Input/Output Variables (Read/Write)

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
40001	HeatDemand	1 bit unsigned	---	Heat Demand/Request. Setting the state member of this variable will put the boiler in heating mode.	0 = no heat demand 1 = heat demand
40002	SetpointTimer	16 bit unsigned	---	System Setpoint Timer The system setpoint timer is a BMS failsafe feature. This countdown timer should be periodically reloaded with a timeout value (in seconds). If the timer reaches zero, the control assumes that the BMS is no longer operating and the local setpoint (saved on the control) is reloaded. This is a failsafe feature used to help safeguard the system in case of BMS failure. When any (1) Read/Write variable is timer is written, if the SetpointTimer is less than 60, it is automatically reloaded with 60. (1) In Firmware Versions < 3.48, the BMS has to write the SystemSetpoint to automatically reload the SetpointTimer.	0 – 65535 seconds
40003	Setpoint	8 bit unsigned	1.0	System Setpoint (see *SetpointTimer*)	40 - 220 °F
40004	OAResetEnable	1 bit unsigned	---	Enables/Disables outdoor air reset mode.	0 = disabled 1 = enabled
40005	OARSetpoint	16 bit signed	1.0	Outdoor air reset setpoint. Temperature at which boiler shuts down.	40 – 100 °F
40006	OARHighWaterTemp	16 bit signed	1.0	Boiler water temperature setpoint when outdoor air temperature is at the high outdoor air temperature setpoint (OARHiAirTemp).	60 – 150 °F
40007	OARHighAirTemp	16 bit signed	1.0	High outdoor air temperature setpoint.	50 – 90 °F
40008	OARLowWaterTemp	16 bit signed	1.0	Header/Supply temperature setpoint when outdoor air temperature is at the low outdoor air temperature setpoint (OARLoAirTemp).	70 – 220 °F
40009	OARLowAirTemp	16 bit signed	1.0	Low outdoor air temperature setpoint.	-35 – 40 °F
40010	SetMonth	8 bit unsigned	---	Set real time clock – month (*see SetClock*)	0 (January) - 11 (December)
40011	SetDay	8 bit unsigned	---	Set real time clock – day (*see SetClock*)	1 – 31
40012	SetYear	8 bit unsigned	---	Set real time clock – year (*see SetClock*)	0 – 99
40013	SetHour	8 bit unsigned	---	Set real time clock – hour (*see SetClock*)	0 – 23

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
40014	SetMinute	8 bit unsigned	---	Set real time clock – minute (*see SetClock*)	0 – 59
40015	SetSecond	8 bit unsigned	---	Set real time clock – second (*see SetClock*)	0 – 59
40016	SetWeekday	8 bit unsigned	---	Set real time clock – weekday (*see SetClock*)	1 (Monday) - 7 (Sunday)
40017	SetClock	1 bit unsigned	---	Set (write) the real time clock. To write the real time clock, the system variables (SetMonth, SetMonth, SetDay, SetYear, SetHour, SetMinute, SetSecond, SetWeekday) must first be loaded with the correct date and time. Then, a 1 must be written to the state portion of this system variable to write the new date and time to the system clock.	0 = no action 1 = set/write the clock
----- The following registers are available starting in firmware version 3.48+ -----					
40018	DHWSetpoint	16 bit signed	1.0	DHW Setpoint	40 - 200 °F

Input Variables (Read Only)

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30001	BoilersOn	8 bit unsigned	---	The number of boilers currently running.	0 – 16
30002	Modulation	8 bit unsigned	0.01	Current system (target) modulation level. This is the modulation level that the system is trying to run at to meet the heating demand.	0 – 100 %
30003	HeaderTemp	16 bit signed	0.01	Header / System temperature.	32 – 250 °F
30004	SupplyTemp	16 bit signed	0.01	Supply temperature.	32 – 250 °F
30005	ReturnTemp	16 bit signed	0.01	Return temperature.	32 – 250 °F
30006	OutsideTemp	16 bit signed	0.01	Outside air temperature.	-40 – 250 °F
30007	Spare1	16 bit signed	---	Raw A/D value from spare 1 input.	-32768 to 32767
	DHW Temp	16 bit signed	0.01	DHW Sensor Temperature	32 – 250 °F
30008	Spare2	16 bit signed	---	Raw A/D value from spare 2 input.	-32768 to 32767
30009	Month	8 bit unsigned	---	Real time clock month.	0 (January) - 11 (December)
30010	Day	8 bit unsigned	---	Real time clock day.	1 – 31
30011	Year	8 bit unsigned	---	Real time clock year.	0 – 99
30012	Hour	8 bit unsigned	---	Real time clock hour.	0 – 23
30013	Minute	8 bit unsigned	---	Real time clock minute.	0 – 59
30014	Second	8 bit unsigned	---	Real time clock second.	0 – 59
30015	Weekday	8 bit unsigned	---	Real time clock weekday.	1 (Monday) – 7 (Sunday)
30016	Boiler01Status1	16 bit unsigned	---	Boiler (1 – 16) status1 and status 2 flags. These bits indicate the state of various boiler statuses. Boiler01 = Master or “Connected Boiler” Boiler02 = Member01 … Boiler16 = Member15	See the BoilerStatus1 Flags and BoilerStatus2 Flags in Appendix A.
30017	Boiler01Status2				
30018	Boiler02Status1				
30019	Boiler02Status2				
30020	Boiler03Status1				
30021	Boiler03Status2				
30022	Boiler04Status1				

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30023	Boiler04Status2				
30024	Boiler05Status1				
30025	Boiler05Status2				
30026	Boiler06Status1				
30027	Boiler06Status2				
30028	Boiler07Status1				
30029	Boiler07Status2				
30030	Boiler08Status1				
30031	Boiler08Status2				
30032	Boiler09Status1				
30033	Boiler09Status2				
30034	Boiler10Status1				
30035	Boiler10Status2				
30036	Boiler11Status1				
30037	Boiler11Status2				
30038	Boiler12Status1				
30039	Boiler12Status2				
30040	Boiler13Status1				
30041	Boiler13Status2				
30042	Boiler14Status1				
30043	Boiler14Status2				
30044	Boiler15Status1				
30045	Boiler15Status2				
30046	Boiler16Status1				
30047	Boiler16Status2				
30048	Boiler01RuntimeHigh16	16 bit unsigned	---	Boiler (1 – 16) Runtime seconds High (Upper) and Low (Lower) 16 bit	0 – 4294967295 seconds

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30049	Boiler01RuntimeLow16			counters. To get the actual runtime for any given boiler (##), the high and low 16 bit counters must be combined (concatenated) into a single 32 bit counter as: Boiler##RuntimeHigh16:Boiler##RuntimeLow16 <u>Example</u> Boiler01Runtime = (Boiler01RuntimeHigh16 * 65536) + Boiler01RuntimeLow16 Boiler01 = Master or “Connected Boiler” Boiler02 = Member01 … Boiler16 = Member15	
30050	Boiler02RuntimeHigh16				
30051	Boiler02RuntimeLow16				
30052	Boiler03RuntimeHigh16				
30053	Boiler03RuntimeLow16				
30054	Boiler04RuntimeHigh16				
30055	Boiler04RuntimeLow16				
30056	Boiler05RuntimeHigh16				
30057	Boiler05RuntimeLow16				
30058	Boiler06RuntimeHigh16				
30059	Boiler06RuntimeLow16				
30060	Boiler07RuntimeHigh16				
30061	Boiler07RuntimeLow16				
30062	Boiler08RuntimeHigh16				
30063	Boiler08RuntimeLow16				
30064	Boiler09RuntimeHigh16				
30065	Boiler09RuntimeLow16				
30066	Boiler10RuntimeHigh16				
30067	Boiler10RuntimeLow16				
30068	Boiler11RuntimeHigh16				
30069	Boiler11RuntimeLow16				
30070	Boiler12RuntimeHigh16				
30071	Boiler12RuntimeLow16				
30072	Boiler13RuntimeHigh16				
30073	Boiler13RuntimeLow16				
30074	Boiler14RuntimeHigh16				

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30075	Boiler14RuntimeLow16				
30076	Boiler15RuntimeHigh16				
30077	Boiler15RuntimeLow16				
30078	Boiler16RuntimeHigh16				
30079	Boiler16RuntimeLow16				
30080	Boiler01Status3	16 bit unsigned	---	Boiler (1 – 16) status3 flags. These bits indicate the state of various boiler statuses. Boiler01 = Master or "Connected Boiler" Boiler02 = Member01 … Boiler16 = Member15	See the BoilerStatus3 Flags in Appendix A.
30081	Boiler02Status3				
30082	Boiler03Status3				
30083	Boiler04Status3				
30084	Boiler05Status3				
30085	Boiler06Status3				
30086	Boiler07Status3				
30087	Boiler08Status3				
30088	Boiler09Status3				
30089	Boiler10Status3				
30090	Boiler11Status3				
30091	Boiler12Status3				
30092	Boiler13Status3				
30093	Boiler14Status3				
30094	Boiler15Status3				
30095	Boiler16Status3				
----- The following registers are available starting in firmware version 2.0 -----					
30096	Boiler01SupplyTemp	16 bit signed	0.01	Boiler (1 – 16) supply temperature (if available). See BoilerStatus2 to determine if the sensor is present. Boiler01 = Master or "Connected Boiler" Boiler02 = Member01 …	32 – 250 °F
30097	Boiler02SupplyTemp				
30098	Boiler03SupplyTemp				
30099	Boiler04SupplyTemp				

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30100	Boiler05SupplyTemp			Boiler16 = Member15	
30101	Boiler06SupplyTemp				
30102	Boiler07SupplyTemp				
30103	Boiler08SupplyTemp				
30104	Boiler09SupplyTemp				
30105	Boiler10SupplyTemp				
30106	Boiler11SupplyTemp				
30107	Boiler12SupplyTemp				
30108	Boiler13SupplyTemp				
30109	Boiler14SupplyTemp				
30110	Boiler15SupplyTemp				
30111	Boiler16SupplyTemp				
30112	Boiler01ReturnTemp	16 bit signed	0.01	Boiler (1 – 16) return temperature (if available). See BoilerStatus2 to determine if the sensor is present. Boiler01 = Master or “Connected Boiler” Boiler02 = Member01 … Boiler16 = Member15	32 – 250 °F
30113	Boiler02ReturnTemp				
30114	Boiler03ReturnTemp				
30115	Boiler04ReturnTemp				
30116	Boiler05ReturnTemp				
30117	Boiler06ReturnTemp				
30118	Boiler07ReturnTemp				
30119	Boiler08ReturnTemp				
30120	Boiler09ReturnTemp				
30121	Boiler10ReturnTemp				
30122	Boiler11ReturnTemp				
30123	Boiler12ReturnTemp				
30124	Boiler13ReturnTemp				
30125	Boiler14ReturnTemp				

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30126	Boiler15ReturnTemp				
30127	Boiler16ReturnTemp				
30128	Boiler01CyclesHigh16	16 bit unsigned	---	Boiler (1 – 16) Cycles High (Upper) and Low (Lower) 16 bit counters. To get the actual cycle count for any given boiler (##), the high and low 16 bit counters must be combined (concatenated) into a single 32 bit counter as: Boiler##CyclesHigh16:Boiler##CyclesLow16 <u>Example</u> Boiler01Cycles = (Boiler01CyclesHigh16 * 65536) + Boiler01CyclesLow16 Boiler01 = Master or "Connected Boiler" Boiler02 = Member01 … Boiler16 = Member15	0 – 4294967295
30129	Boiler01CyclesLow16				
30130	Boiler02CyclesHigh16				
30131	Boiler02CyclesLow16				
30132	Boiler03CyclesHigh16				
30133	Boiler03CyclesLow16				
30134	Boiler04CyclesHigh16				
30135	Boiler04CyclesLow16				
30136	Boiler05CyclesHigh16				
30137	Boiler05CyclesLow16				
30138	Boiler06CyclesHigh16				
30139	Boiler06CyclesLow16				
30140	Boiler07CyclesHigh16				
30141	Boiler07CyclesLow16				
30142	Boiler08CyclesHigh16				
30143	Boiler08CyclesLow16				
30144	Boiler09CyclesHigh16				
30145	Boiler09CyclesLow16				
30146	Boiler10CyclesHigh16				
30147	Boiler10CyclesLow16				
30148	Boiler11CyclesHigh16				
30149	Boiler11CyclesLow16				
30150	Boiler12CyclesHigh16				
30151	Boiler12CyclesLow16				

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30152	Boiler13CyclesHigh16				
30153	Boiler13CyclesLow16				
30154	Boiler14CyclesHigh16				
30155	Boiler14CyclesLow16				
30156	Boiler15CyclesHigh16				
30157	Boiler15CyclesLow16				
30158	Boiler16CyclesHigh16				
30159	Boiler16CyclesLow16				
----- The following registers are available starting in firmware version 3.48+ -----					
30160	Boiler01Status4	16 bit unsigned	---	Boiler (1 – 16) status4 flags. These bits indicate the state of various boiler statuses. Boiler01 = Master or “Connected Boiler” Boiler02 = Member01 … Boiler16 = Member15	See the BoilerStatus4 Flags in Appendix A.
30161	Boiler02Status4				
30162	Boiler03Status4				
30163	Boiler04Status4				
30164	Boiler05Status4				
30165	Boiler06Status4				
30166	Boiler07Status4				
30167	Boiler08Status4				
30168	Boiler09Status4				
30169	Boiler10Status4				
30170	Boiler11Status4				
30171	Boiler12Status4				
30172	Boiler13Status4				
30173	Boiler14Status4				
30174	Boiler15Status4				
30175	Boiler16Status4				

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30176 … 30207	RESERVED	---	---	---	---
30208	Boiler01DHWTemp	16 bit signed	---	Boiler (1 – 16) DHW temperature (if available). See BoilerStatus4 to determine if the sensor is present. Boiler01 = Master or “Connected Boiler” Boiler02 = Member01 … Boiler16 = Member15	32 – 250 °F
30209	Boiler02DHWTemp				
30210	Boiler03DHWTemp				
30211	Boiler04DHWTemp				
30212	Boiler05DHWTemp				
30213	Boiler06DHWTemp				
30214	Boiler07DHWTemp				
30215	Boiler08DHWTemp				
30216	Boiler19DHWTemp				
30217	Boiler10DHWTemp				
30218	Boiler11DHWTemp				
30219	Boiler12DHWTemp				
30220	Boiler13DHWTemp				
30221	Boiler14DHWTemp				
30222	Boiler15DHWTemp				
30223	Boiler16DHWTemp				
30224	Boiler01Modulation	16 bit signed	---	The running (“display”) modulation. This is typically the actual running modulation except under special circumstances when the boiler is running in a self-protection mode (Op. Limit, ½ Fire Rate, etc.) Boiler01 = Master or “Connected Boiler” Boiler02 = Member01 … Boiler16 = Member15	0 - 100
30225	Boiler02Modulation				
30226	Boiler03Modulation				
30227	Boiler04Modulation				
30228	Boiler05Modulation				
30229	Boiler06Modulation				
30230	Boiler07Modulation				
30231	Boiler08Modulation				

Address	Name	Raw Data Type	Scale	Description	Valid Values/Range
30232	Boiler09Modulation				
30233	Boiler10Modulation				
30234	Boiler11Modulation				
30235	Boiler12Modulation				
30236	Boiler13Modulation				
30237	Boiler14Modulation				
30238	Boiler15Modulation				
30239	Boiler16Modulation				
30240	OperatingSetpoint	16 bit signed	---	This is the current operating or active setpoint. It may be: 1) The normal heating setpoint. 2) The DHW setpoint if running in DHW mode. 3) A calculated setpoint if running in Outdoor Air Reset Mode 4) The 4-20ma (0-10V) setpoint.	40 - 220 °F

APPENDIX A – Status Flags

BoilerStatus1 Flags

Bit	Description	Valid Values/Range
0	Pilot Valve	0 = closed, 1 = open
1	Blower Running	0 = off, 1 = on (running)
2	Ignition Alarm	0 = ok, 1 = alarm
3	IRI Alarm	0 = ok, 1 = alarm
4	High Limit	0 = ok, 1 = tripped
5	Air Prove Switch	0 = proven, 1 = not proven
6	---	---
7	Software Operator Tripped	0 = not tripped, 1 = tripped
8	Header Sensor not detected	0 = detected, 1 = not detected
9	Supply Sensor not detected	0 = detected, 1 = not detected
10	Return Sensor not detected	0 = detected, 1 = not detected
11	Outside Sensor not detected	0 = detected, 1 = not detected
12	System Pump Running	0 = off, 1 = on (running)
13	Combustion Air Damper Prove Obsolete – Available only on revision 1.x controls.	0 = not proven, 1 = proven
14	Master Boiler	0 = member, 1 = master
15	Boiler Detected A boiler was detected at this address.	0 = not detected, 1 = detected

BoilerStatus2 Flags

Bit	Description	Valid Values/Range
0	Disabled The boiler is disabled. For instance, when minimum off time has not been met.	0 = enabled, 1 = disabled
1	Local Override (member boilers only) State of the local override (Heat Demand) input on member boilers.	0 = no override, 1 = override
2	Alarm An alarm or warning condition has occurred. An attempt(s) will automatically be made to recover and resume normal operation.	0 = ok, 1 = alarm
3	Failed A condition has occurred under which the boiler can no longer run.	0 = ok, 1 = failed
4	Member Error An “Alarm” or “Failed” condition has occurred on one (or more) of the member boilers.	0 = ok, 1 = error
5	Boiler Running	0 = off, 1 = running
6	Local Pump Running	0 = off, 1 = running
7	System Water Prove (Flow) Interlock. This input was previously called “Spare 3”.	0 = open, 1 = closed
8	LWCO Interlock (Low Water Cut Off)	0 = open, 1 = closed
9	VFD Interlock (Variable Frequency Drive)	0 = open, 1 = closed
10	Gas Prove Interlock	0 = open, 1 = closed
11	Spare 4 (User) Interlock	0 = open, 1 = closed
12	Operator Interlock	0 = open, 1 = closed
13	Local Water Prove (Flow) Interlock	0 = open, 1 = closed
14	UV Sensor Air Prove Interlock	0 = open, 1 = closed
15	Main Valve	0 = closed, 1 = open

BoilerStatus3 Flags

Bit	Description	Valid Values/Range
0	AA High Fire Input	0 = off, 1 = on
1	Heat Demand Input (Local Override)	0 = off, 1 = on (1)
2	4-20ma Remote Enable Input	0 = off, 1 = on
3	Outdoor Air Reset Override Input	0 = off, 1 = on
4	T1 Input	0 = off, 1 = on
5	T2 Input	0 = off, 1 = on
6	T3 Input	0 = off, 1 = on
7	T4 Input	0 = off, 1 = on
8	---	---
9	---	---
10	---	---
11	---	---
12	---	---
13	---	---
14	---	---
15	---	---

BoilerStatus4 Flags

Bit	Description	Valid Values/Range
0	DHW Enabled (1) DHW Mode had been enabled in the menus.	0 = off, 1 = on (menu)
1	Combustion Air Damper Prove (1) Status of Combustion Air Damper Prove Input J12B	0 = not proven, 1 = proven
2	Call Service Fault (1)	0 = off, 1 = on
3	Air Switch (Blower) Fault (1)	0 = off, 1 = on
4	---	---
5	---	---
6	---	---
7	---	---
8	---	---
9	DHW Sensor not detected (1)	0 = detected, 1 = not detected
10	DHW Boiler (1) This control board has been designated a DHW boiler by cutting the DHW jumper (JPS1).	0 = no, 1 = yes (DHW jumper cut)
11	Operating Limit Clamp (1) Boiler input is being limited (clamped) due to a high supply (outlet) temperature.	0 = off, 1 = clamped
12	---	---
13	---	---
14	---	---
15	---	---

(1) Available in Firmware Version 3.48+.