

Data Aire Mini-dap4

Modbus RTU Protocol Integration Instructions

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Introduction

The purpose of this instruction booklet is to show user how to configure a Mini-dap4 RS-485 Modbus RTU communication card for a Modbus RTU network connection. A complete description of the Modbus protocol is not within the scope of this document. It is assumed that the System Integrator, who is responsible for setting various Modbus parameters such as Modbus address and baudrate is familiar with the Modbus protocol.

A complete Mini-dap4 Modbus register list is on section 3 of this booklet.

I. Modbus RTU Protocol Interface

Modbus RTU protocol requires the Mini-dap4 to have an optional RS-485 card. This card is normally installed at the factory when it is ordered with Mini-dap4 but it can also be added in the field to an existing Mini-dap4 controller.

A. RS-485 Card Installation



1. If an RS-485 card is installed in Mini-dap4 controller Serial card 1 port, skip to step 5. If **not**, contact Data Aire Part Dept. to obtain an RS-485 card before proceeding to next step.
2. Disconnect the power supply from the Mini-dap4 and remove the Serial card 1 cover.
3. Insert the RS-485 card into serial card 1 slot of Mini-dap4 controller. Line up the white terminal block on the card with pins in the serial card 1 slot. Press firmly until card is fully seated.



4. Cut the pre-punched hole on the cover then re-install cover to Mini-dap4.

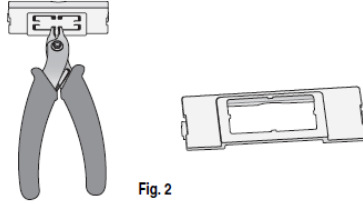
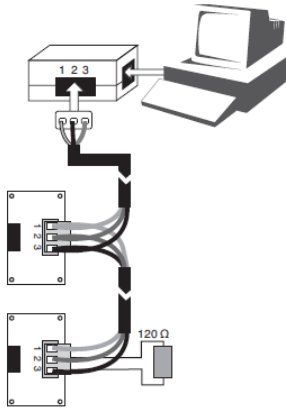
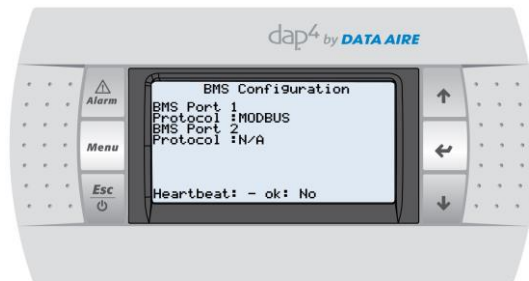


Fig. 2

- Connect network wiring to the card. Network cable should be 22 to 18 AWG shielded twisted pair cable. Make sure the wire polarity is wired properly. Shield wire should be connected to GND terminal. If the card is placed in the last device of the serial wiring loop, a 120 ohm, ¼ W end of line resistor should be connected between + and – terminal (pin 2 and pin3) of the card.

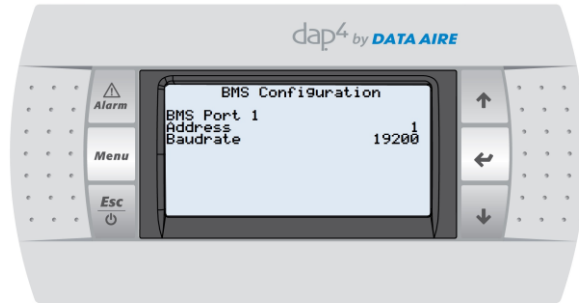


- Configure BMS PORT 1 with “MODBUS” protocol in Menu G: Network Config of the Mini-dap4 controller. Press Menu button, enter service password (default password 0000) then go to menu G- to program protocol to Modbus as below.



B. Changing Modbus Network Address and Communication Baudrate

Mini-Dap4 communication parameter is default to 1200, 8N1 (data bits=8, no parity, stop bit=1) and the default address is 1. To program the network address and communication baud rate (1200-19200), go to menu G –Network Config, use Select down button to go to the second screen of the BMS configuration (see below). Use Enter button to move the cursor to Address or Baudrate to make change.



II. Troubleshooting

Problem	Possible Cause	Possible Remedy
<ul style="list-style-type: none"> - Cannot connect to the Mini-dap4 Modbus card 	<ul style="list-style-type: none"> - Unit or Mini-dap4 is not powered - Incorrect network protocol programmed in dap4 menu G- Network Config. - Loose, shorted, or open network wiring. - Incorrect wiring polarity. - Wiring distance too long and end-of-loop resistor is not installed. - Incorrect network address. - Incorrect baud rate setting. - Miss-match in data bit, parity or stop bit configuration of the client system. - Controller is still in rebooting time-out. - Polling incorrect register index number or use Hex register number instead of decimal - Polling rate to fast. 	<ul style="list-style-type: none"> - Check and turn unit power on and make sure dap4 or mini-dap4 controller is powered as well. - Check menu G- Network Config to make sure BMS port 1 protocol is programmed to "Modbus". - Check network wiring for open, short circuit, or loose connection. - Check network wiring for correct polarity. - If wiring distance is long, install a 120 ohm, ¼ watt resistor across + and – of on the last devices in the loop. - Check the programmed address and baudrate to make sure they match with client system setting. - Check the data bits, parity and stop of client system to make sure they are set to 8-None-1. - After the unit is powered, allow two to three minutes for the controller and the card complete their reboot. - Check registers type and registers index number to make sure the correct registers and data type are polled. See Mini-dap4

Problem	Possible Cause	Possible Remedy
		Modbus registers definition table below for details. Mini-Dap4 register index number is decimal number, not Hex. - Reduce request polling rate.
- Loss of communication with existing devices when a new device is added to the network.	- Open circuit, short circuit or incorrect polarity in network wiring. - Duplicate network addresses. - System is overloaded because the bad wiring conductor is used or there are too many devices connected in the network, or request polling rate too fast	- Check wiring shorted or open circuit. Also check wiring polarity. - Check Modbus address of each device to make sure there is no duplication. - Check to make sure 22 AWG or 18 AWG copper, shielded, twisted cable is used for network wiring. - Check to make sure number of devices installed in the network trunk does not exceed the maximum number of the devices allows in an RS-485 network. Reduce polling rate.

III. Mini-Dap4 Modbus RTU Registers Definition

Note:

1. Divide the value by 10 for the decimal value reading.
2. In some case, the Modbus index register is offset by 1
3. All points in this list are applied to Mini-dap4 software version 1.32 or later.
Some points are not applied if you have older Mini-dap4 software version.
4. R= read only, R/W= read/writeable, A=Analog, I=integer, D=digital

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
	Standard DX and Chilled Water System				
1	Temperature of return air	R	Ret_Air_Tmp	A	30002
2	Maximum Return air temp in last 24hrs	R	Maximum	A	30003
3	Minimum Return air temp in last 24hrs	R	Minumum	A	30004
4	Temperature setpoint	R/W	Temp_Setpoint	A	40005
5	Amount from setpoint before a comp is staged on	R/W	Temp_Deadband	A	40006
6	Humidity Sensor Calibration	R/W	Ain_offs	A	40007

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
7	Return Temperature Sensor Calibration	R/W	Ain_offs	A	40008
33	Amount temp must change for each stage of heat/cool	R/W	Stage_sp	A	40034
34	High Dewpoint setpoint (applies only when humidifier configured to dewpoint control)	R/W	Dewpoint_Hi_SP	A	40035
35	Deadband of Hi dewpoint (applies only when humidifier configured to dewpoint control)	R/W	Dewpoint_Hi_Dband	A	40036
36	Low dewpoint setpoint (applies only when humidifier configured to dewpoint control)	R/W	Dewpoint_Lo_SP	A	40037
37	Deadband of low dewpoint (applies only when humidifier configured to dewpoint control)	R/W	Dewpoint_Lo_Dband	A	40038
42	Dew point of return air (only display in dewpoint control mode)	R	Ret_Air_Dewpt	A	30043
56	Model 2=MINI-PLUS 3=MINI 4=LCS 8=gPOD	R	Model	A	30057
2	Relative humidity displayed as xx%	R	Humidity_dis	I	30211
3	Cooling Stages On = Cooling stages are currently on – This point applies to DX unit only	R	Stages_On	I	30212
4	Number of heat stages running	R	Heaters_On	I	30213
5	Maximum humidity in last 24hrs	R	Maximum	I	30214
6	Minimum humidity in last 24hrs	R	Minumum	I	30215
7	Cooling Utilization Over Last Hour -Percentage of cooling is used in the last hour of operation; this point applies to DX unit.	R	Comp_duty	I	30216
8	Heating Utilization Over Last Hour -Percentage of heating is used in the last hour of operation	R	Heat_duty	I	30217
9	Humidifier Utilization Over Last Hour -Percentage of humidifier is used in the last hour of operation	R	Hum_duty	I	30218
10	Compressor 1 Runtime -This point applies to DX unit with one compressor -high	R	C1_Hours_H	I	30219
11	Compressor 1 Runtime -This point applies to DX unit with one compressor -low	R	C1_Hours_L	I	30220
12	Compressor 2 Runtime -This point applies to DX unit with dual compressor - high	R	C2_Hours_H	I	30221
13	Compressor 2 Runtime -This point applies to DX unit with dual compressor - low	R	C2_Hours_L	I	30222
14	Heater 1 Runtime - high	R	Ht1_Hours_H	I	30223
15	Heater 1 Runtime - low	R	Ht1_Hours_L	I	30224
16	Current second	R	CURRENT_SECOND	I	30225
17	Current minute	R	CURRENT_MINUTE	I	30226
18	Current hour	R	CURRENT_HOUR	I	30227
19	Current day	R	CURRENT_DAY	I	30228
20	Current month	R	CURRENT_MONTH	I	30229
21	Current year	R	CURRENT_YEAR	I	30230
22	Firestat setpoint	R/W	Firestat_SP	I	40231
23	Humidity upper limit alarm	R/W	Hum_Hi_SP	I	40232
24	Upper limit alarm of return air temp	R/W	Ret_Air_Hi_SP	I	40233
25	Humidity lower limit alarm	R/W	Hum_Lo_SP	I	40234
26	Lower limit alarm of return air temp	R/W	Ret_Air_Lo_SP	I	40235
27	Humidity deadband	R/W	Hum_deadband	I	40236
28	Humidity setpoint	R/W	Hum_setpoint	I	40237
29	system start delay-Time before the system starts up	R/W	Start_dly	I	40238

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
30	Optional Alarm 1 Delay	R	Del	I	30239
31	Optional Alarm 2 Delay	R	Del	I	30240
32	Optional Alarm 3 Delay	R	Del	I	30241
33	Message on optional alarm screen 1, some also add function	R	Alarm1_txt	I	30242
34	Message on optional alarm screen 2, some also add function	R	Alarm2_txt	I	30243
35	Message on optional alarm screen 3, some also add function	R	Alarm3_txt	I	30244
37	Comps 0=none, 1=one, 2=one+UL, 3=two,	R	Comp_sel	I	30246
38	0=none, 1= comp limited, 2=twocomp limited, 3= comp unlimited, 4=twocomp unlimited	R	Dehum_mode	I	30247
39	0=None, 1=one, 2=one elect	R	Reheat_sel	I	30248
40	0=none, 1=comp mod, 2=comp non, 3= comf mod, 4= conf non mod	R	Hum_sel	I	30249
41	Alarm contact message-Text displayed on all alarm screens	R	Alm_Contact_msg	I	30250
42	0= start wo/alarm, 1= start w/alarm, 2= requires reset of alarm	R	PowerUp_sel	I	30251
43	0=None, 1=short beeps, 2=long beep, 3=Constant	R	Buzzer_Select	I	30252
44	% of Chilled water valve opening (of 10VDC of analog output #1)	R	CW_disp	I	30253
45	Chilled Water Utilization Over Last Hour - This applies to Chilled water or Energy saver units.	R	WtrVlv_duty	I	30254
46	Humidifier Runtime - high	R	Hum_Hours_H	I	30255
47	Humidifier Runtime - low	R	Hum_Hours_L	I	30256
48	Blower Runtime - high	R	Blower_Hours_H	I	30257
49	Blower Runtime - low	R	Blower_Hours_L	I	30258
51	0= no comp assist, 1=one comp assist, 2= two comp assist, 3... 4...	R	Assist_sel	I	30260
52	Water valve type 0=none, 1=chill, 2=Engy, 3=Aux chill, 4=Disc Reg	R	WtrVlv_sel	I	30261
53	Water valve voltage 0= 0-10, 1=2-10, 2=7-10, 3=6-9, 4=4-7	R	WtrVlv_Volts_sel	I	30262
55	Dehumidifier Runtime - High	R	Dehum_Hours_H	I	30264
56	Dehumidifier Runtime - Low	R	Dehum_Hours_L	I	30265
58	Time between drain cycles 0=12hr, 1=24hr, 2=48hr, 3=96hr, 4=None	R	AutoFlush_dly	I	30267
87	Chilled Water Runtime - This applies to chilled water units only - high	R	CW_Hours_H	I	30296
88	Chilled Water Runtime - This applies to chilled water units only - low	R	CW_Hours_L	I	30297
93	Condenser Runtime - high	R	Cond_Hours_H	I	30302
94	Condenser Runtime - low	R	Cond_Hours_L	I	30303
132	Maint required alarm delay (Hrs)	R/W	Maint_dly	I	40341
138	Low part of the job number	R	Job_Number_L	I	30347
139	High part of the job number	R	Job_Number_H	I	30348
152	Part of the serial number that reflects the year	R	Ser_Date	I	30361
153	Serial number of the processor board	R	Ser_Number	I	30362
154	Last letter of the serial number	R	Ser_Suffix	I	30363
173	Second part of model number (mini controller only)	R	Mod_Txt2s	I	30382

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
175	Third part of model number (mini controller only)	R	Mod_Txt3s	I	30384
177	Fouth part of model number (mini controller only)	R	Mod_Txt4s	I	30386
196	Part of the model number (not on minidap)	R	Mod_Number	I	30405
197	Part of the model number (minidap only)	R	Mod_Txt1s	I	30406
1	Dehumidify mode is running	R	Dehum_On	D	10002
2	Humidifier is running	R	Hum_On	D	10003
7	Dehum is inhibited	R	Dehum_Inhibit	D	10008
8	reheat during dehum	R	Rht_during_dehum	D	10009
10	No air flow alarm	R	Air_Flow_alm	D	10011
11	Dirty filter alarm	R	Filter_alm	D	10012
13	Firestat alarm	R	Firestat_alm	D	10014
14	Compressor short cycle alarm	R	Shortcycle_alm	D	10015
15	Humidity sensor is out of range	R	Humidity_fail	D	10016
16	Return air temperature sensor is out of range	R	Ret_Air_fail	D	10017
17	Maintenance Schedule Due alarm	R	Maint_alm	D	10018
18	High pressure alarm compressor 1	R	C1_HP_alm	D	10019
19	Low pressure alarm compresssor 1	R	C1_LP_alm	D	10020
20	High pressure alarm compressor 2	R	C2_HP_alm	D	10021
21	Low pressure alarm compressor 2	R	C2_LP_alm	D	10022
25	Temperature of return air above alarm limit	R	RA_Tmp_hi_alm	D	10026
26	Temperature of return air below alarm limit	R	RA_Tmp_lo_alm	D	10027
27	Humidity above alarm limit	R	Hum_hi_alm	D	10028
28	Humidity below alarm limit	R	Hum_lo_alm	D	10029
31	Custom alarm #1 -Optional alarm. Custom message displayed	R	Cust_msg_Sw1	D	10032
32	Custom alarm #2 -Optional alarm. Custom message displayed	R	Cust_msg_Sw2	D	10033
33	Custom alarm #3 -Optional alarm. Custom message displayed	R	Cust_msg_Sw3	D	10034
39	Manual override	R	Override_Alm	D	10040
40	High condensation from digital input	R	Condensation_alm	D	10041
41	Unit in standby	R	Unit_In_Standby	D	10042
44	Cooling operation inhibited by BMS	R/W	BMS_Cooling_inhibit	D	00045
45	Heat inhibited due to bms	R/W	BMS_Heat_inhibit	D	00046
46	Humidifier operation inhibited by BMS	R/W	BMS_Humidifier_inhibit	D	00047
47	Dehumidify mode inhibited by bms	R/W	BMS_Dehum_inhibit	D	00048
48	Inhibit fan by bms	R/W	Fan_Inhibit_bms	D	00049
49	Reduces control humidity cycling	R	Hum_Expect	D	10050
51	Units of temperature 0=F, 1=C	R/W	USAshr_f_c	D	00052
52	Lead compressor select 0= C1, 1= C2	R	Lead_Comp	D	10053
53	Water valve direct or reverse acting	R	WtrVlv_dir	D	10054
55	Loss of power requires manual reset of alarm	R	PwrUp_alm	D	10056

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
56	Local alarm #1: See tag inside door	R	SeeTag_cust_alm1	D	10057
57	Local alarm #2: See tag inside door	R	SeeTag_cust_alm2	D	10058
58	Local alarm #3: See tag inside door	R	SeeTag_cust_alm3	D	10059
60	Enable short cycle alarm of the compressors	R	ShortCycle_alm_en	D	10061
61	BMS Supervisor On/Off Control (0=Unit on, 1= Unit Off)	R/W	Superv_Off	D	00062
62	BMS Heart beat for supervisor on/off control. This variable must change at least once a minute or unit will turn on by failsafe	R/W	BMS_Heartbeat	D	00063
66	On-Off unit state (0: Off; 1: On)	R	Sys_On	D	10067
67	Fan running	R	Blower_On	D	10068
144	Control mode 0=Return Temp 1=Supply Temp	R/W	Control_Mode	D	00145
148	Controller size 0=mini dap4 1=dap4	R	pCO_Large	D	10149
168	Unit in alarm (Alarm presents in this unit)	R	Alarm_On	D	10169
190	Enable hi humidity alarm	R/W	Hum_hi_alm_en	D	00191
197	Enable low humidity alarm	R/W	Hum_lo_alm_en	D	00198
198	Enable high return temp alarm	R/W	RA_Tmp_hi_alm_en	D	00199
199	Enable low return temp alarm	R/W	RA_Tmp_lo_alm_en	D	00200
	Optional Energy Saver or Auxiliary Chilled Water Cooling				
8	Temperature of chilled water	R	CW_Tmp	A	30009
11	Chilled Water Temperature Sensor Calibration - Optional sensor required (B10)	R/W	Ain_offs	A	40012
12	CW temperature setpoint for energy saver cooling- Temperature setpoint where E/S chilled water cooling is requested	R/W	EngSaver_Setpoint	A	40013
85	Energy Saver Runtime - This optional point applies to energy saver units only -high	R	Engy_Hours_H	I	30294
86	Energy Saver Runtime - This optional point applies to energy saver units only - low	R	Engy_Hours_L	I	30295
3	Energy saver is running	R	Engy_On	D	10004
	Optional Sensors and Alarms				
8	Temperature of chilled water	R	CW_Tmp	A	30009
9	Temperature of discharge air	R	Disch_Air_Tmp	A	30010
10	Discharge Temperature Sensor Calibration - Optional sensor required (B9)	R/W	Ain_offs	A	40011
11	Chilled Water Temperature Sensor Calibration - Optional sensor required (B10)	R/W	Ain_offs	A	40012
1	Lower limit alarm of discharge air temp	R/W	Disch_Air_Lo_SP	I	40210
54	% of optional modulating humidifier output (from 10volts of analog output #2)	R	Hum_Volts	I	30263
110	Setting of HP alarms/hr before comp is locked out, 1=disabled	R/W	HP_Lockout_Cnt	I	40319
111	Number of HP alarms C1 had within an hour	R	C1_HP_Count	I	30320
112	Number of HP alarms C2 had within an hour	R	C2_HP_Count	I	30321
134	Y2 on mini dap4 is selectable 0=none 1=Hum 2=CW for optional Modulating humidifier or CW valve control	R/W	Y2_Sel	I	40343
5	Heat inhibited due to alarm condition	R	Heat_Held	D	10006
6	Humidifier stopped due to alarm	R	Humidifier_inhibit	D	10007

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
12	Alarm from humidifier digital input	R	Humidifier_alm	D	10013
22	Optional Smoke detected from digital input	R	Smoke_alm	D	10023
23	No water flow alarm (stays high 5min longer if set to lockout)	R	Wtr_Flow_alm	D	10024
24	Discharge air temperature sensor is out of range	R	Disch_Air_fail	D	10025
29	Fan overload / Fan fail	R	Fan_Overload	D	10030
30	Standby pump on	R	Stdby_Pump_On	D	10031
35	Humidifier stopped due to custom alarm switch	R	HumSw_Inhibit	D	10036
36	Heat inhibited due to custom switch alarm condition	R	Heat_inhibit	D	10037
37	Reheat and humidification inhibited from operation	R	Rht_Hum_inhibit	D	10038
38	Temperature of discharge air below alarm limit	R	Disch_Tmp_lo_alm	D	10039
42	Chilled water temperature sensor is out of range	R	CW_sns_fail	D	10043
43	Humidifier stopped due to custom alarm switch	R	HumSw_Chk_Cyl	D	10044
54	Alarm: UPS power on	R	Ups_On_alm	D	10055
63	HP count lockout reset (seperate from normal alarm resets. This requires optional auto-reset switch)	R/W	Lockout_Reset	D	00064
64	C1 disabled due to excessive HP alarms	R	C1_Lockout	D	10065
65	C2 disabled due to excessive HP alarms	R	C2_Lockout	D	10066
68	Power A operating (notice only)	R	Pwr_A_Operating	D	10069
69	Power B operating (notice only)	R	Pwr_B_Operating	D	10070
70	Power A Not Available alarm	R	PwrNA_A_alm	D	10071
71	Power B Not Available alarm	R	PwrNA_B_alm	D	10072
73	C2 pressure and temp count reset	R/W	Lockout_Reset2	D	00074
189	Enable low discharge temperature alarm	R/W	Disch_Air_lo_alm_en	D	00190
	Electronic Expansion Valves EEV				
51	Superheat read from EVD C1	R	EVO_Superheat	A	30052
52	Valve position read from EVD in % (100.0)= full open C1	R	EVO_Position	A	30053
53	Suction line pressure in PSI from EVD C1	R	EVO_Suction_Pr	A	30054
54	Suction line temperature from EVD C1	R	Suc_Temp	A	30055
60	Temperature setpoint offset based on humidity	R	Latent_SP	A	30061
64	Suction line pressure in PSI from EVD C2	R	EVO2_Suction_Pr	A	30065
65	Superheat read from EVD C2	R	EVO2_Superheat	A	30066
66	Valve position read from EVD in % (100.0)= full open C2	R	EVO2_Position	A	30067
67	Suction line temperature from EVD C2	R	Suc_Temp2	A	30068
133	Low suction pressure setpoint	R/W	Suc_Tmp_Lo_SP	I	40342
140	Low suction temp setpoint deadband	R/W	Suc_Tmp_Lo_db	I	40349
141	Number of low pressure alarms before comp is locked out	R/W	Suc_Pr_Lockout_Set	I	40350
146	High suction temp setpoint	R/W	Suc_Tmp_Hi_sp	I	40355
147	High suction temp setpoint deadband	R/W	Suc_Tmp_Hi_db	I	40356
148	Number of low pressure alarms C1 had within an hour	R	C1_Suction_Lo_Count	I	30357

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
149	Number of suction high temp alarms C1 had within an hour	R	C1_Suction_Hi_Tmp_Count	I	30358
150	Number of low pressure alarms C2 had within an hour	R	C2_Suction_Lo_Count	I	30359
151	Number of suction high temp alarms C2 had within an hour	R	C2_Suction_Hi_Tmp_Count	I	30360
155	Number of temperature alarms before comp is locked out	R/W	Suc_tmpHi_Lockout_Set	I	40364
166	Low suction pressure alarm C1	R	Low_Suc_Prs1_alm	D	10167
167	Low suction pressure alarm C2	R	Low_Suc_Prs2_alm	D	10168
170	Low suction temp alarm C1	R	Low_Suc_Tmp1	D	10171
171	Low suction temp alarm C2	R	Low_Suc_Tmp2	D	10172
172	High suction temp alarm C1	R	Hi_Suc_Tmp1	D	10173
177	EVD memory fault alarm	R	EVO_eeeprom_alm	D	10178
180	EVD valve 1 motor fault	R	EVO_Motor_alm	D	10181
182	EVD C1 high evap temp alarm	R	EVO_Hi_EvapT_alm	D	10183
185	EVD sensor 1 fault	R	EVO_S1_alm	D	10186
187	EVD sensor 2 fault	R	EVO_S2_alm	D	10188
191	EVD valve 2 motor fault	R	EVO2_Motor_alm	D	10192
194	EVD sensor 3 fault	R	EVO_S3_alm	D	10195
195	EVD sensor 4 fault	R	EVO_S4_alm	D	10196
201	C2 High suction temp alarm	R	EVO2_suc_tmp2_alm	D	10202
202	Enable C2 suction pressure alarm	R/W	Suc_Prs2_alarm_en	D	00203
203	Enable C1 suction pressure alarm	R/W	Suc_Prs_alarm_en	D	00204
205	High evap temp alarm C2	R	EVO2_Hi_EvapT_alm	D	10206
	Optional Rack Temperature Sensor				
43	Setpoint for fan modulation by return or rack temperature	R/W	RA_Fan_Setpoint	A	40044
44	Amount from setpoint before fan starts ramping up	R/W	RA_Fan_Deadband	A	40045
45	The highest of the rack temp sensors connected to this unit	R	Rack_Temp	A	30046
46	The highest rack temp of all units in this zone (Zone master required)	R	Zone_Rack_Temp	A	30047
47	T1 displayed value regardless of inclusion	R	T1_Dis	A	30048
48	T2 displayed value regardless of inclusion	R	T2_Dis	A	30049
49	T3 displayed value regardless of inclusion	R	T1_Dis	A	30050
59	Setpoint for delta of Ret-Sply temp for fan modulation	R/W	Delta_SP	A	40060
61	Return temp minus supply temp	R	Delta_Temp	A	30062
68	T4 displayed value regardless of inclusion	R	T2_Dis	A	30069
69	T5 displayed value regardless of inclusion	R	T1_Dis	A	30070
70	T6 displayed value regardless of inclusion	R	T2_Dis	A	30071
71	T7 displayed value regardless of inclusion	R	T1_Dis	A	30072
72	T8 displayed value regardless of inclusion	R	T2_Dis	A	30073
73	T9 displayed value regardless of inclusion	R	T1_Dis	A	30074
74	T10 displayed value regardless of inclusion	R	T2_Dis	A	30075

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
75	T11 displayed value regardless of inclusion	R	T1_Dis	A	30076
76	T12 displayed value regardless of inclusion	R	T2_Dis	A	30077
77	T13 displayed value regardless of inclusion	R	T1_Dis	A	30078
78	T14 displayed value regardless of inclusion	R	T2_Dis	A	30079
79	T15 displayed value regardless of inclusion	R	T1_Dis	A	30080
80	T16 displayed value regardless of inclusion	R	T2_Dis	A	30081
81	T17 displayed value regardless of inclusion	R	T1_Dis	A	30082
82	T18 displayed value regardless of inclusion	R	T2_Dis	A	30083
83	T19 displayed value regardless of inclusion	R	T1_Dis	A	30084
84	T20 displayed value regardless of inclusion	R	T2_Dis	A	30085
85	T21 displayed value regardless of inclusion	R	T1_Dis	A	30086
86	T22 displayed value regardless of inclusion	R	T2_Dis	A	30087
87	T23 displayed value regardless of inclusion	R	T1_Dis	A	30088
88	T24 displayed value regardless of inclusion	R	T2_Dis	A	30089
89	T25 displayed value regardless of inclusion	R	T1_Dis	A	30090
90	T26 displayed value regardless of inclusion	R	T2_Dis	A	30091
91	T27 displayed value regardless of inclusion	R	T1_Dis	A	30092
92	T28 displayed value regardless of inclusion	R	T2_Dis	A	30093
93	T29 displayed value regardless of inclusion	R	T1_Dis	A	30094
94	T30 displayed value regardless of inclusion	R	T2_Dis	A	30095
95	T31 displayed value regardless of inclusion	R	T1_Dis	A	30096
96	T32 displayed value regardless of inclusion	R	T2_Dis	A	30097
98	Excludes rack sensors outside the average plus or minus this band	R/W	Rack_Exc_Band	A	40099
100	Average temperature of sensors in Group A	R	Group_Temp_A	A	30101
101	Average temperature of sensors in Group B	R	Group_Temp_B	A	30102
102	Average temperature of sensors in Group C	R	Group_Temp_C	A	30103
103	Average temperature of sensors in Group D	R	Group_Temp_D	A	30104
104	Average temperature of sensors in Group E	R	Group_Temp_E	A	30105
105	Average temperature of sensors in Group F	R	Group_Temp_F	A	30106
106	Average temperature of sensors in Group G	R	Group_Temp_G	A	30107
107	Average temperature of sensors in Group H	R	Group_Temp_H	A	30108
108	Average temperature of sensors in Group I	R	Group_Temp_I	A	30109
109	Average temperature of sensors in Group J	R	Group_Temp_J	A	30110
110	Average temperature of sensors in Group K	R	Group_Temp_K	A	30111
111	Average temperature of sensors in Group L	R	Group_Temp_L	A	30112
112	Average temperature of sensors in Group M	R	Group_Temp_M	A	30113
113	Average temperature of sensors in Group N	R	Group_Temp_N	A	30114
114	Average temperature of sensors in Group O	R	Group_Temp_O	A	30115
115	Average temperature of sensors in Group P	R	Group_Temp_P	A	30116

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
116	Calculated rack temp of unit 2	R	Rack_Temp_U2	A	30117
117	Calculated rack temp of unit 3	R	Rack_Temp_U3	A	30118
118	Calculated rack temp of unit 4	R	Rack_Temp_U4	A	30119
119	Calculated rack temp of unit 5	R	Rack_Temp_U5	A	30120
120	Calculated rack temp of unit 6	R	Rack_Temp_U6	A	30121
121	Calculated rack temp of unit 7	R	Rack_Temp_U7	A	30122
122	Calculated rack temp of unit 8	R	Rack_Temp_U8	A	30123
123	Calculated rack temp of unit 9	R	Rack_Temp_U9	A	30124
124	Calculated rack temp of unit 10	R	Rack_Temp_U10	A	30125
125	Calculated rack temp of unit 11	R	Rack_Temp_U11	A	30126
126	Calculated rack temp of unit 12	R	Rack_Temp_U12	A	30127
127	Calculated rack temp of unit 13	R	Rack_Temp_U13	A	30128
128	Calculated rack temp of unit 14	R	Rack_Temp_U14	A	30129
129	Calculated rack temp of unit 15	R	Rack_Temp_U15	A	30130
130	Calculated rack temp of unit 16	R	Rack_Temp_U16	A	30131
160	Number of rack temp sensors installed	R/W	SHR_T_Num	I	40369
161	Number of groups used	R/W	SHR_Group_Num	I	40370
162	High rack temp alarm setpoint	R/W	SHR_T_Hi_Alm	I	40371
163	Low rack temp alarm setpoint	R/W	SHR_T_Lo_Alm	I	40372
74	Enable limit of fan speed when return air temp too high (For optional rack temperature control)	R/W	Fan_Ht_Limit_en	D	00075
76	Temp of rack sensor above setpoint - T1	R	T1_Hi_Alm	D	10077
77	Temp of rack sensor above setpoint - T2	R	T2_Hi_Alm	D	10078
78	Temp of rack sensor above setpoint - T3	R	T1_Hi_Alm	D	10079
79	Temp of rack sensor above setpoint - T4	R	T2_Hi_Alm	D	10080
81	Temp of rack sensor above setpoint - T5	R	T1_Hi_Alm	D	10082
82	Temp of rack sensor above setpoint - T6	R	T2_Hi_Alm	D	10083
83	Temp of rack sensor above setpoint - T7	R	T1_Hi_Alm	D	10084
84	Temp of rack sensor above setpoint - T8	R	T2_Hi_Alm	D	10085
85	Temp of rack sensor above setpoint - T9	R	T1_Hi_Alm	D	10086
86	Temp of rack sensor above setpoint - T10	R	T2_Hi_Alm	D	10087
87	Temp of rack sensor above setpoint - T11	R	T1_Hi_Alm	D	10088
88	Temp of rack sensor above setpoint - T12	R	T2_Hi_Alm	D	10089
89	Temp of rack sensor above setpoint - T13	R	T1_Hi_Alm	D	10090
90	Temp of rack sensor above setpoint - T14	R	T2_Hi_Alm	D	10091
91	Temp of rack sensor above setpoint - T15	R	T1_Hi_Alm	D	10092
92	Temp of rack sensor above setpoint - T16	R	T2_Hi_Alm	D	10093
93	Temp of rack sensor above setpoint - T17	R	T1_Hi_Alm	D	10094
94	Temp of rack sensor above setpoint - T18	R	T2_Hi_Alm	D	10095
95	Temp of rack sensor above setpoint - T19	R	T1_Hi_Alm	D	10096

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
96	Temp of rack sensor above setpoint - T20	R	T2_Hi_Alm	D	10097
97	Temp of rack sensor above setpoint - T21	R	T1_Hi_Alm	D	10098
98	Temp of rack sensor above setpoint - T22	R	T2_Hi_Alm	D	10099
99	Temp of rack sensor above setpoint - T23	R	T1_Hi_Alm	D	10100
100	Temp of rack sensor above setpoint - T24	R	T2_Hi_Alm	D	10101
101	Temp of rack sensor above setpoint - T25	R	T1_Hi_Alm	D	10102
102	Temp of rack sensor above setpoint - T26	R	T2_Hi_Alm	D	10103
103	Temp of rack sensor above setpoint - T27	R	T1_Hi_Alm	D	10104
104	Temp of rack sensor above setpoint - T28	R	T2_Hi_Alm	D	10105
105	Temp of rack sensor above setpoint - T29	R	T1_Hi_Alm	D	10106
106	Temp of rack sensor above setpoint - T30	R	T2_Hi_Alm	D	10107
107	Temp of rack sensor above setpoint - T31	R	T1_Hi_Alm	D	10108
109	Temp of rack sensor above setpoint - T32	R	T2_Hi_Alm	D	10110
110	Temp of rack sensor below setpoint -T1	R	T1_Lo_Alm	D	10111
111	Temp of rack sensor below setpoint -T2	R	T2_Lo_Alm	D	10112
112	Temp of rack sensor below setpoint -T3	R	T1_Lo_Alm	D	10113
113	Temp of rack sensor below setpoint -T4	R	T2_Lo_Alm	D	10114
114	Temp of rack sensor below setpoint -T5	R	T1_Lo_Alm	D	10115
115	Temp of rack sensor below setpoint -T6	R	T2_Lo_Alm	D	10116
116	Temp of rack sensor below setpoint -T7	R	T1_Lo_Alm	D	10117
117	Temp of rack sensor below setpoint -T8	R	T2_Lo_Alm	D	10118
118	Temp of rack sensor below setpoint -T9	R	T1_Lo_Alm	D	10119
119	Temp of rack sensor below setpoint -T10	R	T2_Lo_Alm	D	10120
120	Temp of rack sensor below setpoint -T11	R	T1_Lo_Alm	D	10121
121	Temp of rack sensor below setpoint -T12	R	T2_Lo_Alm	D	10122
122	Temp of rack sensor below setpoint -T13	R	T1_Lo_Alm	D	10123
123	Temp of rack sensor below setpoint -T14	R	T2_Lo_Alm	D	10124
124	Temp of rack sensor below setpoint -T15	R	T1_Lo_Alm	D	10125
125	Temp of rack sensor below setpoint -T16	R	T2_Lo_Alm	D	10126
126	Temp of rack sensor below setpoint -T17	R	T1_Lo_Alm	D	10127
127	Temp of rack sensor below setpoint -T18	R	T2_Lo_Alm	D	10128
128	Temp of rack sensor below setpoint -T19	R	T1_Lo_Alm	D	10129
129	Temp of rack sensor below setpoint -T20	R	T2_Lo_Alm	D	10130
130	Temp of rack sensor below setpoint -T21	R	T1_Lo_Alm	D	10131
131	Temp of rack sensor below setpoint -T22	R	T2_Lo_Alm	D	10132
132	Temp of rack sensor below setpoint -T23	R	T1_Lo_Alm	D	10133
133	Temp of rack sensor below setpoint -T24	R	T2_Lo_Alm	D	10134
134	Temp of rack sensor below setpoint -T25	R	T1_Lo_Alm	D	10135
135	Temp of rack sensor below setpoint -T26	R	T2_Lo_Alm	D	10136
136	Temp of rack sensor below setpoint -T27	R	T1_Lo_Alm	D	10137

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
137	Temp of rack sensor below setpoint -T28	R	T2_Lo_Alm	D	10138
138	Temp of rack sensor below setpoint -T29	R	T1_Lo_Alm	D	10139
139	Temp of rack sensor below setpoint -T30	R	T2_Lo_Alm	D	10140
140	Temp of rack sensor below setpoint -T31	R	T1_Lo_Alm	D	10141
141	Temp of rack sensor below setpoint -T32	R	T2_Lo_Alm	D	10142
142	Lost communications to external temp module	R	Ext_T_Offline_alm	D	10143
147	Rack sensor mode 0=use highest 1=use average	R	Hi_Ave	D	10148
188	Allow offset to cooling setpoint if fan is running at max speed	R/W	En_SP_Offset	D	00189
	Optional Zone Master Control				
50	Temperature setpoint of the Zone Master	R	Master_Temp_Setpoint	A	30051
55	Power in KW currently being consumed in the zone. (Optional Power meter required)	R	Zone_KW	A	30056
141	Temperature of return air from U2	R	Ret_Air_Tmp2	A	30142
142	Temperature of return air from U3	R	Ret_Air_Tmp3	A	30143
143	Temperature of return air from U4	R	Ret_Air_Tmp4	A	30144
144	Temperature of return air from U5	R	Ret_Air_Tmp5	A	30145
145	Temperature of return air from U6	R	Ret_Air_Tmp6	A	30146
146	Temperature of return air from U7	R	Ret_Air_Tmp7	A	30147
147	Temperature of return air from U8	R	Ret_Air_Tmp8	A	30148
148	Temperature of return air from U9	R	Ret_Air_Tmp9	A	30149
149	Temperature of return air from U10	R	Ret_Air_Tmp10	A	30150
150	Temperature of return air from U11	R	Ret_Air_Tmp11	A	30151
151	Temperature of return air from U12	R	Ret_Air_Tmp12	A	30152
152	Temperature of return air from U13	R	Ret_Air_Tmp13	A	30153
153	Temperature of return air from U14	R	Ret_Air_Tmp14	A	30154
154	Temperature of return air from U15	R	Ret_Air_Tmp15	A	30155
155	Temperature of return air from U16	R	Ret_Air_Tmp16	A	30156
155	Temperature of return air from U16	R	Ret_Air_Tmp16	A	30156
99	Zone Airflow Setpoint (1/100th of actual). (Optional unit airflow measurement kit required)	R/W	ZM_Airflow_SP	I	40308
100	Zone Airflow Setpoint from the server (LSB) 000-999. (Optional unit airflow measurement kit required)	R/W	Unity_Airflow_SP_Isb	I	40309
101	Zone Airflow Setpoint from the server (1/100th actual cfm) (Optional unit airflow measurement kit required)	R/W	Unity_Airflow_SP	I	40310
102	1/10th of the total zone airflow (Optional unit airflow measurement kit required)	R	ZM_Airflow	I	30311
113	Number of units selected by ZM for standby based on current schedule	R	Num_Stdby	I	30322
114	Number of units currently running in the zone	R	Num_Units_On	I	30323
115	State of unit (at address 1). 1,12&13 = On, 2 thru 9 = Off	R	Status	I	30324
116	State of U2 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit2_status	I	30325
117	State of U3 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit3_status	I	30326
118	State of U4 when zone master is enabled. (1,12&13 is	R	Unit4_status	I	30327

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
	running, 2-9 is Off)				
119	State of U5 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit5_status	I	30328
120	State of U6 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit6_status	I	30329
121	State of U7 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit7_status	I	30330
122	State of U8 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit8_status	I	30331
123	State of U9 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit9_status	I	30332
124	State of U10 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit10_status	I	30333
125	State of U11 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit11_status	I	30334
126	State of U12 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit12_status	I	30335
127	State of U13 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit13_status	I	30336
128	State of U14 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit14_status	I	30337
129	State of U15 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit15_status	I	30338
130	State of U16 when zone master is enabled. (1,12&13 is running, 2-9 is Off)	R	Unit16_status	I	30339
135	Cause slaves to take setpoint of the master in ZM, 1=Sync	R/W	Sync_Mstr_SP	I	40344
136	Cause slaves to take time of the master in ZM, 1=Sync	R/W	Sync_Clock	I	40345
137	Address of the controller on the pLAN network	R	PLAN_BMS	I	30346
4	Cooling inhibit from Zone Master	R	Cool_Inhibit	D	10005
	Optional CO2 Sensor Control in gPod system				
136	Maximum CO2 level in last 24 Hrs	R	Maximum	A	30137
137	Minimum CO2 level in last 24 Hrs	R	Minimum	A	30138
180	CO2 Level in PPM (gPOD only)	R	CO2_Level	I	30389
181	CO2 Low level alarm setpoint in PPM (gPOD only)	R/W	CO2_Low_SP	I	40390
182	CO2 High level alarm setpoint in PPM (gPOD only)	R/W	CO2_High_SP	I	40391
183	CO2 hysteresis of setpoint in PPM (gPOD only)	R/W	CO2_Deadband	I	40392
184	CO2 Setpoint in PPM (gPOD only)	R/W	CO2_Setpoint	I	40393
199	CO2 valve duty cycle in 10 percent steps (gPOD only)	R/W	CO2_PWM	I	40408
151	Lights On (gPOD only)	R	Lights_On	D	10152
154	CO2 solenoid valve output (gPOD only)	R	CO2_On	D	10155
155	Enable high CO2 level alarm (gPOD only)	R/W	CO2_High_alm_en	D	00156
156	Enable low CO2 level alarm (gPOD only)	R/W	CO2_Low_alm_en	D	00157
157	CO2 Low level alarm (gPOD only)	R	CO2_Lo_alm	D	10158
158	Enable CO2 control at night (gPOD only)	R/W	CO2_Offset	D	00159
200	CO2 High level alarm (gPOD only)	R	CO2_Hi_alm	D	10201
	Optional Power Meter				

Point Index	Description	Read/Write	Variable Name	Data Type	Modbus RTU
63	Total Instantaneous power in watts (X10)being consumed now	R	PM_Power_VA	A	30064
158	Voltage of phase 1 to neutral (Opt Pwr Meter)	R	PM_Phase1N_Voltage	A	30159
159	Voltage of phase 2 to neutral (Opt Pwr Meter)	R	PM_Phase2N_Voltage	A	30160
160	Voltage of phase 3 to neutral (Opt Pwr Meter)	R	PM_Phase3N_Voltage	A	30161
161	Voltage of phase 1 to phase 2 (Opt Pwr Meter)	R	PM_Phase12_Voltage	A	30162
162	Voltage of phase 2 to phase 3 (Opt Pwr Meter)	R	PM_Phase23_Voltage	A	30163
163	Voltage of phase 3 to phase 1 (Opt Pwr Meter)	R	PM_Phase31_Voltage	A	30164
164	Amperage of phase 1 in 1/10th amp resolution (Opt Pwr Meter)	R	Phase1_Amps	A	30165
165	Amperage of phase 2 in 1/10th amp resolution (Opt Pwr Meter)	R	Phase2_Amps	A	30166
166	Amperage of phase 3 in 1/10th amp resolution (Opt Pwr Meter)	R	Phase3_Amps	A	30167
167	Power Factor as a ratio 1:0.xxx (Opt Pwr Meter)	R	Power_Factor	A	30168
168	Total kWh used one hour ago (Opt Pwr Meter)	R	KWH_1	A	30169
169	Total kWh used so far today (Opt Pwr Meter)	R	Kwh_Daily	A	30170
170	Total kWh used one day ago (Opt Pwr Meter)	R	Kwh_Day_1	A	30171
100	Total kWh used in the last 30 days (Opt Pwr Meter)	R	Kwh_Day_30	I	30309
149	Power meter offline alarm	R	PM_Offline_alm	D	10150
150	Power phase lost alarm	R	Phase_alm	D	10151
153	Power meter feature enabled	R/W	P_Meter_en	D	00154
	Scheduler with Night Set-back setpoint offset				
62	Scheduler heating offset	R/W	Ht_Temp_sp_offset	A	40063
133	Cooling setpoint with Temp Setpoint plus scheduler CL offset	R	Cool_sp	A	30134
135	Heating setpoint with Temp Setpoint minus scheduler HT offset	R	Heat_sp	A	30136
172	Scheduler cooling offset	R/W	CL_Temp_sp_offset	A	40173
179	Dehumidify setpoint offset used by scheduler	R/W	Dehum_sp_offset	I	40388
185	Setpoint for humidifier with scheduler offset	R	Humidifier_sp	I	30394
186	Offset for humidification used by scheduler	R/W	Hum_sp_offset	I	40395
187	Setpoint for dehumidifier with scheduler offset	R	Dehum_sp	I	30396