

Points list for the I Bus Board.

All Modbus variables are stored in 16-bit integer format.

<u>#</u>	<u>R/W</u>	<u>NV</u>	<u>Description</u>
These registers show the Main voltages and are in tenths of a volt (1215 = 121.5 Amps)			
1.	R/W		Main Voltage, phase A-B
2.	R/W		Main Voltage, phase B-C
3.	R /W		Main Voltage, phase C-A
4.	R /W		Main Voltage, phase A-N
5.	R /W		Main Voltage, phase B-N
6.	R /W		Main Voltage, phase C-N

An Over Voltage Alarm occurs if the Any L-N voltage is greater than this threshold register at any time and is given in tenths of a volt (1200 = 120.0 Volts). Default is 200.0 VAC

7.	R/W	NV	Over Voltage Alarm Threshold Main
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An Under Voltage Alarm occurs if the Any L-N voltage is less than this threshold register at any time and is given in tenths of a volt (1200 = 120.0 Volts) Default is 60.0 Volts.

8.	R/W	NV	Under Voltage Alarm Threshold Main
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Frequency is measured from the phase A voltage input. Range is 40.0-70.0Hz: **This register will read as 0xFFFF if frequencies outside of this range or if sufficient voltage is not present on phase A for an accurate determination.**

9.	R		Frequency
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These registers show Total Harmonic Distortion (THD) calculations and are given in tenth of a percent (01 = 0.1%).

10.	R		Main Voltage1, phase A THD
11.	R		Main Voltage1, phase B THD
12.	R		Main Voltage1, phase C THD

This register shows what Voltage values that are being read by this board.

Note Maximum Minimum Default Limits for each Voltage Type are:

208	Phase to Phase	High	239	Low	177
	Neutral	High	138	Low	102
380	Phase to Phase	High	437	Low	323
	Phase to Neutral	High	252	Low	186
400	Phase to Phase	High	460	Low	340
	Phase to Neutral	High	265	Low	196
415	Phase to Phase	High	518	Low	383
	Neutral	High	299	Low	221
480	Phase to Phase	High	552	Low	408
	Phase to Neutral	High	319	Low	236
600	Phase to Phase	High	690	Low	510
	Phase to Neutral	High	398	Low	295

If your voltage is between the limits, pick the Higher Limit.

13.	R/W	NV	Voltage Type (208, 380, 400, 415, 480, 600)
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This register shows the setting for the Voltage monitoring setup. A set bit indicated active value.

14.	R/W	NV	Voltage Option Setting
			bit 0: Voltage option set
			bit 1: Set for 50 Hz
			bit 2: External LED blink
			bit 3: Auto Adjust Gain.
			bits 4 – 15: Not Used Always read as 0

These registers show the phase currents and are given in tenth of amps (100 = 10.0 Amps)

NOTE: If there are three two phase breakers, the center breaker's current will be showed as Current, Breaker 1C & 2A.

15.	R/W	Current, Breaker 1A
16.	R/W	Current, Breaker 1B
17.	R/W	Current, Breaker 1C
18.	R/W	Current, Breaker 2A
19.	R/W	Current, Breaker 2B
20.	R/W	Current, Breaker 2C
21.	R	Current, Breakers 1A & 2A
22.	R	Current, Breakers 1B & 2B
23.	R	Current, Breakers 1C & 2C

These registers show the minimum phase currents and are in tenth of amps (100 = 10.0 Amps). For three two phase breakers, see Note on the Current Points above.

24.	R	Minimum Current, Breaker 1A
25.	R	Minimum Current, Breaker 1B
26.	R	Minimum Current, Breaker 1C
27.	R	Minimum Current, Breaker 2A
28.	R	Minimum Current, Breaker 2B
29.	R	Minimum Current, Breaker 2C
30.	R	Minimum Current, Breakers 1A & 2A
31.	R	Minimum Current, Breakers 1B & 2B
32.	R	Minimum Current, Breakers 1C & 2C

These registers show the maximum phase currents and are in tenth of amps (100 = 10.0 Amps). For three two phase breakers, see Note on the Current Points above.

33.	R	Maximum Current, Breaker 1A
34.	R	Maximum Current, Breaker 1B
35.	R	Maximum Current, Breaker 1C
36.	R	Maximum Current, Breaker 2A
37.	R	Maximum Current, Breaker 2B
38.	R	Maximum Current, Breaker 2C
39.	R	Maximum Current, Breakers 1A & 2A
40.	R	Maximum Current, Breakers 1B & 2B
41.	R	Maximum Current, Breakers 1C & 2C

Writing to this register will reset all Min and Max registers to currents present value.

42.	W	Min/Max Reset
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The following Breaker Size Registers set the capacity of each breaker for the alarms. Units are in Amps (20 = 20 Amps). The values that can be written are between 15 and 100. The Default value is -1 (65535). If the breaker is -1 (65535) then no alarm for this breaker will be given. This can be done by giving the breaker a size 0. For three two phase breakers, see Note on the Current Points above.

43.	R/W	NV	Breaker Size 1A
44.	R/W	NV	Breaker Size 1B
45.	R/W	NV	Breaker Size 1C
46.	R/W	NV	Breaker Size 2A
47.	R/W	NV	Breaker Size 2B
48.	R/W	NV	Breaker Size 2C

Writing to this register will set all the Breakers size registers to the value written. The Values that are written to the Breaker sizes must be either zero or between 15 and 100. To remove all breakers, give a value of 0. This register should always read 0.

49.	W		Global Breaker Size
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These registers show current demand per phase and are in tenth of amps (260 = 26.0 Amps). Values are the average current over the time given in the Demand Register.

50.	R	Demand phase 1A
51.	R	Demand phase 1B
52.	R	Demand phase 1C
53.	R	Demand phase 2A
54.	R	Demand phase 2B
55.	R	Demand phase 2C

The Demand Register is time that the demand is averaged over in minutes. It must be between 15 to 60 minutes. The Default is 15 minutes.

56.	R/W	NV	Demand time
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These registers show Percent load and is given in tenth of a percent (753 = 75.3%). These percents are the Amps per phase divided by the breaker size of the same phase.

57.	R	Percent load Breaker 1A
58.	R	Percent load Breaker 1B
59.	R	Percent load Breaker 1C
60.	R	Percent load Breaker 2A
61.	R	Percent load Breaker 2B
62.	R	Percent load Breaker 2C

These registers show crest factor per phase. Values are peak current/rms current with three decimal places (1412 = 1.412).

63.	R	Crest Factor Breaker 1A
64.	R	Crest Factor Breaker 1B
65.	R	Crest Factor Breaker 1C
66.	R	Crest Factor Breaker 2A
67.	R	Crest Factor Breaker 2B
68.	R	Crest Factor Breaker 2C

The following Zero Current Registers set a bit for every channel, which reads a current that has gone to zero. All alarms are active until reset by the controller, or the current returns to the channel. To reset any alarm, read the register and then write the register with the desired alarm bit cleared.

Note: Current Loss is when the current goes above 1.5 Amps and then goes to zero an alarm is set for that branch breaker. If bit 15 on the Current Option Setting is set the alarm will be active on the loss of current.

69. R/W NV Zero Current Register

bit 0: Breaker 1A
 bit 1: Breaker 1B
 bit 2: Breaker 1C
 bit 3: Breaker 2A
 bit 4: Breaker 2B
 bit 5: Breaker 2C
 bits 6 – 15: Not Used Always read as 0

The following Warning Register sets a bit for every channel, which reads a current above the Warning Threshold for at least the Warning Time-Delay. All warnings are latching and must be reset by the controller. To reset any alarm, read the register and then write the register with the desired alarm bit cleared.

70. R/W NV Warning Register (Latching)

bit 0: Breaker 1A
 bit 1: Breaker 1B
 bit 2: Breaker 1C
 bit 3: Breaker 2A
 bit 4: Breaker 2B
 bit 5: Breaker 2C
 bits 6 – 15: Not Used Always read as 0

The following Alarm Register sets a bit for every channel, which reads a current above the Alarm Threshold for at least the Alarm Time-Delay. All alarms are latching and must be reset by the controller. To reset any alarm, read the register and then write the register with the desired alarm bit cleared.

71. R/W NV Alarm Register (Latching)

bit 0: Breaker 1A
 bit 1: Breaker 1B
 bit 2: Breaker 1C
 bit 3: Breaker 2A
 bit 4: Breaker 2B
 bit 5: Breaker 2C
 bits 6 – 15: Not Used Always read as 0

The following Warning Threshold register sets the thresholds for the Warning alarms. A Warning alarm is given in percent of the breaker size registers for each phase (75 = 75%). A Warning alarm will occur if the measured current is above the Warning Threshold for at least the Warning Time Delay. Default for the Warning thresholds is 70%. The Values that are written to the Warning Threshold must be between 40 and 100 and always below the corresponding Alarm Threshold.

72. R/W NV Warning Threshold

The following Alarm Threshold registers set the thresholds for the Alarms. A Alarm Threshold register is given in percent of the breaker size registers for each phase (85 = 85%). An Alarm will occur if the measured current is above the Alarm Threshold for at least the Alarm Time Delay. Default for the Alarm thresholds is 80%. The Values that are written to the Alarm Threshold must be between 50 and 100 and always above the corresponding Warning Threshold.

73. R/W NV Alarm Threshold

The Warning Time Delay register set the minimum time required for the current to exist above the Warning Threshold before the Warning alarm is set. Units are in seconds. The Values that are written to the Warning Time Delays must be between 0-60. The Default is 0 (zero) which means that there is no delay for the Warning alarm.

74. R/W NV Warning Time Delay

The Alarm Time Delay register set the minimum time required for the current to exist above the alarm Threshold before the Alarm is set. Units are in seconds. The Values that are written to the Alarm Time Delays must be between 0-60. The Default is 10 which means that there is ten seconds before an Alarm is given.

75. R/W NV Alarm Time Delay

This register provides a quick status of alarms for the unit. A bit in this register is set if any bit in the indicated register is set.

76. R NV Global Alarm Register
 bit 0: Warning Register
 bit 1: Alarm Register
 bit 2: Zero Current Register
 bit 3: Over Voltage
 bit 4: Under Voltage
 bit 5: Over Temperature
 bit 6: Under Temperature
 bits 7 – 15: Not Used Always read as 0

These alarms are latching and must be cleared by the user. To reset any alarm, read the register and then write the register with the desired alarm bit cleared. Writing a 1 to any bit has no effect.

77. R/W NV Meter Alarm Status (Latching)
 bit 0: Over Voltage Phase A
 bit 1: Over Voltage Phase B
 bit 2: Over Voltage Phase C
 bit 3: Under Voltage Phase A
 bit 4: Under Voltage Phase B
 bit 5: Under Voltage Phase C
 bit 6: Over Temperature Board
 bit 7: Over Temperature 1
 bit 8: Over Temperature 2
 bit 9: Over Temperature 3
 bit 10: Over Temperature 4
 bit 11: Under Temperature Board
 bit 12: Under Temperature 1
 bit 13: Under Temperature 2
 bit 14: Under Temperature 3
 bit 15: Under Temperature 4

This register shows the setting for the Temperature and Current monitoring setup. A set bit indicated active value.

78. R/W NV Current Option Setting

bit 0: Flip Current for Strip 1
 bit 1: Flip Current for Strip 2
 bit 2: Temperature in Fahrenheit
 bits 3 – 14: Not Used Always read as 0
 bit 15 Current Loss

These registers show the KW and are in hundredth of KW (500 = 5.00 KW)

79.	R	KW, Breaker 1A
80.	R	KW, Breaker 1B
81.	R	KW, Breaker 1C
82.	R	KW, Breaker 2A
83.	R	KW, Breaker 2B
84.	R	KW, Breaker 2C
85.	R	KW, Breakers 1A & 2A
86.	R	KW, Breakers 1B & 2B
87.	R	KW, Breakers 1C & 2C

KVA Registers 88-96 are in hundredth of KVA (500 = 5.00 KVA)

88.	R	KVA, Breaker 1A
89.	R	KVA, Breaker 1B
90.	R	KVA, Breaker 1C
91.	R	KVA, Breaker 2A
92.	R	KVA, Breaker 2B
93.	R	KVA, Breaker 2C
94.	R	KVA, Breakers 1A & 2A
95.	R	KVA, Breakers 1B & 2B
96.	R	KVA, Breakers 1C & 2C

KVAR Registers 97-105 are in hundredth of KVAR (500 = 5.00 KVAR)

97.	R	KVAR, Breaker 1A
98.	R	KVAR, Breaker 1B
99.	R	KVAR, Breaker 1C
100.	R	KVAR, Breaker 2A
101.	R	KVAR, Breaker 2B
102.	R	KVAR, Breaker 2C
103.	R	KVAR, Breakers 1A & 2A
104.	R	KVAR, Breakers 1B & 2B
105.	R	KVAR, Breakers 1C & 2C

Power Factor Registers 106-114 are in hundredth of PF (98 = 0.98 PF)

106.	R	Power Factor, Breaker 1A
107.	R	Power Factor, Breaker 1B
108.	R	Power Factor, Breaker 1C
109.	R	Power Factor, Breaker 2A
110.	R	Power Factor, Breaker 2B
111.	R	Power Factor, Breaker 2C
112.	R	Power Factor, Breaker 1A & 2A
113.	R	Power Factor, Breaker 1B & 2B
114.	R	Power Factor, Breaker 1C & 2C

These registers are circuit Phase Kilowatt Hours per phase. Values are in kilowatts hours (90 = 90kwh) For KWH 32-bit value multiply High-word integer by 2¹⁶ (65536) and add Low-word integer.

115.	R	NV	KWH High-word integer, Breaker 1A
116.	R	NV	KWH Low-word integer, Breaker 1A
117.	R	NV	KWH High-word integer, Breaker 1B
118.	R	NV	KWH Low-word integer, Breaker 1B
119.	R	NV	KWH High-word integer, Breaker 1C
120.	R	NV	KWH Low-word integer, Breaker 1C
121.	R	NV	KWH High-word integer, Breaker 2A
122.	R	NV	KWH Low-word integer, Breaker 2A
123.	R	NV	KWH High-word integer, Breaker 2B
124.	R	NV	KWH Low-word integer, Breaker 2B
125.	R	NV	KWH High-word integer, Breaker 2C
126.	R	NV	KWH Low-word integer, Breaker 2C
127.	R	NV	KWH High-word integer, Breaker 1A & 2A
128.	R	NV	KWH Low-word integer, Breaker 1A & 2A
129.	R	NV	KWH High-word integer, Breaker 1B & 2B
130.	R	NV	KWH Low-word integer, Breaker 1B & 2B
131.	R	NV	KWH High-word integer, Breaker 1C & 2C
132.	R	NV	KWH Low-word integer, Breaker 1C & 2C

Writing this register will reset all KWH registers to zero.

133.	W	KWH Reset
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Bus connection temperature given in degrees Celsius (24 = 24 °C) or Fahrenheit (75 = 75 °F).

134.	R	Temperature Board
135.	R	Temperature 1
136.	R	Temperature 2
137.	R	Temperature 3
138.	R	Temperature 4
139.	R	Max Temperature Board
140.	R	Max Temperature 1
141.	R	Max Temperature 2
142.	R	Max Temperature 3
143.	R	Max Temperature 4
144.	R	Min Temperature Board
145.	R	Min Temperature 1
146.	R	Min Temperature 2
147.	R	Min Temperature 3
148.	R	Min Temperature 4

This register gives the over temperature threshold for the board given in degrees Celsius (24 = 24 °C) or Fahrenheit (75 = 75 °F). Default for Temperature threshold for board is 80 °C and for the Bus Temperature thresholds is 120 °C.

149.	R/W	Over Temperature threshold
150.	R/W	Under Temperature threshold

This register shows the IBus board sources voltage

151.	R	IBus Board Voltage
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This register shows whether this Modbus address is communicating.

152.	R	Communication Error
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These registers show the IBus unit name as sixteen characters long and are compacted into eight integers or two characters per integer.

153.	R/W	NV	IBus Board Name bit 0-7 Char 2 bit 8-15 Char 1
154.	R/W	NV	IBus Board Name bit 0-7 Char 4 bit 8-15 Char 3
155.	R/W	NV	IBus Board Name bit 0-7 Char 6 bit 8-15 Char 5
156.	R/W	NV	IBus Board Name bit 0-7 Char 8 bit 8-15 Char 7
157.	R/W	NV	IBus Board Name bit 0-7 Char 10 bit 8-15 Char 9
158.	R/W	NV	IBus Board Name bit 0-7 Char 12 bit 8-15 Char 11
159.	R/W	NV	IBus Board Name bit 0-7 Char 14 bit 8-15 Char 13
160.	R/W	NV	IBus Board Name bit 0-7 Char 16 bit 8-15 Char 15

Note: The value of any option that is not selected will be given as a -1 (65535)