

PROFIRE



PF3100



**PF3107-00 MODBUS
REGISTER MAP**



WARNING:

ALL MODBUS REGISTERS ARE FOR DIAGNOSTIC INFORMATION ONLY. MODBUS REGISTER VALUES MUST NOT BE RELIED UPON SAFETY FUNCTIONS.

1 INTRODUCTION

This document outlines key configuration and register information for PF3100 systems utilizing a PF3107-00 Modbus card. This document is applicable for the following hardware and firmware versions:

SYSTEM FIRMWARE

PF3107-00 MODBUS CARD HARDWARE

NA-45.2

v1.3X

Previous versions of the PF3107-00 Modbus Register Map can be found at profireenergy.com.

1.1 GENERAL INFORMATION

The Modbus Card implements a Modbus slave device which allows BMS controller setting and status information to be read remotely by a PLC or other remote Modbus master device. The protocol used is Modbus RTU and the physical implementation is half-duplex RS-485. The Modbus Card interfaces with each connected BMS controller independently.

1.2 CONFIGURATION

There are no configurable Modbus settings available on the PF3100. The Modbus master device must be configured in accordance with the specifications below to ensure proper functionality:

- The slave address of each BMS Controller card is the last byte of its MAC address (e.g., A BMS with MAC address A0:00:00:00:00:2B has a Modbus address of 2B hex (43 decimal). Ensure that slave addresses are updated when BMS Controller cards are replaced in the system.
- The baud rate is automatically selected upon power up based on the baud rate setting of the master device (either 9600 or 19200 bps). Ensure that the PF3100 system is power cycled after changing the baud rate for the change to take effect.
- Data bits must be set to 8.
- Parity must be set to none.
- Stop Bit must be set to 1.
- A 120 Ω termination resistor is present on the Modbus card and can be enabled or disabled using the DIP switch next to the Modbus connection terminals.
- The Start and Status contacts on the Modbus card are not currently supported.

1.3 LED INDICATORS

The Modbus card has two LEDs (Tx and Rx) mounted on the board for communications troubleshooting to help troubleshoot communications.

Each LED blinks three times when the card is powered up.

The Rx LED blinks twice every time a valid message is received and once every time an invalid message is received.

The Tx LED blinks once every time the card transmits a Modbus message.

Note: When troubleshooting Modbus communication issues, ensure all other slave devices are removed from the bus to minimize transmissions that are not intended for the PF3100.

2 MODBUS REGISTER MAP

The following is a complete list of Modbus registers supported by the PF3100 system.

Note: If an input becomes invalid, its corresponding Modbus register will report a value of 0. Similarly, all registers associated with BMS controllers that are not communicating with the system will also report values of 0.

2.1 READ-ONLY DISCRETE INPUTS

The Discrete Inputs (100xx) are single byte read-only values. Reading one input will result in a single byte being returned with the least significant bit holding the value. Reading multiple inputs per command will result in a bit packed vector being returned.

Use the “Read Input Status” command (0x02) to read the Discrete Inputs.

Example 1: Read Single – Reading 1 register starting from Register Offset 3 will result in one data byte being returned with the least significant bit containing the value from Register Offset 3. All other unused bits will be set to zero.

Example 2: Read Multiple – Reading 12 registers starting from Register Offset 3 will result in two data bytes being returned. The value of the registers will be populated in the bits of each byte, beginning with the least significant bit of each byte. All other unused bits will be set to zero.

ADDRESS (OFFSET)	NAME	0	1
10001 (0)	Run	System not in a running state	System in a running state
10002 (1)	Pilot	Pilot output de-energized	Pilot output energized
10004 (3)	High Fire	HFV output de-energized	HFV output energized
10005 (4)	SSV1	SSV1 output de-energized	SSV1 output energized
10006 (5)	SSV2	SSV2 output de-energized	SSV2 output energized
10015 (14)	Aux Input	Aux Input Open	Aux Input Closed
10016 (15)	Pressure Input	Pressure Input Open	Pressure Input Closed
10017 (16)	Level Input	Level Input Open	Level Input Closed
10021 (20)	POC Input	POC Input Open	POC Input Closed
10022 (21)	ESD Input	ESD Input Open	ESD Input Closed
10023 (22)	Start Input	Start Input Open	Start Input Closed
10024 (23)	BMS Communication Status	No Communication	Communicating

2.2 READ-ONLY INPUT/HOLDING REGISTERS

The Input Registers (300xx) are 2 byte read-only values which are mirrored in 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 and the “Read Holding Registers” command (0x03) to read Holding Registers.

Example 1: Read Single – Reading 1 register starting from Register Offset 3 results in two data bytes being returned. The first byte will be the most significant byte of Register Offset 3, and the second byte will be the least significant byte.

Example 2: Read Multiple – Reading 2 registers starting from Register Offset 3 will result in four data bytes being returned. The first byte will be the most significant byte of Register Offset 3, the second byte will be the least significant byte of Register Offset 3, the third byte will be the most significant byte of Register Offset 4, and the fourth byte will be the least significant byte of Register Offset 4.

ADDRESS [OFFSET]	NAME	TYPE	RANGE
30001/40001 (0)	Run	int16	0 = Not Running
			1 = Running
30004/40004 (3)	Process Thermocouple Reading	int16	-50 - 1350°C (-58 - 2462°F) <small>*Per units specified in register 30060/40060</small>
30006/40006 (5)	Pilot Flame Presence	int16	0 = Flame absent on all pilot modules
			100 = Flame present on at least one pilot module
30008/40008 (7)	Process Temp Setpoint	int16	0 - 1350°C (32 - 2462°F) <small>*Per units specified in register 30060/40060</small>
30009/40009 (8)	Low Fire Setpoint	int16	0 - 1350°C (32 - 2462°F) <small>*Per units specified in register 30060/40060</small>
30010/40010 (9)	Pilot Off Setpoint	int16	0 - 1350°C (32 - 2462°F) <small>*Per units specified in register 30060/40060</small>
30011/40011 (10)	Level/Flow Input	int16	Digital Mode: 0 = Open, 1 = Closed
			4-20 Mode: 0 - 100%
30012/40012 (11)	Pressure Input	int16	Digital Mode: 0 = Open, 1 = Closed
			4-20 Mode: 0 - 100%
30017/40017 (16)	Low Temp Setpoint	int16	-200 - 1350°C (-328 - 2462°F) <small>*Per units specified in register 30060/40060</small>
30018/40018 (17)	High Temp Setpoint	int16	0 - 1350°C (32 - 2462°F) <small>*Per units specified in register 30060/40060</small>
30020/40020 (19) To 30039/40039 (38)	Temperature Wizard Input 1 To Temperature Wizard Input 20	int16	-50 - 1350°C (-58 - 2462°F) <small>*Per units specified in register 30060/40060</small>
30040/40040 (39)	Main Flame Presence	int16	0 = Flame absent
			100 = Flame present
30041/40041 (40)	Valve Output Status Bits	int16	BIT 0: Pilot, 0 = De-energized
			BIT 1: Reserved
			BIT 2: SSV1, 0 = De-energized
			BIT 3: Reserved
			BIT 4: SSV2, 0 = De-energized
			BIT 5: Reserved
			BIT 6: High Fire, 0 = De-energized
			BIT 7: Reserved

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30042/40042 (41)	Aux Output Percentage	int16	0 - 100 %
30043/40043 (42)	Shutdown Codes	int16	0 = No outstanding shutdown codes Not 0 = 16-bit shutdown code
30044/40044 (43)	Dry Input State Bits	int16	BIT 0: Start, 0 = Open; 1 = Closed BIT 1: ESD, 0 = Open; 1 = Closed BIT 2: POC, 0 = Open; 1 = Closed BIT 3: Aux In, 0 = Open; 1 = Closed BIT 4: Level, 0 = Open; 1 = Closed BIT 5: Pressure, 0 = Open; 1 = Closed
30050/40050 (49)	Modbus Receive Counter <small>*Running total of properly addressed Ethernet messages received by a BMS in the system</small>	int16	0 - 65535 <small>*Rolls over to 0 when count exceeds 65535</small>
30051/40051 (50)	Ethernet Message Receive Counter <small>*Running total of properly addressed Ethernet messages received by a BMS in the system</small>	int16	0 - 65535 <small>*Rolls over to 0 when count exceeds 65535</small>
30060/40060 (59)	Modbus Temperature Units <small>*Used for all temperature reads/writes except where indicated.</small>	int16	0 = Celsius 1 = Fahrenheit
30061/40061 (60) To 30065/40065 (64) ^{Note 1}	I/O Expansion Module 1 MAC Address To I/O Expansion Module 5 MAC Address	int16	Low Byte: Last byte of address High Byte: Second last byte of address
30070/40070 (69) To 30073/40073 (72) ^{Note 1}	I/O Expansion Module 1, Input 1 To I/O Expansion Module 1, Input 4	int16	Digital Mode: 0 = Open, 1 = Closed 4-20 Mode: Input value in mA x 100
30074/40074 (73) To 30077/40077 (76) ^{Note 1}	I/O Expansion Module 2, Input 1 To I/O Expansion Module 2, Input 4	int16	Digital Mode: 0 = Open, 1 = Closed 4-20 Mode: Input value in mA x 100
30078/40078 (77) To 30081/40081 (80) ^{Note 1}	I/O Expansion Module 3, Input 1 To I/O Expansion Module 3, Input 4	int16	Digital Mode: 0 = Open, 1 = Closed 4-20 Mode: Input value in mA x 100
30082/40082 (81) To 30085/40085 (84) ^{Note 1}	I/O Expansion Module 4, Input 1 To I/O Expansion Module 4, Input 4	int16	Digital Mode: 0 = Open, 1 = Closed 4-20 Mode: Input value in mA x 100
30086/40086 (85) To 30089/40089 (88) ^{Note 1}	I/O Expansion Module 5, Input 1 To I/O Expansion Module 5, Input 4	int16	Digital Mode: 0 = Open, 1 = Closed 4-20 Mode: Input value in mA x 100
30110/40110 (109)	Modbus Check Sum Failure Count	uint16	0 - 65535 <small>*Capped at 65535 - Power cycle to reset</small>
30111/40111 (110)	Modbus Invalid Device Addressing Count	uint16	0 - 65535 <small>*Capped at 65535 - Power cycle to reset</small>
30112/40112 (111)	Modbus Receive Timeout Fail Count	uint16	0 - 65535 <small>*Capped at 65535 - Power cycle to reset</small>
30113/40113 (112)	Modbus Invalid Function Code Fail Count	uint16	0 - 65535 <small>*Capped at 65535 - Power cycle to reset</small>
30114/40114 (113)	Modbus Unsupported Register Fail Count	uint16	0 - 65535 <small>*Capped at 65535 - Power cycle to reset</small>
30115/40115 (114)	Modbus Incoming Packet Fault Count	uint16	0 - 65535 <small>*Capped at 65535 - Power cycle to reset</small>
30162 (161)	Modbus Firing Rate	uint16	0 - 1000 (0 - 100% rounded to the nearest %)

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30182/40182 (181)	Controller State	int16	0 = Ready 1 = Alarm 2 = Lockout 3 = Confirm Start 4 = Waiting 5 = Igniting 6 = Flame Detect 7 = Pilot 8 = Low Fire 9 = High Fire 10 = Reset 11 = Power On 12 = Transition Delay 13 = Appliance Startup 14 = Incinerate 15 = Incinerate No Assist
30301/40301 (300)	Ignition Module 1 State	int16	0 = Off 1 = Sparking 2 = Lit Any other = Invalid
30302/40302 (301)	Ignition Module 2 State		
30303/40303 (302)	Ignition Module 3 State		
30304/40304 (303)	Ignition Module 4 State		
30305/40305 (304)	Ignition Module 5 State		
30306/40306 (305)	Ignition Module 6 State		
30307/40307 (306)	Ignition Module 7 State		
30308/40308 (307)	Ignition Module 8 State		
30309/40309 (308)	Ignition Module 9 State		
30310/40310 (309)	Ignition Module 10 State		
30311/40311 (310)	Ignition Module 11 State		
30312/40312 (311)	Ignition Module 12 State		
30313/40313 (312)	Ignition Module 13 State		
30314/40314 (313)	Ignition Module 14 State		
30317/40317 (316)	Ignition Module 1 Pilot Flame Status	uint16	0 = Pilot flame not detected 100 = Instantaneous pilot flame detected
30318/40318 (317)	Ignition Module 2 Pilot Flame Status		
30319/40319 (318)	Ignition Module 3 Pilot Flame Status		
30320/40320 (319)	Ignition Module 4 Pilot Flame Status		
30321/40321 (320)	Ignition Module 5 Pilot Flame Status		
30322/40322 (321)	Ignition Module 6 Pilot Flame Status		
30323/40323 (322)	Ignition Module 7 Pilot Flame Status		
30324/40324 (323)	Ignition Module 8 Pilot Flame Status		
30325/40325 (324)	Ignition Module 9 Pilot Flame Status		
30326/40326 (325)	Ignition Module 10 Pilot Flame Status		
30327/40327 (326)	Ignition Module 11 Pilot Flame Status		
30328/40328 (327)	Ignition Module 12 Pilot Flame Status		
30329/40329 (328)	Ignition Module 13 Pilot Flame Status		
30330/40330 (329)	Ignition Module 14 Pilot Flame Status		

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30333/40333 (332)	Ignition Module 1 Main Flame Status	uint16	0 = Main flame not detected 100 = Instantaneous main flame detected
30334/40334 (333)	Ignition Module 2 Main Flame Status		
30335/40335 (334)	Ignition Module 3 Main Flame Status		
30336/40336 (335)	Ignition Module 4 Main Flame Status		
30337/40337 (336)	Ignition Module 5 Main Flame Status		
30338/40338 (337)	Ignition Module 6 Main Flame Status		
30339/40339 (338)	Ignition Module 7 Main Flame Status		
30340/40340 (339)	Ignition Module 8 Main Flame Status		
30341/40341 (340)	Ignition Module 9 Main Flame Status		
30342/40342 (341)	Ignition Module 10 Main Flame Status		
30343/40343 (342)	Ignition Module 11 Main Flame Status		
30344/40344 (343)	Ignition Module 12 Main Flame Status		
30345/40345 (344)	Ignition Module 13 Main Flame Status		
30346/40346 (345)	Ignition Module 14 Main Flame Status		
30349/40349 (348)	Ignition Module 1 Ion Aux In Measurement	uint16	4-20 Mode: 0 - 250 (0 - 25.0 mA) Digital Mode: 0 = De-energized, 10 = Energized
30350/40350 (349)	Ignition Module 2 Ion Aux In Measurement		
30351/40351 (350)	Ignition Module 3 Ion Aux In Measurement		
30352/40352 (351)	Ignition Module 4 Ion Aux In Measurement		
30353/40353 (352)	Ignition Module 5 Ion Aux In Measurement		
30354/40354 (353)	Ignition Module 6 Ion Aux In Measurement		
30355/40355 (354)	Ignition Module 7 Ion Aux In Measurement		
30356/40356 (355)	Ignition Module 8 Ion Aux In Measurement		
30357/40357 (356)	Ignition Module 9 Ion Aux In Measurement		
30358/40358 (357)	Ignition Module 10 Ion Aux In Measurement		
30359/40359 (358)	Ignition Module 11 Ion Aux In Measurement		
30360/40360 (359)	Ignition Module 12 Ion Aux In Measurement		
30361/40361 (360)	Ignition Module 13 Ion Aux In Measurement		
30362/40362 (361)	Ignition Module 14 Ion Aux In Measurement		
30365/40365 (364)	Ignition Module 1 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30366/40366 (365)	Ignition Module 1 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30367/40367 (366)	Ignition Module 1 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30368/40368 (367)	Ignition Module 1 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV PF3102-01 UV Pilot Card: Flame Quality in percent
30369/40369 (368)	Ignition Module 1 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV PF3102-01 UV Pilot Card: N/A

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30370/40370 (369)	Ignition Module 1 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV PF3102-01 UV Pilot Card: N/A
30371/40371 (370)	Ignition Module 2 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30372/40372 (371)	Ignition Module 2 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30373/40373 (372)	Ignition Module 2 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30374/40374 (373)	Ignition Module 2 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV PF3102-01 UV Pilot Card: Flame Quality in percent
30375/40375 (374)	Ignition Module 2 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV PF3102-01 UV Pilot Card: N/A
30376/40376 (375)	Ignition Module 2 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV PF3102-01 UV Pilot Card: N/A
30377/40377 (376)	Ignition Module 3 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30378/40378 (377)	Ignition Module 3 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30379/40379 (378)	Ignition Module 3 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30380/40380 (379)	Ignition Module 3 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV PF3102-01 UV Pilot Card: Flame Quality in percent
30381/40381 (380)	Ignition Module 3 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV PF3102-01 UV Pilot Card: N/A
30382/40382 (381)	Ignition Module 3 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV PF3102-01 UV Pilot Card: N/A
30383/40383 (382)	Ignition Module 4 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30384/40384 (383)	Ignition Module 4 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30385/40385 (384)	Ignition Module 4 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30386/40386 (385)	Ignition Module 4 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV PF3102-01 UV Pilot Card: Flame Quality in percent
30387/40387 (386)	Ignition Module 4 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV PF3102-01 UV Pilot Card: N/A
30388/40388 (387)	Ignition Module 4 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV PF3102-01 UV Pilot Card: N/A
30389/40389 (388)	Ignition Module 5 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30390/40390 (389)	Ignition Module 5 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30391/40391 (390)	Ignition Module 5 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30392/40392 (391)	Ignition Module 5 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent
30393/40393 (392)	Ignition Module 5 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30394/40394 (393)	Ignition Module 5 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30395/40395 (394)	Ignition Module 6 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30396/40396 (395)	Ignition Module 6 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30397/40397 (396)	Ignition Module 6 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)

ADDRESS [OFFSET]	NAME	TYPE	RANGE
30398/40398 (397)	Ignition Module 6 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent
30399/40399 (398)	Ignition Module 6 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30400/40400 (399)	Ignition Module 6 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30401/40401 (400)	Ignition Module 7 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30402/40402 (401)	Ignition Module 7 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30403/40403 (402)	Ignition Module 7 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30404/40404 (403)	Ignition Module 7 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent
30405/40405 (404)	Ignition Module 7 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30406/40406 (405)	Ignition Module 7 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30407/40407 (406)	Ignition Module 8 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30408/40408 (407)	Ignition Module 8 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30409/40409 (408)	Ignition Module 8 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30410/40410 (409)	Ignition Module 8 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent

ADDRESS [OFFSET]	NAME	TYPE	RANGE
30411/40411 (410)	Ignition Module 8 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30412/40412 (411)	Ignition Module 8 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30413/40413 (412)	Ignition Module 9 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30414/40414 (413)	Ignition Module 9 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30415/40415 (414)	Ignition Module 9 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30416/40416 (415)	Ignition Module 9 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent
30417/40417 (416)	Ignition Module 9 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30418/40418 (417)	Ignition Module 9 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30419/40419 (418)	Ignition Module 10 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30420/40420 (419)	Ignition Module 10 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30421/40421 (420)	Ignition Module 10 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30422/40422 (421)	Ignition Module 10 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent

ADDRESS [OFFSET]	NAME	TYPE	RANGE
30423/40423 (422)	Ignition Module 10 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30424/40424 (423)	Ignition Module 10 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30425/40425 (424)	Ignition Module 11 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30426/40426 (425)	Ignition Module 11 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30427/40427 (426)	Ignition Module 11 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30428/40428 (427)	Ignition Module 11 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent
30429/40429 (428)	Ignition Module 11 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30430/40430 (429)	Ignition Module 11 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30431/40431 (430)	Ignition Module 12 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30432/40432 (431)	Ignition Module 12 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30433/40433 (432)	Ignition Module 12 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30434/40434 (433)	Ignition Module 12 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30435/40435 (434)	Ignition Module 12 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30436/40436 (435)	Ignition Module 12 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30437/40437 (436)	Ignition Module 13 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30438/40438 (437)	Ignition Module 13 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30439/40439 (438)	Ignition Module 13 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30440/40440 (439)	Ignition Module 13 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent
30441/40441 (440)	Ignition Module 13 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30442/40442 (441)	Ignition Module 13 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30443/40443 (442)	Ignition Module 14 Diagnostic Register 1	uint16	PF3102-00 Ion Pilot Card: Pilot DC High in mV
			PF3102-01 UV Pilot Card: Fault Contact (0 = de-energized, 1 = energized)
30444/40444 (443)	Ignition Module 14 Diagnostic Register 2	uint16	PF3102-00 Ion Pilot Card: Pilot DC Low in mV
			PF3102-01 UV Pilot Card: Flame Off Contact (0 = de-energized, 1 = energized)
30445/40445 (444)	Ignition Module 14 Diagnostic Register 3	uint16	PF3102-00 Ion Pilot Card: Pilot AC signal in mV
			PF3102-01 UV Pilot Card: Flame On Contact (0 = de-energized, 1 = energized)
30446/40446 (445)	Ignition Module 14 Diagnostic Register 4	uint16	PF3102-00 Ion Pilot Card: Main DC High in mV
			PF3102-01 UV Pilot Card: Flame Quality in percent

ADDRESS [OFFSET]	NAME	TYPE	RANGE
30447/40447 (446)	Ignition Module 14 Diagnostic Register 5	uint16	PF3102-00 Ion Pilot Card: Main DC Low in mV
			PF3102-01 UV Pilot Card: N/A
30448/40448 (447)	Ignition Module 14 Diagnostic Register 6	uint16	PF3102-00 Ion Pilot Card: Main AC signal in mV
			PF3102-01 UV Pilot Card: N/A
30461/40461 (460)	Ignition Module 1 Serial Number	uint16	Last 2 bytes of Ignition Module serial number
30462/40462 (461)	Ignition Module 2 Serial Number		
30463/40463 (462)	Ignition Module 3 Serial Number		
30464/40464 (463)	Ignition Module 4 Serial Number		
30465/40465 (464)	Ignition Module 5 Serial Number		
30466/40466 (465)	Ignition Module 6 Serial Number		
30467/40467 (466)	Ignition Module 7 Serial Number		
30468/40468 (467)	Ignition Module 8 Serial Number		
30469/40469 (468)	Ignition Module 9 Serial Number		
30470/40470 (469)	Ignition Module 10 Serial Number		
30471/40471 (470)	Ignition Module 11 Serial Number		
30472/40472 (471)	Ignition Module 12 Serial Number		
30473/40473 (472)	Ignition Module 13 Serial Number		
30474/40474 (473)	Ignition Module 14 Serial Number		

ADDRESS [OFFSET]	NAME	TYPE	RANGE
477/40477 (476)	Ignition Module 1 Flame Source	uint16	0 = Pilot and Main 1 = Pilot 2 = Main
30478/40478 (477)	Ignition Module 2 Flame Source		
30479/40479 (478)	Ignition Module 3 Flame Source		
30480/40480 (479)	Ignition Module 4 Flame Source		
30481/40481 (480)	Ignition Module 5 Flame Source		
30482/40482 (481)	Ignition Module 6 Flame Source		
30483/40483 (482)	Ignition Module 7 Flame Source		
30484/40484 (483)	Ignition Module 8 Flame Source		
30485/40485 (484)	Ignition Module 9 Flame Source		
30486/40486 (485)	Ignition Module 10 Flame Source		
30487/40487 (486)	Ignition Module 11 Flame Source		
30488/40488 (487)	Ignition Module 12 Flame Source		
30489/40489 (488)	Ignition Module 13 Flame Source		
30490/40490 (489)	Ignition Module 14 Flame Source		
30501/40501 (500) To 30545/40545 (544)	IO Expansion Logical Input 1 To IO Expansion Logical Input 45	uint16	Digital Mode: 0 = Open, 1 = Closed 4-20 Mode: Input value in base units <small>Note 2, Note 4</small>
30601/40601 (600) To 30645/40645 (644)	IO Expansion Logical Input 1 To IO Expansion Logical Input 45	uint16	Digital Mode: 0 = Open, 10 = Closed 4-20 Mode: Input value x10 in base units <small>Note 2, Note 4</small>
30701/40701 (700) To 30790/40790 (789)	IO Expansion Logical Input 1 <small>Note 3</small> To IO Expansion Logical Input 45 <small>Note 3</small>	float	Digital Mode: 0 = Open, 1 = Closed 4-20 Mode: Input value as a floating-point number in base units <small>Note 4</small>
30801/40801 (800) Bit 0	Alarm 1000 - Pilot Flame Detected While Off	Single bit	1 = Alarm set
30801/40801 (800) Bit 1	Alarm 1001 - Main Flame Detected While Off	Single bit	1 = Alarm set
30801/40801 (800) Bit 2	Alarm 1002 - POC Contact Open	Single bit	1 = Alarm set
30801/40801 (800) Bit 3	Alarm 1003 - POC HF Contact Open	Single bit	1 = Alarm set
30801/40801 (800) Bit 4	Alarm 1004 - POC2 Contact Open	Single bit	1 = Alarm set
30801/40801 (800) Bit 5	Alarm 1005 - POP Contact Open	Single bit	1 = Alarm set
30801/40801 (800) Bit 6	Alarm 1006 - Level/Flow Contact Open	Single bit	1 = Alarm set
30801/40801 (800) Bit 7	Alarm 1007 - Low Level/Flow	Single bit	1 = Alarm set
30801/40801 (800) Bit 8	Alarm 1008 - Fuel Pressure Contact Open	Single bit	1 = Alarm set
30801/40801 (800) Bit 9	Alarm 1009 - Low Fuel Pressure	Single bit	1 = Alarm set
30801/40801 (800) Bit 10	Alarm 1010 - Low Fuel Pressure Dry Contact	Single bit	1 = Alarm set
30801/40801 (800) Bit 11	Alarm 1011 - ESD Contact Open	Single bit	1 = Alarm set

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30801/40801 (800) Bit 12	Alarm 1012 - Primary Process Temperature High ESD	Single bit	1 = Alarm set
30801/40801 (800) Bit 13	Alarm 1013 - Incompatible Firmware	Single bit	1 = Alarm set
30801/40801 (800) Bit 14	Reserved		
30801/40801 (800) Bit 15	Reserved		
30802/40802 (801) Bit 0	Alarm 1016 - Pilot Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 1	Alarm 1017 - SSV1 Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 2	Alarm 1018 - SSV2 Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 3	Alarm 1019 - HF Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 4	Alarm 1020 - Pilot Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 5	Alarm 1021 - SSV1 Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 6	Alarm 1022 - SSV2 Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 7	Alarm 1023 - HF Solenoid Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 8	Alarm 1024 - Low Voltage	Single bit	1 = Alarm set
30802/40802 (801) Bit 9	Alarm 1025 - High Voltage	Single bit	1 = Alarm set
30802/40802 (801) Bit 10	Alarm 1026 - Pilot Module Comm Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 11	Alarm 1027 - Incomplete Commissioning	Single bit	1 = Alarm set
30802/40802 (801) Bit 12	Alarm 1028 - Cross Compare Failure	Single bit	1 = Alarm set
30802/40802 (801) Bit 13	Alarm 1029 - Cross Compare Packet Timeout	Single bit	1 = Alarm set
30802/40802 (801) Bit 14	Alarm 1030 - Factory Calibration Error	Single bit	1 = Alarm set
30802/40802 (801) Bit 15	Alarm 1031 - Invalid Configuration	Single bit	1 = Alarm set
30803/40803 (802) Bit 0	Alarm 1032 - Ignition Switch Stuck	Single bit	1 = Alarm set
30803/40803 (802) Bit 1	Alarm 1033 - Auxiliary Temperature High ESD	Single bit	1 = Alarm set
30803/40803 (802) Bit 2	Reserved		
30803/40803 (802) Bit 3	Alarm 1035 - Pilot Load Monitor Error	Single bit	1 = Alarm set
30803/40803 (802) Bit 4	Alarm 1036 - Pilot Flame Detect Voltage Error	Single bit	1 = Alarm set
30803/40803 (802) Bit 5	Alarm 1037 - Pilot Flame Quality Mismatch	Single bit	1 = Alarm set
30803/40803 (802) Bit 6	Alarm 1038 - Main Load Monitor Error	Single bit	1 = Alarm set
30803/40803 (802) Bit 7	Alarm 1039 - Main Flame Detect Voltage Error	Single bit	1 = Alarm set
30803/40803 (802) Bit 8	Alarm 1040 - Main Flame Quality Mismatch	Single bit	1 = Alarm set
30803/40803 (802) Bit 9	Alarm 1041 - Ion Pilot Module Valve Test Failed	Single bit	1 = Alarm set
30803/40803 (802) Bit 10	Alarm 1042 - Ion Pilot Module Valve Test Failed	Single bit	1 = Alarm set
30803/40803 (802) Bit 11	Reserved		
30803/40803 (802) Bit 12	Reserved		
30803/40803 (802) Bit 13	Alarm 1045 - Pilot Flame Fail	Single bit	1 = Alarm set
30803/40803 (802) Bit 14	Alarm 1046 - Main Flame Fail	Single bit	1 = Alarm set
30803/40803 (802) Bit 15	Alarm 1047 - High Fuel Pressure After Main On	Single bit	1 = Alarm set
30804/40804 (803) Bit 0	Alarm 1048 - Stopped Via External Switch	Single bit	1 = Alarm set
30804/40804 (803) Bit 1	Alarm 1049 - User Stop	Single bit	1 = Alarm set
30804/40804 (803) Bit 2	Alarm 1050 - Safety Core Temperature Too High	Single bit	1 = Alarm set
30804/40804 (803) Bit 3	Alarm 1051 - Safety Core Temperature Too Low	Single bit	1 = Alarm set
30804/40804 (803) Bit 4	Reserved		
30804/40804 (803) Bit 5	Alarm 1053 - Controller Settings CRC Failed	Single bit	1 = Alarm set

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30804/40804 (803) Bit 6	Reserved		
30804/40804 (803) Bit 7	Alarm 1055 - Input Pin Connection Test Failed	Single bit	1 = Alarm set
30804/40804 (803) Bit 8	Alarm 1056 - State Mismatch	Single bit	1 = Alarm set
30804/40804 (803) Bit 9	Reserved		
30804/40804 (803) Bit 10	Alarm 1058 - Ion Aux In Tripped	Single bit	1 = Alarm set
30804/40804 (803) Bit 11	Alarm 1059 - Ion Aux In Contact Range Error	Single bit	1 = Alarm set
30804/40804 (803) Bit 12	Alarm 1060 - Ion Aux In Contact Mismatch	Single bit	1 = Alarm set
30804/40804 (803) Bit 13	Alarm 1061 - Ion Aux In Contact Cross Compare Failure	Single bit	1 = Alarm set
30804/40804 (803) Bit 14	Alarm 1062 - Level/Flow Input Range Error	Single bit	1 = Alarm set
30804/40804 (803) Bit 15	Alarm 1063 - Level/Flow Input Mismatch Error	Single bit	1 = Alarm set
30805/40805 (804) Bit 0	Alarm 1064 - Pressure Input Range Error	Single bit	1 = Alarm set
30805/40805 (804) Bit 1	Alarm 1065 - Pressure Input Mismatch Error	Single bit	1 = Alarm set
30805/40805 (804) Bit 2	Alarm 1066 - Start Contact Mismatch Error	Single bit	1 = Alarm set
30805/40805 (804) Bit 3	Alarm 1067 - ESD Contact Mismatch Error	Single bit	1 = Alarm set
30805/40805 (804) Bit 4	Alarm 1068 - POC Contact Mismatch Error	Single bit	1 = Alarm set
30805/40805 (804) Bit 5	Alarm 1069 - Aux In Contact Mismatch Error	Single bit	1 = Alarm set
30805/40805 (804) Bit 6	Alarm 1070 - No Valid Primary Process Temperature	Single bit	1 = Alarm set
30805/40805 (804) Bit 7	Alarm 1071 - No Valid Auxiliary Temperature	Single bit	1 = Alarm set
30805/40805 (804) Bit 8	Reserved		
30805/40805 (804) Bit 9	Reserved		
30805/40805 (804) Bit 10	Alarm 1074 - No Appliance Level/Flow	Single bit	1 = Alarm set
30805/40805 (804) Bit 11	Reserved		
30805/40805 (804) Bit 12	Alarm 1076 - Appliance Startup Cancelled	Single bit	1 = Alarm set
30805/40805 (804) Bit 13	Alarm 1077 - Appliance Startup Timeout	Single bit	1 = Alarm set
30805/40805 (804) Bit 14	Alarm 1078 - Appliance Startup Mismatch	Single bit	1 = Alarm set
30805/40805 (804) Bit 15	Reserved		
30806/40806 (805) Bit 0	Alarm 1080 - Controller Disabled	Single bit	1 = Alarm set
30806/40806 (805) Bit 1	Alarm 1081 - Minimum Controllers Rule Violated	Single bit	1 = Alarm set
30806/40806 (805) Bit 2	Alarm 1082 - Controller Network Wiring Error	Single bit	1 = Alarm set
30806/40806 (805) Bit 3	Alarm 1083 - IO Network Wiring Error	Single bit	1 = Alarm set
30806/40806 (805) Bit 4	Alarm 1084 - Failed to Prove Airflow While Running	Single bit	1 = Alarm set
30806/40806 (805) Bit 5	Alarm 1085 - Failed to Prove Airflow While Purging	Single bit	1 = Alarm set
30806/40806 (805) Bit 6	Alarm 1086 - Multiple Primary Process Temperatures	Single bit	1 = Alarm set
30806/40806 (805) Bit 7	Alarm 1087 - Primary Process Temperature Configuration Error	Single bit	1 = Alarm set
30806/40806 (805) Bit 8	Alarm 1088 - Auxiliary Temperature Configuration Error	Single bit	1 = Alarm set
30806/40806 (805) Bit 9	Alarm 1089 - No Primary Process Temperature Configured	Single bit	1 = Alarm set

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30806/40806 (805) Bit 10	Alarm 1090 - UV Flame Detect Fault	Single bit	1 = Alarm set
30806/40806 (805) Bit 11	Alarm 1091 - UV Flame Detect Mismatch	Single bit	1 = Alarm set
30806/40806 (805) Bit 12	Alarm 1092 - UV Input Out of Range	Single bit	1 = Alarm set
30806/40806 (805) Bit 13	Alarm 1093 - UV Input Address Fault	Single bit	1 = Alarm set
30806/40806 (805) Bit 14	Alarm 1094 - IO Expansion Input Invalid	Single bit	1 = Alarm set
30806/40806 (805) Bit 15	Alarm 1095 - I/O Expansion POAF Input Invalid	Single bit	1 = Alarm set
30807/40807 (806) Bit 0	Alarm 1096 - IO Expansion Analog Input High	Single bit	1 = Alarm set
30807/40807 (806) Bit 1	Alarm 1097 - IO Expansion Analog Input Low	Single bit	1 = Alarm set
30807/40807 (806) Bit 2	Alarm 1098 - IO Expansion Digital Input Open	Single bit	1 = Alarm set
30807/40807 (806) Bit 3	Alarm 1099 - IO Expansion Configuration Error	Single bit	1 = Alarm set
30807/40807 (806) Bit 4	Alarm 1100 - Invalid Appliance Firing Rate Input	Single bit	1 = Alarm set
30807/40807 (806) Bit 5	Alarm 1101 - Failed to Prove Purge Position	Single bit	1 = Alarm set
30807/40807 (806) Bit 6	Alarm 1102 - Failed to Prove Pilot Position	Single bit	1 = Alarm set
30807/40807 (806) Bit 7	Alarm 1103 - Failed to Prove Light Off Position	Single bit	1 = Alarm set
30807/40807 (806) Bit 8	Alarm 1104 - FARC Cross Limit Error	Single bit	1 = Alarm set
30807/40807 (806) Bit 9	Alarm 1105 - FARC Fuel Channel Position Error	Single bit	1 = Alarm set
30807/40807 (806) Bit 10	Alarm 1106 - FARC Air Channel Position Error	Single bit	1 = Alarm set
30807/40807 (806) Bit 11	Reserved		
30807/40807 (806) Bit 12	Alarm 1108 - PID Configuration Error	Single bit	1 = Alarm set
30807/40807 (806) Bit 13	Alarm 1109 - Pilot Configuration Error	Single bit	1 = Alarm set
30807/40807 (806) Bit 14	Alarm 1110 - Bleed Valve Closed with Main Off	Single bit	1 = Alarm set
30807/40807 (806) Bit 15	Alarm 1111 - Bleed Valve Open with Main ON	Single bit	1 = Alarm set
30808/40808 (807) Bit 0	Alarm 1112 - The Bleed Valve Input is Invalid	Single bit	1 = Alarm set
30808/40808 (807) Bit 1	Alarm 1113 - BMS Wait Timeout	Single bit	1 = Alarm set
30808/40808 (807) Bit 2	Alarm 1114 - IO Expansion Wait Timeout	Single bit	1 = Alarm set
30808/40808 (807) Bit 3	Alarm 1115 - One or more descriptors are Invalid	Single bit	1 = Alarm set
30808/40808 (807) Bit 4	Alarm 1116 - Settings CRC Mismatch	Single bit	1 = Alarm set
30808/40808 (807) Bit 5	Alarm 1117 - Airflow Input Stuck	Single bit	1 = Alarm set
30808/40808 (807) Bit 6	Alarm 1118 - Secondary PID Configuration Error	Single bit	1 = Alarm set
30808/40808 (807) Bit 7	Alarm 1119 - UV Flame Detect Stale Data	Single bit	1 = Alarm set
30808/40808 (807) Bit 8	Alarm 1120 - IO 4-20 Output PID Configuration Error	Single bit	1 = Alarm set
30808/40808 (807) Bit 9	Alarm 1121 - IO Expansion Dry Contact Configuration Error	Single bit	1 = Alarm set
30808/40808 (807) Bit 10	Alarm 1122 - System is in Calibration Mode	Single bit	1 = Alarm set
30808/40808 (807) Bit 11	Alarm 1123 - Low %O2	Single bit	1 = Alarm set
30808/40808 (807) Bit 12	Alarm 1124 - Cross Limiting Enabled on Invalid Curve	Single bit	1 = Alarm set
30808/40808 (807) Bit 13	Alarm 1125 - No Position Feedback On Cross Limited Channel	Single bit	1 = Alarm set
30808/40808 (807) Bit 14	Alarm 1126 - FARC Settings Error	Single bit	1 = Alarm set
30808/40808 (807) Bit 15	Alarm 1127 - FARC Requires Proof of Airflow	Single bit	1 = Alarm set
30809/40809 (808) Bit 0	Alarm 1128 - FARC Requires Forced Draft Fan	Single bit	1 = Alarm set
30809/40809 (808) Bit 1	Alarm 1129 - FARC Requires Low Fire	Single bit	1 = Alarm set

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30809/40809 (808) Bit 2	Alarm 1130 - FARC Requires Aux Out	Single bit	1 = Alarm set
30809/40809 (808) Bit 3	Alarm 1131 - FARC Table Requires Commissioning	Single bit	1 = Alarm set
30809/40809 (808) Bit 4	Alarm 1132 - FARC Fuel and Air Channels not Assigned	Single bit	1 = Alarm set
30809/40809 (808) Bit 5	Alarm 1133 - FARC Air Control Output Configuration Error	Single bit	1 = Alarm set
30809/40809 (808) Bit 6	Alarm 1134 - FARC Light Off Firing Rate Error	Single bit	1 = Alarm set
30809/40809 (808) Bit 7	Alarm 1135 - FARC Settings Out of Range	Single bit	1 = Alarm set
30809/40809 (808) Bit 8	Alarm 1136 - FARC Aux 1 Channel Position Error	Single bit	1 = Alarm set
30809/40809 (808) Bit 9	Alarm 1137 - FARC Aux 2 Channel Position Error	Single bit	1 = Alarm set
30809/40809 (808) Bit 10	Alarm 1138 - FARC Aux 3 Channel Position Error	Single bit	1 = Alarm set
30809/40809 (808) Bit 11	Alarm 1139 - FARC Feedback Missing	Single bit	1 = Alarm set
30809/40809 (808) Bit 12	Alarm 1140 - FARC Redundant Inputs	Single bit	1 = Alarm set
30809/40809 (808) Bit 13	Alarm 1141 - Bleed Valve Proof of Open Configuration Error	Single bit	1 = Alarm set
30809/40809 (808) Bit 14	Alarm 1142 - O2 Sensor Configuration Error	Single bit	1 = Alarm set
30809/40809 (808) Bit 15	Alarm 1143 - FARC Output Configuration Error	Single bit	1 = Alarm set
30810/40810 (809) Bit 0	Alarm 1144 - Appliance Firing Rate Configuration Error	Single bit	1 = Alarm set
30810/40810 (809) Bit 1	Alarm 1145 - Logical Temperature Input Name Collision	Single bit	1 = Alarm set
30810/40810 (809) Bit 2	Alarm 1146 - Proof of Airflow Configuration Error	Single bit	1 = Alarm set
30810/40810 (809) Bit 3	Alarm 1147 - TC Flame Detect Requires a 4-20 Input	Single bit	1 = Alarm set
30810/40810 (809) Bit 4	Alarm 1148 - O2 Trim Enabled Without Stack Input	Single bit	1 = Alarm set
30810/40810 (809) Bit 5	Alarm 1149 - Manual O2 Trim Requires Manual FARC	Single bit	1 = Alarm set
30810/40810 (809) Bit 6	Alarm 1150 - O2 Trim Requires Correctly Commissioned Curves	Single bit	1 = Alarm set
30810/40810 (809) Bit 7	Alarm 1151 - FARC Enabled on a Multi-Controller System	Single bit	1 = Alarm set
30810/40810 (809) Bit 8	Alarm 1152 - IO Expansion Span Config Error	Single bit	1 = Alarm set
30810/40810 (809) Bit 9	Alarm 1153 - Controller Not In An Appliance	Single bit	1 = Alarm set
30810/40810 (809) Bit 10	Alarm 1154 - Low Heat Standby Configuration Error	Single bit	1 = Alarm set
30810/40810 (809) Bit 11	Alarm 1155 - FARC Feedback Configuration Error	Single bit	1 = Alarm set
30810/40810 (809) Bit 12	Alarm 1156 - O2 Trim Requires an O2 Sensor	Single bit	1 = Alarm set
30810/40810 (809) Bit 13	Alarm 1157 - POLO Enabled with TCV Disabled	Single bit	1 = Alarm set
30810/40810 (809) Bit 14	Alarm 1158 - Natural Draft Pre-Purge Configuration Error	Single bit	1 = Alarm set
30810/40810 (809) Bit 15	Alarm 1159 - Too Many IO Modules Configured	Single bit	1 = Alarm set

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30811/40811 (810) Bit 0	Alarm 1160 - Main UV Module Enabled without Main Detect	Single bit	1 = Alarm set
30811/40811 (810) Bit 1	Alarm 1161 - Main Flame Detect Enabled with No Main Flame Modules	Single bit	1 = Alarm set
30831/40831 (830) Bit 0	Wait 2000 - Low Voltage	Single bit	1 = Alarm set
30831/40831 (830) Bit 1	Wait 2001 - High Voltage	Single bit	1 = Alarm set
30831/40831 (830) Bit 2	Wait 2002 - Low Fuel Pressure	Single bit	1 = Alarm set
30831/40831 (830) Bit 3	Wait 2003 - Low Fuel Pressure Dry Contact	Single bit	1 = Alarm set
30831/40831 (830) Bit 4	Wait 2004 - Low Level/Flow	Single bit	1 = Alarm set
30831/40831 (830) Bit 5	Wait 2005 - Proc Temp Too High	Single bit	1 = Alarm set
30831/40831 (830) Bit 6	Wait 2006 - Start Contact Open	Single bit	1 = Alarm set
30831/40831 (830) Bit 7	Wait 2007 - Purging	Single bit	1 = Alarm set
30831/40831 (830) Bit 8	Wait 2008 - Loss of Communications	Single bit	1 = Alarm set
30831/40831 (830) Bit 9	Wait 2009 - IO Expansion Input Invalid	Single bit	1 = Alarm set
30831/40831 (830) Bit 10	Wait 2010 - IO Expansion Analog Input High	Single bit	1 = Alarm set
30831/40831 (830) Bit 11	Wait 2011 - IO Expansion Analog Input Low	Single bit	1 = Alarm set
30831/40831 (830) Bit 12	Wait 2012 - IO Expansion Digital Input Open	Single bit	1 = Alarm set
30831/40831 (830) Bit 13	Wait 2013 - Level/Flow Contact Open	Single bit	1 = Alarm set
30831/40831 (830) Bit 14	Wait 2014 - IO Expansion Configuration Error	Single bit	1 = Alarm set
30831/40831 (830) Bit 15	Wait 2015 - Low Heat Standby	Single bit	1 = Alarm set
30841/40841 (840) Bit 0	Main Permissive 4000 - Low Fuel Pressure	Single bit	1 = Alarm set
30841/40841 (840) Bit 1	Main Permissive 4001 - Aux In Low Fuel Pressure	Single bit	1 = Alarm set
30841/40841 (840) Bit 2	Main Permissive 4002 - Switching to Curve A	Single bit	1 = Alarm set
30841/40841 (840) Bit 3	Main Permissive 4003 - Switching to Curve B	Single bit	1 = Alarm set
30841/40841 (840) Bit 4	Main Permissive 4004 - IO Expansion Input Invalid	Single bit	1 = Alarm set
30841/40841 (840) Bit 5	Main Permissive 4005 - IO Expansion Analog Input High	Single bit	1 = Alarm set
30841/40841 (840) Bit 6	Main Permissive 4006 - IO Expansion Analog Input Low	Single bit	1 = Alarm set
30841/40841 (840) Bit 7	Main Permissive 4007 - IO Expansion Digital Input Open	Single bit	1 = Alarm set
30841/40841 (840) Bit 8	Main Permissive 4008 - IO Expansion Configuration Error	Single bit	1 = Alarm set
30841/40841 (840) Bit 9	Main Permissive 4009 - Aux In Contact Open	Single bit	1 = Alarm set
30841/40841 (840) Bit 10	Main Permissive 4010 - Low Heat Standby	Single bit	1 = Alarm set
30841/40841 (840) Bit 11	Main Permissive 4011 - POLO Contact Open	Single bit	1 = Alarm set
30841/40841 (840) Bit 12	Reserved		
30841/40841 (840) Bit 13	Reserved		
30841/40841 (840) Bit 14	Reserved		
30841/40841 (840) Bit 15	Reserved		
30851/40851 (850) Bit 0	Warning 3000 - Low Voltage	Single bit	1 = Alarm set
30851/40851 (850) Bit 1	Warning 3001 - High Voltage	Single bit	1 = Alarm set
30851/40851 (850) Bit 2	Warning 3002 - High Fuel Pressure	Single bit	1 = Alarm set

ADDRESS (OFFSET)	NAME	TYPE	RANGE
30851/40851 (850) Bit 3	Warning 3003 - Low Process Temp	Single bit	1 = Alarm set
30851/40851 (850) Bit 4	Warning 3004 - High Level/Flow	Single bit	1 = Alarm set
30851/40851 (850) Bit 5	Warning 3005 - Reserved	Single bit	1 = Alarm set
30851/40851 (850) Bit 6	Warning 3006 - Grounded Thermocouple	Single bit	1 = Alarm set
30851/40851 (850) Bit 7	Warning 3007 - POC Contact Failed to Open	Single bit	1 = Alarm set
30851/40851 (850) Bit 8	Warning 3008 - POC2 Contact Failed to Open	Single bit	1 = Alarm set
30851/40851 (850) Bit 9	Warning 3009 - POP Contact Failed to Open	Single bit	1 = Alarm set
30851/40851 (850) Bit 10	Warning 3010 - Thermocouple Failure	Single bit	1 = Alarm set
30851/40851 (850) Bit 11	Warning 3011 - High Auxiliary Temperature	Single bit	1 = Alarm set
30851/40851 (850) Bit 12	Warning 3012 - Factory Calibration Error	Single bit	1 = Alarm set
30851/40851 (850) Bit 13	Warning 3013 - Level/Flow Input Range Error	Single bit	1 = Alarm set
30851/40851 (850) Bit 14	Warning 3014 - Level/Flow Input Mismatch Error	Single bit	1 = Alarm set
30851/40851 (850) Bit 15	Warning 3015 - Appliance Communication Error	Single bit	1 = Alarm set
30852/40852 (851) Bit 0	Warning 3016 - Partially Running Appliance	Single bit	1 = Alarm set
30852/40852 (851) Bit 1	Warning 3017 - IO Expansion Input Invalid	Single bit	1 = Alarm set
30852/40852 (851) Bit 2	Warning 3018 - IO Expansion Analog Input High	Single bit	1 = Alarm set
30852/40852 (851) Bit 3	Warning 3019 - IO Expansion Analog Input Low	Single bit	1 = Alarm set
30852/40852 (851) Bit 4	Warning 3020 - IO Expansion Digital Input Open	Single bit	1 = Alarm set
30852/40852 (851) Bit 5	Warning 3021 - IO Expansion Configuration Error	Single bit	1 = Alarm set
30852/40852 (851) Bit 6	Warning 3022 - PID Configuration Warning	Single bit	1 = Alarm set
30852/40852 (851) Bit 7	Warning 3023 - Pilot Module Comm Warning	Single bit	1 = Alarm set
30852/40852 (851) Bit 8	Warning 3024 - FARC System In Manual Mode	Single bit	1 = Alarm set
30852/40852 (851) Bit 9	Warning 3025 - Appliance Firing Rate Input Invalid	Single bit	1 = Alarm set
30852/40852 (851) Bit 10	Warning 3026 - IO Expansion Module Internal Voltage Fault	Single bit	1 = Alarm set
30852/40852 (851) Bit 11	Warning 3027 - O2 Trim at Limit	Single bit	1 = Alarm set
30852/40852 (851) Bit 12	Warning 3028 - High Measured %O2	Single bit	1 = Alarm set
30852/40852 (851) Bit 13	Warning 3029 - Manual O2 Trim	Single bit	1 = Alarm set
30852/40852 (851) Bit 14	Reserved		
30852/40852 (851) Bit 15	Reserved		

¹ Care must be taken when reading the I/O Expansion inputs over Modbus as the I/O Expansion modules may become re-ordered upon power cycle or settings modification (e.g., the module represented as Module 2 over Modbus may be represented as Module 1 following a power cycle). For this reason, the following procedure is recommended when reading I/O Expansion

Inputs via registers 30070 through 30089:

i. Scan input registers 30061 to 30065 for the MAC address of the module from which you wish to read.

ii. Use the following formula to determine the correct register to read:

$$30070 + 4 \times (\text{register from step i} - 30061) + (\text{desired module input} - 1)$$

Ex. Desired input = Input 2 from I/O expansion module with MAC address ending in "A1B2"

Associated Modbus register = scan of 30061-30065 looking for "A1B2" = 30063 for this example

Register associated with reading for Input 2: $30070 + 4 \times (30063 - 30061) + (2 - 1) = 30070 + 8 + 1 = 30079$

² Values below 0 are represented as 0, and values above 65535 are represented as 65535.

Consider using registers 30701/40701 through 30790/40790 if values are not between 0 and 65535.

³ Floating-point numbers are held in two sequential registers and are represented in IEEE-754 standard format.

Ex. IO Expansion Input 1 is held in consecutive registers 30701 & 30702 (and 40701 & 40702).

IO Expansion Input 45 is held in consecutive registers 30789 & 30790 (and 40789 & 40790).

⁴ I/O Expansion Input Base Units:

- Pressure Input - Kilopascals (kPa)

- Level Input - Litres (L)

- Flow Input - Cubic metres per second (m³/s)

- Custom (temperature) - Celsius (°C)

- Custom (non-temperature) - Percent (%)

2.3 READ/WRITE HOLDING REGISTERS

The Holding Registers (400xx) are 2 byte read/write values.

Use either the “Pre-set Single Register” command (0x06) or the “Pre-set Multiple Registers” command (0x10) to write to the Holding Registers.

Use the “Read Holding Registers” command (0x03) to read the Holding Registers.

Example 1: Write Single – Writing 1 register starting from Register Offset 100 will require two data bytes to be sent. The first byte will be the most significant byte of Register Offset 100 and the second byte will be the least significant byte.

Example 2: Write Multiple – Writing 2 registers starting from Register Offset 100 will require four data bytes to be sent. The first byte will be the most significant byte of Register Offset 100, the second byte will be the least significant byte of Register Offset 100, the third byte will be the most significant byte of Register Offset 101, and the fourth byte will be the least significant byte of Register Offset 101.

ADDRESS (OFFSET)	NAME	RANGE	BIT REPRESENTATION
40100 (99)	Start/ Stop Register <i>*Send start command to all connected BMS within 10 seconds to start entire appliance.</i>	1234: Start BMS	0x04D2
		4321: Stop BMS	0x10E1
40101 (100)	Process Temp Setpoint Change Request <i>*Check register 30008/40008 to verify change has been accepted</i>	0 - 1350°C (32 - 2462°F) <i>*Per units specified in register 30060/40060</i>	int16
40102 (101)	Low Fire Setpoint Change Request <i>*Check register 30009/40009 to verify change has been accepted.</i>	0 - 1350°C (32 - 2462°F) <i>*Per units specified in register 30060/40060</i>	int16
40103 (102)	Pilot Off Setpoint Change Request <i>*Check register 30010/40010 to verify change has been accepted.</i>	0 - 1350°C (32 - 2462°F) <i>*Per units specified in register 30060/40060</i>	int16
40104 (103)	Low Temperature Setpoint Change Request <i>*Check register 30017/40017 to verify change has been accepted.</i>	0 - 1350°C (32 - 2462°F) <i>*Per units specified in register 30060/40060</i>	int16
40143 (142)	Clear Shutdown Code <i>*Allow 5 seconds between consecutive write attempts to this register.</i>	1 = Acknowledge shutdown	0x0001
		Not 1 = No effect	
40160 (159)	Temperature Unit Change Request <i>*Check register 30060/40060 to verify change has been accepted.</i>	0 = Celsius 1 = Fahrenheit	uint16
40161 (160)	Secondary PID Setpoint	0 - 65535 in base units only <i>Note 1</i>	uint16
	Temperature card input	0 – 65535 Celsius (°C)	30°C = 0x001E
	I/O Expansion Pressure input	0 – 65535 Kilopascals (kPa)	30kPa = 0x001E
	I/O Expansion Level input	0 – 65535 Litres (L)	30L = 0x001E
	I/O Expansion Flow input	0 – 65535 Cubic metres per second (m³/s)	30 m³/s = 0x001E
	I/O Expansion Custom Temperature input	0 – 65535 Celsius (°C)	30°C = 0x001E
	I/O Expansion Custom (Non-temperature) input	0 – 65535 Percent (%)	30% = 0x001E
40162 (161)	Modbus Firing Rate	0 - 1000 (0 - 100.0%)	uint16
40167 (166)	Set Main Permissive	0 = Not set 1 = Set	uint16

ADDRESS (OFFSET)	NAME	RANGE	BIT REPRESENTATION
40219 (218)	FARC Curve Selection NOTE: It is recommended that Remote Curve Selection be enabled only when an O2 sensor is installed. This will ensure shutdown in the event that an improperly configured curve is selected.	0 = Curve A 1 = Curve B	uint16
40220 (219)	Integral Jacketing	0 = Disabled 1 = Enabled	uint16
40221 (220)	Cascaded PID	0 = Disabled 1 = Enabled	uint16
40222 (221)	Primary Setpoint Max	Setting value (in configured Modbus temperature units per register 40160) multiplied by 10.	uint16
40223 (222)	Primary Setpoint Min		
40224 (223)	Secondary Setpoint Max		
40225 (224)	Secondary Setpoint Min		
40226 (225)	Secondary Proportional Band		
40227 (226)	Secondary Integral Gain	Setting value in minutes multiplied by 10	uint16
40228 (227)	Secondary Derivative Gain	Setting value in minutes multiplied by 10	uint16
40229 (228)	Secondary Integral Reset Range	Setting value (in configured Modbus Temperature Units per register 40160) multiplied by 10.	uint16
40230 (229)	PID Staging Mode	0 = Disabled 1 = High Input 2 = Low Input 3 = Primary in Range 4 = Secondary in Range 5 = Primary and Secondary in Range 6 = Primary or Secondary in Range	uint16
40231 (230)	PID Ramp Time	Setting value as shown on UI	uint16
40232 (231)	PID Primary Rate Limit	Setting value as shown on UI	uint16
40233 (232)	PID Secondary Rate Limit	Setting value as shown on UI	uint16
40234 (233)	PID Primary Deadband	Setting value (in configured Modbus temperature units per register 40160) multiplied by 10.	uint16
40235 (234)	PID Secondary Deadband		
40236 (235)	Proportional Band		
40237 (236)	Integral Gain	Setting value in minutes multiplied by 10	uint16
40238 (237)	Derivative Gain	Setting value in minutes multiplied by 10	uint16
40239 (238)	Integral Reset Range	Setting value (in configured Modbus temperature units per register 40160) multiplied by 10.	uint16
40240 (239)	Sample Time	Setting value in seconds multiplied by 10	uint16

¹All Secondary PID Setpoint change requests must be written in the appropriate base units as specified in the table (e.g., for a temperature card thermocouple input configured as a Secondary PID Input with UI Temperature Units setting set to Fahrenheit - the UI displays the input readings in Fahrenheit, but all Secondary PID Setpoint change requests written to register 40161 must be in Celsius. Similarly, reads of register 40161 are represented in Celsius).

3 VERSION HISTORY

DOCUMENT VERSION	RELEASE DATE	APPLICABLE SYSTEM FIRMWARE	APPLICABLE PF3107-00 MODBUS CARD HARDWARE
v8.0	19 FEB 2026	NA-45.2	v1.3.x
v7.0	30 SEP 2025	NA-45.0	v1.3.x
v6.0	12 MAY 2025	NA-44.0	v1.3.x
v5.0	15 JAN 2024	NA-43.6	v1.3.x
v4.0	14 NOV 2022	NA-43.3	v1.3.x
v3.0	26 OCT 2022	NA-43.2	v1.3.x
v2.0	31 JAN 2022	NA-43	v1.3.x

3.1 DOCUMENT CHANGE SUMMARY

3.1 VERSION 8.0

No material changes. Updated to show that this document is applicable for NA-45.2 firmware.

3.2 VERSION 7.0

- Added support for new registers added in NA-45.0 release
 - Additional registers between 304 and 473 for status information pertaining to Ignition Modules 5 through 14
 - 3 new alarm registers

3.3 VERSION 6.0

- Added details for new registers added in NA-44.0 release
 - Function Code 0x03/0x04
 - 161 - Modbus Firing Rate
 - 181 - Controller State
 - 300-303 - Ignition Module State
 - 316-319 - Ignition Module Pilot Flame Status
 - 322-335 - Ignition Module Main Flame Status
 - 348-351 - Ignition Module Ion Aux In Measurement
 - 364-387 - Ignition Module Flame Diagnostics
 - 800-809 - Alarms
 - 830 - Waits
 - 840 - Main Permissives
 - 850-851 - Warnings
- Function Code 0x06/0x10
 - 161 - Modbus Firing Rate
 - 166 - Modbus Main Permissive
 - 218 - FARC Curve Selection
 - 219-239 - PID configuration settings
- Corrected registers 500-789 to specify that values are displayed in base units

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