

Intelligent Reclosing-MT53As

-- - -Modbus RTU communication protocol

Document Version

V1.0

date of issue

2021-05-21

Shanghai Matis Electric Co., Ltd.



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1 Protocol Specifica- tion

This communication protocol is the Intelligent Control Reclosing Modbus protocol, which allows users to read and write device parameters using Modbus commands. In this protocol, all communication data and return values are in hexadecimal unless otherwise specified.

2 Frame FORMAT SUMMARY

Modbus frame format

Address code	FC	Data field	Check code
--------------	----	------------	------------

2.1 Address Code

- occupies 1 byte;
- Each device terminal corresponds to an address code within the range of 1 to 32 (0x01 to 0x20). The value 0 is a broadcast address, which allows data reading but not configuration.

2.2 FC

- occupies 1 byte;
- According to the definition of the standard Modbus protocol function code, two common basic function codes are selected as the read and write function codes of this protocol.

Function code definition

FC	Act on
0x03	Read hold register
0x06	Write single register

2.3 Data Field

- The format of data field is determined by function code.
- Read register 0x03
- The data field of the response frame consists of the number of bytes and data in the corresponding range of registers.

0x 03 Read Register Frame Format					
Request frame			Response frame		
Frame format	Value/Range	Bytes	Frame format	Value/Range	Bytes

Address code	0~247	1	Address code	0~247	1
FC	0x03	1	FC	0x03	1
Resident memory starting address	0 ~ 0xFFFF	2	Return data length	2*N	1
Number of contiguous registers N	1~125	2	Return data	2~250	2*N
CRC verification		2	CRC verification		2

All frame data containing 2 bytes (except CRC) are **high byte first, low byte last**.

➤ Write to single register 0x06

Write a single hold register, primarily used for parameter configuration, occupying 8 bytes. The return frame matches the request frame. The register value is the written value.

0x 06 writes a single register frame format

Request frame			Response frame		
Frame format	Value/Range	Bytes	Frame format	Value/Range	Bytes
Address code	0~247	1	Address code	0~247	1
FC	0x06	1	FC	0x06	1
Register address	0~ 0xF FFF	2	Register address	0~0xFFFF	2
Register value	0~ 0xF FFF	2	Register value	0~0xFFFF	2
CRC verification		2	CRC verification		2

2.4 Check Code

The check code is calculated using CRC-16 (the generating polynomial is A001), **with the low byte first and the high byte last**.

2.5 MODBUS Abnormal Response Frame

When the device receives the request frame from the master station and successfully processes the data in the request frame, it returns a normal response frame to the master station. If the device fails to receive the request frame from the master station, it does not perform any operation and returns nothing. The master station can set a timeout time as the basis for determining device failure.

When a device receives a request frame from the master station, but the function code or register of the request frame does not meet the data definition requirements, the device cannot process the data in the request frame. In this case, the device must return an exception response frame to the master station. The format of the exception response frame is shown in the table below:

MODBUS Abnormal Response Frame Format

Anomalous response frame		
Frame format	Value/Range	Byte size
Address code	0~247	1
FC	0x80 + Request Function Code	1
Exception code	01/02/03	1
CRC verification		2

The function code is the high bit of the received request frame's function code, indicating that the frame is an abnormal response frame.

The exception code is defined in the following table:

MODBUS Error Code

Exception code	Name	Meaning
01	Illegal function code	The function code of the request frame is not defined
02	Improper register	The register address of the request frame is not defined
03	Illegitimate register value	The register value or register length in the request frame does not conform to the defined format.

3 Registry DEFINITION

3.1 Register Address

16 address in base	Data item	Read and write properties	Scale	Windows default	Data type	Byte length	Unit
0000	Mailing address	R/W	1~254	1	word	2	
0001	Communication baud rate	R/W	1: 2400 2: 4800 3: 9600	3	word	2	
0002	Communication check bit	R/W	1: NONE 2: EVEN 3: ODD	1	word	2	
0003	Communication stop bit	R/W	1: 1bit 2: 1.5bit 3: 2bit	1	word	2	
0004	State control	R/W	Enter 2020 to reset and restart	0	word	2	
0005	System upgrade control	R/W	Enter upgrade mode 2025	0	word	2	MHz
0006	System clock high bit	R			word	2	S
0007	System clock bit	R			word	2	S
0008	Hardware ID	R			word	2	
0009	Firmware version number	R			word	2	
000A (10)	Enable auto-replace	R/W	1 : open 0 : close	1	word	2	
000B	Auto Reconcile Time	R			word	2	S
000C (12)	Display status	R	1 The red light is always on. 2 The green light is always on. 4 : blinking red lamp 5 The green light is flash-		word	2	

			ing.				
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000D	AUX output state	R	0 : no-output 1 : Output	0	word	2	
000E	Lock status	R	0 No padlock 1 : There is a padlock		word	2	
000F (15)	Position Hall (triggered when 1)	R	Bit 0: Split Hall Bit 1: Reset Hall Bit 2: Closed Hall Bit 3: Motor fault		word	2	
0010 (16)	Reclosing state	R	Bit1: Command to open the circuit (0x0002) Bit2: Command to close (0x0004) Bit3: Instruction Lock (0x0008) Bit4: Instruction Unlock (0x0010) Bit5: Automatic open (0x0020) (initial state is open after power-on) Bit6: Automatic closing (0x0040) Bit10: External closing (0x0400) Bit11: Fault tripping (0x0800) Bit15: Lockout status (Locked: 0x8000, unlocked: 0) The device failed initially, and the gear did not reset (0x0000)		word	2	
0011 (17)	Control open/close	W	1 : separating brake 2 : switch on		word	2	
0012	Device Mode	R/W			word	2	
0013	Auto-repetition count setting	R/W		3	word	2	
0014	Closing delay compensation	R/W	1~300	25	word	2	MS
0015	Compensation for time delay of circuit breaker	R/W	1~300	0	word	2	MS

0016	Switching reset compensation	R/W	1~300	15	word	2	MS
0017	Compensation for breaker reset	R/W	1~300	20	word	2	MS
0018	Closing time	R			word	2	MS
0019	Operation time of breaker	R			word	2	MS
001A	Closing reset time	R			word	2	MS
001B	Splitting reset time	R			word	2	MS
001C	Circuit breaker lock-out time	R			word	2	MS
001D	Unlock reset time	R			word	2	MS
001F	Motor running time	R			word	2	
002B	Command closing count	R			word	2	
002C	Command trip count	R			word	2	
002D	Lock count	R			word	2	
002E	Manual lock attempts	R			word	2	
002F	Manual closing count	R			word	2	
0030	Wait for stabilization time	R					
0031	Repetition Count Mark	R					
0032	Repetition 1 time	R/W	1~3600	10	word	2	S
0033	Repetition 2 Time	R/W	1~3600	60	word	2	S
0034	Repetition 3 time	R/W	1~3600	300	word	2	S
003C	Stabilize for 1 hour	R/W	1~3600	60	word	2	S
003D	Stabilize for 2 hours	R/W	1~3600	60	word	2	S
003E	Stabilize for 3 hours	R/W	1~3600	60	word	2	S

3.2 Modbus Register

Address	Attribute	Scale	Windows default	Unit	Length (char)	Data item
0000	R/W	1~254	1		2	Mailing address
0001	R/W	1: 2400 2: 4800 3 : 9600 4 : 3 19200 5: 115200			2	Serial port baud rate
0002	R/W	1: NONE 2: EVEN 3: ODD	1		2	Communication check bit
0003	R/W	1: 1 bit	1		2	Communication stop bit
0004	W		0		2	State control
0005	W		0		2	System upgrade control
0006	R				2	System clock high bit
0007	R				2	System clock bit
0008	R				2	Hardware ID
0009	R				2	Firmware version number

Add features:

- 1、 When the device is locked, it responds to broadcast address 0; when unlocked, it does not respond to address 0.
- 2、 To modify the factory default configuration parameters, you need to enter a password to unlock them.
- 3.

Broadcast address:

[TX] – 00 03 00 00 00 01 85 DB

[RX] – 01 03 02 00 01 79 84

Broadcast address:

[TX] – 00 06 00 00 00 02 09 DA

[RX] – 02 06 00 00 00 02 08 38

Read all registers from address

[TX] -01 03 00 00 00 1E C5 C2 (Default Address 1)

[RX] – 01 03 3C 00 01 00 04 00 01 00 02 00 00 00 00 00 01 2E 00 00 03 E2
00 01 00 00 00 01 00 01 00 00 00 03 00 00 00 00 00 00 00 03 20 00 0A 00 2D
00 05 00 10 00 10 00 00 00 00 00 04 00 05 34 4E

4 Version CONT- ROL

Time	Edition	Event	Handlers
20210521	V1.0	Initial version	Tang Ji



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CRC verification		2	CRC verification		2

All frame data containing 2 bytes (except CRC) are **high byte first, low byte last**.

➤ Write to single register 0x06

Write a single hold register, primarily used for parameter configuration, occupying 8 bytes. The return frame matches the request frame. The register value is the written value.

0x 06 writes a single register frame format

Request frame			Response frame		
Frame format	Value/Range	Bytes	Frame format	Value/Range	Bytes
Address code	0~247	1	Address code	0~247	1
FC	0x06	1	FC	0x06	1
Register address	0~ 0xF FFF	2	Register address	0~0xFFFF	2
Register value	0~ 0xF FFF	2	Register value	0~0xFFFF	2
CRC verification		2	CRC verification		2

2.4 Check Code

The CRC-16 (polynomial A001) is used to calculate the check code, **with the low byte first and the high byte last**.

2.5 MODBUS Abnormal Response Frame

When the device receives the request frame from the master station and successfully processes the data in the request frame, it returns a normal response frame to the master station. If the device fails to receive the request frame from the master station, it does not perform any operation and returns nothing. The master station can set a timeout time as the basis for determining device failure.

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0002	Communication check bit	R/W	1: NONE 2: EVEN 3: ODD	1	word	2	
0003	Communication stop bit	R/W	1: 1bit 2: 1.5bit 3: 2bit	1	word	2	
0004	State control	R/W	Enter 2020 to reset and restart	0	word	2	
0005	System upgrade control	R/W	Enter 2025 upgrade mode	0	word	2	MHz
0006	System clock high bit	R			word	2	S
0007	System clock bit	R			word	2	S
0008	Hardware ID	R			word	2	
0009	Firmware version number	R			word	2	
000A (10)	Enable auto-replace	R/W	1 : open 0 : close	1	word	2	
000B	Auto Reconcile Time	R			word	2	S
000C (12)	Display status	R	1 The red light is always on. 2 The green light is always on. 4 : blinking red lamp 5 The green light is flash-		word	2	

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000E	Lock status	R	0 No padlock 1 : Has a padlock		word	2	
000F (15)	Position Hall (triggered when 1)	R	Bit 0: Split Hall Bit 1: Reset Hall Bit 2: Closed Hall Bit 3: Motor fault		word	2	
0010 (16)	Reclosing state	R	Bit1: Command to open the circuit (0x0002) Bit2: Command to close (0x0004) Bit3: Instruction Lock (0x0008) Bit4: Instruction Unlock (0x0010) Bit5: Automatic open (0x0020) (initial state is open after power-on) Bit6: Automatic closing (0x0040) Bit10: External closing (0x0400) Bit11: Fault tripping (0x0800) Bit15: Lockout status (Lock set to 0x8000, unlocked to 0) The device failed initially, and the gear did not reset (0x0000)		word	2	
0011 (17)	Control closing and opening	W	1 : separating brake 2 : switch on 3 : lock 4 : deblocking		word	2	
0012	Device Mode	R/W			word	2	
0013	Auto-repetition count setting	R/W		3	word	2	

0014	Closing delay compensation	R/W	1~300	25	word	2	MS
0015	Compensation for time delay of circuit breaker	R/W	1~300	0	word	2	MS
0016	Switching reset compensation	R/W	1~300	15	word	2	MS
0017	Compensation for breaker reset	R/W	1~300	20	word	2	MS
0018	Closing time	R			word	2	MS
0019	Operation time of breaker	R			word	2	MS
001A	Closing reset time	R			word	2	MS
001B	Splitting reset time	R			word	2	MS
001C	Circuit breaker lockout time	R			word	2	MS
001D	Unlock reset time	R			word	2	MS
001F	Motor running time	R			word	2	
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002C	Command trip count	R			word	2	
002D	Lock count	R			word	2	
002E	Manual lock attempts	R			word	2	
002F	Manual closing count	R			word	2	
0030	Wait for stabilization time	R					
0031	Repetition Count Mark	R					
0032	Repetition 1 time	R/W	1~3600	10	word	2	S
0033	Repetition 2 Time	R/W	1~3600	60	word	2	S
0034	Repetition 3 time	R/W	1~3600	300	word	2	S
003C	Stable for 1 hour	R/W	1~3600	60	word	2	S
003D	Stabilize for 2 hours	R/W	1~3600	60	word	2	S
003E	Stabilize for 3 hours	R/W	1~3600	60	word	2	S

3.2 Modbus Register

Address	Attribute	Scale	Windows default	Unit	Length (char)	Data item
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0004	W		0		2	State control
0005	W		0		2	System upgrade control
0006	R				2	System clock high bit
0007	R				2	System clock bit
0008	R				2	Hardware ID
0009	R				2	Firmware version number

Add feature:

- 1、 When the device is locked, it responds to broadcast address 0; when unlocked, it does not respond to address 0.
- 2、 To modify the factory default configuration parameters, you need to enter a password to unlock 3.

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[TX] – 00 03 00 00 00 01 85 DB

[RX] – 01 03 02 00 01 79 84

Broadcast address:

[TX] – 00 06 00 00 00 02 09 DA

[RX] – 02 06 00 00 00 02 08 38

Read all registers from address

[TX] -01 03 00 00 00 1E C5 C2 (Default Address 1)

[RX] – 01 03 3C 00 01 00 04 00 01 00 02 00 00 00 00 00 01 2E 00 00 03 E2
00 01 00 00 00 01 00 01 00 00 00 03 00 00 00 00 00 00 03 20 00 0A 00 2D
00 05 00 10 00 10 00 00 00 00 04 00 05 34 4E

4 Version CONT- ROL

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