	...
39	...	...
40	...	...
41	...	...
42	...	...
43	...	...
44	...	...
45	...	...
46	...	...
47	...	...
48	...	...
49	...	...
50	...	...
51	...	...
52	...	...
53	...	...
54	...	...
55	...	...
56	...	...
57	...	...
58	...	...
59	...	...
60	...	...
61	...	...
62	...	...
63	...	...
64	...	...
65	...	...
66	...	...
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98	...	...
99	...	...
100	...	...



APPENDIX H

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BMS II MODBUS ADDRESS ASSIGNMENTS

H-1 BMS II STANDARD INPUT REGISTER ASSIGNMENTS

Table H-1. BMS II Standard Input Register Address Mapping

Modbus Data Address (Hex)	Menu Item	Units and Range	Default/Comments
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## APPENDIX H

## APPENDIX H (cont.)

**Table H-1. BMS II Standard Input Register Address Mapping-Cont.**

[illegible]

## APPENDIX H (cont.)

**Table H-1. BMS II Standard Input Register Address Mapping-Cont.**

[illegible]

## **APPENDIX H**



## APPENDIX H (cont.)

## H-2 BUS II Controller Standard Holding Register Assignments

**Table H-2. BMS II Standard Holding Register Address Mapping**

Modbus Data Address (Hex)	Menu Item	Units and Range	Default/Comments
0000	Temperature	°C	25.0
0001	Humidity	%	50.0
0002	Pressure	hPa	1013.25
0003	Altitude	m	100.0
0004	Speed	km/h	0.0
0005	Direction	°	0.0
0006	Acceleration	m/s²	9.81
0007	Angular Velocity	°/s	0.0
0008	Angular Acceleration	°/s²	0.0
0009	Roll	°	0.0
000A	Pitch	°	0.0
000B	Yaw	°	0.0
000C	Roll Rate	°/s	0.0
000D	Pitch Rate	°/s	0.0
000E	Yaw Rate	°/s	0.0
000F	Roll Acceleration	°/s²	0.0
0010	Pitch Acceleration	°/s²	0.0
0011	Yaw Acceleration	°/s²	0.0
0012	Roll Jerk	°/s³	0.0
0013	Pitch Jerk	°/s³	0.0
0014	Yaw Jerk	°/s³	0.0
0015	Roll Velocity	°/s	0.0
0016	Pitch Velocity	°/s	0.0
0017	Yaw Velocity	°/s	0.0
0018	Roll Acceleration	°/s²	0.0
0019	Pitch Acceleration	°/s²	0.0
001A	Yaw Acceleration	°/s²	0.0
001B	Roll Jerk	°/s³	0.0
001C	Pitch Jerk	°/s³	0.0
001D	Yaw Jerk	°/s³	0.0
001E	Roll Velocity	°/s	0.0
001F	Pitch Velocity	°/s	0.0
0020	Yaw Velocity	°/s	0.0
0021	Roll Acceleration	°/s²	0.0
0022	Pitch Acceleration	°/s²	0.0
0023	Yaw Acceleration	°/s²	0.0
0024	Roll Jerk	°/s³	0.0
0025	Pitch Jerk	°/s³	0.0
0026	Yaw Jerk	°/s³	0.0
0027	Roll Velocity	°/s	0.0
0028	Pitch Velocity	°/s	0.0
0029	Yaw Velocity	°/s	0.0
002A	Roll Acceleration	°/s²	0.0
002B	Pitch Acceleration	°/s²	0.0
002C	Yaw Acceleration	°/s²	0.0
002D	Roll Jerk	°/s³	0.0
002E	Pitch Jerk	°/s³	0.0
002F	Yaw Jerk	°/s³	0.0
0030	Roll Velocity	°/s	0.0
0031	Pitch Velocity	°/s	0.0
0032	Yaw Velocity	°/s	0.0
0033	Roll Acceleration	°/s²	0.0
0034	Pitch Acceleration	°/s²	0.0
0035	Yaw Acceleration	°/s²	0.0
0036	Roll Jerk	°/s³	0.0
0037	Pitch Jerk	°/s³	0.0
0038	Yaw Jerk	°/s³	0.0
0039	Roll Velocity	°/s	0.0
003A	Pitch Velocity	°/s	0.0
003B	Yaw Velocity	°/s	0.0
003C	Roll Acceleration	°/s²	0.0
003D	Pitch Acceleration	°/s²	0.0
003E	Yaw Acceleration	°/s²	0.0
003F	Roll Jerk	°/s³	0.0
0040	Pitch Jerk	°/s³	0.0
0041	Yaw Jerk	°/s³	0.0
0042	Roll Velocity	°/s	0.0
0043	Pitch Velocity	°/s	0.0
0044	Yaw Velocity	°/s	0.0
0045	Roll Acceleration	°/s²	0.0
0046	Pitch Acceleration	°/s²	0.0
0047	Yaw Acceleration	°/s²	0.0
0048	Roll Jerk	°/s³	0.0
0049	Pitch Jerk	°/s³	0.0
004A	Yaw Jerk	°/s³	0.0
004B	Roll Velocity	°/s	0.0
004C	Pitch Velocity	°/s	0.0
004D	Yaw Velocity	°/s	0.0
004E	Roll Acceleration	°/s²	0.0
004F	Pitch Acceleration	°/s²	0.0
0050	Yaw Acceleration	°/s²	0.0
0051	Roll Jerk	°/s³	0.0
0052	Pitch Jerk	°/s³	0.0
0053	Yaw Jerk	°/s³	0.0
0054	Roll Velocity	°/s	0.0
0055	Pitch Velocity	°/s	0.0
0056	Yaw Velocity	°/s	0.0
0057	Roll Acceleration	°/s²	0.0
0058	Pitch Acceleration	°/s²	0.0
0059	Yaw Acceleration	°/s²	0.0
005A	Roll Jerk	°/s³	0.0
005B	Pitch Jerk	°/s³	0.0
005C	Yaw Jerk	°/s³	0.0
005D	Roll Velocity	°/s	0.0
005E	Pitch Velocity	°/s	0.0
005F	Yaw Velocity	°/s	0.0
0060	Roll Acceleration	°/s²	0.0
0061	Pitch Acceleration	°/s²	0.0
0062	Yaw Acceleration	°/s²	0.0
0063	Roll Jerk	°/s³	0.0
0064	Pitch Jerk	°/s³	0.0
0065	Yaw Jerk	°/s³	0.0
0066	Roll Velocity	°/s	0.0
0067	Pitch Velocity	°/s	0.0
0068	Yaw Velocity	°/s	0.0
0069	Roll Acceleration	°/s²	0.0
006A	Pitch Acceleration	°/s²	0.0
006B	Yaw Acceleration	°/s²	0.0
006C	Roll Jerk	°/s³	0.0
006D	Pitch Jerk	°/s³	0.0
006E	Yaw Jerk	°/s³	0.0
006F	Roll Velocity	°/s	0.0
0070	Pitch Velocity	°/s	0.0
0071	Yaw Velocity	°/s	0.0
0072	Roll Acceleration	°/s²	0.0
0073	Pitch Acceleration	°/s²	0.0
0074	Yaw Acceleration	°/s²	0.0
0075	Roll Jerk	°/s³	0.0
0076	Pitch Jerk	°/s³	0.0
0077	Yaw Jerk	°/s³	0.0
0078	Roll Velocity	°/s	0.0
0079	Pitch Velocity	°/s	0.0
007A	Yaw Velocity	°/s	0.0
007B	Roll Acceleration	°/s²	0.0
007C	Pitch Acceleration	°/s²	0.0
007D	Yaw Acceleration	°/s²	0.0
007E	Roll Jerk	°/s³	0.0
007F	Pitch Jerk	°/s³	0.0
0080	Yaw Jerk	°/s³	0.0
0081	Roll Velocity	°/s	0.0
0082	Pitch Velocity	°/s	0.0
0083	Yaw Velocity	°/s	0.0
0084	Roll Acceleration	°/s²	0.0
0085	Pitch Acceleration	°/s²	0.0
0086	Yaw Acceleration	°/s²	0.0
0087	Roll Jerk	°/s³	0.0
0088	Pitch Jerk	°/s³	0.0
0089	Yaw Jerk	°/s³	0.0
008A	Roll Velocity	°/s	0.0
008B	Pitch Velocity	°/s	0.0
008C	Yaw Velocity	°/s	0.0
008D	Roll Acceleration	°/s²	0.0
008E	Pitch Acceleration	°/s²	0.0
008F	Yaw Acceleration	°/s²	0.0
0090	Roll Jerk	°/s³	0.0
0091	Pitch Jerk	°/s³	0.0
0092	Yaw Jerk	°/s³	0.0
0093	Roll Velocity	°/s	0.0
0094	Pitch Velocity	°/s	0.0
0095	Yaw Velocity	°/s	0.0
0096	Roll Acceleration	°/s²	0.0
0097	Pitch Acceleration	°/s²	0.0
0098	Yaw Acceleration	°/s²	0.0
0099	Roll Jerk	°/s³	0.0
009A	Pitch Jerk	°/s³	0.0
009B	Yaw Jerk	°/s³	0.0
009C	Roll Velocity	°/s	0.0
009D	Pitch Velocity	°/s	0.0
009E	Yaw Velocity	°/s	0.0
009F	Roll Acceleration	°/s²	0.0
00A0	Pitch Acceleration	°/s²	0.0
00A1	Yaw Acceleration	°/s²	0.0
00A2	Roll Jerk	°/s³	0.0
00A3	Pitch Jerk	°/s³	0.0
00A4	Yaw Jerk	°/s³	0.0
00A5	Roll Velocity	°/s	0.0
00A6	Pitch Velocity	°/s	0.0
00A7	Yaw Velocity	°/s	0.0
00A8	Roll Acceleration	°/s²	0.0
00A9	Pitch Acceleration	°/s²	0.0
00AA	Yaw Acceleration	°/s²	0.0
00AB	Roll Jerk	°/s³	0.0
00AC	Pitch Jerk	°/s³	0.0
00AD	Yaw Jerk	°/s³	0.0
00AE	Roll Velocity	°/s	0.0
00AF	Pitch Velocity	°/s	0.0
00B0	Yaw Velocity	°/s	0.0
00B1	Roll Acceleration	°/s²	0.0
00B2	Pitch Acceleration	°/s²	0.0
00B3	Yaw Acceleration	°/s²	0.0
00B4	Roll Jerk	°/s³	0.0
00B5	Pitch Jerk	°/s³	0.0
00B6	Yaw Jerk	°/s³	0.0
00B7	Roll Velocity	°/s	0.0
00B8	Pitch Velocity	°/s	0.0
00B9	Yaw Velocity	°/s	0.0
00BA	Roll Acceleration	°/s²	0.0
00BB	Pitch Acceleration	°/s²	0.0
00BC	Yaw Acceleration	°/s²	0.0
00BD	Roll Jerk	°/s³	0.0
00BE	Pitch Jerk	°/s³	0.0
00BF	Yaw Jerk	°/s³	0.0
00C0	Roll Velocity	°/s	0.0
00C1	Pitch Velocity	°/s	0.0
00C2	Yaw Velocity	°/s	0.0
00C3	Roll Acceleration	°/s²	0.0
00C4	Pitch Acceleration	°/s²	0.0
00C5	Yaw Acceleration	°/s²	0.0
00C6	Roll Jerk	°/s³	0.0
00C7	Pitch Jerk	°/s³	0.0
00C8	Yaw Jerk	°/s³	0.0
00C9	Roll Velocity	°/s	0.0
00CA	Pitch Velocity	°/s	0.0
00CB	Yaw Velocity	°/s	0.0
00CC	Roll Acceleration	°/s²	0.0
00CD	Pitch Acceleration	°/s²	0.0
00CE	Yaw Acceleration	°/s²	0.0
00CF	Roll Jerk	°/s³	0.0
00D0	Pitch Jerk	°/s³	0.0
00D1	Yaw Jerk	°/s³	0.0
00D2	Roll Velocity	°/s	0.0
00D3	Pitch Velocity	°/s	0.0
00D4	Yaw Velocity	°/s	0.0
00D5	Roll Acceleration	°/s²	0.0
00D6	Pitch Acceleration	°/s²	0.0
00D7	Yaw Acceleration	°/s²	0.0
00D8	Roll Jerk	°/s³	0.0
00D9	Pitch Jerk	°/s³	0.0
00DA	Yaw Jerk	°/s³	0.0
00DB	Roll Velocity	°/s	0.0
00DC	Pitch Velocity	°/s	0.0
00DD	Yaw Velocity	°/s	0.0
00DE	Roll Acceleration	°/s²	0.0
00DF	Pitch Acceleration	°/s²	0.0
00E0	Yaw Acceleration	°/s²	0.0
00E1	Roll Jerk	°/s³	0.0
00E2	Pitch Jerk	°/s³	0.0
00E3	Yaw Jerk	°/s³	0.0
00E4	Roll Velocity	°/s	0.0
00E5	Pitch Velocity	°/s	0.0
00E6	Yaw Velocity	°/s	0.0
00E7	Roll Acceleration	°/s²	0.0
00E8	Pitch Acceleration	°/s²	0.0
00E9	Yaw Acceleration	°/s²	0.0
00EA	Roll Jerk	°/s³	0.0
00EB	Pitch Jerk	°/s³	0.0
00EC	Yaw Jerk	°/s³	0.0
00ED	Roll Velocity	°/s	0.0
00EE	Pitch Velocity	°/s	0.0
00EF	Yaw Velocity	°/s	0.0
00F0	Roll Acceleration	°/s²	0.0
00F1	Pitch Acceleration	°/s²	0.0
00F2	Yaw Acceleration	°/s²	0.0
00F3	Roll Jerk	°/s³	0.0
00F4	Pitch Jerk	°/s³	0.0
00F5	Yaw Jerk	°/s³	0.0
00F6	Roll Velocity	°/s	0.0
00F7	Pitch Velocity	°/s	0.0
00F8	Yaw Velocity	°/s	0.0
00F9	Roll Acceleration	°/s²	0.0
00FA	Pitch Acceleration	°/s²	0.0
00FB	Yaw Acceleration	°/s²	0.0
00FC	Roll Jerk	°/s³	0.0
00FD	Pitch Jerk	°/s³	0.0
00FE	Yaw Jerk	°/s³	0.0
00FF	Roll Velocity	°/s	0.0

## APPENDIX H

## APPENDIX H (cont.)

**Table H-2. BMS II Standard Holding Register Address Mapping**

Modbus Data Address (Hex)	Menu Item	Units and Range	Default Comments
0000	Temperature	°C	25.0
0001	Humidity	%	50.0
0002	Pressure	hPa	1013.25
0003	Wind Speed	m/s	0.0
0004	Wind Direction	°	0.0
0005	Solar Radiation	W/m²	0.0
0006	Rainfall	mm	0.0
0007	Soil Moisture	%	50.0
0008	Light Intensity	lux	0.0
0009	CO2 Concentration	ppm	400.0
000A	PM2.5 Concentration	µg/m³	0.0
000B	PM10 Concentration	µg/m³	0.0
000C	NO2 Concentration	ppb	0.0
000D	O3 Concentration	ppb	0.0
000E	Barometric Pressure	hPa	1013.25
000F	Relative Humidity	%	50.0
0010	Air Quality Index	Index	0.0
0011	Water Level	m	0.0
0012	Water Temperature	°C	25.0
0013	Water Flow Rate	m³/s	0.0
0014	Water Quality Index	Index	0.0
0015	Water pH	pH	7.0
0016	Water Conductivity	µS/cm	0.0
0017	Water Dissolved Oxygen	mg/L	0.0
0018	Water Turbidity	NTU	0.0
0019	Water Total Dissolved Solids	mg/L	0.0
001A	Water Total Suspended Solids	mg/L	0.0
001B	Water Ammonia Nitrogen	mg/L	0.0
001C	Water Nitrate Nitrogen	mg/L	0.0
001D	Water Phosphate	mg/L	0.0
001E	Water Nitrite Nitrogen	mg/L	0.0
001F	Water Chlorophyll a	µg/L	0.0
0020	Water Chlorophyll b	µg/L	0.0
0021	Water Chlorophyll c	µg/L	0.0
0022	Water Chlorophyll d	µg/L	0.0
0023	Water Chlorophyll e	µg/L	0.0
0024	Water Chlorophyll f	µg/L	0.0
0025	Water Chlorophyll g	µg/L	0.0
0026	Water Chlorophyll h	µg/L	0.0
0027	Water Chlorophyll i	µg/L	0.0
0028	Water Chlorophyll j	µg/L	0.0
0029	Water Chlorophyll k	µg/L	0.0
002A	Water Chlorophyll l	µg/L	0.0
002B	Water Chlorophyll m	µg/L	0.0
002C	Water Chlorophyll n	µg/L	0.0
002D	Water Chlorophyll o	µg/L	0.0
002E	Water Chlorophyll p	µg/L	0.0
002F	Water Chlorophyll q	µg/L	0.0
0030	Water Chlorophyll r	µg/L	0.0
0031	Water Chlorophyll s	µg/L	0.0
0032	Water Chlorophyll t	µg/L	0.0
0033	Water Chlorophyll u	µg/L	0.0
0034	Water Chlorophyll v	µg/L	0.0
0035	Water Chlorophyll w	µg/L	0.0
0036	Water Chlorophyll x	µg/L	0.0
0037	Water Chlorophyll y	µg/L	0.0
0038	Water Chlorophyll z	µg/L	0.0
0039	Water Chlorophyll aa	µg/L	0.0
003A	Water Chlorophyll ab	µg/L	0.0
003B	Water Chlorophyll ac	µg/L	0.0
003C	Water Chlorophyll ad	µg/L	0.0
003D	Water Chlorophyll ae	µg/L	0.0
003E	Water Chlorophyll af	µg/L	0.0
003F	Water Chlorophyll ag	µg/L	0.0
0040	Water Chlorophyll ah	µg/L	0.0
0041	Water Chlorophyll ai	µg/L	0.0
0042	Water Chlorophyll aj	µg/L	0.0
0043	Water Chlorophyll ak	µg/L	0.0
0044	Water Chlorophyll al	µg/L	0.0
0045	Water Chlorophyll am	µg/L	0.0
0046	Water Chlorophyll an	µg/L	0.0
0047	Water Chlorophyll ao	µg/L	0.0
0048	Water Chlorophyll ap	µg/L	0.0
0049	Water Chlorophyll aq	µg/L	0.0
004A	Water Chlorophyll ar	µg/L	0.0
004B	Water Chlorophyll as	µg/L	0.0
004C	Water Chlorophyll at	µg/L	0.0
004D	Water Chlorophyll au	µg/L	0.0
004E	Water Chlorophyll av	µg/L	0.0
004F	Water Chlorophyll aw	µg/L	0.0
0050	Water Chlorophyll ax	µg/L	0.0
0051	Water Chlorophyll ay	µg/L	0.0
0052	Water Chlorophyll az	µg/L	0.0
0053	Water Chlorophyll ba	µg/L	0.0
0054	Water Chlorophyll bb	µg/L	0.0
0055	Water Chlorophyll bc	µg/L	0.0
0056	Water Chlorophyll bd	µg/L	0.0
0057	Water Chlorophyll be	µg/L	0.0
0058	Water Chlorophyll bf	µg/L	0.0
0059	Water Chlorophyll bg	µg/L	0.0
005A	Water Chlorophyll bh	µg/L	0.0
005B	Water Chlorophyll bi	µg/L	0.0
005C	Water Chlorophyll bj	µg/L	0.0
005D	Water Chlorophyll bk	µg/L	0.0
005E	Water Chlorophyll bl	µg/L	0.0
005F	Water Chlorophyll bm	µg/L	0.0
0060	Water Chlorophyll bn	µg/L	0.0
0061	Water Chlorophyll bo	µg/L	0.0
0062	Water Chlorophyll bp	µg/L	0.0
0063	Water Chlorophyll bq	µg/L	0.0
0064	Water Chlorophyll br	µg/L	0.0
0065	Water Chlorophyll bs	µg/L	0.0
0066	Water Chlorophyll bt	µg/L	0.0
0067	Water Chlorophyll bu	µg/L	0.0
0068	Water Chlorophyll bv	µg/L	0.0
0069	Water Chlorophyll bw	µg/L	0.0
006A	Water Chlorophyll bx	µg/L	0.0
006B	Water Chlorophyll by	µg/L	0.0
006C	Water Chlorophyll bz	µg/L	0.0
006D	Water Chlorophyll ca	µg/L	0.0
006E	Water Chlorophyll cb	µg/L	0.0
006F	Water Chlorophyll cc	µg/L	0.0
0070	Water Chlorophyll cd	µg/L	0.0
0071	Water Chlorophyll ce	µg/L	0.0
0072	Water Chlorophyll cf	µg/L	0.0
0073	Water Chlorophyll cg	µg/L	0.0
0074	Water Chlorophyll ch	µg/L	0.0
0075	Water Chlorophyll ci	µg/L	0.0
0076	Water Chlorophyll cj	µg/L	0.0
0077	Water Chlorophyll ck	µg/L	0.0
0078	Water Chlorophyll cl	µg/L	0.0
0079	Water Chlorophyll cm	µg/L	0.0
007A	Water Chlorophyll cn	µg/L	0.0
007B	Water Chlorophyll co	µg/L	0.0
007C	Water Chlorophyll cp	µg/L	0.0
007D	Water Chlorophyll cq	µg/L	0.0
007E	Water Chlorophyll cr	µg/L	0.0
007F	Water Chlorophyll cs	µg/L	0.0
0080	Water Chlorophyll ct	µg/L	0.0
0081	Water Chlorophyll cu	µg/L	0.0
0082	Water Chlorophyll cv	µg/L	0.0
0083	Water Chlorophyll cw	µg/L	0.0
0084	Water Chlorophyll cx	µg/L	0.0
0085	Water Chlorophyll cy	µg/L	0.0
0086	Water Chlorophyll cz	µg/L	0.0
0087	Water Chlorophyll da	µg/L	0.0
0088	Water Chlorophyll db	µg/L	0.0
0089	Water Chlorophyll dc	µg/L	0.0
008A	Water Chlorophyll dd	µg/L	0.0
008B	Water Chlorophyll de	µg/L	0.0
008C	Water Chlorophyll df	µg/L	0.0
008D	Water Chlorophyll dg	µg/L	0.0
008E	Water Chlorophyll dh	µg/L	0.0
008F	Water Chlorophyll di	µg/L	0.0
0090	Water Chlorophyll dj	µg/L	0.0
0091	Water Chlorophyll dk	µg/L	0.0
0092	Water Chlorophyll dl	µg/L	0.0
0093	Water Chlorophyll dm	µg/L	0.0
0094	Water Chlorophyll dn	µg/L	0.0
0095	Water Chlorophyll do	µg/L	0.0
0096	Water Chlorophyll dp	µg/L	0.0
0097	Water Chlorophyll dq	µg/L	0.0
0098	Water Chlorophyll dr	µg/L	0.0
0099	Water Chlorophyll ds	µg/L	0.0
009A	Water Chlorophyll dt	µg/L	0.0
009B	Water Chlorophyll du	µg/L	0.0
009C	Water Chlorophyll dv	µg/L	0.0
009D	Water Chlorophyll dw	µg/L	0.0
009E	Water Chlorophyll dx	µg/L	0.0
009F	Water Chlorophyll dy	µg/L	0.0
00A0	Water Chlorophyll dz	µg/L	0.0
00A1	Water Chlorophyll ea	µg/L	0.0
00A2	Water Chlorophyll eb	µg/L	0.0
00A3	Water Chlorophyll ec	µg/L	0.0
00A4	Water Chlorophyll ed	µg/L	0.0
00A5	Water Chlorophyll ee	µg/L	0.0
00A6	Water Chlorophyll ef	µg/L	0.0
00A7	Water Chlorophyll eg	µg/L	0.0
00A8	Water Chlorophyll eh	µg/L	0.0
00A9	Water Chlorophyll ei	µg/L	0.0
00AA	Water Chlorophyll ej	µg/L	0.0
00AB	Water Chlorophyll ek	µg/L	0.0
00AC	Water Chlorophyll el	µg/L	0.0
00AD	Water Chlorophyll em	µg/L	0.0
00AE	Water Chlorophyll en	µg/L	0.0
00AF	Water Chlorophyll eo	µg/L	0.0
00B0	Water Chlorophyll ep	µg/L	0.0
00B1	Water Chlorophyll eq	µg/L	0.0
00B2	Water Chlorophyll er	µg/L	0.0
00B3	Water Chlorophyll es	µg/L	0.0
00B4	Water Chlorophyll et	µg/L	0.0
00B5	Water Chlorophyll eu	µg/L	0.0
00B6	Water Chlorophyll ev	µg/L	0.0
00B7	Water Chlorophyll ew	µg/L	0.0
00B8	Water Chlorophyll ex	µg/L	0.0
00B9	Water Chlorophyll ey	µg/L	0.0
00BA	Water Chlorophyll ez	µg/L	0.0
00BB	Water Chlorophyll fa	µg/L	0.0
00BC	Water Chlorophyll fb	µg/L	0.0
00BD	Water Chlorophyll fc	µg/L	0.0
00BE	Water Chlorophyll fd	µg/L	0.0
00BF	Water Chlorophyll fe	µg/L	0.0
00C0	Water Chlorophyll ff	µg/L	0.0
00C1	Water Chlorophyll fg	µg/L	0.0
00C2	Water Chlorophyll fh	µg/L	0.0
00C3	Water Chlorophyll fi	µg/L	0.0
00C4	Water Chlorophyll fj	µg/L	0.0
00C5	Water Chlorophyll fk	µg/L	0.0
00C6	Water Chlorophyll fl	µg/L	0.0
00C7	Water Chlorophyll fm	µg/L	0.0
00C8	Water Chlorophyll fn	µg/L	0.0
00C9	Water Chlorophyll fo	µg/L	0.0
00CA	Water Chlorophyll fp	µg/L	0.0
00CB	Water Chlorophyll fq	µg/L	0.0
00CC	Water Chlorophyll fr	µg/L	0.0
00CD	Water Chlorophyll fs	µg/L	0.0
00CE	Water Chlorophyll ft	µg/L	0.0
00CF	Water Chlorophyll fu	µg/L	0.0
00D0	Water Chlorophyll fv	µg/L	0.0
00D1	Water Chlorophyll fw	µg/L	0.0
00D2	Water Chlorophyll fx	µg/L	0.0
00D3	Water Chlorophyll fy	µg/L	0.0
00D4	Water Chlorophyll fz	µg/L	0.0
00D5	Water Chlorophyll ga	µg/L	0.0
00D6	Water Chlorophyll gb	µg/L	0.0
00D7	Water Chlorophyll gc	µg/L	0.0
00D8	Water Chlorophyll gd	µg/L	0.0
00D9	Water Chlorophyll ge	µg/L	0.0
00DA	Water Chlorophyll gf	µg/L	0.0
00DB	Water Chlorophyll gg	µg/L	0.0
00DC	Water Chlorophyll gh	µg/L	0.0
00DD	Water Chlorophyll gi	µg/L	0.0
00DE	Water Chlorophyll gj	µg/L	0.0
00DF	Water Chlorophyll gk	µg/L	0.0
00E0	Water Chlorophyll gl	µg/L	0.0
00E1	Water Chlorophyll gm	µg/L	0.0
00E2	Water Chlorophyll gn	µg/L	0.0
00E3	Water Chlorophyll go	µg/L	0.0
00E4	Water Chlorophyll gp	µg/L	0.0
00E5	Water Chlorophyll gq	µg/L	0.0
00E6	Water Chlorophyll gr	µg/L	0.0
00E7	Water Chlorophyll gs	µg/L	0.0
00E8	Water Chlorophyll gt	µg/L	0.0
00E9	Water Chlorophyll gu	µg/L	0.0
00EA	Water Chlorophyll gv	µg/L	0.0
00EB	Water Chlorophyll gw	µg/L	0.0
00EC	Water Chlorophyll gx	µg/L	0.0
00ED	Water Chlorophyll gy	µg/L	0.0
00EE	Water Chlorophyll gz	µg/L	0.0
00EF	Water Chlorophyll ha	µg/L	0.0
00F0	Water Chlorophyll hb	µg/L	0.0
00F1	Water Chlorophyll hc	µg/L	0.0
00F2	Water Chlorophyll hd	µg/L	0.0
00F3	Water Chlorophyll he	µg/L	0.0
00F4	Water Chlorophyll hf	µg/L	0.0
00F5	Water Chlorophyll hg	µg/L	0.0
00F6	Water Chlorophyll hh	µg/L	0.0
00F7	Water Chlorophyll hi	µg/L	0.0
00F8	Water Chlorophyll hj	µg/L	0.0
00F9	Water Chlorophyll hk	µg/L	0.0
00FA	Water Chlorophyll hl	µg/L	0.0
00FB	Water Chlorophyll hm	µg/L	0.0
00FC	Water Chlorophyll hn	µg/L	0.0
00FD	Water Chlorophyll ho	µg/L	0.0
00FE	Water Chlorophyll hp	µg/L	0.0
00FF	Water Chlorophyll hq	µg/L	0.0
0100	Water Chlorophyll hr	µg/L	0.0
0101	Water Chlorophyll hs	µg/L	0.0
0102	Water Chlorophyll ht	µg/L	0.0
0103	Water Chlorophyll hu	µg/L	0.0
0104	Water Chlorophyll hv	µg/L	0.0
0105	Water Chlorophyll hw	µg/L	0.0
0106	Water Chlorophyll hx	µg/L	0.0
0107	Water Chlorophyll hy	µg/L	0.0
0108	Water Chlorophyll hz	µg/L	0.0
0109	Water Chlorophyll ia	µg/L	0.0
010A	Water Chlorophyll ib	µg/L	0.0
010B	Water Chlorophyll ic	µg/L	0.0
010C	Water Chlorophyll id	µg/L	0.0
010D	Water Chlorophyll ie	µg/L	0.0
010E	Water Chlorophyll if	µg/L	0.0
010F	Water Chlorophyll ig	µg/L	0.0
0110	Water Chlorophyll ih	µg/L	0.0
0111	Water Chlorophyll ii	µg/L	0.0
0112	Water Chlorophyll ij	µg/L	0.0
0113	Water Chlorophyll ik	µg/L	0.0
0114	Water Chlorophyll il	µg/L	0.0
0115	Water Chlorophyll im	µg/L	0.0
0116	Water Chlorophyll in	µg/L	0.0
0117	Water Chlorophyll io	µg/L	0.0
0118	Water Chlorophyll ip	µg/L	0.0
0119	Water Chlorophyll iq	µg/L	0.0
011A	Water Chlorophyll ir	µg/L	0.0
011B	Water Chlorophyll is	µg/L	0.0
011C	Water Chlorophyll it	µg/L	0.0
011D	Water Chlorophyll iu	µg/L	0.0
011E	Water Chlorophyll iv	µg/L	0.0
011F	Water Chlorophyll iw	µg/L	0.0
0120	Water Chlorophyll ix	µg/L	0.0
0121	Water Chlorophyll iy	µg/L	0.0
0122	Water Chlorophyll iz	µg/L	0.0
0123	Water Chlorophyll ja	µg/L	0.0
0124	Water Chlorophyll jb	µg/L	0.0
0125	Water Chlorophyll jc	µg/L	0.0
0126	Water Chlorophyll jd	µg/L	0.0
0127	Water Chlorophyll je	µg/L	0.0
0128	Water Chlorophyll jf	µg/L	0.0
0129	Water Chlorophyll jg	µg/L	0.0
012A	Water Chlorophyll jh	µg/L	0.0
012B	Water Chlorophyll ji	µg/L	0.0
012C	Water Chlorophyll jj	µg/L	0.0
012D	Water Chlorophyll jk	µg/L	0.0
012E	Water Chlorophyll jl	µg/L	0.0
012F	Water Chlorophyll jm	µg/L	0.0
0130	Water Chlorophyll jn	µg/L	0.0
0131	Water Chlorophyll jo	µg/L	0.0
0132	Water Chlorophyll jp	µg/L	0.0
0133	Water Chlorophyll jq	µg/L	0.0
0134	Water Chlorophyll jr	µg/L	0.0
0135	Water Chlorophyll js	µg/L	0.0
0136	Water Chlorophyll jt	µg/L	0.0
0137	Water Chlorophyll ju	µg/L	0.0
0138	Water Chlorophyll jv	µg/L	0.0
0139	Water Chlorophyll jw	µg/L	0.0
013A	Water Chlorophyll jx	µg/L	0.0
013B	Water Chlorophyll jy	µg/L	0.0
013C	Water Chlorophyll jz	µg/L	0.0
013D	Water Chlorophyll ka	µg/L	0.0
013E	Water Chlorophyll kb	µg/L	0.0

## APPENDIX H (cont.)

**Table H-2. BMS II Standard Holding Register Address Mapping**

[illegible]

## APPENDIX H

## APPENDIX H (cont.)

***Table H-2. BMS II Standard Holding Register Address Mapping***

Modbus Data Address (Hex)	Menu Item	Units and Range	Default/Comments
0000			
0001			
0002			
0003			
0004			
0005			
0006			
0007			
0008			
0009			
000A			
000B			
000C			
000D			
000E			
000F			
0010			
0011			
0012			
0013			
0014			
0015			
0016			
0017			
0018			
0019			
001A			
001B			
001C			
001D			
001E			
001F			
0020			
0021			
0022			
0023			
0024			
0025			
0026			
0027			
0028			
0029			
002A			
002B			
002C			
002D			
002E			
002F			
0030			
0031			
0032			
0033			
0034			
0035			
0036			
0037			
0038			
0039			
003A			
003B			
003C			
003D			
003E			
003F			
0040			
0041			
0042			
0043			
0044			
0045			
0046			
0047			
0048			
0049			
004A			
004B			
004C			
004D			
004E			
004F			
0050			
0051			
0052			
0053			
0054			
0055			
0056			
0057			
0058			
0059			
005A			
005B			
005C			
005D			
005E			
005F			
0060			
0061			
0062			
0063			
0064			
0065			
0066			
0067			
0068			
0069			
006A			
006B			
006C			
006D			
006E			
006F			
0070			
0071			
0072			
0073			
0074			
0075			
0076			
0077			
0078			
0079			
007A			
007B			
007C			
007D			
007E			
007F			
0080			
0081			
0082			
0083			
0084			
0085			
0086			
0087			
0088			
0089			
008A			
008B			
008C			
008D			
008E			
008F			
0090			
0091			
0092			
0093			
0094			
0095			
0096			
0097			
0098			
0099			
009A			
009B			
009C			
009D			
009E			
009F			
00A0			
00A1			
00A2			
00A3			
00A4			
00A5			
00A6			
00A7			
00A8			
00A9			
00AA			
00AB			
00AC			
00AD			
00AE			
00AF			
00B0			
00B1			
00B2			
00B3			
00B4			
00B5			
00B6			
00B7			
00B8			
00B9			
00BA			
00BB			
00BC			
00BD			
00BE			
00BF			
00C0			
00C1			
00C2			
00C3			
00C4			
00C5			
00C6			
00C7			
00C8			
00C9			
00CA			
00CB			
00CC			
00CD			
00CE			
00CF			
00D0			
00D1			
00D2			
00D3			
00D4			
00D5			
00D6			
00D7			
00D8			
00D9			
00DA			
00DB			
00DC			
00DD			
00DE			
00DF			
00E0			
00E1			
00E2			
00E3			
00E4			
00E5			
00E6			
00E7			
00E8			
00E9			
00EA			
00EB			
00EC			
00ED			
00EE			
00EF			
00F0			
00F1			
00F2			
00F3			
00F4			
00F5			
00F6			
00F7			
00F8			
00F9			
00FA			
00FB			
00FC			
00FD			
00FE			
00FF			

## APPENDIX H (cont.)

**Table H-2. BMS II Standard Holding Register Address Mapping**

Modbus Data Address (Hex)	Menu Item	Units and Range	Default/Comments

## APPENDIX H

## APPENDIX H (cont.)

***Table H-2. BMS II Standard Holding Register Address Mapping***

Modbus Data Address (Hex)	Menu Item	Units and Range	Default/Comments
</			

## APPENDIX H (cont.)

***Table H-2. BMS II Standard Holding Register Address Mapping***

Modbus Data Address (Hex)	Menu Item	Units and Range	Default/Comments

## APPENDIX H

## APPENDIX H (cont.)

***Table H-2. BMS II Standard Holding Register Address Mapping***

Modbus Data Address (Hex)	Menu Item	Units and Range	Default/Comments
0000	Temperature	°C / -20 to 50	25.0 / Setpoint
0001	Humidity	%RH / 0 to 100	50.0 / Target
0002	Pressure	kPa / 90 to 110	101.3 / Barometric
0003	CO2 Level	ppm / 400 to 1000	400.0 / Ambient
0004	Light Intensity	lux / 0 to 1000	100.0 / Ambient
0005	PM2.5	µg/m³ / 0 to 100	10.0 / Ambient
0006	PM10	µg/m³ / 0 to 500	50.0 / Ambient
0007	NO2	ppb / 0 to 100	10.0 / Ambient
0008	O3	ppb / 0 to 100	10.0 / Ambient
0009	SO2	ppb / 0 to 100	10.0 / Ambient
000A	Temperature	°C / -20 to 50	25.0 / Setpoint
000B	Humidity	%RH / 0 to 100	50.0 / Target
000C	Pressure	kPa / 90 to 110	101.3 / Barometric
000D	CO2 Level	ppm / 400 to 1000	400.0 / Ambient
000E	Light Intensity	lux / 0 to 1000	100.0 / Ambient
000F	PM2.5	µg/m³ / 0 to 100	10.0 / Ambient
0010	PM10	µg/m³ / 0 to 500	50.0 / Ambient
0011	NO2	ppb / 0 to 100	10.0 / Ambient
0012	O3	ppb / 0 to 100	10.0 / Ambient
0013	SO2	ppb / 0 to 100	10.0 / Ambient



## APPENDIX I

## BOILER START AND BOILER STOP LEVELS

BOILER START AND BOILER STOP LEVELS	
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
15	100
16	100
17	100
18	100
19	100
20	100
21	100
22	100
23	100
24	100
25	100
26	100
27	100
28	100
29	100
30	100
31	100
32	100
33	100
34	100
35	100
36	100
37	100
38	100
39	100
40	100
41	100
42	100
43	100
44	100
45	100
46	100
47	100
48	100
49	100
50	100
51	100
52	100
53	100
54	100
55	100
56	100
57	100
58	100
59	100
60	100
61	100
62	100
63	100
64	100
65	100
66	100
67	100
68	100
69	100
70	100
71	100
72	100
73	100
74	100
75	100
76	100
77	100
78	100
79	100
80	100
81	100
82	100
83	100
84	100
85	100
86	100
87	100
88	100
89	100
90	100
91	100
92	100
93	100
94	100
95	100
96	100
97	100
98	100
99	100
100	100

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	5
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## ~~MODULE X BOILER START/STOP LEVELS~~

[illegible]

