PROFIRE

PF2100

MODBUS REGISTER MAP

MODBUS CARD:

FOR HARDWARE v2.0 ONLY
FOR FIRMWARE v2.0, v4.0, v4.1, v4.3, v4.4

DATA LOGGING CARD:

FOR HARDWARE v2.3, v2.4
FOR FIRMWARE v5.0, v5.1

WELCOME TO PROFIRE!

We are thrilled that you have chosen Profire to deliver the most user-friendly, dependable, and secure burner management and combustion control solutions for your heating application — and that's just the beginning!

For 20+ years we have been dedicated to designing products for thermal appliances used across several industrial applications. Through the expertise of our engineering team and our extensive field experience, we continuously strive to develop performance-driven solutions tailored to meet your objectives and goals. Our products and services include:

- **Certified & Approved BMS Controllers**
- **Performance-Driven Fuel Trains**
- **High Efficiency Burners**
- **Commissioning and Training**
- **Preventative Maintenance**
- **Solution Enhancements**
- **And so much more!**

Natural draft, forced draft, multi-pilot, multi-burner, you name it, our experts are ready to help.
Reach out and let's get started today!

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1 INTRODUCTION

This guide can be consulted to interface with a Modbus Expansion Card or Data Logging Expansion Card installed in a PF2100, PF2100i, or PF2100F system. This guide is relevant to the firmware detailed in the table below. If your firmware does not match this table, please consult Profire Energy to arrange for an upgrade.

SYSTEM TYPE	SYSTEM FIRMWARE VERSION
PF2100	E1.8.217
PF2100F (Open)	F1.7.045
PF2100F (Enclosed)	F1.7.202
PF2100i	I1.9.103

NOTE:
Certain register functionality may differ, depending on the type of system the Expansion Card is installed in. Each variation in functionality is identified by this symbol: ⚠

2 FIRMWARE VERSION HISTORY

2.1 MODBUS CARD FIRMWARE

MODBUS CARD FIRMWARE VERSION	DESCRIPTION
v2.0	First version compatible with Modbus Card HW v2.0. Requires DC FW v1.6.3CE and TC FW v1.6.38.
v4.0	Requires DC FW E1.8.005 or higher and TC FW E1.8.005 or higher.
v4.1	Compatible with all FW versions DC FW v1.6.3CE/TC FW v1.6.38 and higher. Added comm error counters. Reliability improvements.
v4.3	Added latching registers.
v4.4	Reliability improvements.

2.2 DATA LOGGING CARD FIRMWARE

DATA LOGGING CARD FIRMWARE VERSION	DESCRIPTION
v5.0	First version to be mass produced.
v5.1	Improved microcontroller and SPI reliability. Reliability improvements.

NOTE:
If you have older data logging firmware, contact Profire to discuss update options.

3 MODBUS COMMANDS

Only the following Modbus RTU commands are supported by the PF2100 Modbus and Data Logging Cards. All other Modbus RTU commands are not supported. Modbus TCP is not directly supported but can be used if a third-party bridge is purchased. Refer to the official "Modicon Modbus Protocol Reference Guide" available on the Modicon website for further details on Modbus RTU commands.

NOTE:
The Modbus RTU standard specifies an 8N2 format when parity is disabled. However, the Modbus Expansion Card and Data Logging Expansion Card both use 8N1 (8 data bits, no parity, 1 stop bit). 8N1 is commonly used and supported in most Modbus devices.

NAME	COMMAND	ADDRESS RANGE	DESCRIPTION
Read Input Status	2 = 0x02	10001 - 19999	Bit packs the response.
Read Holding Registers	3 = 0x03	40001 - 49999	Two bytes per register are returned.
Read Input Registers	4 = 0x04	30001 - 39999	Two bytes per register are returned.
Preset Single Register	6 = 0x06	40001 - 49999	Two bytes per register must be sent.
Preset Multiple Registers	16 = 0x10	40001 - 49999	Two bytes per register must be sent.

3.1 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. This guide provides both numbers for your convenience. Consult your software documentation to determine which is required in your case.

To understand why this is, it is useful to know a bit about how Modbus RTU packets are structured. Modbus RTU packets encode the Register Address next to each command. The Register Offset is calculated by subtracting the Base Address from the Register Address as follows:

Register Offset = Register Address – Base Address

For example, the Base Address for Command 0x03 is 40001. If you want to read register 40003, then the Register Offset encoded in the Modbus RTU packet would be 40003 – 40001 = 2.

3.2 REGISTER VALUE DEFINITIONS

The following definitions are terms used in this guide to refer to register values.

- **For Data Bits, positive logic is used:**
  Set = Logic High = ON = 1
  Clear = Logic Low = OFF = 0
- **For Dry Contacts:**
  Open = the attached switch is open and current does not flow.
  Closed = the attached switch is closed and current is flowing.
- **For Powered Valve Outputs:**
  Energized = Open = the attached valve is open, and fluid is flowing.
  De-energized = Closed = the attached valve is closed, and fluid is not flowing.

3.3 LATCHED VS UNLATCHED REGISTERS

Latched registers have the same function as their corresponding unlatched registers but will remain set if responsible for a system shutdown. Latched registers will only clear upon system restart. For example: Upon a high fuel pressure event, registers 10020 (High Pressure Input) and 10036 (High Pressure Input Latched) will be set and the system will shut down. Register 10020 will remain set until the fuel pressure returns to an acceptable level, whereas register 10036 will remain set regardless of changes in fuel pressure and will not clear until the system is restarted.

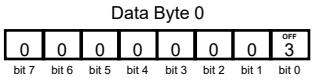
3.4 READ-ONLY DISCRETE INPUTS

These are single bit values that are read only. 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.

REGISTER ADDRESS (OFFSET)	NAMES AND VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
10001 (0)	Run 0 = Not Running 1 = Running	The Run bit is set when the controller is running in any state other than Ready, Alarm, or Shutdown. It is also set when the system is waiting for an enabled wait condition before relighting. This indicates that the system is actively firing or is attempting to light. The Run bit will also be set if the system is running in Manual Mode. The status contact does not always match the state of the run bit. Refer to the user manual for more information on the status contact.	2.0+	5.0+
10002 (1)	Pilot 0 = De-energized 1 = Energized	*The Pilot bit is set whenever the controller is attempting to drive the Pilot Solenoid to an open position. This is not a proof of position.* ⚠ *PF2100i: This bit will clear when the Assist Gas Off setpoint is passed. It is not recommended to use this register for verifying the Pilot state. See note [1]*	2.0+	5.0+
10003 (2)	Low Fire (PF2100/PF2100F) 0 = De-energized 1 = Energized	The Low Fire bit is set whenever the controller is attempting to drive the Low Fire Solenoid to an open position. This is not a proof of position. ⚠ *PF2100F: Not recommended.*	2.0+	5.0+
	Assist Gas (PF2100i) 0 = De-energized 1 = Energized	*The Assist Gas bit is set whenever the controller is attempting to drive the Assist Gas to an open position. This is not a proof of position.* ⚠ *PF2100i: This bit will clear when the Assist Gas Off setpoint is passed. It is not recommended to use this register for verifying the Assist Gas state. See note [1]*	2.0+	5.0+
10004 (3)	High Fire (PF2100/PF2100F) 0 = De-energized 1 = Energized	The High Fire bit is set whenever the controller is attempting to drive the High Fire Solenoid to an open position. This is not a proof of position. ⚠ *PF2100F: Not recommended.*	2.0+	5.0+
	Waste Gas (PF2100i) 0 = De-energized 1 = Energized	The Waste Gas bit is set whenever the controller is attempting to drive the Waste Gas Solenoid to an open position. This is not a proof of position. ⚠ *PF2100i: This bit will clear when the Assist Gas Off setpoint is passed. It is not recommended to use this register for verifying the Waste Gas state. See note [1]*	2.0+	5.0+
10017 (16)	Level Input 0 = Closed 1 = Open	The Level Input bit shows the state of the Level Input. When the Level Input is closed (normal condition), the Level Input bit is off. When the Level Input is open (alarm condition), the bit is on.	2.0+	5.0+
10018 (17)	Main Solenoid Feedback 0 = LF & HF De-energized 1 = LF or HF Energized	The Main Solenoid Feedback bit can be used to verify the proper operation of the circuitry and wiring powering the Main Solenoids (both Low Fire and High Fire). This bit will be set if either output has voltage present on it, regardless of the source of the voltage. Therefore, if this bit is set but both 10003 and 10004 are clear, a circuitry/wiring short to 12/24V may be present. Similarly, if this bit is clear but either 10003 or 10004 are set, a circuitry/wiring short to ground may be present. This is not a proof of position. ⚠ *PF2100F: Not recommended.*	2.0+	5.0+

REGISTER ADDRESS (OFFSET)	NAMES AND VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
10019 (18)	Pilot Solenoid Feedback 0 = De-energized 1 = Energized	The Pilot Solenoid Feedback bit can be used to verify the proper operation of the circuitry and wiring powering the Pilot Solenoid. This bit will be set if the output has voltage present on it, regardless of the source of the voltage. Therefore, if this bit is set but 10002 is clear, a circuitry/wiring short to 12/24V may be present. Similarly, if this bit is clear but 10002 is set, a circuitry/wiring short to ground may be present. This is not a proof of position.	2.0+	5.0+
10020 (19)	High Pressure Input 0 = Closed 1 = Open	The High Pressure Input bit shows the state of the High Pressure Input. When the High Pressure Input is closed (normal condition), the High Pressure Input bit is clear. When the High Pressure Input is open (alarm condition), the bit is set.	2.0+	5.0+
10021 (20)	Proof of Closure Input 0 = Closed 1 = Open	The Proof of Closure Input bit shows the state of the Proof of Closure Input. When the Proof of Closure Input is closed (normal condition), the Proof of Closure Input bit is clear. When the Proof of Closure Input is open (unit not safe to start condition), the bit is set. ⚠ *PF2100F: Not recommended.*	2.0+	5.0+
10022 (21)	ESD Input 0 = Closed 1 = Open	The ESD Input bit shows the state of the ESD Input. When the ESD Input is closed (normal condition), the ESD Input bit is clear. When the ESD Input is open (alarm condition), the bit is set. ⚠ *PF2100F: Unused.* ⚠ *PF2100i: Unused.* 🔺 *See note [2]*	2.0+	5.0+
10023 (22)	Start Input 0 = Closed 1 = Open	The Start Input bit shows the state of the Start Input. When the Start Input is closed (normal condition), the Start Input bit is clear. When the Start Input is open, (unit stopped), the bit is set.	2.0+	5.0+
10024 (23)	Low Pressure Input 0 = Closed 1 = Open	The Low Pressure Input bit shows the state of the Low Pressure Input. When the Low Pressure Input is closed (normal condition), the Low Pressure Input bit is clear. When the Low Pressure Input is open (alarm condition), the bit is set.	2.0+	5.0+
10025 (24)	Flame Detected 0 = No Flame 1 = Flame Detected	The Flame Detected bit shows the state of the flame detection circuitry. When there is no flame or the flame does not meet minimum requirements, the bit is clear. When the flame meets or exceeds the minimum flame detection requirements, the bit is set.	2.0+	5.0+
10026 (25)	Flame Test Fail 0 = Flame Test OK 1 = Flame Test Failed	The Flame Test Fail bit shows the state of the flame test system. The flame detection circuitry does a self-test every 1.2 seconds. If the flame test is OK, the Flame Test Fail bit is off. If the flame test fails, the Flame Test Fail bit will be on.	2.0+	5.0+
10027 (26)	Unit Failure 0 = Unit OK 1 = Unit Failed	The Unit Failure bit shows the state of the unit self-tests. During operation, many self-tests and verifications of the internal operation of the unit are performed. If the unit passes these tests, the Unit Failure bit is clear. If any of these tests fail, the Unit Failure bit is set.	2.0+	5.0+
10028 (27)	Low or High Voltage 0 = Voltage OK 1 = Voltage Bad	The Low or High Voltage bit shows whether the voltage applied to the controller is within acceptable limits. If the voltage is within limits, the Low or High Voltage bit is clear. If the voltage is out of limits, the bit is set. The PF2100 has a warning voltage threshold, and an alarm threshold. The bit is set once the voltage exceeds the alarm threshold. Refer to the PF2100 User Manual for more information.	2.0+	5.0+

REGISTER ADDRESS (OFFSET)	NAMES AND VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
10029 (28)	HiTemp Alarm 0 = No Alarm 1 = Alarm	The HiTemp Alarm shows the state of the High Temperature Shutdown. If the process temperature is below the High Temperature Shutdown limit, the bit is clear. If the High Temperature Shutdown limit is exceeded, the bit will be set. ⚠ *PF2100F: Unused.*	2.0+	5.0+
10030 (29)	4-20 Card Alarm 0 = No Alarm 1 = Alarm	The 4-20 Card Alarm bit is set whenever one or more bits are set in in register 30014/40014. This could mean any of the following: the level or pressure inputs are below their respective low setpoints, above their respective high setpoints, disconnected, or there is a hardware failure on the 4-20 card.	2.0+	5.0+
10033 (32)	Level Input (Latched)	Latched version of 10017.	4.3+	5.0+
10034 (33)	Main Solenoid Feedback (Latched)	Latched version of 10018. ⚠ *PF2100F: Not recommended.*	4.3+	5.0+
10035 (34)	Pilot Solenoid Feedback (Latched)	Latched version of 10019.	4.3+	5.0+
10036 (35)	High Pressure Input (Latched)	Latched version of 10020.	4.3+	5.0+
10037 (36)	Proof of Closure Input (Latched)	Latched version of 10021. ⚠ *PF2100F: Not recommended.*	4.3+	5.0+
10038 (37)	ESD Input (Latched)	Latched version of 10022. ⚠ *PF2100F: Unused.* ⚠ *PF2100i: Unused.* 🔺 *See note [2]*	4.3+	5.0+
10039 (38)	Start Input (Latched)	Latched version of 10023.	4.3+	5.0+
10040 (39)	Low Pressure (Latched)	Latched version of 10024.	4.3+	5.0+
10041 (40)	Flame Detected (Latched)	Latched version of 10025.	4.3+	5.0+
10042 (41)	Flame Test Fail (Latched)	Latched version of 10026.	4.3+	5.0+
10043 (42)	Unit Failure (Latched)	Latched version of 10027.	4.3+	5.0+
10044 (43)	Low or High Voltage (Latched)	Latched version of 10028.	4.3+	5.0+
10045 (44)	HiTemp Alarm (Latched)	Latched version of 10029. ⚠ *PF2100F: Unused.*	4.3+	5.0+
10046 (45)	4-20 Card Alarm (Latched)	Latched version of 10030.	4.3+	5.0+

3.5 READ-ONLY INPUT/HOLDING REGISTERS

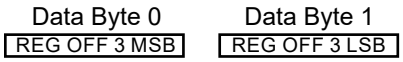
The Input Registers (300xx) are 2-byte read-only values. They are mirrored in corresponding Holding Registers (400xx) for convenience and to maintain compatibility with some PLCs.

Use the “Read Input Registers” Command (0x04) to read the Input Registers (300xx).

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

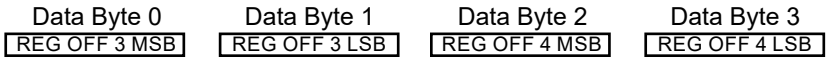
Example 1: Read Single

Reading 1 register starting from Register Offset 3 will result 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 and the second byte will be the least significant byte. The next two bytes will contain the value of Register Offset 4. (i.e. 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.)



REGISTER ADDRESS (OFFSET)	BIT#	NAME	VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
30001/40001 (0)		***RUN AND VALVE STATUS BITS:***		***REFER TO REGISTER ADDRESSES:***	2.0+	5.0+
	Bit 0	Run	0 = Not Running	10001		
	Bit 1	Pilot	0 = De-energized	10002 ⚠ *PF2100i: This bit will clear when the Assist Gas Off setpoint is passed. It is not recommended to use this register for verifying the Pilot state. See note [1]*		
	Bit 2	Low Fire (PF2100/ PF2100F) Assist Gas (PF2100i)	0 = De-energized	10003 ⚠ *PF2100F: Not recommended.* ⚠ *PF2100i: This bit will clear when the Assist Gas Off setpoint is passed. It is not recommended to use this register for verifying the Assist Gas state. See note [1]*		
	Bit 3	High Fire (PF2100/ PF2100F) Waste Gas (PF2100i)	0 = De-energized	10004 ⚠ *PF2100F: Not recommended.* ⚠ *PF2100i: This bit will clear when the Assist Gas Off setpoint is passed. It is not recommended to use this register for verifying the Waste Gas state. See note [1]*		
30002/40002 (1)		***INPUT STATUS AND FLAGS (NON-LATCHING):***		***REFER TO REGISTER ADDRESSES:***	2.0+	5.0+
	Bit 0	Level Input	0 = Closed	10017		
	Bit 1	Main Solenoid Feedback	0 = LF & LH De-energized	10018 ⚠ *PF2100F: Not recommended.*		
	Bit 2	Pilot Solenoid Feedback	0 = De-energized	10019		
	Bit 3	High Pressure Input	0 = Closed	10020		
	Bit 4	Proof of Closure Input	0 = Closed	10021 ⚠ *PF2100F: Not recommended.*		
	Bit 5	ESD Input	0 = Closed	10022 ⚠ *PF2100F: Unused.* ⚠ *PF2100i: Unused.* 🔺 *See note [2]*		
	Bit 6	Start Input	0 = Closed	10023		
	Bit 7	Low Pressure Input	0 = Closed	10024		
	Bit 8	Flame Detected	0 = No Flame	10025		
	Bit 9	Flame Test Fail	0 = Flame Test OK	10026		
	Bit 10	Unit Failure	0 = Unit OK	10027		
	Bit 11	Low or High Voltage	0 = Voltage OK	10028		
	Bit 12	HiTemp Alarm	0 = No Alarm	10029 ⚠ *PF2100F: Unused.*		
	Bit 13	4-20 Card Alarm	0 = No Alarm	10030		

REGISTER ADDRESS (OFFSET)	BIT#	NAME	VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
30003/40003 (2)		High Temp Thermocouple Value	-50°C to 1350°C	This is the current reading of the High Temp Thermocouple encoded as a 16-bit signed integer in °C. ⚠ *See note [3]*	2.0+	5.0+
30004/40004 (3)		Process Thermocouple Value (PF2100/PF2100F) Chamber Thermocouple Value (PF2100i)	-50°C to 1350°C	This is the current reading of the Process/Chamber Thermocouple encoded as a 16-bit signed integer in °C. ⚠ *See note [3]*	2.0+	5.0+
30005/40005 (4)		Aux Thermocouple Reading	-50°C to 1350°C	This is the current reading of the Aux Thermocouple encoded as a 16-bit signed integer in °C. ⚠ *See note [3]*	2.0+	5.0+
30006/40006 (5)		Pilot Flame Quality	0% to 100%	This number represents the quality of the pilot flame. The higher the number the better the flame.	2.0+	5.0+
30007/40007 (6)		***INPUT STATUS AND FLAGS (LATCHING):***		***REFER TO REGISTER ADDRESSES:***	4.3+	5.0+
	Bit 0	Level Input	0 = Closed	10033		
	Bit 1	Main Solenoid Feedback	0 = LF & HF De-energized	10034 ⚠ *PF2100F: Not recommended.*		
	Bit 2	Pilot Solenoid Feedback	0 = De-energized	10035		
	Bit 3	High Pressure Input	0 = Closed	10036		
	Bit 4	Proof of Closure Input	0 = Closed	10037 ⚠ *PF2100F: Not recommended.*		
	Bit 5	ESD Input	0 = Closed	10038 ⚠ *PF2100F: Unused.* ⚠ *PF2100i: Unused.* ⚠ *See note [2]*		
	Bit 6	Start Input	0 = Closed	10039		
	Bit 7	Low Pressure Input	0 = Closed	10040		
	Bit 8	Flame Detected	0 = No Flame	10041		
	Bit 9	Flame Test Fail	0 = Flame Test OK	10042		
	Bit 10	Unit Failure	0 = Unit OK	10043		
	Bit 11	Low or High Voltage	0 = Voltage OK	10044		
	Bit 12	HiTemp Alarm	0 = No Alarm	10045 ⚠ *PF2100F: Unused.*		
	Bit 13	4-20 Card Alarm	0 = No Alarm	10046		

REGISTER ADDRESS (OFFSET)	BIT#	NAME	VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
30008/40008 (7)		Process (High Fire) Setpoint (PF2100) Waste Gas Setpoint (PF2100i)	0 to 1350°C	This is the current Process (also called High Fire) / Waste Gas Setpoint. ⚠ *PF2100F: Unused.* ⚠ *See note [3]*	2.0+	5.0+
30009/40009 (8)		Low Fire Setpoint (PF2100) Minimum Run Temperature (PF2100F) Assist Gas Setpoint (PF2100i)	0 to 1350°C	This is the current Low Fire/ Minimum Run Temperature/ Assist Gas Setpoint. Value has no meaning if Low Fire is disabled. ⚠ *See note [3]*	2.0+	5.0+
30010/40010 (9)		Pilot Off Setpoint	0 to 1350°C	This is the current Pilot Off Setpoint. Value has no meaning if Pilot Off is disabled. ⚠ *PF2100F: Unused.* ⚠ *PF2100i: Unused.* ⚠ *See note [3]*	2.0+	5.0+
30011/40011 (10)		4-20mA Level Reading	"LVL Offset" to "LVL Range"	This is encoded as a 16-bit unsigned integer in the units specified in the PF2100 settings. ⚠ *PF2100i: Unused.*	2.0+	5.0+
30012/40012 (11)		4-20mA Pressure Reading	0 to "PRS Range"	This is encoded as a 16-bit unsigned integer in units specified in the PF2100 settings, but the value is encoded x10. For example, 30psi would be encoded as 300.	2.0+	5.0+
30013/40013 (12)		Reserved		Reserved for future use.	2.0+	5.0+
30014/40014 (13)		***4-20mA EXPANSION CARD ALARM:***		This indicates the Alarm Status of the 4-20mA Expansion Card. Each bit represents an error as shown on the left. If bits 0 and 1 are both set, the Level Input is disconnected. If bits 2 and 3 are both set, the Pressure Input is disconnected.	2.0+	5.0+
	Bit 0	Level Low Alarm ⚠ *PF2100i: Unused.*	0 = No Alarm			
	Bit 1	Level High Alarm ⚠ *PF2100i: Unused.*	0 = No Alarm			
	Bit 2	Pressure Low Alarm	0 = No Alarm			
	Bit 3	Pressure High Alarm	0 = No Alarm			
	Bit 4	4-20 Card Failure	0 = No Alarm			
30015/40015 (14)		Modbus to Terminal Communication Error	0 = No Error 1 = Communication Error	If there is a Modbus Card to Terminal Card Communication Error, this register will be set to 1 and all other Modbus registers will clear to zero.	4.1+	5.0+

REGISTER ADDRESS (OFFSET)	BIT#	NAME	VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
30016/40016 (15)		Modbus to Terminal Communication Error Counter	0 to 65535	Counts consecutive communications timeouts within the Terminal Card when register 30015/40015 = 1. Will reset to zero when register 30015/40015 = 0.	4.1+	5.0+
30018/40018 (17)		Board Temperature		This is the current temperature reading of the Data Logging Expansion Card. The temperature units are configured by DIP switches on the Data Logging Card.	N/A	5.0+
30019/40019 (18)		0-30V Input Reading		This is the DC voltage reading at the 0-30V input terminals of the Data Logging Card multiplied by 10. For example, 12VDC would be encoded as 120.	N/A	5.0+
30020/40020 (19)		4-20mA Input Reading		This is the current reading at the 4-20mA input terminals of the Data Logging Expansion Card expressed as a percentage multiplied by 10 For example, 12mA is 50% of range which would be encoded as 500.	N/A	5.0+
30021/40021 (20)		Clock - Second	0 to 59	This is the seconds component of the current clock reading on the Data Logging Expansion Card.	N/A	5.0+
30022/40022 (21)		Clock - Minute	0 to 59	This is the minutes component of the current clock reading on the Data Logging Expansion Card.	N/A	5.0+
30023/40023 (22)		Clock - Hour	0 to 23	This is the hour component of the current clock reading on the Data Logging Expansion Card.	N/A	5.0+
30024/40024 (23)		Clock - Day	1 to 31	This is the day component of the current clock reading on the Data Logging Expansion Card.	N/A	5.0+
30025/40025 (24)		Clock - Month	1 to 12	This is the month component of the current clock reading on the Data Logging Expansion Card.	N/A	5.0+
30026/40026 (25)		Clock - Year	> 2000	This is the year component of the current clock reading on the Data Logging Expansion Card.	N/A	5.0+
30030/40030 (29)		Card Firmware Version		This is the current firmware version of the Data Logging Expansion Card multiplied by 10 For example, v5.1 Data Logging Expansion firmware would be encoded as 51.	N/A	5.0+

3.6 READ/WRITE HOLDING REGISTERS

These are 2-byte read/write values. Setpoints are checked to be within range before being accepted. To verify that a setpoint is accepted, read back the setpoint registers in 30008-30010 or 40008-40010. See the Modbus Manual for recommended procedures.

Use the “Preset Single Register” command (0x06) or the “Preset Multiple Registers” command (0x10) to write these registers.

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

Data Byte 0	Data Byte 1
REG OFF 100 MSB	REG OFF 100 LSB

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 and the second byte will be the least significant byte. The next two bytes will contain the value of Register Offset 101. (i.e. 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.)

Data Byte 0	Data Byte 1	Data Byte 2	Data Byte 3
REG OFF 100 MSB	REG OFF 100 LSB	REG OFF 101 MSB	REG OFF 101 LSB

REGISTER ADDRESS (OFFSET)	NAME AND VALUES	VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
40100 (99)	***WRITE COMMAND REGISTER:*** Set register to decimal 1234 to start unit. Set register to decimal 4321 to stop unit.	0, 1234, 4321	This register is used to remotely stop or start the unit and will clear when the command is accepted.	2.0+	5.0+
40101 (100)	Process (High Fire) Setpoint Change Request (PF2100) Waste Gas Setpoint Change Request (PF2100i)	0 to 1350°C	This register is used to request the unit to change the SP to the specified value and will clear when the setpoint is accepted. Read register 30008/40008 to verify that the change was accepted. ⚠ *PF2100F: Unused.* ⚠ *See note [3], [4]*	2.0+	5.0+
40102 (101)	Low Fire Setpoint Change Request (PF2100) Minimum Run Temperature Setpoint Change Request (PF2100F) Assist Gas Setpoint Change Request (PF2100i)	0 to 1350°C	This register is used to request the unit to change the SP and will clear when the setpoint is accepted. Read register 30009/40009 to verify that the change was accepted. ⚠ *See note [3], [4]*	2.0+	5.0+
40103 (102)	Pilot Off Setpoint Change Request (PF2100) Low Temp Alarm Setpoint (PF2100F)	0 to 1350°C	This register is used to request the unit to change the SP and will clear when setpoint is accepted. Read register 30010/40010 to verify that the change was accepted. ⚠ *PF2100i: Unused.* ⚠ *See note [3], [4]*	2.0+	5.0+
40110 (109)	Set Clock - Second	0 to 59	This register is used to set the clock seconds. Register 40116 (115) must be set to 1 for the change to take effect. Read register 30021/40021 to verify that the change was accepted.	N/A	5.0+
40111 (110)	Set Clock - Minute	0 to 59	This register is used to set the clock minutes. Register 40116 (115) must be set to 1 for the change to take effect. Read register 30022/40022 to verify that the change was accepted.	N/A	5.0+
40112 (111)	Set Clock - Hour	0 to 23	This register is used to set the clock hour. Register 40116 (115) must be set to 1 for the change to take effect. Read register 30023/40023 to verify that the change was accepted.	N/A	5.0+
40113 (112)	Set Clock - Day	1 to 31	This register is used to set the clock day. Register 40116 (115) must be set to 1 for the change to take effect. Read register 30024/40024 to verify that the change was accepted.	N/A	5.0+

REGISTER ADDRESS (OFFSET)	NAME AND VALUES	VALUES	DESCRIPTION	MODBUS CARD FW VERSION	DATA LOGGING CARD FW VERSION
40114 (113)	Set Clock - Month	1 to 12	This register is used to set the clock month. Register 40116 (115) must be set to 1 for the change to take effect. Read register 30025/40025 to verify that the change was accepted.	N/A	5.0+
40115 (114)	Set Clock - Year	>2000	This register is used to set the clock year. Register 40116 (115) must be set to 1 for the change to take effect. Read register 30026/40026 to verify that the change was accepted.	N/A	5.0+
40116 (115)	Do Not Apply Clock Changes	0	This register is used to apply the changes made to the clock in registers 40110-40115. Read registers 30021/40021 to 30026/40026 to verify that the command was accepted.	N/A	5.0+
	Apply Clock Changes as Set in Registers 40110-40115	1			

4 NOTES

[1] On the PF2100i model, register 10002, 10003, 10004, and 40001 (bit 1 to 3) will clear when the Assist Gas Off setpoint is passed – despite the pilot and main valve both still being energized. As a result of this, it is recommended to use register 40002 and 40004 to determine the valve state. Register 40002 bit 1 will verify that either the Assist Gas or Waste Gas valve is open. Register 40002 bit 2 will verify that the Pilot valve is open. Register 40004 will verify the process temperature. Through cross comparing the information in register 40002 and 40004 to a known setpoint (such as the Assist Gas Off setpoint in register 40009) one can infer the current valve state. Another option is using registers 10018 and 10019 in place of register 40002 to check the valve state.

[2] **Warning:** There is a known issue where Modbus registers pertaining to the ESD contact will not operate correctly if the PF2100 Terminal Card was built to BOM v2.4.7.

[3] These thermocouple readings are all encoded using 16-bit signed integers and are always reported in Celsius even if the PF2100 is set to display the temperature in Fahrenheit.

[4] A setpoint cannot be set above/below the setpoint that bounds it above/below.

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