TVR UNIT MODBUS GATEWAY

User Manual

Applcable Model:TCONTMODBUS02

Thank you for purchasing our product.
Read this manual carefully before using this product and keep it for future reference.

CONTENTS

1 Overview

- 1.1 Maintenance by Customer 01
- 1.2 System Architecture 01
- 1.3 Installation Method 02
- 1.4 Preparation before installation 02
- 1.5 Function Codes for Commands 03
- 1.6 Error Responses 03

2 Using the Product

- 2.1 Configuring the PC IP Address 04
- 2.2 Configuring the Gateway 05
- 2.3 Restoring Factory Settings 06
- 2.4 Checking Air Conditioner Information 06
- 2.5 Examples 07
  - 2.5.1 Modbus RTU Data Frame 07
  - 2.5.2 Modbus TCP Data Frame 10

3 Mapping Tables of TCONTMODBUS02

- 3.1 Mapping Table Description — Discrete Inputs 12
  - 3.1.1 IDU 12
  - 3.1.2 ODU 13
- 3.2 Mapping Table Description — Input Registersles 14
  - 3.2.1 IDU — HTHM 14
  - 3.2.2 IDU — Non-HTHM 16
  - 3.2.3 ODU 18
- 3.3 Mapping Table Description — Holding Registers 19

Safety Precautionsvv

The product, and its Operation and Installation Manual describes the following content, including how to handle the product, prevent harm to others and prevent property losses, as well as how to use the product correctly and safely. Read the following carefully and make sure you understand the content (identifiers and marks), and observe the below precautions.

⚠Caution

Read the safety precautions carefully prior to installation.
Make sure you observe the important safety precautions provided below.
Meanings of marks:

⚠ Caution: Improper handling may lead to personal injury or material loss.

⚠ Warning: Improper handling may lead to death or serious injury.

Once the installation work is completed, test to verify that the device is operating normally, and hand over the manual to the customer for safekeeping.

[Note] The "harm" means that the affected party does not need to be admitted to hospital or require long-term treatment.This generally refers to wounds, scalds, or electric shocks.
Icons Material losses refer to property and material losses.

Icon	Name	
	Prohibited. Specific information about the prohibited item is described within the icons or in the form of graphics or text next to where the symbol is located.	
	Mandatory. Specific information about the mandatory item is described within the icons or in the form of graphics or text next to where the symbol is located.	
Warning	Commissioned installation	Get your distributor or a professional to install the product. The installation personnel must be equipped with the professional knowledge. When you install on your own, any mistake you made during the operations may lead to a fire, electric shock, or injury.
Using Warning	Prohibited	Do not use combustible paints to spray directly on the data converter as this may cause a fire.
	Prohibited	Do not handle the product with wet hands, and do not let water seeps into the device, as this will cause electric shocks.

⚠Warning

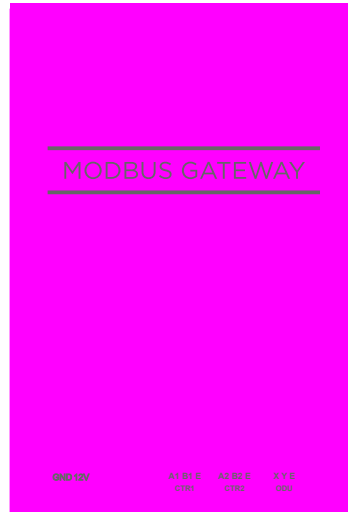
- Get your distributor or a professional to install the product.
- Non-professionals may not install the equipment properly which may in turn lead to electric shock or fire.

⚠Caution

Do not install the product to where there is a danger of flammable gas leakages. Any leakage within the vicinity of the device may cause a fire.

1 Overview

1.1 Maintenance by Customer



No.	Name	Description
1	GND 12V	Supplies power.
2	LAN	Provides the Web service for debugging. Modbus settings can be configured on the Web page. Supports the Modbus TCP/IP protocol. Supports Category 5 network cables.
3	A1B1E	Supports the Modbus RTU protocol.
4	A2B2E	Reserved
5	XYE	Connects to port X/Y/E of an ODU.

1.2 System Architecture

TCONTMODBUS02 supports the TVR Ultra and TVR Ultra HR models.*Note 1

TCONTMODBUS02 supports a maximum of 8 refrigerant systems and 64 IDUs. The addresses of IDUs and ODUs connected to TCONTMODBUS02 cannot be duplicated. *Note 2 When a system change occurs, TCONTMODBUS02 needs to be restarted.

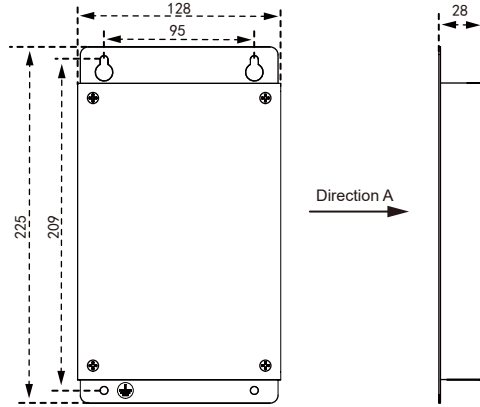
A third party can conduct integrated development through the Modbus RTU or Modbus TCP/IP protocol.

*Note 1: For details about supported models, contact technical support engineers.

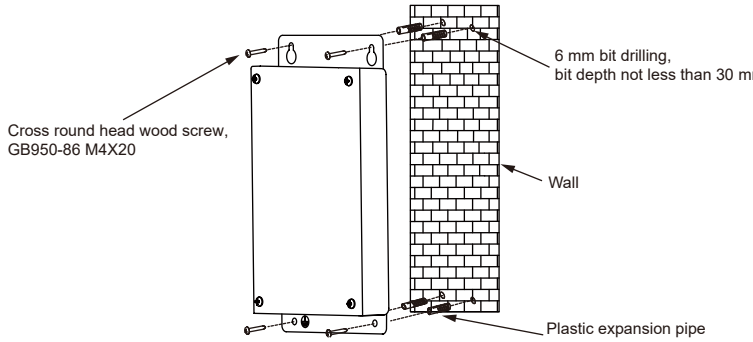
*Note 2: The addresses of IDUs connected to the same TCONTMODBUS02 cannot be duplicated. The addresses of ODUs must be unique.

1.3 Installation Method

I. Structural Dimensions（Unit：mm）



II. Installation Diagram



1.4 Preparation before installation

Check whether the following assemblies are complete

No.	Name	Qty.	Remarks
1	TCONTMODBUS02	1	————————
2	Power Adapter	3	12V/2A
3	Accessory Bag	2	For Mounting on the Wall
4	Installation Manual	1	————————

1.5 Function Codes for Commands

NO.	Function Name	Function
0x02	Read Discrete Inputs	Reads data.
0x03	Read Holding Register	Reads data.
0x04	Read Input Register	Reads data.
0x06	Write Single Holding Register	Writes data.
0x10	Write Holding Registers	Writes data.

1.6 Error Responses

A third-party device serves as the master Modbus device while TCONTMODBUS02 serves as the slave device.

The master device sends a request and waits for a response from the slave device. When no error occurs, the slave device responds normally. If a data check error occurs, the slave device does not respond. When data sent by the master device have an error other than the data check error, the slave device responds with an error.

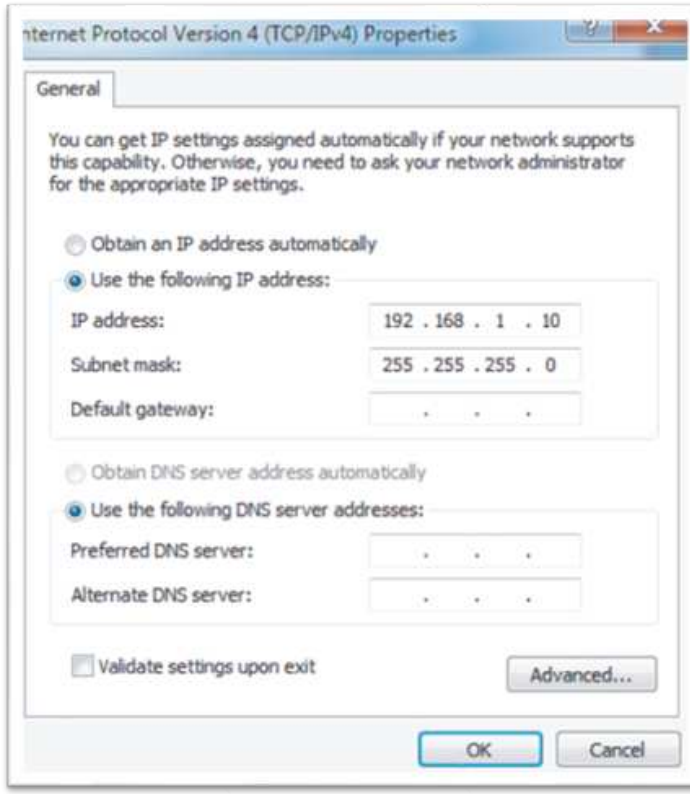
Code	Name	Meaning
0x01	Invalid function code	The slave device receives a function code that cannot be executed.
0x02	Invalid data address	The received data address is not supported by the slave device.
0x03	Invalid data	The value queried in the data area is not supported by the slave device.
0x06	The slave device is busy	The slave device is busy processing a time-consuming programcommand and the master device needs to send the messagewhen the slave device is idle.

2. Using the Product

2.1 Configuring the PC IP Address

The default IP address of the TCONTMODBUS02 is 192.168.1.185. The PC used for accessing the Web page of TCONTMODBUS02 must be in the same network segment as TCONTMODBUS02.

Open the "Internet Protocol Version 4 (TCP/IPv4) Properties" dialogue box and set the IP address and subnet mask, for example, set the IP address to 192.168.1.10 and the subnet mask to 255.255.255.0.



After configuration, click "OK".

Note: The above configuration is for reference purposes only. Please follow instructions of IT personnel during actual projects.

2.2 Configuring the Gateway

In the address bar of the browser (*Note 3), enter "http://192.168.1.185:8586". The Web page of the TCONTMODBUS02 is displayed, as shown in the figure below.

*Note 3: Internet Explorer (IE) is the recommended browser.
The table below describes the parameters.

Parameter	Description
SN	Reserved
Version	Software version
IP address	IP address of TCONTMODBUS02 If the Modbus TCP/IP protocol is adopted, the IP addresses of the TCONTMODBUS02 gateways in the same network segment must be unique.
Mask	The default value is 255.255.255.0. Enter the value according to actual project requirements.
Gateway	Local gateway IP address
Port setting	Baud rate: The default value is 9600. Parity bit: There is no parity check by default. Stop bit: The default value is 1 bit.
Modbus address	Modbus address If there are multiple TCONTMODBUS02 gateways on the same bus, their Modbus addresses cannot be duplicated.

After modifying parameters, click "Save" to save the settings.

After settings are modified, the TCONTMODBUS02 automatically restarts.

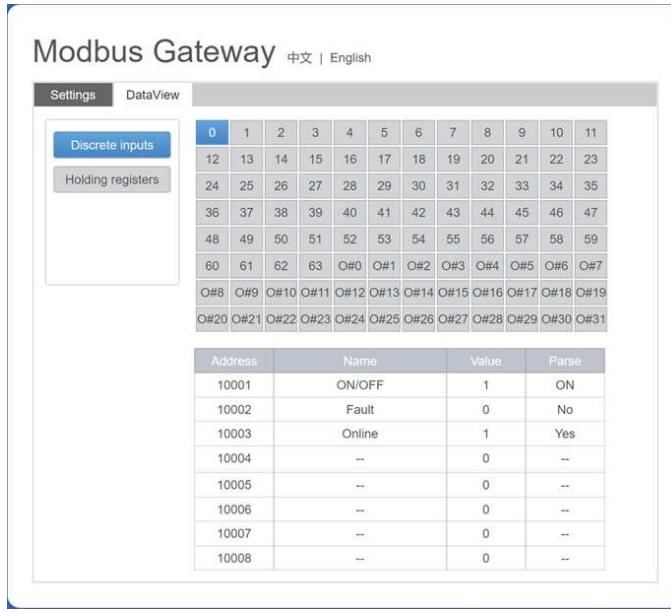
2.3 Restoring Factory Settings

Press "SW1" three times consecutively within 5 seconds after TCONTMODBUS02 is powered on, to enable the device to enter the factory setting restoration mode. The RUN indicator blinks rapidly at a frequency of 5 Hz. After factory settings are restored, the system automatically restarts, and the RUN indicator blinks normally at a frequency of 1 Hz.

2.4 Checking Air Conditioner Information

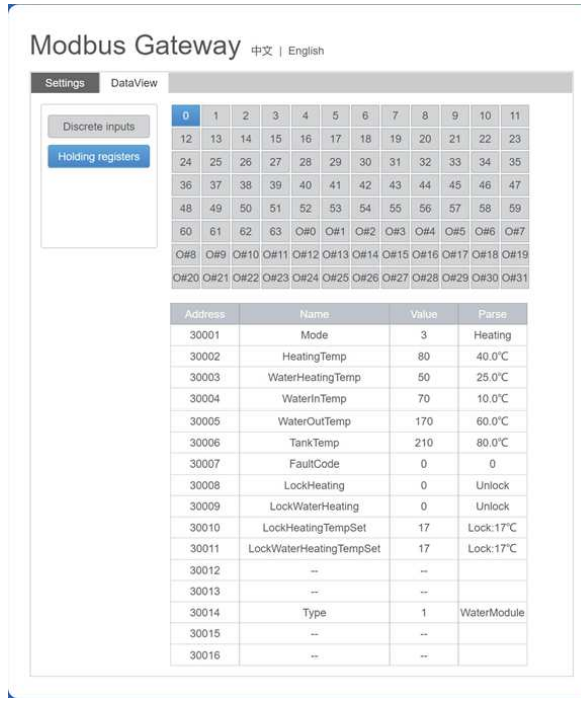
Click the "DataView" tab on the Web page, and click "Discrete inputs" or "Holding registers" to check information about air conditioners.

When "Discrete inputs" is selected, a page as shown in the figure below is displayed.



Click the address No. of an IDU or ODU. Operation information about the air conditioner is displayed.

When "Holding registers" is selected, a page similar to the one shown in the figure below is displayed.



In the figure above, the first column indicates addresses, the second column indicates register names, the third column indicates original values, and the fourth column indicates parsed values.

2.5 Examples

2.5.1 Modbus RTU Data Frame

Request/Response:

Device Address	Function Code	Data	Error Check and Correction
1 byte	1 byte	N bytes	2 bytes

1) 0x02 Read Discrete Inputs

Example: Requesting the device to read discrete input addresses 0–15

Request packet: 01 02 00 00 00 0F 38 0E

Response packet: 01 02 02 05 05 7A EB

Request Packet		Response Packet	
Domain Name	(Hexadecimal Value)	Domain Name	(Hexadecimal Value)
Modbus address	1	Modbus address	1
Function code	2	Function code	2
Start address Hi (high byte)	0	Byte quantity	2
Start address Lo (low byte)	0	Input status 7-0	5
Output quantity Hi	0	Input status 15-8	5
Output quantity Lo	0F	Check code Hi	7A
Check code Hi	38	Check code Lo	EB
Check code Lo	0E		

"Hi" indicates the high byte while "Lo" indicates the low byte.

2) 0x03 Read Holding Register

Example: Requesting the device to read data from holding registers 1–5

Request packet: 01 03 00 01 00 05 D4 09

Response packet: 01 03 0A 00 01 00 02 00 03 00 14 00 17 4E EC

Request Packet		Response Packet	
Domain Name	(Hexadecimal Value)	Domain Name	(Hexadecimal Value)
Modbus address	1	Modbus address	1
Function code	3	Function code	3
Start address Hi	0	Byte quantity	0A
Start address Lo	1	Hi of holding register 1	0
Hi of the input register quantity	0	Lo of holding register 1	1
Lo of the input register quantity	5	Hi of holding register 2	0
Check code Hi	D4	Lo of holding register 2	2
Check code Lo	9	Hi of holding register 3	0
		Lo of holding register 3	3
		Hi of holding register 4	0
		Lo of holding register 4	14
		Hi of holding register 5	0
		Lo of holding register 5	17
		Check code Hi	4E
		Check code Lo	EC

3) 0x04 Read Input Register

Example: Requesting the device to read data from input registers 32–34

Request packet: 01 04 00 20 00 03 B1 C1

Response packet: 01 04 06 00 05 00 0A 00 10 8D 5D

Request Packet		Response Packet	
Domain Name	(Hexadecimal Value)	Domain Name	(Hexadecimal Value)
Modbus address	1	Modbus address	1
Function code	4	Function code	4
Start address Hi	0	Byte quantity	6
Start address Lo	20	Hi of input register 32	0
Hi of the input register quantity	0	Lo of input register 32	5
Lo of the input register quantity	3	Hi of input register 33	0
Check code Hi	B1	Lo of input register 33	0A
Check code Lo	C1	Hi of input register 34	0
		Lo of input register 34	10
		Check code Hi	8D
		Check code Lo	5D

4) 0x06 Write Single Holding Register

Example: Requesting the device to write the hexadecimal 00 14 to register 4

Request packet: 01 06 00 04 00 14 C8 04

Response packet: 01 06 00 04 00 14 C8 04

Request Packet		Response Packet	
Domain Name	(Hexadecimal Value)	Domain Name	(Hexadecimal Value)
Modbus address	1	Modbus address	1
Function code	6	Function code	6
Register address Hi	0	Output address Hi	0
Register address Lo	4	Output address Lo	4
Register value Hi	0	Output value Hi	0
Register value Lo	14	Output value Lo	14
Check code Hi	C8	Check code Hi	C8
Check code Lo	4	Check code Lo	4

5) 0x10 Write Multiple Holding Registers

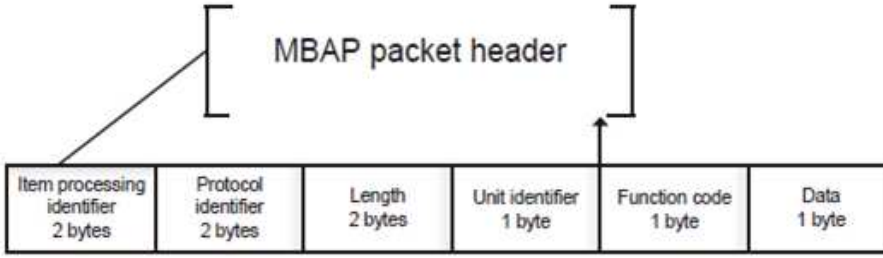
Example: Requesting the device to write the hexadecimal 00 02 and 00 01 to two registers beginning with 2

Request packet: 01 10 00 02 04 00 02 00 01 12 76

Response packet: 01 10 00 02 00 02 E0 08

Request Packet		Response Packet	
Domain Name	(Hexadecimal Value)	Domain Name	(Hexadecimal Value)
Modbus address	1	Modbus address	1
Function code	10	Function code	10
Start address Hi	0	Start address Hi	0
Start address Lo	2	Start address Lo	2
Byte quantity	4	Hi of the register quantity	0
Register value Hi	0	Lo of the register quantity	12
Register value Lo	2	Check code Hi	E0
Register value Hi	0	Check code Lo	8
Register value Lo	1		
Check code Hi	12		
Check code Lo	76		

2.5.2 Modbus TCP Data Frame



1) 0x02 Read Discrete Inputs

   Example: Requesting the device to read discrete input addresses 0–15

   Request packet: 46 25 00 00 00 06 01 02 00 00 00 0F

   Response packet: 46 25 00 00 00 05 01 02 02 05 05

2) 0x03 Read Holding Register

   Example: Requesting the device to read data from holding registers 1-5

   Request packet: C5 E4 00 00 00 06 01 03 00 01 00 05

   Response packet: C5 E4 00 00 00 0D 01 03 0A 00 01 00 03 00 05 00 14 00 17

3) 0x04 Read Input Register

   Example: Requesting the device to read data from input registers 32–34

   Request packet: 46 9F 00 00 00 06 01 04 00 20 00 03

   Response packet: 46 9E 00 00 00 09 01 04 06 00 05 00 0A 00 10

4) 0x06 Write Single Holding Register

   Example: Requesting the device to write the hexadecimal 00 14 to register 4

   Request packet: 47 A6 00 00 00 06 01 06 00 04 00 14

   Response packet: 47 A6 00 00 00 06 01 06 00 04 00 14

5) 0x10 Write Multiple Holding Registers
   Example: Requesting the device to write the hexadecimal 00 02 and 00 01 to two registers beginning with 2

   Request packet: 48 03 00 00 00 0B 01 10 00 02 04 00 02 00 01

   Response packet: 48 03 00 00 00 06 01 10 00 02 00 02

3. Mapping Tables of TCONTMODBUS02

Type	Offset Address (Modbus Poll Actual Input Address)
Discrete input	Protocol address = Register address – 10001
Input register	Protocol address = Register address – 30001
Holding register	Protocol address = Register address – 40001

3.1 Mapping Table Description — Discrete Inputs

3.1.1 IDU

Discrete inputs are applicable only to IDUs and ODUs. High temperature hydraulic modules (HTHMs) are a type of IDU.

Discrete Input	Function Code	Register Address	Data Length	Meaning
IDU0	2	10001	1bit	0 - Off, 1 - On
	2	10002	1bit	0 - No error, 1 - Error
	2	10003	1bit	0 - Offline, 1 - Online
	2	10004	1bit	Reserved
	2	10005	1bit	Reserved
	2	10006	1bit	Reserved
	2	10007	1bit	Reserved
	2	10008	1bit	Reserved
IDU1	2	10009	1bit	0 - Off, 1 - On
	2	10010	1bit	0 - No error, 1 - Error
	2	10011	1bit	0 - Offline, 1 - Online
	2	10012	1bit	Reserved
	2	10013	1bit	Reserved
	2	10014	1bit	Reserved
	2	10015	1bit	Reserved
	2	10016	1bit	Reserved
...		…		

Discrete Input	Function Code	Register Address	Data Length	Meaning
IDUn (The valid value of n ranges from 0 to 63.)	2	n*8+1+10000	1bit	0 - Off, 1 - On
	2	n*8+2+10000	1bit	0 - No error, 1 - Error
	2	n*8+3+10000	1bit	0 - Offline, 1 - Online
	2	n*8+4+10000	1bit	Reserved
	2	n*8+5+10000	1bit	Reserved
	2	n*8+6+10000	1bit	Reserved
	2	n*8+7+10000	1bit	Reserved
	2	n*8+8+10000	1bit	Reserved

3.1.2 ODU

Discrete inputs are applicable only to IDUs and ODUs. High temperature hydraulic modules (HTHMs) are a type of IDU.

Discrete Input	Function Code	Register Address	Data Length	Meaning
ODU0	2	11001	1bit	0 - Off, 1 - On
	2	11002	1bit	0 - No error, 1 - Error
	2	11003	1bit	0 - Offline, 1 - Online
	2	11004	1bit	Reserved
	2	11005	1bit	Reserved
	2	11006	1bit	Reserved
	2	11007	1bit	Reserved
	2	11008	1bit	Reserved
...		…		
ODUn (The valid value of n ranges from 0 to 31.)	2	n*8+1001+10000	1bit	0 - Off, 1 - On
	2	n*8+1002+10000	1bit	0 - No error, 1 - Error
	2	n*8+1003+10000	1bit	0 - Offline, 1 - Online
	2	n*8+1004+10000	1bit	Reserved
	2	n*8+1005+10000	1bit	Reserved
	2	n*8+1006+10000	1bit	Reserved
	2	n*8+1007+10000	1bit	Reserved
	2	n*8+1008+10000	1bit	Reserved

3.2 Mapping Table Description — Input Registers

The specific functions of input registers depend on the models. For example, register address 30002 indicates the set temperature for heating when the IDU is an HTHM and indicates the fan speed when the IDU is a non-HTHM TVR unit.

3.2.1 IDU — HTHM

If an HTHM is used, the register addresses are parsed as shown in the table below.

Read Input Register	Function Code	Register Address	Data Length	Variable Name (HTHM)	Meaning
IDU0	4	30001	2bytes	Operating mode	0 - Off, 3 - Heat, 7 - Water heating
	4	30002	2bytes	Set temperature for heating	Actual temperature (Celsius) × 10
	4	30003	2bytes	Set temperature for water heating	Actual temperature (Celsius) × 10
	4	30004	2bytes	Water inlet temperature	Actual temperature (Celsius) × 10
	4	30005	2bytes	Water outlet temperature	Actual temperature (Celsius) × 10
	4	30006	2bytes	Water tank temperature	Actual temperature (Celsius) × 10
	4	30007	2bytes	Error code	
	4	30008	2bytes	Heating mode lock	0 - Unlimit, 1 - On, 2 - Off
	4	30009	2bytes	Water heating mode lock	0 - Unlimit, 1 - On, 2 - Off
	4	30010	2bytes	Lock of set temperature for heating	0xFFFF indicates Unlimit. 0xFFFE indicates Lock. Specific temperature values: Actual temperature (Celsius) × 10
	4	30011	2bytes	Lock of set temperature for water heating	It is parsed according to the protocol. 0xFFFF indicates Unlimit. 0xFFFE indicates Lock. Specific temperature values: Actual temperature (Celsius) × 10
	4	30012	2bytes	Reserved	Reserved
	4	30013	2bytes	Reserved	Reserved
	4	30014	2bytes	Model	Model: 0 – TVR unit, 1 – HTHM
	4	30015	2bytes	Reserved	Reserved
	4	30016	2bytes	Reserved	Reserved
...					

IDUn	4	30001+n*16	2bytes	Operating mode	0 - Off, 3 - Heat, 7 - Water heating
	4	30002+n*16	2bytes	Set temperature for heating	Actual temperature (Celsius) × 10
	4	30003+n*16	2bytes	Set temperature for water heating	Actual temperature (Celsius) × 10
	4	30004+n*16	2bytes	Water inlet temperature	Actual temperature (Celsius) × 10
	4	30005+n*16	2bytes	Water outlet temperature	Actual temperature (Celsius) × 10
	4	30006+n*16	2bytes	Water tank temperature	Actual temperature (Celsius) × 10
	4	30007+n*16	2bytes	Error code	
	4	30008+n*16	2bytes	Heating mode lock	0 - Unlimit, 1 - On, 2 - Off
	4	30009+n*16	2bytes	Water heating mode lock	0 - Unlimit, 1 - On, 2 - Off
	4	30010+n*16	2bytes	Lock of set temperature for heating	0xFFFF indicates Unlimit. 0xFFFE indicates Lock. Specific temperature values: Actual temperature (Celsius) × 10
	4	30011+n*16	2bytes	Lock of set temperature for water heating	It is parsed according to the protocol. 0xFFFF indicates Unlimit. 0xFFFE indicates Lock. Specific temperature values: Actual temperature (Celsius) × 10
	4	30012+n*16	2bytes		
	4	30013+n*16	2bytes		
	4	30014+n*16	2bytes	Model	Model: 0 – TVR unit, 1 – HTHM
	4	30015+n*16	2bytes		
	4	30016+n*16	2bytes		

Low byte of error code + bit 0 of high byte of error code
0: No error
1~20: A0~AF,AH,AL,AP,AU
21~40: b0~bF,bH,bL,bP,bU
41~60: C0~CF,CH,CL,CP,CU
61~80: E0~EF,EH,EL,EP， EU
81~100: F0~FF,FH,FL,FP,FU
101~120: H0~HF,HH,HL,HP,HU
121~140: L0~LF,LH,LL,LP,LU
141~160: J0~JF,JH,JL,JP,JU
161~180: n0~nF,nH,nL,nP,nU
181~200: P0~PF,PH,PL,PP,PU
201~220: r0~rF,rH,rL,rP,rU
221~240: t0~tF,tH,tL,tP,tU
241~260: U0~UF,UH,UL,UP,UU

3.2.2 IDU — Non-HTHM

If a non-HTHM IDU is used, the register addresses are parsed as shown in the table below.

Read Input Register	Function Code	Register Address	Data Length	Variable Name (TVR Unit)	Meaning
IDU0	4	30001	2bytes	Mode	TVR unit mode 0 - Off, 1 -Fan, 2 - Cool, 3 - Heat, 4 - Auto, 5 - Dry HRV mode 0 - Off, 1 - Free cool, 2 - Heat exchange, 3 - Bypass, 4 - Auto
	4	30002	2bytes	Fan speed	0 - Fan stop, (DC fan: seven fan speeds) speeds 1-7; (AC fan: three fan speeds), 8 - Breeze, 9 - Low speed, 10 - Medium speed, 11 - High speed, 12 - Auto
	4	30003	2bytes	Set temperature/Dual-setpoint cooling temperature	Actual temperature × 10
	4	30004	2bytes	Dual-setpoint heating temperature	Actual temperature × 10
	4	30005	2bytes	Indoor temperature	Actual temperature × 10
	4	30006	2bytes	Error code	Error codes: 0 to 255
	4	30007	2bytes	Mode lock	Mode lock: 0 - Unlock, 1 - Lock cool, 2 - Lock heat
	4	30008	2bytes	Fan speed lock	Fan speed lock: 0 - Unlock (DC fan, seven fan speeds), 1 - Lock speed 1, 2 - Lock speed 2, 3 - Lock speed 3, 4 - Lock speed 4, 5 - Lock speed 5, 6 - Lock speed 6, 7 - Lock speed 7; (AC fan, three fan speeds) 9 - Lock low speed,10 - Lock medium speed, 11 - Lock high speed
	4	30009	2bytes	Remote controller lock	Remote controller lock: 0 - Unlock, 1 - Lock
	4	30010	2bytes	Wired controller lock	Wired controller lock: 0 - Unlock, 1 - Lock
	4	30011	2bytes	Lower limit of cooling temperature	Lower limit of cooling temperature: 0xFFFF - Unlock Other values: Actual temperature × 10
	4	30012	2bytes	Upper limit of heating temperature	Upper limit of heating temperature: 0xFFFF - Unlock Other values: Actual temperature × 10
	4	30013	2bytes	Swing lock	Swing lock: 0 - Unlock, 1 - Lock
	4	30014	2bytes	Model	Model: 0 – TVR unit, 1 – HTHM
	4	30015	2bytes	Reserved	Reserved
	4	30016	2bytes	Reserved	Reserved
…					

IDUn	4	30001+n*16	2bytes	Mode	TVR unit mode 0 - Off, 1 -Fan, 2 - Cool, 3 - Heat, 4 - Auto, 5 - Dry HRV mode 0 - Off, 1 - Free cool, 2 - Heat exchange, 3 - Bypass, 4 - Auto
	4	30002+n*16	2bytes	Fan speed	0 - Fan stop, (DC fan: seven fan speeds) speeds 1-7; (AC fan: three fan speeds), 8 - Breeze, 9 - Low speed, 10 - Medium speed, 11 - High speed, 12 - Auto
	4	30003+n*16	2bytes	Set temperature/Dual-setpoint cooling temperature	Actual temperature × 10
	4	30004+n*16	2bytes	Dual-setpoint heating temperature	Actual temperature × 10
	4	30005+n*16	2bytes	Indoor temperature	Actual temperature × 10
	4	30006+n*16	2bytes	Error code	Error codes: 0 to 255
	4	30007+n*16	2bytes	Mode lock	Mode lock: 0 - Unlock, 1 - Lock cool, 2 - Lock heat
	4	30008+n*16	2bytes	Fan speed lock	Fan speed lock: 0 - Unlock (DC fan, seven fan speeds), 1 - Lock speed 1, 2 - Lock speed 2, 3 - Lock speed 3, 4 - Lock speed 4, 5 - Lock speed 5, 6 - Lock speed 6, 7 - Lock speed 7; (AC fan, three fan speeds) 9 - Lock low speed,10 - Lock medium speed, 11 - Lock high speed
	4	30009+n*16	2bytes	Remote controller lock	Remote controller lock: 0 - Unlock, 1 - Lock
	4	30010+n*16	2bytes	Wired controller lock	Wired controller lock: 0 - Unlock, 1 - Lock
	4	30011+n*16	2bytes	Lower limit of cooling temperature	Lower limit of cooling temperature: 0xFFFF - Unlock Other values: Actual temperature × 10
	4	30012+n*16	2bytes	Upper limit of heating temperature	Upper limit of heating temperature: 0xFFFF - Unlock Other values: Actual temperature × 10
	4	30013+n*16	2bytes	Swing lock	Swing lock: 0 - Unlock, 1 - Lock
	4	30014+n*16	2bytes	Model	Model: 0 – TVR unit, 1 – HTHM
	4	30015+n*16	2bytes		Reserved
	4	30016+n*16	2bytes		Reserved

3.2.3 ODU

Read Input Register	Function Code	Register Address	Data Length	Variable Name (TVR Unit)	Meaning
ODU0	4	32001	2bytes	Operating mode	Operation mode: 0 - Off, 1 - Cool, 2 - Heat, 3 - Forced cool, 4 - Master cool, 5 - Master heat
	4	32002	2bytes	Outdoor ambient temperature	Actual temperature × 10
	4	32003	2bytes	Number of operating IDUs	(Note: It indicates the actual number of IDUs that require power.)
	4	32004	2bytes	Error code	Error code
	4	32005	2bytes	Reserved	Reserved
	4	32006	2bytes	Reserved	Reserved
		…			
	4	32010	2bytes	Reserved	Reserved
…					
ODUn	4	n*10+32001	2bytes	Operating mode	Operation mode: 0 - Off, 1 - Cool, 2 - Heat, 3 - Forced cool, 4 - Master cool, 5 - Master heat
	4	n*10+32002	2bytes	Outdoor ambient temperature	Actual temperature × 10
	4	n*10+32003	2bytes	Number of operating IDUs	(Note: It indicates the actual number of IDUs that require power.)
	4	n*10+32004	2bytes	Error code	Error code
	4	n*10+32005	2bytes	Reserved	Reserved
	4	n*10+32006	2bytes	Reserved	Reserved
		…			
	4	n*10+32010	2bytes	Reserved	Reserved

Low byte of error code + bit 0 of high byte of error code
0: No error
1~20: A0~AF,AH,AL,AP,AU
21~40: b0~bF,bH,bL,bP,bU
41~60: C0~CF,CH,CL,CP,CU
61~80: E0~EF,EH,EL,EP， EU
81~100: F0~FF,FH,FL,FP,FU
101~120: H0~HF,HH,HL,HP,HU
121~140: L0~LF,LH,LL,LP,LU
141~160: J0~JF,JH,JL,JP,JU
161~180: n0~nF,nH,nL,nP,nU
181~200: P0~PF,PH,PL,PP,PU
201~220: r0~rF,rH,rL,rP,rU
221~240: t0~tF,tH,tL,tP,tU
241~260: U0~UF,UH,UL,UP,UU

3.3 Mapping Table Description — Holding Registers

Write Holding Register	Function Code	Register Address	Data Length	Meaning
All off	6	45001	2bytes	1 - All off
IDU0	16	45002	2bytes	TVR unit - mode: 0 - Off, 1- Fan, 2 - Cool, 3 - Heat, 4 - Auto, 5 - Dry HRV: 0 - Off, 1 - Fan, 2 - Heat exchange, 3 - Bypass, 4 - Auto, 5 - Discharge
	16	45003	2bytes	TVR unit - fan speed: 0 - Auto, (DC fan: seven fan speeds) speeds 1-7; (AC fan: three fan speeds) 9 - Low speed, 10 - Medium speed, 11 - High speed
	16	45004	2bytes	TVR unit - set temperature bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45005	2bytes	TVR unit - dual-setpoint heating temperatur bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45006	2bytes	HTHM - mode: 0 - Off 3 - Heat 8 - Water heating 10 - Heating and water heating 63 - Unchanged
	16	45007	2bytes	HTHM - set temperature for water heating bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45008	2bytes	HTHM - set temperature for heating bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45009	2bytes	Reserved
…				
IDUn (0≤ n≤ 63)	16	45002+N*8	2bytes	TVR unit - mode: 0 - Off, 1- Fan, 2 - Cool, 3 - Heat, 4 - Auto, 5 - Dry HRV: 0 - Off, 1 - Fan, 2 - Heat exchange, 3 - Bypass, 4 - Auto, 5 - Discharge
	16	45003+N*8	2bytes	TVR unit - fan speed: 0 - Auto, (DC fan: seven fan speeds) speeds 1-7; (AC fan: three fan speeds) 9 - Low speed, 10 - Medium speed, 11 - High speed
	16	45004+N*8	2bytes	TVR unit - set temperature bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45005+N*8	2bytes	TVR unit - dual-setpoint heating temperature bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45006+N*8	2bytes	HTHM - mode: 0 - Off 3 - Heat 10 - Heating and water heating 63 - Unchanged
	16	45007+N*8	2bytes	HTHM - set temperature for water heating bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45008+N*8	2bytes	HTHM - set temperature for heating bit0-bit6: 1–100 indicate 1–100°C. bit7: flag of half a degree, 1 - Existence of 0.5°C, 0 - No 0.5°C
	16	45009+N*8	2bytes	Reserved

Note: Be sure to enter register addresses to control the device. Otherwise, control results may not be the same as expected.

Note: Some models do not support all of the above parameters. For details about parameters supported by a model, contact technical support engineers. For example, regarding the "mode setting" parameter, when the refrigerant system is a cooling only system and a heating mode command is sent to the IDU of the refrigerant system, the operating mode is not the same as expected and the IDU may be shut down or in another state.

Note: When the gateway, IDUs, or ODUs have just been powered on and the gateway does not obtain device information correctly or fails to obtain device information, the default values of the control parameters are as follows: For a non-HTHM unit, the default operation mode is cooling, the default fan speed is low speed, the default set temperature is 25°C, and the default set temperature for heating in auto mode is 25°C. For an HTHM, the default mode is off, the set temperature for water heating is 25°C, and the set temperature for heating is 25°C.

Note: When the machine is in standby state, once it receives temperature adjustment, mode adjustment or wind speed adjustment command, it will be switched on and run under the above set conditions.