



IN COOPERATION WITH NGI®

N35100 Modbus

N35100 Series Programming Guide Modbus Protocol

Modbus

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1 Communication Configuration

Communication Protocol: Standard Modbus RTU communication protocol

Communication mode: LAN, serial port RS232, RS485

Factory Default IP Address:192.168.0.123

Factory default device ID: 1

UDP port number:7000

TCP port number: port 7000 is supported

Factory default serial port baud rate: 115200 (can be set, reboot takes effect)

2 Modbus Overview

Modbus protocol was originally developed by Modicon. At the end of 1979, Modicon became part of Schneider Automation. Now Modbus is the most popular protocol in industrial field. This protocol supports traditional serial link RS-232, RS-422, RS-485 and Ethernet. Many industrial equipment including PLC, DCS, smart meters, etc. are adopting Modbus protocol as the communication standard among them.

Modbus protocol includes ASCII, RTU, TCP, etc., which does not specify the physical layer. This protocol defines the message structure which the controller can recognize and use, regardless of what kind of network they communicate through. The standard Modicon controller uses RS232C to achieve serial Modbus. Modbus's ASCII and RTU protocols stipulate the structure of messages and data, the way of inquiry and answer. The data communication adopts master/slave method. The master station sends out a data request message. The slave station sends data to the master station for responding to the request after receiving the correct message. The master station can also directly send messages to modify the data of slave station to realize bidirectional reading and writing.

If the data format is not easy for understanding, it is recommended to use the tools "Modbus Poll", "Modbus Slave" to send and receive data packets, and "AccessPort" to capture the contents of data packets for analysis.

3 Modbus RTU Description

- 1) Multiple bytes apply **Big-Endian**.
- 2) The starting addresses of all readable and writable registers are **even** numbers.
- 3) The readable and writable numbers are **even** numbers.
- 4) 4 bytes are applied.

For example, the value of register address 2 is written as 0x12345678. Then the

hexadecimal number of the written data packet is:

01 10 00 02 00 02 04 56 78 12 34 EE 90

5) The read register adopts the function code 0x03. The write register adopts the function code 0x10. Other function codes are reserved.

6) ID in the following ranges from 1 to 250. Value 255 means a broadcast packet which does not need to be returned.

4 Modbus RTU Protocol Format

4.1 Master Computer Reading Multiple Registers (0x03)

4.1.1 Master Computer Sending

ID	FunctionCode	StartReg	RegCount	Checksum
----	--------------	----------	----------	----------

Field	No. of Bytes	Definition
ID	1	Device/card ID
FunctionCode	1	Fixed as 0x03
StartReg	2	To read start register
RegCount	2	To read register counts
Checksum	2	CRC value of all data except itself

4.1.2 Slave Computer Correct Return

ID	FunctionCode	RegDataBytes	RegData	Checksum
----	--------------	--------------	---------	----------

Field	No. of Bytes	Definition
ID	1	Device/card ID
FunctionCode	1	Fixed as 0x03
RegDataBytes	1	Register data bytes, RegCount*2 in practice
RegData	2* RegCount	Register data
Checksum	2	CRC value of all data except itself

4.2 Master Computer Writing Multiple Registers (0x10)

4.2.1 Master Computer Sending

ID	FunctionCode	StartReg	RegCount	RegDataBytes	RegData	Checksum
----	--------------	----------	----------	--------------	---------	----------

Field	No. of Bytes	Definition
ID	1	Device/card ID
FunctionCode	1	Fixed as 0x10
StartReg	2	To write start register
RegCount	2	To write register counts
RegDataBytes	1	Register data bytes, RegCount*2 in practice
RegData	2* RegCount	Register data
Checksum	2	CRC value of all data except itself

4.2.2 Slave Computer Correct Return

ID	FunctionCode	StartReg	RegCount	Checksum
----	--------------	----------	----------	----------

Field	No. of Bytes	Definition
ID	1	Device/card ID
FunctionCode	1	Fixed as 0x10
StartReg	2	To write start register
RegCount	2	To write register counts
Checksum	2	CRC value of all data except itself

5 Operation

5.1 Basic Operation

5.1.1 Status Readout

Address: 10

Attribute: RO

Type: Uint32

Byte: 4Byte
Parameters: defined as follows

5.1.2 Clear Protection

Address: 72
Attribute: WO
Type: Uint32
Byte: 4Byte
Parameters: 1 for clear protection

5.2 Output Setting

5.2.1 Voltage Setting

Address: 78
Attribute: WR
Type: Float
Byte: 4Byte
Parameters: Unit: V

5.5.2 Source Current Setting

Address: 80
Attribute: WR
Type: Float
Byte: 4Byte
Parameters: Unit: A

5.5.3 Load Current Setting

Address: 82
Attribute: WR
Type: Float
Byte: 4Byte
Parameters: Unit: A

5.2.4 Source Power Setting

Address: 84

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: W

5.2.5 Load Power Setting

Address: 86

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: W

5.2.6 Example

Example: Set the power supply to normal mode, the voltage value is 5V, the source current value is 1A, the load current value is 1A, the source power value is 10W, and the load power value is 10W, so that it outputs and reads the voltage, current, and power, with the following commands:

Address	Data Type	Attribute	Register Value	Description
62	n	WR	0	Shut off output for power supply
60	n	WR	0	Set operation mode to normal mode
144	n	WR	0	Set power supply to CV priority
78	f	WR	5	Set voltage to 5V in normal mode
80	f	WR	1	Set source current to 1A in normal mode
82	f	WR	1	Set load current to 1A in normal mode
84	f	WR	10	Set source power to 10W in normal mode
86	f	WR	10	Set load power to 10W in normal mode
62	n	WR	1	Shut on output for power supply
12	f	RO		To obtain readback voltage
14	f	RO		To obtain readback current

16	f	RO		To obtain readback power
----	---	----	--	--------------------------

5.3 Readback

5.3.1 Readback Voltage

Address: 12

Attribute: RO

Type: Float

Byte: 4Byte

Parameters: Unit: V

5.3.2 Readback Current

Address: 14

Attribute: RO

Type: Float

Byte: 4Byte

Parameters: Unit: A

5.3.3 Readback Power

Address: 16

Attribute: RO

Type: Float

Byte: 4Byte

Parameters: Unit: W

5.3.4 Readback Capacity

Address: 20

Attribute: RO

Type: Float

Byte: 4Byte

Parameters: Unit: Ah

5.3.5 Temperature

Address: 26

Attribute: RO

Type: Float

Byte: 4Byte

Parameters: Unit: °C

5.4 Protection

5.4.1 OVP

Address: 116

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: V

5.4.2 OCP

Address: 118

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: V

5.4.3 OPP

Address: 120

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: W

5.4.4 UVP

Address: 122

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: V

5.4.5 UCP

Address: 124

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: A

5.4.6 OVP Delay Time

Address: 126

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: s

5.4.7 OCP Delay Time

Address: 128

Attribute: WR

Type: Float

Byte: 4Byte

Parameters: Unit: s

5.4.8 OPPDelay Time

Address: 130

Attribute: WR
Type: Float
Byte: 4Byte
Parameters: Unit: s

5.4.9 UVP Ready Time

Address: 132
Attribute: WR
Type: Float
Byte: 4Byte
Parameters: Unit: s

5.4.10 UVP Delay Time

Address: 134
Attribute: WR
Type: Float
Byte: 4Byte
Parameters: Unit: W

5.4.11 UCP Ready Time

Address: 136
Attribute: WR
Type: Float
Byte: 4Byte
Parameters: Unit: s

5.4.12 UCP Delay Time

Address: 138
Attribute: WR
Type: Float
Byte: 4Byte

Parameters: Unit: s

5.5 Digital Signal

5.5.1 Input Signal 1

Address: 6000

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-OFF

1-Onoff

2-Clear

5.5.2 Control Mode

Address: 6020

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-Trigger

1-Hold

5.5.3 Input Signal 2

Address: 6002

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-OFF

1-Onoff

2-Clear

5.5.4 Control Mode

Address: 6022

Attribute: WR
Type: int
Byte: 4Byte
Parameters: 0-Trigger
 1-Hold

5.5.5 Input Signal 3

Address: 6004
Attribute: WR
Type: int
Byte: 4Byte
Parameters: 0-OFF
 1-Onoff
 2-Clear

5.5.6 Control Mode

Address: 6024
Attribute: WR
Type: int
Byte: 4Byte
Parameters: 0-Trigger
 1-Hold

5.5.7 Output Signal 1

Address: 6040
Attribute: WR
Type: int
Byte: 4Byte
Parameters: 0-OFF
 1-Onoff
 2-Fault

5.5.8 Output Signal 2

Address: 6042

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-OFF

1-Onoff

2-Fault

5.5.9 Output Signal 3

Address: 6044

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-OFF

1-Onoff

2-Fault

5.6 Analogue Signal

5.6.1 Base Voltage

Address: 6160

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-5V

1-10V

5.6.2 Analogue Programming CH1

Address: 6080

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

- 0-off
- 1-voltage programming
- 2-source current programming
- 3-load current programming
- 4-source power programming
- 5-load power programming

5.6.3 Analogue Programming CH2

Address: 6082

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

- 0-off
- 1-voltage programming
- 2-source current programming
- 3-load current programming
- 4-source power programming
- 5-load power programming

5.6.4 Analogue Monitoring CH1

Address: 6120

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

- 0-off
- 1-MONI-V

5.6.5 Analogue Monitoring CH2

Address: 6122

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-off

1-MONI-V

2-MONI-I

3-MONI-P

5.7 Power Control

5.7.1 ONOFF

Address: 62

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-off

1-on

5.7.2 CC/CV Priority

Address: 144

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-CV priority

1-CC priority

5.7.3 Operation Mode

Address: 60

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

- 0-Normal mode
- 1-Charge mode
- 2-Discharge mode
- 3-Simulated internal resistance
- 4-Constant resistance function
- 120- Step test
- 121- Wave test
- 122-Anywave test
- 123- Advanced Test
- 124- Automotive Waveforms
- 126-External Programming
- 128-Sequence Mode

5.7.4 Trigger Wave

Address: 64

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

- 0-no trigger
- 1-trigger

5.8 SEQ Edit

5.8.1 File Edit

Address: 176

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Number 1~10

5.8.2 Total Steps

Address: 178

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 1~1000

5.8.3 Cycle Times

Address: 180

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 0~65535; 0 for infinite cycle

5.8.4 Link to File

Address: 182

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 0~10, 0 for no link

5.8.5 Step No.

Address: 184

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 1~1000

5.8.6 Voltage for Present Step

Address: 186

Attribute: WR

Type: float
Byte: 4Byte
Parameters: Unit: V

5.8.7 Source Current

Address: 188
Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: A

5.8.8 Load Current

Address: 190
Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: A

5.8.9 Source Power

Address: 200
Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: W

5.8.10 Load Power

Address: 202
Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: W

5.8.11 Voltage Slew

Address: 192

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V/s

5.8.12 Current Slew

Address: 194

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A/s

5.8.13 Dwell

Address: 196

Attribute: WR

Type: float

Byte: 4Byte

5.8.14 Unit

Address: 198

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: 0-ms, 1-s, 2-min, 3-h

5.8.15 Example

SEQ mode will perform the operation steps one by one in the selected SEQ file. Links

can be made between files. Cycle times can also be adjustable.

Set the power supply to SEQ mode and set SEQ file No. to 1, total steps to 3, cycle times to 1, link to file as 0 .

SEQ File No.	Total Steps	Cycle Times	Link to File	Step No.	Output Voltage	Source Current	Load Current	Source Power	Load Power	Voltage Slew	Current Slew	Dwell
1	3	1	0	1	1V	1A	1A	10W	10W	10000	5000	10S
				2	2V	2A	2A	20W	20W	10000	5000	10S
				3	3V	3A	3A	30W	30W	10000	5000	10S

Address	Data Type	Attribute	Register Value	Description
62	n	WR	0	Shut off output for the power supply
60	n	WR	128	Set operation mode to SEQ mode
176	n	WR	1	Set SEQ file No. to 1
178	n	WR	3	Set total steps to 3
180	n	WR	1	Set SEQ file cycle times to 1
182	n	WR	0	Set link file for SEQ file No. 1 to 0
184	n	WR	1	Set step No. to 1
186	f	WR	1	Set voltage to 1V for step 1
188	f	WR	1	Set source current to 1A for step 1
190	f	WR	1	Set load current to 1A for step 1
200	f	WR	10	Set source power to 10W for step 1
202	f	WR	10	Set load power to 10W for step 1
192	f	WR	10000	Set voltage slew to 10000V/S for step 1
194	f	WR	5000	Set load power slew to 5000A/S for step 1
196	f	WR	10	Set dwell time to 10S for step 1
198	n	WR	1	Set dwell time unit to S for step 1
184	n	WR	2	Set step No. to 2
186	f	WR	2	Set voltage to 2V for step 2
188	f	WR	2	Set source current to 2A for step 2
190	f	WR	2	Set load current to 2A for step 2
200	f	WR	10	Set source power to 10W for step 2
202	f	WR	10	Set load power to 10W for step 2
192	f	WR	10000	Set voltage slew to 10000V/S for step 2
194	f	WR	5000	Set load power slew to 5000A/S for step 2

196	f	WR	10	Set dwell time to 10S for step 2
198	n	WR	1	Set dwell time unit to S for step 2
184	n	WR	3	Set step No. to 3
186	f	WR	3	Set voltage to 3V for step 3
188	f	WR	3	Set source current to 3A for step 3
190	f	WR	3	Set load current to 3A for step 3
200	f	WR	10	Set source power to 10W for step 3
202	f	WR	10	Set load power to 10W for step 3
192	f	WR	10000	Set voltage slew to 10000V/S for step 3
194	f	WR	5000	Set load power slew to 5000A/S for step 3
196	f	WR	10	Set dwell time to 10S for step 3
198	n	WR	1	Set dwell time unit to S for step 3

5.9 SEQ Test

5.9.1 File No.

Address: 34
Attribute: WR
Type: int
Byte: 4Byte
Parameters: 1~10

5.9.2 Step No.

Address: 38
Attribute: RO
Type: int
Byte: 4Byte

5.9.3 Cycle Times

Address: 40
Attribute: RO

Type: int
Byte: 4Byte

5.9.4 Dwell

Address: 42
Attribute: RO
Type: int
Byte: 4Byte

5.9.5 Unit

Address: 44
Attribute: RO
Type: int
Byte: 4Byte
Parameters: Unit: 0-ms, 1-s, 2-min, 3-h

5.9.6 Example

Set SEQ file No. 1 and obtain the corresponding parameters.

Address	Data Type	Read/Write	Register Value	Description
62	n	WR	0	Shut off output for the power supply
60	n	WR	128	Set operation mode to SEQ mode
34	n	WR	1	Set SEQ file No. to 1
62	n	WR	1	Shut on output for the power supply
38	n	RO		Present step
40	n	RO		Present file cycle times
42	f	RO		Dwell for Present step
44	n	RO		Unit for Present step

5.10 Parallel

5.10.1 Master-Slave Selection

Address: 308

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-Master;

1-1 Slave;

2-2 Slave;

3-3 Slave;

4-4 Slave

5-5 Slave

6-6 Slave

7-7 Slave

8-8 Slave

9-9 Slave

5.10.2 Slave No.

Address: 310

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1~9; before modifying please turn off parallel

5.10.3 Parallel Control

Address: 312

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-OFF;1-ON

5.11 SR

5.11.1 Voltage Setting

Address: 318

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

5.11.2 Max. Current

Address: 320

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

5.11.3 Max. Power

Address: 322

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

5.11.4 Resistance Setting

Address: 324

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: Ω

5.11.5 Example

Address	Data Type	Read/Write	Register Value	Description
342	f	WR	5	Set resistance to 5Ω
338	f	WR	55	Set resistance Max. current to 55A
340	f	WR	600	Set resistance Max. power to 600W
60	n	WR	4	Set to resistance mode
62	n	WR	1	Shut on output for power supply

5.12 CR

5.12.1 Resistance Setting

Address: 342

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: Ω

5.12.2 Max. Current

Address: 338

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

5.12.3 Max. Power

Address: 340

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

5.12.4 Example

Address	Data Type	Read/Write	Register Value	Description
342	f	WR	5	Set resistance to 5Ω
338	f	WR	55	Set resistance Max. current to 55A
340	f	WR	600	Set resistance Max. power to 600W
60	n	WR	4	Set to resistance mode
62	n	WR	1	Shut on output for power supply

5.13 Charging Test

5.13.1 Charging Voltage

Address: 352

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

5.13.2 Charging Current

Address: 354

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

5.13.3 Cut-off Voltage

Address: 358

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

5.13.4 Cut-off Current

Address: 360

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

5.13.5 Cut-off Capacity

Address: 362

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Range : 0~1000; Unit: Ah

5.13.6 Cut-off Time

Address: 364

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Range : 0~86400; Unit: s

5.13.7 Example

Explanation: in this Mode, one of the following conditions can be met to stop charging.

1. Cut-off Voltage
2. Cut-off Current
3. Charging Time
4. Cut-off Capacity

Address	Data Type	Read/Write	Register Value	Description
352	f	WR	5	Set charge voltage to 5V

358	f	WR	1	Set charge current to 1A
364	f	WR	600	Set charge time to 600s
60	n	WR	1	Select the mode to Charge
62	n	WR	1	Enable the output for the power supply

5.14 Discharging Test

5.14.1 Discharging Current

Address: 370

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

5.14.2 Discharging Power

Address: 372

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

5.14.3 Cut-off Voltage

Address: 374

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

5.14.4 Cut-off Capacity

Address: 376

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Range : 0~1000; Unit: Ah

5.14.5 Cut-off Time

Address: 378

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Range : 0~86400; Unit: s

5.14.6 Example

Explanation: in this Mode, one of the following conditions can be met to stop discharging.

1. Cut-off Voltage
2. Charging Time
3. Cut-off Capacity

Address	Data Type	Read/Write	Register Value	Description
370	f	WR	5	Set discharge current to 5A
372	f	WR	10	Set discharge power to 10W
378	f	WR	600	Set discharge time to 600s
60	n	WR	2	Select the mode to discharge mode
62	n	WR	1	Enable the output for the power supply

5.15 Car Test

5.15.1 Level 1 Search Term

Address: 10000

Attribute: WR

Type: Uint32

Byte: 4Byte

Parameters: 0: ISO16750-2 (ISO16750-2 Waveform Protocol) 1:
LV124 (LV124 Waveform Protocol)

Default: 0

Note: Search Term and Setup data change must be first OFF machine output, and the latter parameter must be decided by the former parameter.

5.15.2 Level 2 Search Term

Address: 10002

Attribute: WR

Type: Uint32

Byte: 4Byte

Default: 0

Level 1 Search Term	Parameters	Description
0: ISO16750-2	0: Short-Drop 1: Reset-Test 2: Start-Profile 3: Load-Dump	Short-Drop: Car Short Time Voltage Drop Waveform Reset-Test: Car Voltage Reset Test Waveform Start-Profile: Car Start Waveform Load-Dump: Load Dump Waveform
1: LV124	0: E-04 1: E-07	E-04: Jump start Experiment Pulse E-07: Experimental parameters for slow drop and slow rise of supply voltage

5.15.3 Level 3 Search Term

Address: 10004

Attribute: WR

Type: Uint32

Byte: 4Byte

Default: 0

Level 1 Search Term	Level 2 Search Term	Parameters	Description
0: ISO16750-2	0: Short-Drop	0: 12V 1: 24V	12V: Selected 12V short time voltage drop waveform 24V: Selected 24V short time voltage drop waveform
	2: Start-Profile	0: 12V 1: 24V	12V: Selected 12V Car Start Waveform 24V: Selected 24V Car Start Waveform
	3: Load-Dump	0: Test-A 1: Test-B	Test-A: Select unconcentrated Load Dump Waveform suppression pulse Test-B: Select concentrated Load Dump Waveform suppression pulse

5.15.4 Level 4 Search Term

Address: 10006

Attribute: WR

Type: Uint32

Byte: 4Byte

Default: 0

Level 1 Search Term	Level 2 Search Term	Level 3 Search Term	Parameters	Description
0: ISO16750-2	2: Start-Profile	0: 12V	0: Level1 1: Level2 2: Level3 3: Level4	Level1: Corresponding 12V waveform voltage/duration Level2: Corresponding 12V waveform voltage/duration Level3: Corresponding 12V waveform voltage/duration Level4: Corresponding 12V waveform voltage/duration

		1: 24V	0: Level1 1: Level2 2: Level3	Level1: Corresponding 24V waveform voltage/duration Level2: Corresponding 24V waveform voltage/duration Level3: Corresponding 24V waveform voltage/duration
	3: Load-Dump	0: Test-A 1: Test-B	0: 12V 1: 24V	12V: Select 12V system 24V: Select 24V system

5.15.5 Waveform Setting I

Address: 10400

Attribute: WR

Type: Float

Byte: 4Byte

Level 1 Search Term	Level 2 Search Term	Level 3 Search Term	Level 4 Search Term	Description
0: ISO16750-2	1: Reset-Test	None		Usmin: minimum power voltage Unit: V
	3: Load-Dump	0: Test-A 1: Test-B	0: 12V 1: 24V	Td: pulse width Unit: ms
1: LV124	1: E-07	None		Ubmax: start voltage Unit: V

5.15.6 Waveform Setting II

Address: 10402

Attribute: WR

Type: Float

Byte: 4Byte

Level 1 Search Term	Level 2 Search Term	Level 3 Search Term	Level 4 Search Term	Description
0: ISO16750-2	3: Load-Dump	0: Test-A 1: Test-B	0: 12V 1: 24V	Un: peak voltage Unit: V
1: LV124	1: E-07	None		Ubmin: holding voltage Unit: V

5.15.7 Waveform Setting III

Address: 10404

Attribute: WR

Type: Float

Byte: 4Byte

Level 1 Search Term	Level 2 Search Term	Level 3 Search Term	Level 4 Search Term	Description
0: ISO16750-2	3: Load-Dump	0: Test-A 1: Test-B	0: 12V 1: 24V	Us: Clamping voltage (only available in Test B mode with 24V rating) Unit: V
1: LV124	1: E-07	None		Ubmin Holding Time: Holding time of voltage at Ubmin Range: 0~3600S

5.15.8 Trigger Car Waveform

Address: 10800

Attribute: WR

Type: Uint32

Byte: 4Byte

Parameters: 0-untrigger; 1-Trigger

Default: 0

Note: When set to 0, it will not change the waveform being triggered, and 0 is only used to query whether the waveform curve is in running state or not.

5.15.9 Example

As an example, to perform Reset-Test under ISO16750-2 protocol, Usmin is set to 48V.

Address	Data Type	Read/Write	Register Value	Description
20	n	WR	0	Turn off the Output
10000	n	WR	0	Set to ISO16750-2 protocol
10002	n	WR	1	Select the Reset-Test Car Voltage Waveform
10400	f	WR	48	Set the Usmin. to 48V
60	n	WR	124	Select Car Test Mode
62	n	WR	1	Turn on the Output
10800	n	WR	1	Trigger Car Waveform

5.16 Step Test

5.16.1 Voltage Setting

Address: 800

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

Default: 0

5.16.2 Source Current Setting

Address: 802

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

Default: 0

5.16.3 Load Current Setting

Address: 804

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

Default: 0

5.16.4 Source Power Setting

Address: 806

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

Default: 0

5.16.5 Load Power Setting

Address: 808

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

Default: 0

5.16.6 Mode Selection

Address: 820

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0- Voltage ;

1-Current ;

Default: 0

5.16.7 Trigger Mode

Address: 824

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-sequential trigger;

1-mannual trigger;

Default: 0

5.16.8 Cycle Times

Address: 818

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 0~65535, 0 for infinite cycle;

Default: 0

5.16.9 Start

Address: 810

Attribute: WR

Type: float

Byte: 4Byte
Default: 0

5.16.10 End

Address: 812
Attribute: WR
Type: float
Byte: 4Byte
Default: 0

5.16.11 Increment

Address: 814
Attribute: WR
Type: float
Byte: 4Byte
Default: 0

5.16.12 Increment Time

Address: 816
Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: s
Default: 0

5.16.13 Example

Address	Data Type	Read/Write	Register Value	Description
62	n	WR	0	Shut off output for power supply
60	n	WR	120	Set to Step Test
800	f	WR	50	Set steady state voltage to 50V

802	f	WR	10	Set steady state source current to 10A
804	f	WR	10	Set steady state load current to 10A
806	f	WR	100	Set steady state source power to 100W
808	f	WR	100	Set steady state load power to 100W
820	n	WR	0	Set mode selection to voltage mode
824	n	WR	0	Set trigger mode to sequential trigger
818	n	WR	1	Set cycle times to 1
810	f	WR	10	Set starting value to 10
812	f	WR	20	Set ending value to 20
814	f	WR	2	Set increment value to 2
816	f	WR	1	Set increment time to 1s
62	n	WR	1	Shut on output for power supply
64	n	WR	1	Trigger waveform to operate

5.17 Wave Edit

5.17.1 File No.

Address: 880

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 1~10

5.17.2 File Length

Address: 882

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1~200

5.17.3 Cycle Times

Address: 884

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 0~65535, 0 for infinite cycle

5.17.4 Link to File

Address: 886

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 0~10, 0 for no link

5.17.5 Mode Selection

Address: 888

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0- Voltage ; 1-Current

5.17.6 Step No.

Address: 890

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 1~Present file length

5.17.7 Amplitude

Address: 892

Attribute: WR

Type: float

Byte: 4Byte

5.17.8 Dwell

Address: 894

Attribute: WR

Type: float

Byte: 4Byte

5.17.9 Example

Example: Set the power supply to Wave mode, set the file to 1, the file length to 3, cycle times to 1, and the link file to 0. The edited output parameters are listed below:

File No.	File Length	Cycle Times	Link to File	Mode Selection	Step No.	Amplitude	Cycle Times
1	3	1	0	0	1	20	1
					2	10	1
					3	40	1

Address	Data Type	Read/Write	Register Value	Description
62	n	WR	0	Shut off output for power supply
60	n	WR	121	Set to Wave Test
880	n	WR	1	Set file No. to 1
882	n	WR	3	Set file length to 3
884	n	WR	1	Set file cycle times to 1
886	n	WR	0	Set file No. to 1

888	n	WR	0	Set mode selection for File No.1 to 0
890	n	WR	1	Set Step No. to 1
892	f	WR	20	Set amplitude for File No.1 Step No.1 to 20
894	f	WR	1	Set dwell for file No.1 step No.1 to 1s
890	n	WR	2	Set the step No. to 2
892	f	WR	10	Set amplitude for File 1 Step 2 to 10
894	f	WR	1	Set dwell for file No.1 step No.2 to 1s
890	n	WR	3	Set the step No. to 3
892	f	WR	40	Set amplitude for File 1 Step 3 to 40
894	f	WR	1	Set dwell for file No.1 step No.3 to 1s

5.18 Wave Operation

5.18.1 Voltage Setting

Address: 840

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

Default: 0

5.18.2 Source Current Setting

Address: 842

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

Default: 0

5.18.3 Load Current Setting

Address: 844

Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: A
Default: 0

5.18.4 Source Power Setting

Address: 846
Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: W
Default: 0

5.18.5 Load Power Setting

Address: 848
Attribute: WR
Type: float
Byte: 4Byte
Parameters: Unit: W
Default: 0

5.18.6 File No.

Address: 850
Attribute: WR
Type: int
Byte: 4Byte
Parameters: 1~10

5.18.7 Step No.

Address: 852

Attribute: RO

Type: int

Byte: 4Byte

5.18.8 Cycle Times

Address: 854

Attribute: RO

Type: int

Byte: 4Byte

5.18.9 Dwell

Address: 856

Attribute: RO

Type: float

Byte: 4Byte

5.18.10 Output Mode

Address: 860

Attribute: RO

Type: int

Byte: 4Byte

5.18.11 Example

To run file No.1 and to obtain the relevant parameters, the command is as follows

Address	Data Type	Read/Write	Register Value	Description
62	n	WR	0	Shut off output for power supply
60	n	WR	121	Set operation mode to wave mode

840	f	WR	50	Set steady state voltage to 50V
842	f	WR	10	Set steady state source current to 10A
844	f	WR	10	Set steady state load current to 10A
846	f	WR	100	Set steady state source power to 100W
848	f	WR	100	Set steady state load power to 100W
850	n	WR	1	Set SEQ File No. to 1
62	n	WR	1	Shut on output for power supply
64	n	WR	1	Trigger waveform operation
852	n	RO		Present step
854	n	RO		Present cycle times
856	f	RO		Present dwell
860	n	RO		Output mode for present step

5.19 Anywave Test

5.19.1 Voltage Setting

Address: 930

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

Default: 0

5.19.2 Source Current Setting

Address: 932

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

Default: 0

5.19.3 Load Current Setting

Address: 934

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

Default: 0

5.19.4 Source Power Setting

Address: 936

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

Default: 0

5.19.5 Load Power Setting

Address: 938

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

Default: 0

5.19.6 Mode Selection

Address: 940

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0- Voltage ; 1-Current

5.19.7 Wave File

Address: 942

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1-30;

1-Sine wave files;

2-Triangle wave files;

3-Pulse waveform files;

4~30-User-defined waveform files

5.19.8 Wave Selection

Address: 944

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-Sine wave

1-Triangle wave

2-Pulse wave

3-Top Clipping Waveform

4-Custom waveform

Note: Only user-defined waveform files can be selected, which need to be edited and downloaded using the host computer.

5.19.9 Output Amplitude

Address: 946

Attribute: WR

Type: float

Byte: 4Byte

5.19.10 Output Bias

Address: 948

Attribute: WR

Type: float

Byte: 4Byte

5.19.11 Output Phase

Address: 950

Attribute: WR

Type: float

Byte: 4Byte

Parameters: 0-360

5.19.12 Frequency Setting

Address: 952

Attribute: WR

Type: float

Byte: 4Byte

Parameters: 0.01-1000Hz

5.19.13 Percentage

Address: 954

Attribute: WR

Type: float

Byte: 4Byte

Parameters: 0-100, sine wave, custom waveform settings are invalid.

5.19.14 Example

Anywave Test

Address	Data Type	Read/Write	Register Value	Description
62	n	WR	0	Shut off output for power supply
60	n	WR	122	Set operation mode to Anywave Test

930	f	WR	50	Set steady state voltage to 50V
932	f	WR	10	Set steady state source current to 10A
934	f	WR	10	Set steady state load current to 10A
936	f	WR	100	Set steady state source power to 100W
938	f	WR	100	Set steady state load power to 100W
940	n	WR	0	Set mode selection to voltage mode
942	n	WR	1	Set Wave File to 1
944	n	WR	\	Wave selection, only custom wave file to be set
946	f	WR	10	Set output amplitude to 10
948	f	WR	20	Set output bias to 20
950	f	WR	0	Set output phase to 0
952	f	WR	1	Set output frequency to 1Hz
954	f	WR	\	No setup required for sine wave file
62	n	WR	1	Shut on output for power supply
64	n	WR	1	Trigger wave operation

5.20 Advanced Edit

5.20.1 File No.

Address: 1020

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1~10

5.20.2 File Length

Address: 1022

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1~200

5.20.3 Cycle Times

Address: 1024

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 0~65535, 0 for infinite cycle

5.20.4 Link to File

Address: 1026

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 0~10, 0 for no link

5.20.5 Mode Selection

Address: 1028

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0- Voltage ;1-Current

5.20.6 Step No.

Address: 1030

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range 1~Present file length

5.20.7 Wave File

Address: 1032

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1-30;

1-Sine wave files;

2-Triangle wave files;

3-Pulse Wave File;

4~30-User-defined Wave File

5.20.8 Output Amplitude

Address: 1034

Attribute: WR

Type: float

Byte: 4Byte

5.20.9 Output Bias

Address: 1036

Attribute: WR

Type: float

Byte: 4Byte

5.20.10 Output Phase

Address: 1038

Attribute: WR

Type: float

Byte: 4Byte

Parameters: 0-360

5.20.11 Frequency Setting

Address: 1040

Attribute: WR

Type: float

Byte: 4Byte

Parameters: 0.01-1000Hz

5.20.12 Percentage

Address: 1042

Attribute: WR

Type: float

Byte: 4Byte

Parameters: 0-100

5.20.13 Set-up Time

Address: 1044

Attribute: WR

Type: float

Byte: 4Byte

5.20.14 Dwell

Address: 1046

Attribute: WR

Type: float

Byte: 4Byte

5.20.15 Example

Example: Set the power supply to Advanced mode, set the file to 1, file length to 3, cycle times to 1, and the link file to 0. The output parameters are listed below:

File No.	File Length	Cycle Times	Link to File	Mode Selection	Step No.	Wave File	Output Amplitude	Output Bias	Output Phase	Frequency	Percentage	Set-up Time	Dwell
1	3	1	0	0	1	1	5	20	0	1	50	0.1	1
					2	2	10	30	90	2	50	0.1	1
					3	3	15	40	0	4	50	0.1	1

Address	Data Type	Read/Write	Register Value	Description
62	n	WR	0	Shut off output for power supply
60	n	WR	123	Set operation mode to Advanced Mode
1020	n	WR	1	Set edit file No. to 1
1022	n	WR	3	Set file length to 3
1024	n	WR	1	Set cycle times to 1
1026	n	WR	0	Set link file for file No.1 to 0
1028	n	WR	0	Set mode selection for file No.1 to 0
1030	n	WR	1	Set step No. to 1
1032	n	WR	1	Set wave file for file No.1 step No.1 to 1
1034	f	WR	5	Set output amplitude for file No.1 step No.1 to 5
1036	f	WR	20	Set output bias for file No.1 step No.1 to 20
1038	f	WR	0	Set output phase for file No.1 step No.1 to 0
1040	f	WR	1	Set frequency for file No.1 step No.1 to 1
1042	f	WR	50	Set percentage for file No.1 step No.1 to 50
1044	f	WR	0.1	Set set-up time for file No.1 step No.1 to 0.1
1046	f	WR	1	Set operation time for file No.1 step No.1 to 1
1030	n	WR	2	Set step No. to 2
1032	n	WR	2	Set wave file for file No.1 step No.2 to 2
1034	f	WR	10	Set output amplitude for file No.1 step No.2 to 10
1036	f	WR	30	Set output bias for file No.1 step No.2 to 30
1038	f	WR	90	Set output phase for file No.1 step No.2 to 90
1040	f	WR	2	Set frequency for file No.1 step No.2 to 2
1042	f	WR	50	Set percentage for file No.1 step No.2 to 50
1044	f	WR	0.1	Set set-up time for file No.1 step No.2 to 0.1
1046	f	WR	1	Set operation time for file No.1 step No.2 to 1

1030	n	WR	3	Set step No. to 3
1032	n	WR	3	Set wave file for file No.1 step No.3 to 3
1034	f	WR	15	Set output amplitude for file No.1 step No.3 to 15
1036	f	WR	40	Set output bias for file No.1 step No.3 to 40
1038	f	WR	0	Set output phase for file No.1 step No.3 to 0
1040	f	WR	4	Set frequency for file No.1 step No.3 to 4
1042	f	WR	50	Set percentage for file No.1 step No.3 to 50
1044	f	WR	0.1	Set set-up time for file No.1 step No.3 to 0.1
1046	f	WR	1	Set operation time for file No.1 step No.3 to 1

5.21 Advanced Operation

5.21.1 Voltage Setting

Address: 980

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: V

Default: 0

5.21.2 Source Current Setting

Address: 982

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

Default: 0

5.21.3 Load Current Setting

Address: 984

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A

Default: 0

5.21.4 Source Power Setting

Address: 986

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

Default: 0

5.21.5 Load Power Setting

Address: 988

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: W

Default: 0

5.21.6 File No.

Address: 990

Attribute: WR

Type: int

Byte: 4Byte

Parameters: File No.1~10

5.21.7 Step No.

Address: 992

Attribute: RO

Type: int

Byte: 4Byte

5.21.8 Cycle Times

Address: 994

Attribute: RO

Type: int

Byte: 4Byte

5.21.9 Dwell

Address: 996

Attribute: RO

Type: float

Byte: 4Byte

5.21.10 Output Mode

Address: 1000

Attribute: RO

Type: int

Byte: 4Byte

5.21.11 Example

To operate the SEQ file No.1 and to obtain the relevant parameters, the instructions are as follows:

Address	Data Type	Read/Write	Register Value	Description
62	n	WR	0	Shut off output for power supply
60	n	WR	123	Set operation mode to Advanced Mode
980	f	WR	50	Set steady state voltage to 50V
982	f	WR	10	Set steady state source current to 10A
984	f	WR	10	Set steady state load current to 10A
986	f	WR	100	Set steady state source power to 100W
988	f	WR	100	Set steady state load power to 100W
990	n	WR	1	Set operation file No. to 1
62	n	WR	1	Shut on output for power supply
64	n	WR	1	Trigger wave operation
992	n	RO		Present step
994	n	RO		Present cycle times
996	f	RO		Present dwell
990	n	RO		Output mode for present step

5.22 Function

5.22.1 Timer Shutdown Enable

Address: 214

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-OFF

1-ON

5.22.2 Timer shutdown

Address: 216

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: s

5.22.3 Delay ON

Address: 222

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: s

5.22.4 Delay OFF

Address: 224

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: s

5.22.5 Output Priority

Address: 144

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0- Voltage Priority

1- Current Priority

5.22.6 Power-ON Default

Address: 226

Attribute: WR

Type: float

Byte: 4Byte

Parameters:

0-Last+OFF

- 1-Last
- 2-Reset

5.22.7 Voltage Fast Zero

Address: 156

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-OFF; 1-ON

5.22.8 Voltage Rise Slew

Address: 100

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Unit: V/s

5.22.9 Current Rise Slew

Address: 104

Attribute: WR

Type: float

Byte: 4Byte

Parameters: Unit: A/s

5.23 System

5.23.1 IP Address

Address: 242

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Dot decimal representation: such as IP for 192.168.0.123, converted to hexadecimal as: C0 A8 00 7B; then read the data as: 7B 00 A8 C0

5.23.2 Subnet Mask

Address: 244

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Dot decimal representation: such as IP 255.255.255.0, converted to hexadecimal: FF FF FF 00; then read the data as: FF FF FF FF 00

5.23.3 Gateway

Address: 246

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Dot decimal representation: such as IP for 192.168.0.1, converted to hexadecimal as: C0 A8 00 01; then read the data as: 01 00 A8 C0

5.23.4 Device Address

Address: 260

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1~250

5.23.5 Serial Baud Rate

Address: 248

Attribute: WR

Type: int

Byte: 4Byte

Parameters:

0-9600

1-19200

2-38400

3-115200

5.23.6 Beeper

Address: 256

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-OFF; 1-ON

5.23.7 Language

Address: 258

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-Chinese; 1-English

5.23.8 CAN Address

Address: 262

Attribute: WR

Type: int

Byte: 4Byte

Parameters: Range : 1~127

5.23.9 CAN Baud Rate

Address: 252

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 1-1000

5.23.10 Power-off Memory

Address: 152

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 0-OFF; 1-ON

5.23.11 Factory Reset

Address: 70

Attribute: WR

Type: int

Byte: 4Byte

Parameters: 1 for factory reset

Executing the factory reset command will reset the following parameters of the device:

- 1, reset voltage to 0 in normal mode, and set source current, load current, source power, load power to Max.;
- 2, reset load resistance and series internal resistance setting value to 0;
- 3, reset CC/CV priority to CV priority;
- 4, reset ON, OFF delay time is 0;
5. Reset the output to the off state; Reset the bleed current to open;
6. Reset the protection setting value (under voltage, over voltage, over current, over power, etc.) to 0; Reentry protection closed; The protection delay is 1s.
7. Reset the constant power (voltage, current, power) setting value to 0;
- 8, clear all sequence run files, sequence file allocation step is 0;
9. Reset the default power-on status is Last+Off.
- 10, reset the charging mode all parameters (charging voltage, charging current, charging time, cut-off voltage, cut-off current, cut-off capacity) to 0;
- 11, Reset all Settings of the car test set the parameter to 0, the default is: ISO16750-2 Short-Drop (short-time voltage drop waveform)
12. Reset the device IP address to 192.168.0.123, device ID to 1, serial port rate to 115200, CAN ID to 1, CAN rate to 250kbps, sampling speed to medium, and save and close the device after power failure.

Note: After the factory Settings are restored, the data needs to be saved to the memory, and the factory Settings will take about 10 seconds to restore