



MODBUS IC CARD READER PMR20/PMR2-MA

User manual V1.5



Version

Version	Memo	Date
V1.0	Initial	2015
V1.2	Change some Register	2016-03-06
V1.4	Add some Live hold Register after address 40100	2018-10-01
V1.5	Config Register add some new function	2018-12-01

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1. Summary

PMR20/PMR20-MA RFID card reader is a universal reader designed by 13.56M contactless RF technology. The reader is embedded with Cortex M3 processor and NXP series of original chips to ensure stable and reliable read-write performance. The reader is commonly used in PLC ModBus-RTU Protocol, can be easily connected with industrial control system, and read The card device fully takes into account the convenience of interface operation of PLC and the operability of secondary development. For the convenience of users. The development SDK includes computer-side testing and setting software, PLC-side testing routines, etc. PMR20/PMR20-MA card reader Automatically searching for specified types of cards, Users only need to read the card serial number register to get it easily.

2. Specification

- ◆ **Frequency:** 13.56MHZ
- ◆ **RFID Station and MCU:** MF RC500, Cortex M3 STM32F103
- ◆ **Card Protocol:** ISO14443A
- ◆ **Read Distance:** 5~10cm, 8cm Normal
- ◆ **Beep and LED:** One Beep and One LED , which can be controlled.
- ◆ **Interface:** Modbus-RTU with RS485
- ◆ **Power:** DC9~24V
- ◆ **Power Consumption:** 1W
- ◆ **Working Temperature:** -20 ~ +70°C

- ◆ *Storage Temperature:* -40 ~ +125°C
- ◆ *Size:* 115 * 75 * 15 (mm)
- ◆ *Weight:* 150g
- ◆ *Firmware Upgrade:* Support remote upgrade

3.Wire

4 wire to Connect

Color	Symbol
Red	Power VCC (+9~+24V)
Black	Power GND
Yellow	485 D+ (A)
Green	485 D- (B)

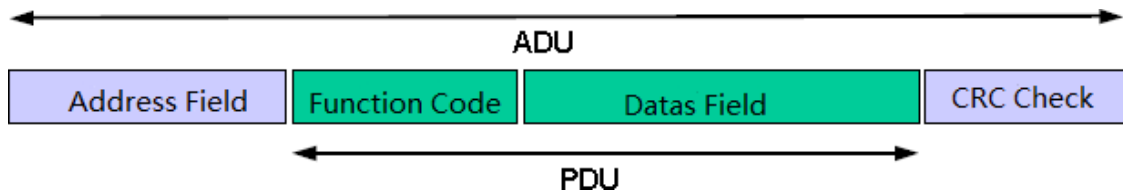
4.Card Supported

ISO14443A

- ◆ Mifare One S50/70
- ◆ Mifare Plus(Level1)
- ◆ Jcop 41 only the (Mifare 1K & 4K compatible)

5. MODBUS-RTU

The MODBUS protocol defines a simple protocol data unit (PDU), which is independent of the underlying communication layer. MODBUS protocol mapping on a particular bus or network can introduce some additional fields on the application data unit (ADU). General Modbus frame as shown below.



(Figure 1 Modbus Protocol package)

5.1 ModBus-RTU Protocol

The PMR20/PMR20-MA RFID reader supports many bauds, the default baud rate is 19200, N, 8,1.

5.1.1 PLC Send :

Device ID	Function Code	Data	CRC16
1 byte	1 byte	N byte	2bytes(LSB)

5.1.2 Reader Answer :

Device ID	Function Code	Data	CRC16
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1 byte	1 byte	N byte	2bytes(LSB)
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5.2 Supported command

The following command are displayed in HEX format.

5.2.1 Command: Read register - 0x03(DEC: 03)

Send :

Device ID	Function	Data				CRC16
		Start Register Address: High Byte	Start Register Address: Low Byte	Register Number: High Byte	Register Number: Low Byte	
1 byte	0x03	1 byte	1 byte	1 byte	1 byte	2bytes(LSB)

Answer:

Device ID	Function	Data		CRC16
		Byte Number for reading	Data for reading	
1 byte	0x03	1 byte	N byte	2bytes(LSB)

5.2.2 Command: Set one register - 0x06(DEC: 06)

Device ID	Function	Data				CRC16
		Register Address: High Byte	Register Address: Low Byte	Register Data: High Byte	Register Data: Low Byte	
1 byte	0x06	1 byte	1 byte	1 byte	1 byte	2bytes(LSB)

Answer :

		High Byte	Low Byte	High Byte	Low Byte	
--	--	-----------	----------	-----------	----------	--

Device ID	Function	Data				CRC16
		Register Address:	Register Address:	Register Data:	Register Data:	

1 byte	0x06	1 byte	1 byte	1 byte	1 byte	2bytes(LSB)
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5.2.3 Command: Set multi Register - 0x10 (DEC: 16)

Send :

Device ID	Function	Data						CRC16
		Start Register Address: High Byte	Start Register Address: Low Byte	Register Number: High Byte	Register Number: Low Byte	Byte Number for writing	Data for writing	
1 byte	0x10	1 byte	1 byte	1 byte	1 byte	1 byte	N byte	2bytes(LSB)

Answer :

Device ID	Function	Data				CRC16
		Start Register Address: High Byte	Start Register Address: Low Byte	Register Number: High Byte	Register Number: Low Byte	
1 byte	0x10	1 byte	1 byte	1 byte	1 byte	2bytes(LSB)

6. Register

Data Format:

0xAAAA, Hex Data AAAA

AAAAH, Hex Data AAAA

11000B, Binary Data 11000

Register Address is Dec Number

Register Address

No.	Name and Address	Description
Power-Off Save Register		
1-1	Reserved Register: 40000	unused
1-2	Parameter Register 1:40001	Baud and ID
1-3	Parameter Register 2:40002	
1-4	Parameter Register 3:40100	
1-5	Block Address Register 2:40101	
1-6	Block Address Register 3:40102	
1-7	Key Register 2:40103~40105	
1-8	Delay Time Register For Same Card:40106	
Power-Off Without Save Register		
2-1	IO Control Register:40003	
2-2	Card Serial No. Register:40004~40007	
2-3	Card Operate Register:40008	
2-4	Status Register: 40009	
2-5	Block Address Register 1:40010	

2-6	Key Register 1:40011~40013	
2-7	Reserved Register: 40014,40015	unused
2-8	Data Register:40016~40047	
2-9	Reserved Register: 40048~40099	unused

6.1 Power-Off Save Register

All Power-Off Save Registers will save the data after power off, so these registers only need be written once. You can write these config data by PC Demo and Config software.

6.1.1 Parameter Register 1:40001

Parameter Register 1 is used to configure the station number of the card reader and the communication baud rate.

Address 40001 (Default Value:0x0301)

bit	Description
15~8	Available Baud: 0x01->9600bps 0x02->14400bps 0x03->19200bps(default) 0x04->28800bps 0x05->38400bps 0x06->57600bps 0x07->115200bps else->19200bps
7~0	Station ID: (default value:0x01) ID from 0x01 to 0xFE

6.1.2 Parameter Register 2:40002

Register 40002 (default value:0x0000)

bit	description
15~8	reserved
8~7	<p>00->Both reading and writing ,Key A authentication(default)</p> <p>01->Both reading and writing, Key B authentication</p> <p>10->Reading card with Key A, writing with Key B</p> <p>11->Reading card with Key B, writing with Key A</p>
6	<p>0-> Authenticate with Key Register 1(40011~40013)</p> <p>1-> Authenticate with Key Register 1(40103~40105)</p>
5	<p>0-><i>Green LED</i> without action after getting card information.</p> <p>1-> <i>Green LED</i> Turn ON after getting card information.(Only 1 Time)</p>
4	<p>0-><i>Beep</i> without action after getting card serial number.</p> <p>1-><i>Beep</i> Turn ON after getting card serial number. (Only 1 Time)</p>
3~0	<p>The Card type of current operation :</p> <p>0x00->S50/S70(Default)</p>

6.1.3 Parameter Register 3:40100

Register Address 40100 (default value:0x0000)

bit	description
8~16	reserved
7	<p>Card Serial No. Register value Empty automation.</p> <p>0->Do not Empty value automation, you need fill zero value to the register from 40004 to 40007.</p> <p>1->Empty value after read register from 40004 to 40007, if bit5=1, then the data block register will be empty too.</p>

6	<p>Whether to skip key blocks when reading and writing blocks:</p> <p>0->Do not skip key blocks (default)</p> <p>1->Skip key block</p>
5	<p>Whether to clear all block data registers when clearing card number registers:</p> <p>0->When clearing the card number register, the block data register is not cleared.</p> <p>1->When clearing the card number register, clearing the block data register(That is all written0)</p>
4	<p>Data Mode for Block Data Register(40016~40047),Key Register(40011~40013 and 40103~40105),Card Serial No. Register(40004~40007) .</p> <p>0-> LSB</p> <p>1-> MSB</p>
3	<p>Whether card halt after card operation.</p> <p>0->The Card does not halt after operation to card.</p> <p>1-> The Card does halt after operation to card.</p>
2	<p>0-> write card with the parameter register address 40010</p> <p>1-> write card with the parameter register address 40102</p>
1	<p>0-> write card with the parameter register address 40010</p> <p>1-> write card with the parameter register address 40101</p>
0	<p>0-> Do not read block data after request card No.</p> <p>1-> read block data after request card No.</p>

6.1.4 Block Address Register 2:40101

Register Address 40101 (default value:0x0000)

bit	description
15~8	Block numbers, the max value is 4 0x00->No any block need read or write
7~0	The start block address , the value is from 0x00 to 0xFF

6.1.5 Block Address Register 2:40102

Register Address 40102 (default value:0x0000)

bit	description
15~8	Block numbers, the max value is 4 0x00->No any block need read or write
7~0	The start block address , the value is from 0x00 to 0xFF

6.1.6 Key Register 2:40103~40105

Default value:0xFFFF, 0xFFFF, 0xFFFF

if LSB Selected in Parameter register, the key value is as below:

Register Address	15~8	7~0
40103	Key1 (default 0xFF)	Key0 (default 0xFF)
40104	Key3 (default 0xFF)	Key2 (default 0xFF)
40105	Key5 (default 0xFF)	Key4 (default 0xFF)

if MSB Selected in Parameter register, the key value is as below:

Register	15~8	7~0
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Address		
40103	Key0 (default 0xFF)	Key1 (default 0xFF)
40104	Key2 (default 0xFF)	Key3 (default 0xFF)
40105	Key4 (default 0xFF)	Key5 (default 0xFF)

6.1.7 Delay Time Register For Same Card:40106

The register is used to request the last time if the card serial number has been cleared and within the time set by the register. Read the card, think no card into. If this time is exceeded, it can be re-read as a new tag Operation. This function is mainly used to prevent users from inadvertently operating and Misreading many times.

Default value:0x0000

unit:100ms

6.2 Power-Off Without Save Register

The Power-off without save register will be initial the default value after power on.

6.2.1 IO Control Register:40003

Register Address:40003 (default value:0x0000)

bit	description
15~10	Repeat times
9~8	0x01->Green LED

	0x02->BEEP 0x03-> Green LED and BEEP
7~4	the time of Beep On or LED On, unit 100ms
3~0	the time of Beep off or LED off, unit 100ms

6.2.2 Card Serial No. Register:40004~40007

4 bytes Card Serial No. for register 40004 and 40005, 7 bytes Card Serial No. for register 40004,40005,40006,40007.

if LSB Selected in Parameter register, the key value is as below:

Register Address	15~8	7~0
40004	SN1	SN0
40005	SN3	SN2
40006	SN5	SN4
40007	0	SN6

if MSB Selected in Parameter register, the key value is as below:

Register Address	15~8	7~0
40004	SN0	SN1
40005	SN2	SN3
40006	SN4	SN5
40007	SN6	0(保留)

6.2.3 Card Operate Register: 40008

Register Address:40008 (default value:0x0000)

bit	description
15	Whether halt after operation 0-> Do not Halt 1->Halt
14	Whether Beep after Operate error 0-> Do not Beep 1->Beep 3 times
13	Whether Beep after Operate success 0-> Do not Beep 1->Beep
12~8	reserved
7~0	0x00->no operation 0x01->Read block 0x02->Write block 0x03->Halt 0x04->Initialize Value 0x05->Read Value 0x06->Decrease Value 0x07->Increase Value

6.2.4 Status Register: 40009

Register Address:40009 (default value:0x0000)

bit	description
15~8	reserved
7~0	0x00->Command operation Success 0x01-> Command operation Fail Attention: The value is the status of the executing of Command control Register (0008).

6.2.5 Block Address Register 1:40010

Register Address:40010 (default value:0x0000)

bit	description
15~8	Block numbers, the max value is 4 0x00->No any block need read or write
7~0	The start block address , the value is from 0x00 to 0xFF

6.2.6 Key Register 1: 40011~40013

Default value:0xFFFF, 0xFFFF, 0xFFFF

if LSB Selected in Parameter register, the key value is as below:

Register address	15~8	7~0
40011	Key1 (default 0xFF)	Key0 (default 0xFF)
40012	Key3 (default 0xFF)	Key2 (default 0xFF)

40013	Key5 (default 0xFF)	Key4 (default 0xFF)
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if MSB Selected in Parameter register, the key value is as below:

Register address	15~8	7~0
40011	Key0 (default 0xFF)	Key1 (default 0xFF)
40012	Key2 (default 0xFF)	Key3 (default 0xFF)
40013	Key4 (default 0xFF)	Key5 (default 0xFF)

6.2.7 Reserved register: 40014,40015

These registers are unused.

6.2.8 Block Data Register:40016~40047

Block Data Register will use to save the data which read or write from the card, total 64bytes.

Datax as a 8bits data index.

if LSB Selected in Parameter register, the Block Data value is as below:

Register address	15~8	7~0
40016	Data1	Data0
40017	Data3	Data2

40018	Data5	Data4
...
40045	Data59	Data58
40046	Data61	Data60
40047	Data63	Data62

if MSB Selected in Parameter register, the Block Data value is as below:

Register address	15~8	7~0
40016	Data0	Data1
40017	Data2	Data3
40018	Data4	Data5
...
40045	Data58	Data59
40046	Data60	Data61
40047	Data62	Data63

6.2.9 Reseved Register:40048~40099

These registers are not used.

8. 8. How to order

Need to order or ask for code examples, please contact us through our distributor:

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