

PFRNX MODBUS Functions

0x03/0x04 Read Input/Holding Registers

Request		
communication address	1 byte	0 to 255
Function code	1 byte	0x03/0x04
Starting Address	2 bytes	0x0000 to 0xFFFF
Quantity of Registers	2 bytes	0x0001 to 0x007d (N)
CRC	2 bytes	2 bytes CRC
Response		
communication address	1 byte	1 to 255
Function code	1 byte	0x03/0x04
Byte count	1 bytes	2 X N
Register value	N X 2 bytes	Value
CRC	2 bytes	2 bytes CRC
Error		
communication address	1 byte	1 to 255
Error code	1 byte	0x83/0x84
Exception code	1 bytes	0x01 or 02 or 03 or 04
CRC	2 bytes	2 bytes CRC

0x06 Write Single Registers

Request		
communication address	1 byte	0 to 255
Function code	1 byte	0x06
Register Address	2 bytes	0x0000 to 0xFFFF
Register value	2 bytes	Value
CRC	2 bytes	2 bytes CRC
Response		
communication address	1 byte	1 to 255
Function code	1 byte	0x06
Register Address	2 bytes	0x0000 to 0xFFFF
Register value	2 bytes	value
CRC	2 bytes	2 bytes CRC
Error		
communication address	1 byte	1 to 255
Error code	1 byte	0x86
Exception code	1 bytes	0x01 or 02 or 03 or 04
CRC	2 bytes	2 bytes CRC

0x10 Write Multiple Registers

Request		
communication address	1 byte	0 to 255
Function code	1 byte	0x10
Starting Address	2 bytes	0x0000 to 0xFFFF
Quantity of Registers	2 bytes	0x0001 to 0x007b (N)
Byte count	1 byte	2 X N
Register value	N X 2 bytes	Value
CRC	2 bytes	2 bytes CRC
Response		
communication address	1 byte	1 to 255
Function code	1 byte	0x10
Starting Address	2 bytes	0x0000 to 0xFFFF
Quantity of Registers	2 bytes	value
CRC	2 bytes	2 bytes CRC
Error		
communication address	1 byte	1 to 255
Error code	1 byte	0x90
Exception code	1 bytes	0x01 or 02 or 03 or 04
CRC	2 bytes	2 bytes CRC

*Note: Communication address 0 as a broadcast to all the slave. The slave will not respond with a broadcast command

PFRNX MODBUS Register

Address (Hex)	Parameter	Format	Units and Scale	Range
Product information. Read only. Function 03h or 04h				
0000	Device type - main*	F1	ASCII	'00'
0001		F1	ASCII	'08'
0002		F1	ASCII	'01'
0003	Device type - sub*	F1	ASCII	XX ¹ ('08' = PFR80NX, '12' = PFR120NX, '16' = PFR160NX)
0004		F1	ASCII	XX'
0005	Version number -main	F1	ASCII	'XX'
0006		F1	ASCII	'XX'
0007	Version number -sub	F1	ASCII	'XX'
0008		F1	ASCII	'XX'
0009	Reserverd	--	--	--
000A	Reserverd	--	--	--
000B	Reserverd	--	--	--
000C	Reserverd	--	--	--
000D	Reserverd	--	--	--
000E	Reserverd	--	--	--
000F	Reserverd	--	--	--
Measurements and relay status. Read only. Function 03h or 04h				
0010	Cosφ	F11	--	Bit0- Bit7 = Power factor (0 - 100), Bit8 = Capacitive(0) or Inductive (1), Bit9 = Import (0) or Export (1)
0011	Voltage	F7	1Volts	0 - 600
0012	Current (High Word)	F8	0.01Amps	0 - 1.2x10 ⁷ (120kA)
0013	Current (Low Word)			
0014	Frequency	F6	0.01Hz	2000 - 8000
0015	Voltage Total Harmonic Distortion	F7	1%	0 - 500
0016	Current Total Harmonic Distortion	F7	1%	0 - 500
0017	Required Power (High Word)	F9	1VAR	0 - 2.3x10 ⁸ (230MA)
0018	Required Power (Low Word)			
0019	Active Power (High Word)		1Watts	0 - 2.3x10 ⁸ (230MA)
001A	Active Power (Low Word)			
001B	Reactive Power (High Word)		1VAR	0 - 2.3x10 ⁸ (230MA)
001C	Reactive Power (Low Word)			
001D	Apparent Power (High Word)	1VA	0 - 2.3x10 ⁸ (230MA)	
001E	Apparent Power (Low Word)			
001F	2nd Current Harmonic	F7	1%	0 - 500
0020	3rd Current Harmonic	F7	1%	0 - 500
0021	4th Current Harmonic	F7	1%	0 - 500
0022	5th Current Harmonic	F7	1%	0 - 500
0023	6th Current Harmonic	F7	1%	0 - 500
0024	7th Current Harmonic	F7	1%	0 - 500
0025	8th Current Harmonic	F7	1%	0 - 500
0026	9th Current Harmonic	F7	1%	0 - 500
0027	10th Current Harmonic	F7	1%	0 - 500
0028	11th Current Harmonic	F7	1%	0 - 500
0029	12th Current Harmonic	F7	1%	0 - 500
002A	13th Current Harmonic	F7	1%	0 - 500
002B	14th Current Harmonic	F7	1%	0 - 500
002C	15th Current Harmonic	F7	1%	0 - 500
002D	Alarm Status	F2	Bit Field	Bit 0 - 13
002E	Step Output Status	F3	Bit Field	Bit 0 - 15
002F	LED Status	F4	Bit Field	Bit 0 - 5
0030	Power Factor	F7	--	0 - 100
0031	Ratio Rate Step 1	F7	--	0 - 65535, 0= Disable
0032	Ratio Rate Step 2	F7	--	
0033	Ratio Rate Step 3	F7	--	
0034	Ratio Rate Step 4	F7	--	
0035	Ratio Rate Step 5	F7	--	
0036	Ratio Rate Step 6	F7	--	
0037	Ratio Rate Step 7	F7	--	
0038	Ratio Rate Step 8	F7	--	
0039	Ratio Rate Step 9	F7	--	
003A	Ratio Rate Step 10	F7	--	
003B	Ratio Rate Step 11	F7	--	
003C	Ratio Rate Step 12	F7	--	
003D	Ratio Rate Step 13	F7	--	
003E	Ratio Rate Step 14	F7	--	
003F	Ratio Rate Step 15	F7	--	
0040	Ratio Rate Step 16	F7	--	

Address (Hex)	Parameter	Format	Units and Scale	Range
Settings. Read/Write. Function 03h, 04h, 06h, 10h				
0100	Voltage System	F10	–	0= L-N, 1= L-L
0101	Frequency System	F10	–	0= 50Hz, 1= 60Hz
0102	System ID	F10	–	0= Comm Slave, 1= Sync Master, 2= Sync Slave
0103	Input Control	F10	–	0= No, 1= Yes
0104	Primary CT Ratio	F10	–	5 - 8000
0105	Set Cosφ	F5	–	0 - 40
0106	Smallest Cap	F6	100VAR	0 - 15000 (0 = Auto) (every step is 500 VAR)
0107	Sensitivity	F7	1sec/step	5 - 300
0108	Reconnection Time	F7	1sec	5 - 240
0109	Switch Program	F10	–	0=Manual, 1=Rotational 2= Automatic, 3= Four-quadrant
010A	Rate Step 1 Setting	F10	–	0= Disable, 1= 1 step, 2= 2 steps, 3 steps 4= 4 steps, 5= 6 steps, 7= 8 steps, 8= 12 steps 9= 16steps, 254= Alarm Output, 255= Fan output *Rate Step 1 always set as 1 *Only last Rate Step 16 can be configured as alarm output *Rate Step 16 can be configured as fan output *Rate Step 15 can be configured as fan output only when Rate Step 16 is configured as alarm output
010B	Rate Step 2 Setting			
010C	Rate Step 3 Setting			
010D	Rate Step 4 Setting			
010E	Rate Step 5 Setting			
010F	Rate Step 6 Setting			
0110	Rate Step 7 Setting			
0111	Rate Step8 Setting			
0112	Rate Step 9 Setting			
0113	Rate Step 10 Setting			
0114	Rate Step 11 Setting			
0115	Rate Step 12 Setting			
0116	Rate Step 13 Setting			
0117	Rate Step 14 Setting			
0118	Rate Step 15 Setting			
0119	Rate Step 16 Setting			
011A - 0129	Reserved	–	–	* READ will get back "00" in byte
012A	Voltage THD Alarm	F7	1%	10 - 30
012B	Current THD Alarm	F7	1%	20 - 300
012C	Undercurrent	F6	0.1%	10 - 30
012D	Overcurrent	F7	1%	110 - 140
012E	Undervoltage	F7	1Volts	90 - 395
012F	Overvoltage	F7	1Votls	132 - 500
0130	Reserved	–	–	
0131	Programmable Alarm	F2	Bit Field	Bit 0 - 15
0132	Programmable Output	F2	Bit Field	Bit 0 - 15
0133	Comm. Address	F7	–	1 - 255
0134	Comm. Baudrate	F10	–	0=2400, 1=4800, 2=9600, 3=19200, 4= 38400
0135	Comm. Parity	F10	–	0= None, 1= Even, 2= Odd
0136	Comm. Stop bit	F10	–	0= 1 Stop Bit, 1= 2 Stop Bits
0137	Year	F7	year	0 - 199 (as 2000 - 2199)
0138	Month	F7	month	1 - 12
0139	Day	F7	day	1- 31
013A	Hour	F7	hour	0 - 23
013B	Minute	F7	minute	0 - 59
013C	Second	F7	Second	0 - 59
013D	Step On Timer Setting	F6	1000Hours	1 - 255
013E	Step On Counter Setting	F6	1000Times	1 - 255
Remote command. Write only. Function 06h				
0200	Remote Command	F12	Bit field	--

Address (Hex)	Parameter	Format	Units and Scale	Range
Rate Step On Timer. Read only. Function 03h or 04h				
0300	Rate Step 1 On Time High Byte	F9	Second	0 - 4.29x10 ⁹
0301	Rate Step 1 On Time Low Byte			
:	:			
:	:			
031E	Rate Step 16 On Time High Byte			
031F	Rate Step 16 On Time Low Byte			
Rate Step On Counter. Read only. Function 03h or 04h				
0400	Rate Step 1 On Counter High Byte	F9	–	0 - 4.29x10 ⁹
0401	Rate Step 1 On Counter Low Byte			
:	:			
:	:			
041E	Rate Step 16 On Counter High Byte			
041F	Rate Step 16 On Counter Low Byte			

Address (Hex)	Parameter	Format	Units and Scale	Range
Alarm Records. Read only. Function 03h or 04h				
1000	Alarm Record 1			*Refer below alarm record description
:	:			
:	:			
103B	Alarm Record 60			
System Event Records. Read only. Function 0x03 or 0x04				
2000	System Event Record 1			*Refer below system event record description
:	:			
:	:			
2077	System Event Record 120			
Step Event Records. Read only. Function 0x03 or 0x04				
3000	Step Event Record 1			*Refer below step event record description
:	:			
:	:			
315D	Step Event Record 350			

Alarm or System Event Record consists of 4 words

Word Number	Description	Format	Range
1	Record code, Year	F13	0 - 255, 0 - 199 (as 2000 - 2199)
2	Month, Day	F14	0 - 12, 0 - 31
3	Hour, Minute	F15	0 - 23, 0 - 59
4	Record value	F7	0 - 65536

Step Event Record consists of 8 words

Word Number	Description	Format	Range
1	Step No, Year	F16	1 - 32, 0 - 199 (as 2000 - 2199)
2	Month, Day	F14	1 - 12, 1 - 31
3	Hour, Minute	F15	0 - 23, 0 - 59
4	Cosφ, Direction	F17	0 - 201, 0=Cap 1=Ind
5	High Word Current	F8	0 - 42MA (/100)
6	Low Word Current		
7	Voltage	F7	5 - 600
8	Rated Step On/Off	F7	1 = Step On, 2= Step Off

Description of recode code for system records

Recode Code	Description	Format	Units and Scale	Recode Value
0	Setting change in Voltage System	F10	--	0 = L-N, 1 = L - L
1	Setting change in Frequency System	F10	--	0 = 50Hz, 1 = 60Hz
2	Setting change in System ID	F10	--	0 = Standalone unit, 1 = Master unit, 2 = Slave unit
3	Setting change in Input Control	F10	--	0 = No, 1 = Yes
10	Primary CT	F10	--	5 - 8000
11	Setting change in Set Cosp	F5	--	0 - 40
12	Setting change in Smallest Cap	F6	100 VAR	0 - 15000 (0 = Auto)
13	Setting change in Sensitivity	F7	1 Sec/step	5 - 300
14	Setting change in Reconnection Time	F7	1 Sec	5 - 240
15	Setting change in Switch Program	F10	--	0 = Manual, 1 = Rotational, 2 = Automatic, 3 = Four-quadrant
20 -35	Setting change in Rate step (1 - 16)	F10	--	0 - 9 , 10 = Alarm , 11 = Fan *Refer to Modbus address 010A in page 1
36 - 51	Setting change in Rate Step (17 - 32)			
60	Setting change in THD Voltage	F7	1%	10 - 30
61	Setting change in THD Current	F7	1%	20 - 300
62	Setting change in Undercurrent	F6	0.1%	10 - 30
63	Setting change in Overcurrent	F7	1%	110 - 140
64	Setting change in Undervoltage	F7	1Volts	90 - 395
65	Setting change in Overvoltage	F7	1Volts	132 - 500
80	Setting change in Communication	F10	--	0 = No, 1 = Yes
81	Setting change in Remote Set	F10	--	0 = No, 1 = Yes
82	Setting change in Communication Address	--	--	1 - 255
83	Setting change in Baudrate	F10	--	0=2400, 1=4800, 2=9600, 3=19200, 4=38400
84	Setting change in Parity	F10	--	0=None , 1=Even, 2=Odd
85	Setting change in number of Communcation Stop Bit	F10	--	0=1 bit, 1=2 bits
90	Setting change in Program Alarm	F2	Bit Field	Bit 0 - 13
91	Setting change in Program Output	F2	Bit Field	Bit 0 - 13
92	General Start	--	--	--
93	Master Output Alarm	F10	--	0 = Off, 1 = On
94	Slave Output Alarm	F10	--	0 = Off, 1 = On
95	Master Output Fan	F10	--	0 = Off, 1 = On
96	Slave Output Fan	F10	--	0 = Off, 1 = On
97	Alarm Alert	F18	--	1 - 14
98	Setting change through Communication	--	--	High byte = Starting Address Low byte = End Address
99	Delete single Step On Timer	--	--	1 - 32, 255 = All
100	Delete single Step On counter	--	--	1 - 32, 255 = All
101	Lock Setting change	--	--	--
102	Unlock setting change	--	--	--
103	Default setting	--	--	--
104	Step Output auto Off	--	--	1 -32
105	Auto to manual mode	--	--	--
106	Manual to auto mode	--	--	--
107	Clear alarm	F18	--	1- 14
108	Clear alarm step error	--	--	1 - 32 , 255 = All
109	Clear alarm cap size error	--	--	0 = Smallest cap over size, 1 = No suitable step cap
110	Clear alarm step timer	--	--	1 - 32, 255 = All
111	Clear alarm step counter	--	--	1 - 32, 255 = All

Description of recode code for alarm records

Recode Code	Description	Format	Units and Scale	Recode Value
1	THD Voltage Alarm	F7	1%	(Value in Percentage)
2	THD Current Alarm	F7	1%	(Value in Percentage)
3	Undercurrent Alarm	F6	0.1%	(Value in Percentage)
4	Overcurrent Alarm	F7	1%	(Value in Percentage)
5	Undervoltage Alarm	F7	1Volts	(Value in Voltage)
6	Overvoltage Alarm	F7	1Volts	(Value in Voltage)
7	Capacitor Size Error Alarm	--	--	0 = Smallest cap over size, 1 = No suitable step cap
8	Undercompensate Alarm	--	--	--
9	Overcompensate Alarm	--	--	--
10	Step Error Alarm	--	--	1 - 32 (Step Output)
11	No Voltage Release Alarm	F7	1Volts	(Value in Voltage)
12	CT Polarity Error Alarm	--	--	--
13	Clock Loss Alarm	--	--	--
14	EEPROM Error Alarm	--	--	--
15	Step On Timer Alarm	--	--	1 - 32 (Step Output)
16	Step On Counter Alarm	--	--	1 - 32 (Step Output)

PFRNX MODBUS Mapping Format

Code	Description
F1	2 bytes ASCII Character
F2	Unsigned integer - Alarm Status (0=Off, 1= On) Bit 0: THD Voltage Bit 1: THD Current Bit 2: Undercurrent Bit 3: Overcurrent Bit : Undervoltage Bit 5: Overvoltage Bit 6: Capacitor Size Error Bit 7: Undercompensate Bit 8: Overcompensate Bit 9: Step Error Bit 10: No Voltage Release Bit 11: CT Polarity Error Bit 13: EEPROM Error Bit 14: Step on timer alarm Bit 15: Step on counter alarm
F3	Unsigned integer - Step Output Status (0=Off, 1=On) Bit 0: Step Output 1 : : Bit 15: Step Output 16
F4	Unsigned integer - LED Status (0=Off, 1=On) Bit 0: AUTO LED Bit 1: CAP LED Bit 2: IND LED Bit 3: DMD ON LED Bit 4: DMD OFF LED Bit 5: ALARM LED
F5	Unsigned integer - Set Cosφ 0 - 19 = 0.80 Ind - 0.99 Ind 20 = 1.00 21 - 40 = 0.99 Cap - 0.8 Cap
F6	Unsigned integer A scaled numeric value of certain units Eg. 5 may represent 500VAR or 0.5% Refer to individual register's "Unit and Scale" and "Range" for detail
F7	Unsigned integer A numeric value of certain units Eg. 5 may represent 5V or 5% Refer to individual register's "Unit and Scale" and "Range" for detail
F8	Unsigned long integer Current value in multiples of 0.01 Ampere
F9	Unsigned long integer A numeric value of certain units
F10	Unsigned integer - Miscellaneous A numeric value representation of certain options or functions Refer to "range" column of the register for detail
F11	Unsigned integer Bit0 - Bit7= Cosφ (0 - 100) Bit8 = (0) Capacitor, (1) Inductive Bit9 = (0) Import, (1) Export
F12	Unsigned integer - Remote Command High byte: 1 - Delete all step On timer 2 - Delete single step On timer 3 - Delete all step On counter 4 - Delete single step On counter Low byte: Select number of rate step to delete Eg. 11 represent rate step 11 On timer and counter to be deleted
F13	Unsigned integer High byte: Record code Low byte: Year (0 - 199)
F14	Unsigned integer High byte: Month (1 - 12) Low byte: Day (1 - 31)
F15	Unsigned integer High byte: Hour (0 - 23) Low byte: Minute (0 - 59)
F16	Unsigned integer High Byte: Year (0 - 199) Low byte: Step number

Code	Description
F17	Unsigned integer High Byte: Cosφ (0 - 100 = 0.00 - 1.00 Import) (101 - 201 = 0.00 - 1.00 Export) Low byte: Direction
F18	Unsigned integer - Miscellaneous 1: THD Voltage 2: THD Current 3: Undercurrent 4: Overcurrent 5: Undervoltage 6: Overvoltage 7: Capacitor Size Error 8: Undercompensate 9: Overcompensate 10: Step Error 11: No Voltage Release 12: CT Polarity Error 13: Clock Loss 14: EEPROM Error 15: Step On Timer Alarm 16: Step On Counter Alarm