PROFIRE

## PF2200-FD

# MODBUS CONFIGURATION GUIDE

DOC-001100
v6.1

PROFIRE

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# 1 CONFIGURATION

This document outlines configuration details for using Modbus with the PF2200-FD Forced Draft BMS and is applicable to the following hardware and firmware versions:

| BMS CARD HARDWARE VERSION | UI CARD HARDWARE VERSION | PF2200-FD FIRMWARE VERSION |
|---|---|---|
| v2.3.x and v2.4.x | v3.2.x and v3.3.x | FD 3.0.4 |

The protocol used is Modbus RTU as a slave device and the physical implementation is half-duplex RS-485.

## 1.1 PF2200 MODBUS CONFIGURATION SETTINGS

Navigate to the Modbus Menu (Settings > Setup > Modbus) on the PF2200 User Interface to configure the following settings:

| NAME | DEFAULT | OPTIONS | DESCRIPTION |
|---|---|---|---|
| Modbus RTU Communication | Disabled | Disabled | Enables or disables the Modbus port on the User Interface Card. This must be enabled to utilize Modbus functionality. |
| | | Enabled | |
| Modbus Termination | Disabled | Disabled | Enables or disables a 100 Ω termination resistor across the A and B signal lines. This should be enabled if this device is the last drop on the Modbus line. |
| | | Enabled | |
| Baud Rate | 9600 | 9600 | Baud rate of the communication protocol. 9600 should be used for noisy or long run lengths. |
| | | 19200 | |
| Stop Bits | 1 | 1 | Number of stop bits used for Modbus communication. |
| | | 2 | |
| Parity | None | None | Parity bit used for Modbus communication. |
| | | Odd | |
| | | Even | |
| Slave Address | 1 | 1 - 247 | Modbus slave address of the PF2200. Ensure that the address is not used by any other devices on the Modbus line. |

## 1.2 MODBUS MASTER CONFIGURATION REQUIREMENTS

Ensure that Modbus Master device is configured as follows:

| NAME | REQUIREMENT | NOTES |
|---|---|---|
| Baud Rate | As desired | Must match the Baud Rate setting configured on the PF2200 above. |
| Stop Bits | As desired | Must match the Stop Bits setting configured on the PF2200 above. |
| Parity | As desired | Must match the Parity setting configured on the PF2200 above. |
| Slave Address | As desired | Must match the Slave Address setting configured on the PF2200 above. |
| Mode | RTU | Modbus TCP is not directly supported but can be used with a TCP/IP to RTU Gateway installed. |
| Minimum Interpacket Delay | 20ms | |
| Minimum Response Timeout | 500ms | The recommended response timeout is 1 second or larger. |
| Minimum Time Between Writes | 5 seconds | It is recommended that settings be written only when changed; continuous writing of settings should be avoided. |
| Minimum Time Between Reads | 1 second | |
| Multiplication Factor | As required | A “10x” in the register tables below indicates that the value returned is 10 times its actual value. Any required conversion must be done by the master device. |

## 1.3 TROUBLESHOOTING

The following section outlines some common issues with Modbus configuration and installation.

| PROBLEM | PROPOSED SOLUTIONS |
|---|---|
| Device not responding | Ensure configuration parameters match between the master device and the PF2200.<br>Ensure RS-485 lines are connected properly – The A wire connects to A or D- and the B wire connects to B or D+.<br>Ensure the PF2200 Modbus RTU Communication setting is set to "Enabled".<br>Ensure a signal ground wire is connected between the master and slave device.<br>Raise the response timeout on the master device.<br>Toggle the PF2200 Modbus Termination setting and retry. A termination resistor can cause the master device to be incorrectly biased in some cases.<br>Confirm that the master device has internal pullup and pulldown termination on the data lines as some devices require external biasing resistors to be installed. |
| CRC Errors | Ensure configuration parameters match between the master device and the PF2200.<br>Ensure there is no noise on the line caused by external equipment or long run lengths.<br>Ensure RS-485 lines are connected properly – The A wire connects to A or D- and the B wire connects to B or D+. |
| Data returned is always 0 | Ensure the PF2200 Modbus RTU Communication setting is set to "Enabled".<br>Ensure the UI is communicating with the BMS (see Communication Loss).<br>Ensure register address is correct. |
| BMS shuts down when writing setpoints | Ensure Modbus writes are correctly formatted.<br>Ensure master device is configured to write in the correct units for each register.<br>Ensure that setpoint writes are not causing configuration alarms on the PF2200 (e.g., the system will go to Lockout if the Process Setpoint is written to be higher than its configured High Temperature Setpoint. Refer to the Product Manual for additional details. |
| BMS will not start when Start command sent via Modbus | Ensure the correct value is being written to the Start/Stop Register.<br>Ensure that no active alarms are present on the PF2200 and all on-screen lockout messages have been acknowledged at the PF2200 UI or with the Clear Shutdown Code Register. |
| Read values don't make sense | Ensure that the master device is configured to read values in the units configured on the PF2200 UI<br>Ensure that the master device is configured to apply a 0.1 multiplication factor for any registers that are marked with a "10x" in the Modbus Register Map below. |
| Read values are not matching expected results | Ensure that master device is configured with the correct data type for each register. Use the Test Registers to verify configuration.<br>Ensure register address (or offset – see Register Address vs. Register Offset) is correct. |

### 1.3.1 MODBUS DIAGNOSTICS

Check the Modbus Diagnostics screen (System > Diagnostics > Modbus) for useful troubleshooting information.

| DIAGNOSTIC NAME | DESCRIPTION | POTENTIAL CAUSE |
|---|---|---|
| Transmitted Packets | The total number of packets transmitted. | N/A |
| Checksum Error | The Modbus packet has been received but the CRC check has failed indicating a corrupt packet. | Noise or missed bits on the RS485 line. |
| Illegal Function Code | The requested Modbus function code is not supported. | Modbus master programming error |
| Invalid Address count | The number of received packets that are not addressed to this slave device. | Configured Slave Address setting is incorrect |
| Frame Error | The received Modbus packet has frames that do not match the current configuration. | Configured Baud Rate, Parity, and/or Stop Bits settings do not match the Modbus master communication settings |
| Noise Error | The slave Modbus port has detected noise on the RS-485 line. | Incorrect configuration or noise from external sources. |
| Received Packets | The total number of packets received without protocol error. | N/A |
| Illegal Register Address | The requested register address is not supported. | Modbus master programming error |
| Parity Error | The received Modbus packet has a parity failure. | Corruption, noise, or incorrect configuration |
| Illegal Data Value | The data written to the register is out of range, or if the register spans multiple addresses not all addresses are written to in a single write request. | Modbus master programming error |
| Exceptions | The total count of illegal packet codes. | Incorrect configuration or Modbus master programming error |

## 1.4 MODBUS COMMANDS

The table below specifies the supported Modbus RTU commands.

| NAME | COMMAND | DESCRIPTION |
|---|---|---|
| Read Coil | 1 = 0x01 | Bits pack the response |
| Read Discrete Input | 2 = 0x02 | Bits pack the response |
| Read Holding Registers | 3 = 0x03 | Two bytes per register are returned |
| Read Input Registers | 4 = 0x04 | Two bytes per register are returned |
| Write Single Holding Register | 6 = 0x06 | Two bytes per register must be sent |
| Write Multiple Holding Registers | 16 = 0x10 | Two bytes per register must be sent |

***1 An exception code is returned for any unsupported commands (i.e., 0x05, 0x0F).***
***2 An exception code is returned for any request to an invalid register address.***
***3 Multiple-register requests return 0 for all invalid registers (rather than returning an exception code) as long as the first register has a valid address.***

## 1.5 REGISTER ADDRESS VS REGISTER OFFSET

Some Modbus configuration software requires the 5-digit Register Address to be entered while other software uses the 1-to-4-digit Register Offset. Consult the Modbus master device manufacturer documentation to determine which is required. The Modbus Register Map displays both the address and the offset for each register.

## 1.6 REGISTER DATA FORMAT

The following table specifies the data types supported and indicates how controller status information is represented for each data type:

| DATA TYPE | STATUS INFORMATION (HEXADECIMAL) | MODBUS REPRESENTATION | | ENDIANNESS |
|---|---|---|---|---|
| int16/ uint16 | 0x0A0B | 0x0A0B in a single 16-bit register | | Big-endian |
| int32/ uint32 | 0x0A0B0C0D | 0x0A0B0C0D in two sequential 16-bit registers | 0x0A0B in first register | Big-endian |
| | | | 0x0C0D in second register | |
| Bitset | 0x0000 | 0x0000 in a single 16-bit register where each binary digit represents separate status information | Bit 0: 0b0000 0000 0000 0001 | Big-endian |
| | | | Bit 1: 0b0000 0000 0000 0010 | |
| | | | ⋮ | |
| | | | Bit 14: 0b0100 0000 0000 0000 | |
| | | | Bit 15: 0b1000 0000 0000 0000 | |
| Array | 0x0A0B0C0D0E0F | 0x0F0E0D0C0B0A held in consecutive 16- bit registers | 0x0F0E in first register | Little-endian |
| | | | 0x0D0C in second register | |
| | | | 0x0B0A in third register | |

## 1.7 SYSTEM UNITS

Settings and status registers are represented in their respective display units as configured on the UI (Settings > Setup > Units) unless indicated.

## 1.8 COMMUNICATION LOSS

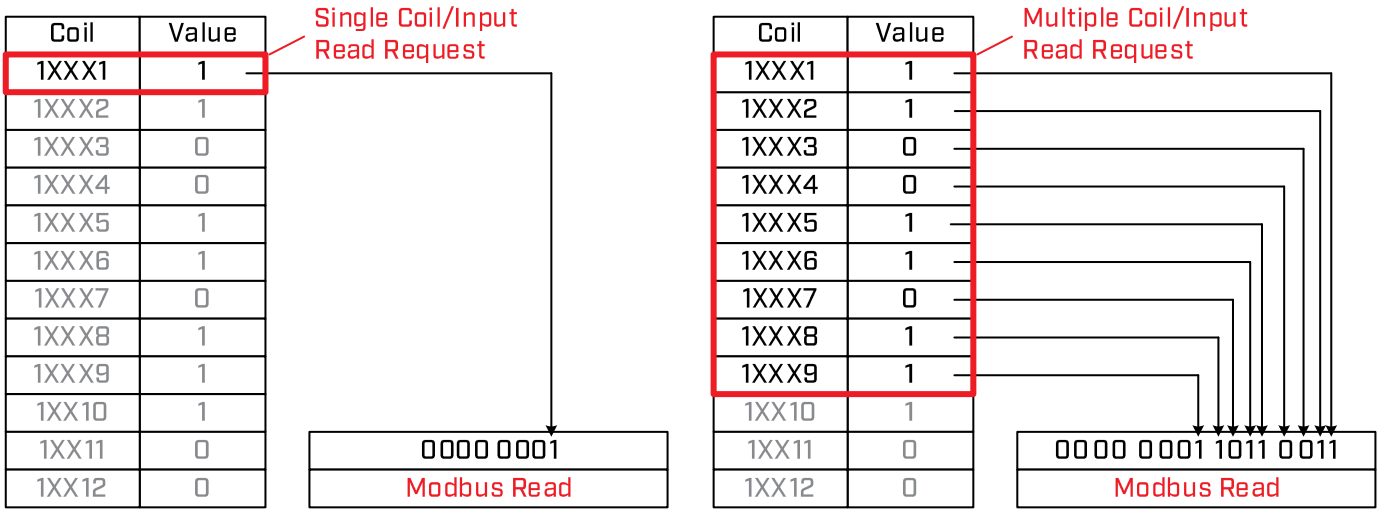
The PF2200 user interface communicates with the BMS card via a proprietary communication protocol called PFN. Modbus data is transferred from the BMS card to the user interface over the PFN link. When the user interface loses communication with the BMS card all Modbus registers return a value of 0 except for the Modbus Communication Error register and the Modbus Communication Error counter as indicated below:

| ADDRESS (OFFSET) | | READ/WRITE | NAME | TYPE | READ VALUE |
|---|---|---|---|---|---|
| 30015/40015 | (14) | Read Only | Modbus Communication Error | uint16 | 0 = No Error<br>1 = Communication Error |
| 30016/40016 | (15) | Read Only | Modbus Communication Error Counter<br>* Increments every second while the BMS and UI are not communicating. | uint16 | 0 - 65535 |

# 2 MODBUS REGISTER MAP

## 2.1 READ ONLY COILS & DISCRETE INPUTS [FUNCTION CODE 0X01 OR 0X02]

Reading a single coil/input returns a single byte holding the requested coil/input value in its least significant bit and reading multiple coils/inputs returns a bit packed vector containing the requested coil/input values. Only requested values are returned (all other bits are set to 0) as indicated in the diagrams below:




| ADDRESS (OFFSET) | | NAME | 0 | 1 |
|---|---|---|---|---|
| 10101/20101<br>To<br>10357/20357 | (100)<br>To<br>(356) | Alarm Bit AL000<br>To<br>Alarm Bit AL256 | Alarm not set | Alarm set |
| 10501/20501<br>To<br>10565/20565 | (500)<br>To<br>(564) | Wait Bit WT000<br>To<br>Wait Bit WT064 | Wait not set | Wait set |
| 10601/20601<br>To<br>10665/20665 | (600)<br>To<br>(664) | Warning Bit WN000<br>To<br>Warning Bit WN064 | Warning not set | Warning set |
| 10701/20701<br>To<br>10765/20765 | (700)<br>To<br>(764) | Main Permissive Bit MP000<br>To<br>Main Permissive Bit MP064 | Main Permissive not set | Main Permissive set |
| 10801/20801 | (800) | Proof of Closure | Open | Closed |
| 10802/20802 | (801) | ESD | Open | Closed |
| 10803/20803 | (802) | Start | Open | Closed |
| 10804/20804 | (803) | Pressure Low | Open | Closed |
| 10805/20805 | (804) | Pressure High | Open | Closed |
| 10806/20806 | (805) | Proof of Position | Open | Closed |
| 10807/20807 | (806) | Level/Flow | Open | Closed |

| ADDRESS (OFFSET) | | NAME | 0 | 1 |
|---|---|---|---|---|
| 10808/20808 | (807) | Aux In 1 | Open | Closed |
| 10809/20809 | (808) | Aux In 2 | Open | Closed |
| 10810/20810 | (809) | Proof of Airflow | Open | Closed |
| 10811/20811 | (810) | UV Fault | Open | Closed |
| 10812/20812 | (811) | UV Flame On | Open | Closed |
| 10813/20813 | (812) | UV Flame Off | Open | Closed |
| 10821/20821 | (820) | Pilot 1 | De-energized | Energized |
| 10822/20822 | (821) | Pilot 2 | De-energized | Energized |
| 10823/20823 | (822) | SSV 1 | De-energized | Energized |
| 10824/20824 | (823) | SSV 2 | De-energized | Energized |
| 10825/20825 | (824) | Fan | De-energized | Energized |
| 10961/20961 | (960) | Flame 1 Load Monitor Check Failure | Alarm not set | Alarm set |
| 10962/20962 | (961) | Flame 2 Load Monitor Check Failure | Alarm not set | Alarm set |
| 10963/20963 | (962) | Flame 1 Voltage Fault | Alarm not set | Alarm set |
| 10964/20964 | (963) | Flame 2 Voltage Fault | Alarm not set | Alarm set |
| 10965/20965 | (964) | Flame 1 DC Input Open Fault | Alarm not set | Alarm set |
| 10966/20966 | (965) | Flame 2 DC Input Open Fault | Alarm not set | Alarm set |
| 10967/20967 | (966) | Flame Detect Software Watchdog Trip | Alarm not set | Alarm set |
| 10981/20981 | (980) | UV Flame Detect Fault | Alarm not set | Alarm set |
| 10982/20982 | (981) | UV Flame Detect Mismatch | Alarm not set | Alarm set |
| 11001/21001 | (1000) | Switch Run Short | Alarm not set | Alarm set |
| 11002/21002 | (1001) | Switch Ignition Short | Alarm not set | Alarm set |
| 11003/21003 | (1002) | Start Short | Alarm not set | Alarm set |
| 11004/21004 | (1003) | Proof of Closure Short | Alarm not set | Alarm set |
| 11005/21005 | (1004) | UV Flame Off Short | Alarm not set | Alarm set |
| 11006/21006 | (1005) | UV Fault Short | Alarm not set | Alarm set |
| 11007/21007 | (1006) | ESD Short | Alarm not set | Alarm set |
| 11021/21021 | (1020) | Pressure Communication Bus Fault | Alarm not set | Alarm set |
| 11022/21022 | (1021) | Pressure High Communication Bus Fault | Alarm not set | Alarm set |
| 11023/21023 | (1022) | Proof of Position Communication Bus Fault | Alarm not set | Alarm set |
| 11024/21024 | (1023) | Level/Flow Communication Bus Fault | Alarm not set | Alarm set |
| 11025/21025 | (1024) | Proof of Airflow Communication Bus Fault | Alarm not set | Alarm set |
| 11026/21026 | (1025) | Aux In 1 Communication Bus Fault | Alarm not set | Alarm set |

| ADDRESS (OFFSET) | | NAME | 0 | 1 |
|---|---|---|---|---|
| 11027/21027 | (1026) | Aux In 2 Communication Bus Fault | Alarm not set | Alarm set |
| 11028/21028 | (1027) | Pilot 1 Communication Bus Fault | Alarm not set | Alarm set |
| 11029/21029 | (1028) | Pilot 2 Communication Bus Fault | Alarm not set | Alarm set |
| 11030/21030 | (1029) | SSV1 Communication Bus Fault | Alarm not set | Alarm set |
| 11031/21031 | (1030) | SSV2 Communication Bus Fault | Alarm not set | Alarm set |
| 11032/21032 | (1031) | Fan Communication Bus Fault | Alarm not set | Alarm set |
| 11033/21033 | (1032) | System Voltage Communication Bus Fault | Alarm not set | Alarm set |
| 11041/21041 | (1040) | Pilot Start Internal Board Fault | Alarm not set | Alarm set |
| 11042/21042 | (1041) | Pilot Read Internal Board Fault | Alarm not set | Alarm set |
| 11043/21043 | (1042) | Pilot Stop Internal Board Fault | Alarm not set | Alarm set |
| 11044/21044 | (1043) | System Start Internal Board Fault | Alarm not set | Alarm set |
| 11045/21045 | (1044) | System Read Internal Board Fault | Alarm not set | Alarm set |
| 11046/21046 | (1045) | System Stop Internal Board Fault | Alarm not set | Alarm set |
| 11047/21047 | (1046) | Digital Input Start Internal Board Fault | Alarm not set | Alarm set |
| 11048/21048 | (1047) | Digital Input Read Internal Board Fault | Alarm not set | Alarm set |
| 11049/21049 | (1048) | Digital Input Stop Internal Board Fault | Alarm not set | Alarm set |
| 11061/21061 | (1060) | Aux Out 1 Fault | Alarm not set | Alarm set |
| 11062/21062 | (1061) | Aux Out 2 Fault | Alarm not set | Alarm set |
| 11063/21063 | (1062) | TCV Output Fault | Alarm not set | Alarm set |

## 2.2 INPUT/HOLDING REGISTERS [READ: 0X03, 0X04 WRITE: 0X06, 0X10]

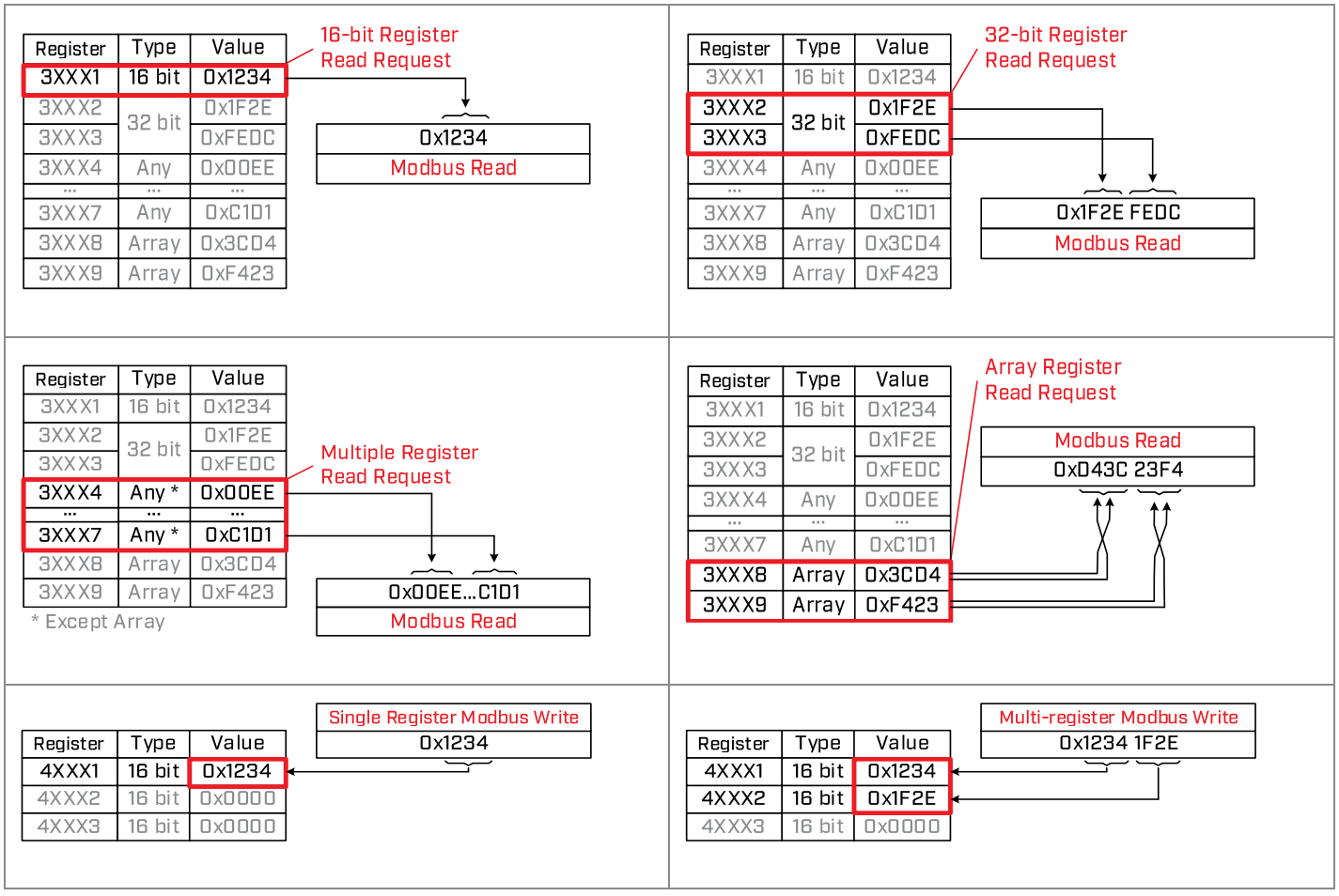
The Input Registers (300xx) are duplicated in the corresponding Holding Registers (400xx) for convenience and to maintain compatibility with some PLCs.

Use the Read Input Register command (0x04) to read the Input Registers (300xx).

Use the Read Holding Registers command (0x03) to read the Holding Registers (400xx).

Use the Preset Single Register command (0x06) or the Preset Multiple Registers command (0x10) to write the Holding Registers.

The following diagrams provide read and write examples for various register types.



### 2.2.1 TEST REGISTERS

The following registers can be used to test whether the Modbus Master is correctly configured and to confirm that both unsigned and signed values can be read properly.

| ADDRESS (OFFSET) | | READ/WRITE | NAME | TYPE | READ VALUE |
|---|---|---|---|---|---|
| 30123/40123 | (122) | Read Only | Test Read - Unsigned | uint16 | 1234 |
| 30124/40124 | (123) | Read Only | Test Read - Signed | int16 | -1234 |

### 2.2.2 BMS SETTINGS AND FUNCTIONS

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|---|
| 30100/40100 | (99) | R/W | Start/Stop Register | uint16 | | Read 0 = Command Accepted | |
| | | | | | | Write 1234 = Start system | |
| | | | | | | Write 4321 = Stop System | |
| 30110/40110 | (109) | R/W | UI Clock Seconds | uint16 | | 0 – 59 seconds | |
| 30111/40111 | (110) | R/W | UI Clock Minutes | uint16 | | 0 – 59 minutes | |
| 30112/40112 | (111) | R/W | UI Clock Hour | uint16 | | 0 – 23 hours | |
| 30113/40113 | (112) | R/W | UI Clock Day | uint16 | | 1 – 31 days | |
| 30114/40114 | (113) | R/W | UI Clock Month | uint16 | | 1 – 12 months | |
| 30115/40115 | (114) | R/W | UI Clock Year | uint16 | | 2000 – 2099 years | |
| 30121/40121 | (120) | R/W | Modbus Remote Echo for Aux 1 | uint16 | 10x | 0 – 1000 (0 – 100 %) | Sets the Aux Output position when configured in Modbus Echo mode |
| 30122/40122 | (121) | R/W | Modbus Remote Echo for Aux 2 | uint16 | 10x | 0 – 1000 (0 – 100 %) | |
| 30143/40143 | (142) | R/W | Clear Shutdown Code | uint16 | | 0 = No effect | |
| | | | | | | 1 = Acknowledge Lockout | |
| 31001/41001 | (1000) | Read Only | Bath Type | uint16 | | 0 = TC | |
| | | | | | | 1 = RTD | |
| 31002/41002 | (1001) | Read Only | Bath Mode | uint16 | | 0 = Process Control | |
| | | | | | | 1 = High Temp ESD | |
| 31003/41003 | (1002) | Read Only | Bath Input | uint16 | | 0 = Dual | |
| | | | | | | 1 = Single | |
| 31004/41004 | (1003) | Read Only | Bath High Temp Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) | |
| 31005/41005 | (1004) | R/W | Bath Pilot Off Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) | |

* Write must be between the Bath Main Off Setpoint and the Bath High Temp Setpoint while running. Writes below or above the bounds will set the register to its lowest or highest allowable value, respectively.

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31006/41006 | (1005) | R/W | Bath Main Off Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| * Write must be between the Bath Process Setpoint and the Bath Pilot Off Setpoint while running. Writes below or above the bounds will set the register to its lowest or highest allowable value, respectively. | | | | | | |
| 31007/41007 | (1006) | R/W | Bath Process Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| * Write must be between the Bath Low Temp Setpoint and the Bath Main Off Setpoint while running. Writes below or above the bounds will set the register to its lowest or highest allowable value, respectively. | | | | | | |
| 31008/41008 | (1007) | Read Only | Bath Low Temp Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| 31009/41009 | (1008) | R/W | Bath Deadband | uint16 | | 0 - 100 °C (32 - 212 °F) |
| 31010/41010 | (1009) | Read Only | Outlet Type | uint16 | | 0 = TC |
| | | | | | | 1 = RTD |
| 31011/41011 | (1010) | Read Only | Outlet Mode | uint16 | | 0 = Disabled |
| | | | | | | 1 = Process Control |
| | | | | | | 2 = High Temp ESD |
| | | | | | | 3 = Display Only |
| 31012/41012 | (1011) | Read Only | Outlet High Temp Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| 31013/41013 | (1012) | R/W | Outlet Pilot Off Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| * Write must be between the Outlet Main Off Setpoint and the Outlet High Temp Setpoint while running. Writes below or above the bounds will set the register to its lowest or highest allowable value, respectively. | | | | | | |
| 31014/41014 | (1013) | R/W | Outlet Main Off Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| * Write must be between the Outlet Process Setpoint and the Outlet Pilot Off Setpoint while running. Writes below or above the bounds will set the register to its lowest or highest allowable value, respectively. | | | | | | |
| 31015/41015 | (1014) | R/W | Outlet Process Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| * Write must be between the Outlet Low Temp Setpoint and the Outlet Main Off Setpoint while running. Writes below or above the bounds will set the register to its lowest or highest allowable value, respectively. | | | | | | |
| 31016/41016 | (1015) | Read Only | Outlet Low Temp Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| 31017/41017 | (1016) | R/W | Outlet Deadband | uint16 | | 0 - 100 °C (32 - 212 °F) |
| 31018/41018 | (1017) | Read Only | Stack Type | uint16 | | 0 = TC |
| | | | | | | 1 = RTD |
| 31019/41019 | (1018) | Read Only | Stack Mode | uint16 | | 0 = Disabled |
| | | | | | | 1 = High Temp ESD |
| | | | | | | 2 = Display Only |
| 31020/41020 | (1019) | Read Only | Stack High Temp Setpoint | uint16 | | 0 - 1350 °C (32 - 2462 °F) |
| 31021/41021 | (1020) | R/W | Stack Deadband | uint16 | | 0 - 100 °C (32 - 212 °F) |
| 31032/41032 | (1031) | Read Only | Proof of Closure | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31033/41033 | (1032) | Read Only | Remote Start | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31034/41034 | (1033) | Read Only | Pressure Type | uint16 | | 0 = Disabled |
| | | | | | | 1 = Digital |
| | | | | | | 2 = 4-20 |
| 31035/41035 | (1034) | Read Only | Pressure Span Min | int32 | 10x | Setting multiplied by 10 in configured Pressure Units<br>* returns 0 if Pressure Units set to mA or % |
| 31037/41037 | (1036) | Read Only | Pressure Span Max | int32 | 10x | Setting multiplied by 10 in configured Pressure Units<br>* returns 0 if Pressure Units set to mA or % |
| 31039/41039 | (1038) | Read Only | Pressure Low Trip | int32 | 10x | Setting multiplied by 10 in configured Pressure Units |
| 31041/41041 | (1040) | Read Only | Pressure High Trip | int32 | 10x | Setting multiplied by 10 in configured Pressure Units |
| 31043/41043 | (1042) | Read Only | Pressure Deadband | uint16 | 10x | Setting multiplied by 10 in configured Pressure Units |
| 31044/41044 | (1043) | Read Only | Low Pressure Delay | uint16 | | 2 - 20 seconds |
| 31045/41045 | (1044) | Read Only | Low Pressure Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| | | | | | | 3 = Main Permissive |
| 31046/41046 | (1045) | Read Only | Pressure High Type | uint16 | | 0 = Disabled |
| | | | | | | 1 = Digital |
| 31047/41047 | (1046) | Read Only | Pressure High | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31048/41048 | (1047) | Read Only | Level/Flow Type | uint16 | | 0 = Disabled |
| | | | | | | 1 = Digital |
| | | | | | | 2 = 4-20 |
| 31049/41049 | (1048) | Read Only | Level/Flow Digital Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| 31050/41050 | (1049) | Read Only | Level/Flow Low Trip Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31051/41051 | (1050) | Read Only | Level/Flow High Trip Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| 31052/41052 | (1051) | Read Only | Level/Flow Span Min | int32 | 10x | Setting multiplied by 10 in configured Level/Flow Units<br>* returns 0 if Level/Flow Units set to mA or % |
| 31054/41054 | (1053) | Read Only | Level/Flow Span Max | int32 | 10x | Setting multiplied by 10 in configured Level/Flow Units<br>* returns 0 if Level/Flow Units set to mA or % |
| 31056/41056 | (1055) | Read Only | Level/Flow Low Trip | int32 | 10x | Setting multiplied by 10 in configured Level/Flow Units |
| 31058/41058 | (1057) | Read Only | Level/Flow High Trip | int32 | 10x | Setting multiplied by 10 in configured Level/Flow Units |
| 31060/41060 | (1059) | Read Only | Level/Flow Deadband | uint16 | 10x | Setting multiplied by 10 in configured Level/Flow Units |
| 31061/41061 | (1060) | Read Only | Level/Flow Delay | uint16 | | 2 - 20 seconds |
| 31062/41062 | (1061) | Read Only | Proof of Position Type | uint16 | | 0 = Disabled |
| | | | | | | 1 = Digital (Proof of Light Off) |
| | | | | | | 2 = 4-20 |
| 31063/41063 | (1062) | Read Only | Light Off Firing Rate | uint16 | | 0 – 100 % |
| 31064/41064 | (1063) | Read Only | TCV Position Error | uint16 | | 0 – 10 % |
| 31065/41065 | (1064) | Read Only | Aux In 1 Type | uint16 | | 0 = Disabled |
| | | | | | | 1 = Digital |
| | | | | | | 2 = 4-20 |
| 31066/41066 | (1065) | Read Only | Aux In 1 4-20 Mode | uint16 | | 0 = High/Low Trip |
| | | | | | | 1 = Appliance Firing Rate |
| | | | | | | 2 = Bath Process SP Adjust |
| | | | | | | 3 = Outlet Process SP Adjust |
| | | | | | | 4 = UV Flame Quality |
| | | | | | | 5 = Air Channel * Available for FARC model only |
| | | | | | | 6 = O2 Sensor * Available for FARC model only |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31067/41067 | (1066) | Read Only | Aux In 1 Digital Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| | | | | | | 3 = Main Permissive |
| | | | | | | 4 = Pilot Position |
| | | | | | | 5 = Purge Position |
| 31068/41068 | (1067) | Read Only | Aux In 1 Low Trip Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| | | | | | | 3 = Main Permissive |
| 31069/41069 | (1068) | Read Only | Aux In 1 High Trip Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| | | | | | | 3 = Main Permissive |
| 31070/41070 | (1069) | Read Only | Aux In 1 Low Trip | int32 | 10x | Setting multiplied by 10 in configured Aux In 1 Units |
| 31072/41072 | (1071) | Read Only | Aux In 1 High Trip | int32 | 10x | Setting multiplied by 10 in configured Aux In 1 Units |
| 31074/41074 | (1073) | Read Only | Aux In 1 Deadband | uint16 | 10x | Setting multiplied by 10 in configured Aux In 1 Units |
| 31076/41076 | (1075) | Read Only | Aux In 1 Span Min | int32 | 10x | Setting multiplied by 10 in configured Aux In 1 Units<br>* returns 0 if Aux In 1 Units set to mA or % |
| 31078/41078 | (1077) | Read Only | Aux In 1 Span Max | int32 | 10x | Setting multiplied by 10 in configured Aux In 1 Units<br>* returns 0 if Aux In 1 Units set to mA or % |
| 31080/41080 | (1079) | Read Only | Aux In 2 Type | uint16 | | 0 = Disabled |
| | | | | | | 1 = Digital |
| | | | | | | 2 = 4-20 |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31081/41081 | (1080) | Read Only | Aux In 2 4-20 Mode | uint16 | | 0 = High/Low Trip |
| | | | | | | 1 = Appliance Firing Rate |
| | | | | | | 2 = Bath Process SP Adjust |
| | | | | | | 3 = Outlet Process SP Adjust |
| | | | | | | 4 = UV Flame Quality |
| | | | | | | 5 = Air Channel * Available for FARC model only |
| | | | | | | 6 = O2 Sensor * Available for FARC model only |
| 31082/41082 | (1081) | Read Only | Aux In 2 Digital Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| | | | | | | 3 = Main Permissive |
| | | | | | | 4 = Pilot Position |
| | | | | | | 5 = Purge Position |
| 31083/41083 | (1082) | Read Only | Aux In 2 Low Trip Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| | | | | | | 3 = Main Permissive |
| 31084/41084 | (1083) | Read Only | Aux In 2 High Trip Mode | uint16 | | 0 = Alarm |
| | | | | | | 1 = Wait |
| | | | | | | 2 = Warning |
| | | | | | | 3 = Main Permissive |
| 31085/41085 | (1084) | Read Only | Aux In 2 Low Trip | int32 | 10x | Setting multiplied by 10 in configured Aux In 2 Units |
| 31087/41087 | (1086) | Read Only | Aux In 2 High Trip | int32 | 10x | Setting multiplied by 10 in configured Aux In 2 Units |
| 31089/41089 | (1088) | Read Only | Aux In 2 Deadband | uint16 | 10x | Setting multiplied by 10 in configured Aux In 2 Units |
| 31090/41090 | (1089) | Read Only | Aux In 2 Span Min | int32 | 10x | Setting multiplied by 10 in configured Aux In 2 Units<br>* returns 0 if Aux In 2 Units set to mA or % |
| 31092/41092 | (1091) | Read Only | Aux In 2 Span Max | int32 | 10x | Setting multiplied by 10 in configured Aux In 2 Units<br>* returns 0 if Aux In 2 Units set to mA or % |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31094/41094 | (1093) | Read Only | Status Contact Mode | uint16 | | 0 = Run Status |
| | | | | | | 1 = Heating Status |
| | | | | | | 2 = Low Temp Warning |
| | | | | | | 3 = Level/Flow Control |
| 31095/41095<br>31096/41096 | (1094)<br>(1095) | Read Only<br>Read Only | Aux Out 1 Mode<br>Aux Out 2 Mode | uint16 | | 0 = Disabled |
| | | | | | | 1 = Level/Flow Echo |
| | | | | | | 2 = Proof of Airflow Echo |
| | | | | | | 3 = Aux In 1 Echo |
| | | | | | | 4 = Aux In 2 Echo |
| | | | | | | 5 = Proof of Position Echo |
| | | | | | | 6 = N/A |
| | | | | | | 7 = N/A |
| | | | | | | 8 = Modbus Echo |
| | | | | | | 9 = Bath Temp Echo |
| | | | | | | 10 = Outlet Temp Echo |
| | | | | | | 11 = Stack Temp Echo |
| | | | | | | 12 = N/A |
| | | | | | | 13 = Air Channel * Available for FARC model only |
| 31097/41097 | (1096) | Read Only | Aux Out 1 Temp Echo Span Min | int16 | | -100 - 1350 °C |
| 31098/41098 | (1097) | Read Only | Aux Out 1 Temp Echo Span Max | int16 | | -100 - 1350 °C |
| 31099/41099 | (1098) | Read Only | Aux Out 2 Temp Echo Span Min | int16 | | -100 - 1350 °C |
| 31100/41100 | (1099) | Read Only | Aux Out 2 Temp Echo Span Max | int16 | | -100 - 1350 °C |
| 31101/41101 | (1100) | Read Only | Pilot Valve PWM | uint16 | | 10 - 100 % |
| 31102/41102 | (1101) | Read Only | SSV PWM | uint16 | | 10 - 100 % |
| 31104/41104 | (1103) | Read Only | Minimum Firing Rate | uint16 | | 0 - 70 % |
| 31105/41105 | (1104) | Read Only | TCV Purge Position | uint16 | | 0 - 100 % |
| 31106/41106 | (1105) | Read Only | TCV Pilot Position | uint16 | | 0 - 100 % |
| 31107/41107 | (1106) | Read Only | Firing Rate Manual Override | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31108/41108 | (1107) | Read Only | Manual Firing Rate | uint16 | | 0 - 100 % |
| 31109/41109 | (1108) | R/W | Process Proportional Band | uint16 | 10x | °C Range: 0 - 10000 (0 - 1000°C) |
| | | | | | | °F Range: 320 - 18320 (32 - 1832°F) |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31110/41110 | (1109) | R/W | Process Integral Time | uint16 | 10x | 0 - 10000 (0 - 1000 min/rep) |
| 31111/41111 | (1110) | R/W | Process Derivative Time | uint16 | 10x | 0 - 10000 (0 - 1000 min) |
| 31112/41112 | (1111) | R/W | Process Integral Reset Range | uint16 | 10x | °C Range: 0 - 10000 (0 - 1000°C) |
| | | | | | | °F Range: 320 - 18320 (32 - 1832°F) |
| 31113/41113 | (1112) | R/W | Cascade SP Proportional Band | uint16 | 10x | °C Range: 0 - 10000 (0 - 1000°C) |
| | | | | | | °F Range: 320 - 18320 (32 - 1832°F) |
| 31114/41114 | (1113) | R/W | Cascade SP Integral Time | uint16 | 10x | 0 - 10000 (0 - 1000 mins/rep) |
| 31115/41115 | (1114) | R/W | Cascade SP Derivative Time | uint16 | 10x | 0 - 10000 (0 - 1000 min) |
| 31116/41116 | (1115) | R/W | Cascade SP Integral Reset Range | uint16 | 10x | °C Range: 0 - 10000 (0 - 1000°C) |
| | | | | | | °F Range: 320 - 18320 (32 - 1832°F) |
| 31117/41117 | (1116) | R/W | PID Output Rate Limit | uint16 | 10x | 1 - 1000 (0.1 = 100 %/sec) |
| 31118/41118 | (1117) | R/W | PID Ramp Time | uint16 | | 0 - 255 seconds |
| 31119/41119 | (1118) | Read Only | Process Control Mode | uint16 | | 0 = External Firing Rate |
| | | | | | | 1 = Bath PID Control |
| | | | | | | 2 = Outlet PID Control |
| | | | | | | 3 = Cascaded PID Control |
| 31120/41120 | (1119) | Read Only | Pilot Off Mode | uint16 | | 0 = Disabled |
| | | | | | | 1 = Off At Pilot Off Setpoint |
| | | | | | | 2 = Off At Main Off Setpoint |
| | | | | | | 3 = Interrupted |
| 31121/41121 | (1120) | Read Only | Pilot 2 | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31122/41122 | (1121) | Read Only | Relight Attempts | uint16 | | 0 - 3 |
| 31123/41123 | (1122) | Read Only | Ignition Mode | uint16 | | 0 = Coil |
| | | | | | | 1 = HEI |
| 31124/41124 | (1123) | Read Only | Pre-Purge Time | uint16 | | 10 - 900 seconds |
| 31125/41125 | (1124) | Read Only | Pilot Startup Delay Time | uint16 | | 5 - 600 seconds |
| 31126/41126 | (1125) | Read Only | Main Startup Delay Time | uint16 | | 30 - 600 seconds |
| 31127/41127 | (1126) | Read Only | Voltage Setting | uint16 | | 0 = 12V |
| | | | | | | 1 = 24V |
| 31128/41128 | (1127) | Read Only | Voltage Restart | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31129/41129 | (1128) | Read Only | L1 Password Enable | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31130/41130 | (1129) | Read Only | Commissioning Complete | uint16 | | 0 = Incomplete |
| | | | | | | 1 = Complete |
| 31131/41131 | (1130) | Read Only | Slave Address | uint16 | | 1 - 247 |
| 31132/41132 | (1131) | Read Only | Baud Rate | uint16 | | 0 = 9600 |
| | | | | | | 1 = 19200 |
| 31133/41133 | (1132) | Read Only | Stop Bits | uint16 | | 0 = 1 |
| | | | | | | 1 = 2 |
| 31134/41134 | (1133) | Read Only | Parity | uint16 | | 0 = None |
| | | | | | | 1 = Odd |
| | | | | | | 2 = Even |
| 31135/41135 | (1134) | Read Only | Modbus Termination | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31136/41136 | (1135) | Read Only | Remote Access | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31137/41137 | (1136) | Read Only | Temperature Units | uint16 | | 0 = Celsius |
| | | | | | | 1 = Fahrenheit |
| 31138/41138 | (1137) | Read Only | Pressure Units | uint16 | | 0 = kPa |
| | | | | | | 1 = psi |
| | | | | | | 2 = inch wc |
| | | | | | | 3 = oz/in$^2$ |
| | | | | | | 4 = kg/cm$^2$ |
| | | | | | | 5 = Percent |
| | | | | | | 6 = Milliamps |
| 31139/41139 | (1138) | Read Only | Level Units | uint16 | | 0 = Litres |
| | | | | | | 1 = m$^3$ |
| | | | | | | 2 = US Gallons |
| | | | | | | 3 = bbl |
| | | | | | | 4 = ft$^3$ |
| | | | | | | 5 = Percent |
| | | | | | | 6 = Milliamps |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31140/41140<br>31141/41141 | (1139)<br>(1140) | Read Only<br>Read Only | Aux In 1 Units<br>Aux In 2 Units | uint16 | | 0 = Percent |
| | | | | | | 1 = Milliamps |
| | | | | | | 2 = Temperature |
| | | | | | | 3 = Pressure |
| | | | | | | 4 = Level |
| | | | | | | 5 = Flow |
| | | | | | | 6 = Percent O2 |
| 31143/41143 | (1142) | Read Only | Minimum Pilots Running | uint16 | | 1 = 1 Pilot required |
| | | | | | | 2 = 2 Pilots required |
| 31144/41144 | (1143) | Read Only | Level/Flow Control Setpoint | int32 | 10x | Setting multiplied by 10 in configured Level/Flow Units |
| 31146/41146 | (1145) | Read Only | Reignition | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31201/41201 | (1200) | Read Only | Pilot Positioning Timeout | uint16 | | 5 – 900 seconds |
| 31202/41202 | (1201) | Read Only | Light Off Positioning Timeout | uint16 | | 5 – 900 seconds |
| 31203/41203 | (1202) | Read Only | Purge Positioning Timeout | uint16 | | 5 – 900 seconds |
| 31204/41204 | (1203) | Read Only | Proof of Airflow Type | uint16 | | 0 = N/A |
| | | | | | | 1 = Digital |
| | | | | | | 2 = 4-20 |
| 31205/41205 | (1204) | Read Only | Proof of Airflow Span Min | int32 | 10x | Setting multiplied by 10 in configured Airflow units<br>* returns 0 if Proof of Airflow Units set to mA or % |
| 31207/41207 | (1206) | Read Only | Proof of Airflow Span Max | int32 | 10x | Setting multiplied by 10 in configured Airflow units<br>* returns 0 if Proof of Airflow Units set to mA or % |
| 31209/41209 | (1208) | Read Only | Proof of Airflow Low Trip | int32 | 10x | Setting multiplied by 10 in configured Airflow units |
| 31211/41211 | (1210) | Read Only | Proof of Airflow Deadband | uint16 | 10x | Setting multiplied by 10 in configured Airflow Units |
| 31213/41213 | (1212) | Read Only | UV Flame Detect Mode | uint16 | | 0 = Disabled |
| | | | | | | 1 = Main Only |
| | | | | | | 2 = Pilot and Main |
| 31214/41214 | (1213) | Read Only | Post Purge Mode | uint16 | | 0 = Purge Position |
| | | | | | | 1 = Last Position |
| 31215/41215 | (1214) | Read Only | Post Purge Time | uint16 | | 10 – 900 seconds |
| 31216/41216 | (1215) | Read Only | Startup Check Timeout | uint16 | | 5 – 900 seconds |
| 31217/41217 | (1216) | Read Only | Airflow Proving Timeout | uint16 | | 5 – 900 seconds |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31219/41219 | (1218) | Read Only | Airflow Units | uint16 | | 0 = CFM |
| | | | | | | 1 = $m^3$/hr |
| | | | | | | 2 = kPa |
| | | | | | | 3 = psi |
| | | | | | | 4 = inch wc |
| | | | | | | 5 = Percent |
| | | | | | | 6 = Milliamps |
| 31220/41220 | (1219) | Read Only | TCV Off Position | uint16 | | 0 – 100 % |
| 31221/41221 | (1220) | Read Only | Proof of Airflow High Trip | int32 | 10x | Setting multiplied by 10 in configured Airflow units |
| 31223/41223 | (1222) | Read Only | Fan Mode | uint16 | | 0 = Forced Draft |
| | | | | | | 1 = Purge Only |
| 31301/41301 | (1300) | Read Only | Flow Units | uint16 | | 0 = L/sec |
| | | | | | | 1 = L/min |
| | | | | | | 2 = m3/sec |
| | | | | | | 3 = m3/min |
| | | | | | | 4 = US Gal/sec |
| | | | | | | 5 = US Gal/min |
| | | | | | | 6 = bbl/sec |
| | | | | | | 7 = bbl/min |
| | | | | | | 8 = ft3/sec |
| | | | | | | 9 = ft3/min |
| | | | | | | 10 = Percent |
| | | | | | | 11 = Milliamps |
| 31302/41302 | (1301) | Read Only | Level/Flow Input Units | uint16 | | 0 = Level |
| | | | | | | 1 = Flow |
| 31303/41303 | (1302) | Read Only | Position Error Timeout | uint16 | | 1 – 10 sec |
| 31304/41304 | (1303) | Read Only | FARC Mode<br>* Available for FARC model only | uint16 | | 0 = Disabled |
| | | | | | | 1 = Enabled |
| 31305/41305 | (1304) | Read Only | FARC Cross Limit Error<br>* Available for FARC model only | uint16 | | 1 -15 % |
| 31306/41306 | (1305) | Read Only | FARC Flat Line Tolerance<br>* Available for FARC model only | uint16 | | 1 -10 % |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31307/41307 | (1306) | Read Only | Air Inversion<br>* Available for FARC model only | uint16 | | 0 = Disabled<br>1 = Enabled |
| 31308/41308 | (1307) | Read Only | Air Off Position<br>* Available for FARC model only | uint16 | | 0 – 100 % |
| 31309/41309 | (1308) | Read Only | Air Purge Position<br>* Available for FARC model only | uint16 | | 0 – 100 % |
| 31310/41310 | (1309) | Read Only | Air Pilot Position<br>* Available for FARC model only | uint16 | | 0 – 100 % |
| 31311/41311 | (1310) | Read Only | Air Post Purge Mode<br>* Available for FARC model only | uint16 | | 0 = Purge Position<br>1 = Last Position |
| 31312/41312 | (1311) | Read Only | Air Position Error<br>* Available for FARC model only | uint16 | | 1 – 10 % |
| 31313/41313 | (1312) | Read Only | FARC Table Fuel Position -100%<br>* Available for FARC model only | Array | | 0x0A**0B**: Fuel Position at 100% Firing Rate |
| 31314/41314 | (1313) | Read Only | FARC Table Fuel Position - 95% and 90%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 95% Firing Rate<br>0x0A**0B**: Fuel Position at 90% Firing Rate |
| 31315/41315 | (1314) | Read Only | FARC Table Fuel Position - 85% and 80%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 85% Firing Rate<br>0x0A**0B**: Fuel Position at 80% Firing Rate |
| 31316/41316 | (1315) | Read Only | FARC Table Fuel Position - 75% and 70%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 75% Firing Rate<br>0x0A**0B**: Fuel Position at 70% Firing Rate |
| 31317/41317 | (1316) | Read Only | FARC Table Fuel Position - 65% and 60%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 65% Firing Rate<br>0x0A**0B**: Fuel Position at 60% Firing Rate |
| 31318/41318 | (1317) | Read Only | FARC Table Fuel Position - 55% and 50%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 55% Firing Rate<br>0x0A**0B**: Fuel Position at 50% Firing Rate |
| 31319/41319 | (1318) | Read Only | FARC Table Fuel Position - 45% and 40%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 45% Firing Rate<br>0x0A**0B**: Fuel Position at 40% Firing Rate |
| 31320/41320 | (1319) | Read Only | FARC Table Fuel Position - 35% and 30%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 35% Firing Rate<br>0x0A**0B**: Fuel Position at 30% Firing Rate |
| 31321/41321 | (1320) | Read Only | FARC Table Fuel Position - 25% and 20%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 25% Firing Rate<br>0x0A**0B**: Fuel Position at 20% Firing Rate |
| 31322/41322 | (1321) | Read Only | FARC Table Fuel Position - 15% and 10%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 15% Firing Rate<br>0x0A**0B**: Fuel Position at 10% Firing Rate |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|---|
| 31323/41323 | (1322) | Read Only | FARC Table Fuel Position - 5% and 0%<br>* Available for FARC model only | Array | | 0x**0A**0B: Fuel Position at 5% Firing Rate<br>0x0A**0B**: Fuel Position at 0% Firing Rate | |
| 31324/41324 | (1323) | Read Only | FARC Table Air Position - 100%<br>* Available for FARC model only | Array | | 0x0A**0B**: Air Position at 100% Firing Rate | |
| 31325/41325 | (1324) | Read Only | FARC Table Air Position - 95% and 90%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 95% Firing Rate<br>0x0A**0B**: Air Position at 90% Firing Rate | |
| 31326/41326 | (1325) | Read Only | FARC Table Air Position - 85% and 80%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 85% Firing Rate<br>0x0A**0B**: Air Position at 80% Firing Rate | |
| 31327/41327 | (1326) | Read Only | FARC Table Air Position - 75% and 70%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 75% Firing Rate<br>0x0A**0B**: Air Position at 70% Firing Rate | |
| 31328/41328 | (1327) | Read Only | FARC Table Air Position - 65% and 60%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 65% Firing Rate<br>0x0A**0B**: Air Position at 60% Firing Rate | |
| 31329/41329 | (1328) | Read Only | FARC Table Air Position - 55% and 50%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 55% Firing Rate<br>0x0A**0B**: Air Position at 50% Firing Rate | |
| 31330/41330 | (1329) | Read Only | FARC Table Air Position - 45% and 40%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 45% Firing Rate<br>0x0A**0B**: Air Position at 40% Firing Rate | |
| 31331/41331 | (1330) | Read Only | FARC Table Air Position - 35% and 30%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 35% Firing Rate<br>0x0A**0B**: Air Position at 30% Firing Rate | |
| 31332/41332 | (1331) | Read Only | FARC Table Air Position - 25% and 20%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 25% Firing Rate<br>0x0A**0B**: Air Position at 20% Firing Rate | |
| 31333/41333 | (1332) | Read Only | FARC Table Air Position - 15% and 10%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 15% Firing Rate<br>0x0A**0B**: Air Position at 10% Firing Rate | |
| 31334/41334 | (1333) | Read Only | FARC Table Air Position - 5% and 0%<br>* Available for FARC model only | Array | | 0x**0A**0B: Air Position at 5% Firing Rate<br>0x0A**0B**: Air Position at 0% Firing Rate | |
| 31335/41335 | (1334) | Read Only | FARC Table Commissioned Points<br>80% to 100% firing rate columns<br>* Available for FARC model only | Bitset | | 0b000**1** 0000: 100% column<br>0b0000 000**1:** 80% column | 0 = Unconfigured<br>1 = Configured |
| 31336/41336 | (1335) | Read Only | FARC Table Commissioned Points<br>0% to 75% firing rate columns<br>* Available for FARC model only | Bitset | | 0b**1**000 0000 0000 0000: 75% column<br>0b0000 0000 0000 000**1:** 0% column | |
| 31337/41337 | (1336) | Read Only | Stack O2 Temp Minimum<br>* Available for FARC model only | uint16 | | 0 – 1350 °C (32 – 2462 °F) | |

| ADDRESS (OFFSET) | | READ/ WRITE | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|---|
| 31338/41338 | (1337) | Read Only | O2 Trim Mode<br>* Available for FARC model only | uint16 | | 0 = Trim Air |
| | | | | | | 1 = Trim Fuel |
| | | | | | | 2 = Disabled |
| 31339/41339 | (1338) | Read Only | O2 Trim Warmup Mode<br>* Available for FARC model only | uint16 | | 0 = Time Delay |
| | | | | | | 1 = Stack Temp |
| 31340/41340 | (1339) | Read Only | O2 Trim Warmup Time<br>* Available for FARC model only | uint16 | | 1 – 100 min |
| 31341/41341 | (1340) | Read Only | O2 Trim Proportional Band<br>* Available for FARC model only | uint16 | 10x | 10 – 10000 (1 – 100%) |
| 31342/41342 | (1341) | Read Only | O2 Trim Integral Time<br>* Available for FARC model only | uint16 | 10x | 0 -1000 (0 – 100 min/rep) |
| 31343/41343 | (1342) | Read Only | O2 Trim High Offset Limit<br>* Available for FARC model only | uint16 | 10x | 0 – 100 (0% - 10%) |
| 31344/41344 | (1343) | Read Only | O2 Trim Low Offset Limit<br>* Available for FARC model only | int16 | 10x | -100 – 0 (-10 – 0%) |
| 31345/41345 | (1344) | Read Only | O2 Trim Target Percent O2<br>* Available for FARC model only | uint16 | 10x | 5 – 220 (0.5 – 22.0%) |

### 2.2.3 BMS READ ONLY STATUS INFORMATION

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|
| 33001/43001<br>33002/43002<br>33003/43003<br>33506/43506 | (3000)<br>(3001)<br>(3002)<br>(3505) | Controller State<br>Primary Next Controller State<br>Secondary Next Controller State<br>Transition Status | int16 | | -1 = Invalid |
| | | | | | 0 = Lockout |
| | | | | | 1 = Alarm |
| | | | | | 2 = Power On |
| | | | | | 3 = Ready |
| | | | | | 4 = Waiting – Confirm start |
| | | | | | 5 = Waiting |
| | | | | | 6 = Startup Checks |
| | | | | | 7 = Proven Pre-Purge – Request Purge Position |
| | | | | | 8 = Proven Pre-Purge – Prove Airflow |
| | | | | | 9 = Proven Pre-Purge – Pre-Purge |
| | | | | | 10 = Proven Pre-Purge –Request Pilot Position |
| | | | | | 11 = Pre-Ignition |
| | | | | | 12 = Ignition |
| | | | | | 13 = Pilot |
| | | | | | 14 = Pilot – Pilot Startup Delay |
| | | | | | 15 = Pilot – Request Light Off Position |
| | | | | | 16 = Main Light Off |
| | | | | | 17 = Main Light Off – Main Detect |
| | | | | | 18 = Main Light Off – Main Delay |
| | | | | | 19 = PID Control |
| | | | | | 20 = Main Turndown |
| 33004/43004 | (3003) | Shutdown Code | uint16 | | 0 – 255 |
| 33005/43005 | (3004) | Relights Remaining | uint16 | | 0 – 3 |
| 33006/43006 | (3005) | State Timer | uint16 | | Current state timer in seconds. |
| 33007/43007 | (3006) | Purge Timer | uint16 | | Purge timer in seconds. |
| 33008/43008 | (3007) | Delta Time | uint16 | | Processor delta time in milliseconds. |
| 33010/43010 | (3009) | Pilot Flame Establishment Failures | uint16 | | Pilot flame establishment failures since last power on |
| 33012/43012 | (3011) | Main Flame Establishment Failures | uint16 | | Main flame establishment failures since last power on |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33105/43105 | (3104) | Alarm Bits 176 to 191 | Bitset | | 0b1000 0000 0000 0000: AL191<br>0b0000 0000 0000 0001: AL176 | 0 = Alarm not set<br>1 = Alarm set |
| 33106/43106 | (3105) | Alarm Bits 160 to 175 | Bitset | | 0b1000 0000 0000 0000: AL175<br>0b0000 0000 0000 0001: AL160 | |
| 33107/43107 | (3106) | Alarm Bits 144 to 159 | Bitset | | 0b1000 0000 0000 0000: AL159<br>0b0000 0000 0000 0001: AL144 | |
| 33108/43108 | (3107) | Alarm Bits 128 to 143 | Bitset | | 0b1000 0000 0000 0000: AL143<br>0b0000 0000 0000 0001: AL128 | |
| 33109/43109 | (3108) | Alarm Bits 112 to 127 | Bitset | | 0b1000 0000 0000 0000: AL127<br>0b0000 0000 0000 0001: AL112 | |
| 33110/43110 | (3109) | Alarm Bits 96 to 111 | Bitset | | 0b1000 0000 0000 0000: AL111<br>0b0000 0000 0000 0001: AL096 | |
| 33111/43111 | (3110) | Alarm Bits 80 to 95 | Bitset | | 0b1000 0000 0000 0000: AL095<br>0b0000 0000 0000 0001: AL080 | |
| 33112/43112 | (3111) | Alarm Bits 64 to 79 | Bitset | | 0b1000 0000 0000 0000: AL079<br>0b0000 0000 0000 0001: AL064 | |
| 33113/43113 | (3112) | Alarm Bits 48 to 63 | Bitset | | 0b1000 0000 0000 0000: AL063<br>0b0000 0000 0000 0001: AL048 | |
| 33114/43114 | (3113) | Alarm Bits 32 to 47 | Bitset | | 0b1000 0000 0000 0000: AL047<br>0b0000 0000 0000 0001: AL032 | |
| 33115/43115 | (3114) | Alarm Bits 16 to 31 | Bitset | | 0b1000 0000 0000 0000: AL031<br>0b0000 0000 0000 0001: AL016 | |
| 33116/43116 | (3115) | Alarm Bits 0 to 15 | Bitset | | 0b1000 0000 0000 0000: AL015<br>0b0000 0000 0000 0001: AL000 | |
| 33204/43204 | (3203) | Wait Bits 0 to 15 | Bitset | | 0b1000 0000 0000 0000: WT015<br>0b0000 0000 0000 0001: WT000 | 0 = Wait not set<br>1 = Wait set |
| 33301/43301 | (3300) | Warning Bits 48 to 63 | Bitset | | 0b1000 0000 0000 0000: WN063<br>0b0000 0000 0000 0001: WN048 | 0 = Warning not set<br>1 = Warning set |
| 33302/43302 | (3301) | Warning Bits 32 to 47 | Bitset | | 0b1000 0000 0000 0000: WN047<br>0b0000 0000 0000 0001: WN032 | |
| 33303/43303 | (3302) | Warning Bits 16 to 31 | Bitset | | 0b1000 0000 0000 0000: WN031<br>0b0000 0000 0000 0001: WN016 | |
| 33304/43304 | (3303) | Warning Bits 0 to 15 | Bitset | | 0b1000 0000 0000 0000: WN015<br>0b0000 0000 0000 0001: WN000 | |
| 33404/43404 | (3403) | Main Permissive Bits 0 to 15 | Bitset | | 0b1000 0000 0000 0000: MP015<br>0b0000 0000 0000 0001: MP000 | 0 = Main Permissive not set<br>1 = Main Permissive set |
| 33501/43501 | (3500) | System Voltage | int16 | 10x | System Voltage reading multiplied by 10 | |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33502/43502 | (3501) | Authentication Level | uint16 | | 0 = None | |
| | | | | | 1 = Remote | |
| | | | | | 2 = L1 | |
| | | | | | 3 = L2 | |
| | | | | | 4 = SYS | |
| 33503/43503 | (3502) | Is Running | uint16 | | 0 = Not Running | |
| | | | | | 1 = Running | |
| 33504/43504 | (3503) | Sync Count | uint32 | | Processor synchronization count | |
| 33506/43506 | (3505) | Transition Status | int16 | | See register 33001/43001 above for range | |
| 33507/43507 | (3506) | Hardware Model Number | uint32 | | Expected reading: 0x220002 | |
| 33509/43509 | (3508) | Firmware Product Variant | uint16 | | 0 = Invalid | |
| | | | | | 6 = Forced Draft | |
| 33510/43510 | (3509) | Region Code | uint16 | | 0 = Invalid | |
| | | | | | 1 = North America | |
| 33511/43511 | (3510) | Bundle Version | uint32 | | 0x**0A**0B0C0D: Product Variant | Example:<br>A read of 0x06030004 corresponds to firmware bundle FD 3.0.4 |
| | | | | | 0x0A**0B**0C0D: Major version | |
| | | | | | 0x0A0B**0C**0D: Minor version | |
| | | | | | 0x0A0B0C**0D**: Release Number | |
| 33513/43513 | (3512) | BMS Firmware Version | uint32 | | 0x**0A**0B0C0D: Major version | |
| | | | | | 0x0A**0B**0C0D: Minor version | |
| | | | | | 0x0A0B**0C**0D: Release number high byte | |
| | | | | | 0x0A0B0C**0D**: Release number low byte | |
| 33515/43515 | (3514) | BMS Bootloader Version | uint32 | | 0x**0A**0B0C0D: Major version | |
| | | | | | 0x0A**0B**0C0D: Minor version | |
| | | | | | 0x0A0B**0C**0D: Release number high byte | |
| | | | | | 0x0A0B0C**0D**: Release number low byte | |
| 33517/43517 | (3516) | BMS BOM Version | uint32 | | 0x**0A**0B0C0D: Major version | |
| | | | | | 0x0A**0B**0C0D: Minor version | |
| | | | | | 0x0A0B**0C**0D: Release number high byte | |
| | | | | | 0x0A0B0C**0D**: Release number low byte | |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE |
|---|---|---|---|---|---|
| 33519/43519 | (3518) | BMS Serial Number Byte 0 and 1 | Array | | e.g., S/N: 0A0B 0C0D **0E0F**<br>Register read: 0x**0F0E**<br>* Note that the byte order is reversed between the serial number and the register read. |
| 33520/43520 | (3519) | BMS Serial Number Byte 2 and 3 | Array | | e.g., S/N: 0A0B **0C0D** 0E0F<br>Register read: 0x**0D0C**<br>* Note that the byte order is reversed between the serial number and the register read. |
| 33521/43521 | (3520) | BMS Serial Number Byte 4 and 5 | Array | | e.g., S/N: **0A0B** 0C0D 0E0F<br>Register read: 0x**0B0A**<br>* Note that the byte order is reversed between the serial number and the register read. |
| 33522/43522 | (3521) | BMS Manufacture Date | uint32 | | 0x**0A**0B0C0D: N/A |
| | | | | | 0x0A**0B**0C0D: Year – 2000 |
| | | | | | 0x0A0B**0C**0D: Month |
| | | | | | 0x0A0B0C**0D**: Day |
| 33524/43524 | (3523) | BMS Manufacture Test Date | uint32 | | 0x**0A**0B0C0D: N/A |
| | | | | | 0x0A**0B**0C0D: Year – 2000 |
| | | | | | 0x0A0B**0C**0D: Month |
| | | | | | 0x0A0B0C**0D**: Day |
| 33526/43526 | (3525) | PFN Version | uint32 | | 0x**0A**0B0C0D: Major |
| | | | | | 0x0A**0B**0C0D: Minor |
| | | | | | 0x0A0B**0C**0D: Release number high byte |
| | | | | | 0x0A0B0C**0D**: Release number low byte |
| 33528/43528 | (3527) | to 33604/43604 (3603) – Reserved | | | |
| 33605/43605 | (3604) | Bath Temp | int16 | 10x | °C Range: -1000 – 13500 (-100 – 1350°C) |
| | | | | | °F Range: -1480 – 24620 (-148 – 2462°F) |
| 33606/43606 | (3605) | Bath 2 Temp | int16 | 10x | °C Range: -1000 – 13500 (-100 – 1350°C) |
| | | | | | °F Range: -1480 – 24620 (-148 – 2462°F) |
| 33607/43607 | (3606) | Outlet Temp | int16 | 10x | °C Range: -1000 – 13500 (-100 – 1350°C) |
| | | | | | °F Range: -1480 – 24620 (-148 – 2462°F) |
| 33608/43608 | (3607) | Stack Temp | int16 | 10x | °C Range: -1000 – 13500 (-100 – 1350°C) |
| | | | | | °F Range: -1480 – 24620 (-148 – 2462°F) |
| 33610/43610 | (3609) | Ambient Temp 1 | int16 | 10x | °C Range: -1000 – 13500 (-100 – 1350°C) |
| | | | | | °F Range: -1480 – 24620 (-148 – 2462°F) |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33611/43611 | (3610) | Ambient Temp 2 | int16 | 10x | °C Range: -1000 – 13500 (-100 – 1350°C) | |
| | | | | | °F Range: -1480 – 24620 (-148 – 2462°F) | |
| 33612/43612<br>33622/43622<br>33632/43632<br>33642/43642<br>33652/43652<br>33662/43662 | (3611)<br>(3621)<br>(3631)<br>(3641)<br>(3651)<br>(3661) | Bath 1 Faults<br>Bath 2 Faults<br>Outlet Faults<br>Stack Faults<br>Ambient Temp 1 Faults<br>Ambient Temp 2 Faults | Bitset | | 0b0000 0001: TC Open | 0 = Alarm not set<br>1 = Alarm set |
| | | | | | 0b0000 0010: RTD Open | |
| | | | | | 0b0000 0100: RTD Short | |
| | | | | | 0b0000 1000: Out of Range | |
| | | | | | 0b0001 0000: Stale Data | |
| 33672/43672 | (3671) | Pilot 1 Flame Status | uint16 | | 0 = No Flame | |
| | | | | | 1 = Flame | |
| 33673/43673 | (3672) | Pilot 2 Flame Status | uint16 | | 0 = No Flame | |
| | | | | | 1 = Flame | |
| 33674/43674 | (3673) | UV Flame Status | uint16 | | 0 = No Flame | |
| | | | | | 1 = Flame | |
| 33675/43675 | (3674) | Pilot Faults | Bitset | | 0b0000 0001: Flame 1 Load Monitor Check Failure | 0 = Alarm not set<br>1 = Alarm set |
| | | | | | 0b0000 0010: Flame 2 Load Monitor Check Failure | |
| | | | | | 0b0000 0100: Flame 1 Voltage Fault | |
| | | | | | 0b0000 1000: Flame 2 Voltage Fault | |
| | | | | | 0b0001 0000: Flame 1 DC Input Open Fault | |
| | | | | | 0b0010 0000: Flame 2 DC Input Open Fault | |
| | | | | | 0b0100 0000: Flame Detect Software Watchdog Trip | |
| 33680/43680 | (3679) | UV Faults | Bitset | | 0b0000 0001: UV Flame Detect Fault | 0 = Alarm not set<br>1 = Alarm set |
| | | | | | 0b0000 0010: UV Flame Detect Mismatch | |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33685/43685 | (3684) | Interlock Input Contact Status | Bitset | | 0b0000 0000 0000 0001: Proof of Closure | 0 = De-energized<br>1 = Energized |
| | | | | | 0b0000 0000 0000 0010: ESD | |
| | | | | | 0b0000 0000 0000 0100: Start | |
| | | | | | 0b0000 0000 0000 1000: Pressure Low | |
| | | | | | 0b0000 0000 0001 0000: Pressure High | |
| | | | | | 0b0000 0000 0010 0000: Proof of Position | |
| | | | | | 0b0000 0000 0100 0000: Level/Flow | |
| | | | | | 0b0000 0000 1000 0000: Aux In 1 | |
| | | | | | 0b0000 0001 0000 0000: Aux In 2 | |
| | | | | | 0b0000 0010 0000 0000: Proof of Airflow | |
| | | | | | 0b0000 0100 0000 0000: UV Fault | |
| | | | | | 0b0000 1000 0000 0000: UV Flame On | |
| | | | | | 0b0001 0000 0000 0000: UV Flame Off | |
| 33690/43690 | (3689) | IO Short Faults | Bitset | | 0b0000 0001: Switch Run | 0 = Alarm not set<br>1 = Alarm set |
| | | | | | 0b0000 0010: Switch Ignition | |
| | | | | | 0b0000 0100: Start | |
| | | | | | 0b0000 1000: Proof of Closure | |
| | | | | | 0b0001 0000: UV Flame Off | |
| | | | | | 0b0010 0000: UV Fault | |
| | | | | | 0b0100 0000: ESD | |
| 33695/43695 | (3694) | UV Flame Fault Voltage | int16 | 10x | UV Flame Fault Input Voltage multiplied by 10 | |
| 33696/43696 | (3695) | UV Flame On Voltage | int16 | 10x | UV Flame On Input Voltage multiplied by 10 | |
| 33697/43697 | (3696) | UV Flame Off Voltage | int16 | 10x | UV Flame Off Input Voltage multiplied by 10 | |
| 33698/43698 | (3697) | ESD Voltage | int16 | 10x | ESD Input Voltage multiplied by 10 | |
| 33699/43699 | (3698) | Start Voltage | int16 | 10x | Start Input Voltage multiplied by 10 | |
| 33700/43700 | (3699) | POC Voltage | int16 | 10x | POC Input Voltage multiplied by 10 | |
| 33701/43701 | (3700) | 4-20 Level/Flow | int32 | 10x | 4-20 Level/Flow Input reading multiplied by 10 | |
| 33703/43703 | (3702) | 4-20 Pressure | int32 | 10x | 4-20 Pressure Input reading multiplied by 10 | |
| 33705/43705 | (3704) | 4-20 High Pressure | int32 | 10x | 4-20 High Pressure Input reading multiplied by 10 | |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33707/43707 | (3706) | 4-20 Proof of Position | int16 | 10x | 4-20 Proof of Position Input reading multiplied by 10 | |
| 33708/43708 | (3707) | 4-20 Proof of Airflow | int16 | 10x | 4-20 Proof of Airflow Input reading multiplied by 10 | |
| 33709/43709 | (3708) | 4-20 Aux In 1 | int32 | 10x | 4-20 Aux In 1 Input reading multiplied by 10 | |
| 33711/43711 | (3710) | 4-20 Aux In 2 | int32 | 10x | 4-20 Aux In 2 Input reading multiplied by 10 | |
| 33713/43713 | (3712) | Process SP Adjust Setpoint | int16 | 10x | Process SP Adjust Setpoint Input reading multiplied by 10 | |
| 33714/43714 | (3713) | External Switch State | uint16 | | 0 = Stop | |
| | | | | | 1 = Run | |
| | | | | | 2 = Ignite | |
| | | | | | 3 = Invalid | |
| | | | | | 4 = Stuck | |
| 33715/43715 | (3714) | I2C Bus Faults | Bitset | | 0b0000 0000 0000 0001: Pressure | 0 = Alarm not set<br>1 = Alarm set |
| | | | | | 0b0000 0000 0000 0010: Pressure High | |
| | | | | | 0b0000 0000 0000 0100: Proof of Position | |
| | | | | | 0b0000 0000 0000 1000: Level/Flow | |
| | | | | | 0b0000 0000 0001 0000: Proof of Airflow | |
| | | | | | 0b0000 0000 0010 0000: Aux In 1 | |
| | | | | | 0b0000 0000 0100 0000: Aux In 2 | |
| | | | | | 0b0000 0000 1000 0000: Pilot 1 | |
| | | | | | 0b0000 0001 0000 0000: Pilot 2 | |
| | | | | | 0b0000 0010 0000 0000: SSV1 | |
| | | | | | 0b0000 0100 0000 0000: SSV2 | |
| | | | | | 0b0000 1000 0000 0000: Fan | |
| | | | | | 0b0001 0000 0000 0000: System Current | |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33720/43720 | (3719) | ADC Faults | Bitset | | 0b0000 0000 0000 0001: Pilot Start | 0 = Alarm not set<br>1 = Alarm set |
| | | | | | 0b0000 0000 0000 0010: Pilot Read | |
| | | | | | 0b0000 0000 0000 0100: Pilot Stop | |
| | | | | | 0b0000 0000 0000 1000: System Start | |
| | | | | | 0b0000 0000 0001 0000: System Read | |
| | | | | | 0b0000 0000 0010 0000: System Stop | |
| | | | | | 0b0000 0000 0100 0000: Digital Input Start | |
| | | | | | 0b0000 0000 1000 0000: Digital Input Read | |
| | | | | | 0b0000 0001 0000 0000: Digital Input Stop | |
| 33725/43725 | (3724) | Valve Driver Status | Bitset | | 0b0000 0001: Pilot 1 | 0 = De-energized<br>1 = Energized |
| | | | | | 0b0000 0010: Pilot 2 | |
| | | | | | 0b0000 0100: SSV 1 | |
| | | | | | 0b0000 1000: SSV 2 | |
| | | | | | 0b0001 0000: Fan | |
| 33730/43730 | (3729) | Status Contact State | uint16 | | 0 = Deenergized | |
| | | | | | 1 = Energized | |
| 33732/43732 | (3731) | Analog Output 1 Fault | uint16 | | 0 = Absent | |
| | | | | | 1 = Present | |
| 33733/43733 | (3732) | Analog Output 2 Fault | uint16 | | 0 = Absent | |
| | | | | | 1 = Present | |
| 33734/43734 | (3733) | Analog Output 3 Fault | uint16 | | 0 = Absent | |
| | | | | | 1 = Present | |
| 33737/43737 | (3736) | TCV Output Percent | uint16 | | 0 – 100% | |
| 33738/43738 | (3737) | Firing Rate | uint16 | | 0 – 100% | |
| 33739/43739 | (3738) | Reserved | | | | |
| 33740/43740 | (3739) | Cascaded PID Setpoint | int16 | 10x | Cascaded PID Setpoint in configured Temperature Units multiplied by 10 | |
| 33742/43742 | (3741) | Pilot 1 Voltage | int16 | 10x | Pilot 1 Voltage multiplied by 10 | |
| 33743/43743 | (3742) | Pilot 1 Current | int16 | 10x | Pilot 1 Current multiplied by 10 | |
| 33744/43744 | (3743) | Pilot 2 Voltage | int16 | 10x | Pilot 2 Voltage multiplied by 10 | |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33745/43745 | (3744) | Pilot 2 Current | int16 | 10x | Pilot 2 Current multiplied by 10 | |
| 33746/43746 | (3745) | SSV 1 Voltage | int16 | 10x | SSV 1 Voltage multiplied by 10 | |
| 33747/43747 | (3746) | SSV 1 Current | int16 | 10x | SSV 1 Current multiplied by 10 | |
| 33748/43748 | (3747) | SSV 2 Voltage | int16 | 10x | SSV 2 Voltage multiplied by 10 | |
| 33749/43749 | (3748) | SSV 2 Current | int16 | 10x | SSV 2 Current multiplied by 10 | |
| 33750/43750 | (3749) | Fan Voltage | int16 | 10x | Fan Voltage multiplied by 10 | |
| 33751/43751 | (3750) | Fan Current | int16 | 10x | Fan Current multiplied by 10 | |
| 33752/43752 | (3751) | System Current | int16 | 10x | System Current multiplied by 10 | |
| 33753/43753 | (3752) | System Power | int16 | 10x | System Power multiplied by 10 | |
| 33754/43754 | (3753) | Pilot 1 Flame DC High Voltage | int16 | | Pilot 1 Flame DC High Voltage in millivolts | |
| 33755/43755 | (3754) | Pilot 1 Flame DC Low Voltage | int16 | | Pilot 1 Flame DC Low Voltage in millivolts | |
| 33756/43756 | (3755) | Pilot 1 AC Voltage | int16 | | Pilot 1 AC Voltage in millivolts | |
| 33757/43757 | (3756) | Pilot 2 Flame DC High Voltage | int16 | | Pilot 2 Flame DC High Voltage in millivolts | |
| 33758/43758 | (3757) | Pilot 2 Flame DC Low Voltage | int16 | | Pilot 2 Flame DC Low Voltage in millivolts | |
| 33759/43759 | (3758) | Pilot 2 AC Voltage | int16 | | Pilot 2 AC Voltage in millivolts | |
| 33760/43760 | (3759) | Valve Power Status | Bitset | | 0b0000 0001: Pilot 1 | 0 = De-energized<br>1 = Energized |
| | | | | | 0b0000 0010: Pilot 2 | |
| | | | | | 0b0000 0100: SSV 1 | |
| | | | | | 0b0000 1000: SSV 2 | |
| | | | | | 0b0001 0000: Fan | |
| 33765/43765 | (3764) | System Up Time | uint16 | | System Up Time since last power on in hours | |
| 33766/43766 | (3765) | Average Hourly Energy Consumption | uint16 | 10x | Average Hourly Energy Consumption multiplied by 10 in Watts/hour | |
| 33767/43767 | (3766) | Pilot 1 Solenoid Run Time | uint16 | | Pilot 1 Solenoid Run Time since last power on in hours | |
| 33768/43768 | (3767) | SSV Run Time | uint16 | | SSV Run Time since last power on in hours | |
| 33769/43769 | (3768) | Fan Run Time | uint16 | | Fan Run Time since last power on in hours | |
| 33770/43770 | (3769) | Average Firing Rate | uint16 | | Average Firing Rate since last power on in % | |
| 33771/43771 | (3770) | Pilot 1 Flame Fail Count | uint16 | | Pilot 1 Flame Fail Count since last power on | |
| 33772/43772 | (3771) | Pilot 2 Flame Fail Count | uint16 | | Pilot 2 Flame Fail Count since last power on | |
| 33773/43773 | (3772) | Pilot 1 Flame Strength | int16 | | Pilot 1 Flame Strength in millivolts | |
| 33774/43774 | (3773) | Pilot 2 Flame Strength | int16 | | Pilot 2 Flame Strength in millivolts | |
| 33777/43777 | (3776) | Main Flame Fail Count | uint16 | | Main Flame Fail Count since last power on | |

| ADDRESS (OFFSET) | | NAME | TYPE | 10X | RANGE | |
|---|---|---|---|---|---|---|
| 33778/43778 | (3777) | Position Status | uint16 | | 0 = Off | |
| | | | | | 1 = Post Purge | |
| | | | | | 2 = Moving to Pre-Purge | |
| | | | | | 3 = Pre-Purge | |
| | | | | | 4 = Moving to Pilot Position | |
| | | | | | 5 = Pilot Position | |
| | | | | | 6 = Moving to Light Off Position | |
| | | | | | 7 = Light Off Position | |
| | | | | | 8 = Process Control | |
| | | | | | 9 = Moving to Main Turndown | |
| | | | | | 10 = Main Turndown | |
| 33779/43779 | (3778) | System Voltage Fault | uint16 | | 0 = Absent | |
| | | | | | 1 = Present | |
| 33780/43780 | (3779) | Hardware Product Variant | uint16 | | 0 = Invalid | |
| | | | | | 6 = Forced Draft | |
| 33781/43781 | (3780) | Pilot 2 Solenoid Run Time | uint16 | | Pilot 2 Solenoid Run Time since last power on in hours | |
| 33783/43783 | (3782) | FARC Faults<br>* Available for FARC model only | Bitset | | 0b0001: Air Position Error | 0 = Alarm not set<br>1 = Alarm set |
| | | | | | 0b0010: Fuel Position Error | |
| | | | | | 0b0100: Cross Limit Error | |
| 33784/43784 | (3783) | Aux Out 1 Percent | uint16 | | 0 – 100 % | |
| 33785/43785 | (3784) | Aux Out 2 Percent | uint16 | | 0 – 100 % | |
| 33786/43786 | (3785) | O2 Sensor warmed up<br>* Available for FARC model only | uint16 | | 0 = O2 sensor has not warmed up | |
| | | | | | 1 = O2 sensor has warmed up | |
| 33787/43787 | (3786) | Applied O2 Offset<br>* Available for FARC model only | int16 | 10x | -100 – 100 (-10 – 10 %) | |
| 33788/43788 | (3787) | Fuel Requested Position<br>* Available for FARC model only | int16 | 10x | 0 – 1000 (0 – 100 %) | |
| 33789/43789 | (3788) | Software Options | Bitset | | 0b0001: FARC and O2 Trim | 0 = Disabled<br>1 = Enabled |
| 33790/43790 | (3789) | Air Requested Position<br>* Available for FARC model only | int16 | 10x | 0 – 1000 (0 – 100 %) | |
| 33791/43791 | (3790) | FARC Fuel Cross Limited<br>* Available for FARC model only | int16 | | 0 = Fuel channel is not currently being cross limited | |
| | | | | | 1 = Fuel channel is actively being cross limited | |
| 33792/43792 | (3791) | FARC Air Cross Limited<br>* Available for FARC model only | int16 | | 0 = Air channel is not currently being cross limited | |
| | | | | | 1 = Air channel is actively being cross limited | |

# 3 DOCUMENT REVISION HISTORY

| DOCUMENT VERSION | RELEASE DATE | APPLICABLE BMS HARDWARE | APPLICABLE UI HARDWARE | APPLICABLE FIRMWARE |
|---|---|---|---|---|
| v6.1 | 08 MAY 2026 | v2.3.x<br>v2.4.x | v3.2.x<br>v3.3.x | FD 3.0.4 |
| v6.0 | 30 JUN 2022 | v2.3.x<br>v2.4.x | v3.2.x<br>v3.3.x | FD 3.0.4 |
| v5.0 | Internal Release | | | |
| v4.0 | 04 MAR 2021 | v2.3.x | v3.2.x | FD 2.1.2 |
| v3.0 | 04 MAR 2021 | v2.3.x | v3.2.x | FD 2.0.4 |
| v2.0 | 02 FEB 2020 | v2.3.x | v3.2.x | FD 2.1.2 |

## 3.1 CHANGE SUMMARY

### 3.1.1 VERSION 6.1

- Branding update

### 3.1.2 VERSION 6.0

- Added registers associated with PF2200-FD FARC model
- Updated bitset and array representation for clarity
- Added Communication Error diagnostics registers to Communication Loss section
- Replaced text examples with graphics
- Updated troubleshooting section to include links to referenced information

### 3.1.3 VERSION 3.0/4.0

- Removed Register 10001/20001 from document.  Use register 33503/43503 for Run Status

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