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ATE800 系列 RFID 无线测温装置

ATE800 series RFID wireless temperature measurement device

使用说明书 V1.4

Operation Manual V1.4

安科瑞电气股份有限公司
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申　明

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1.1 产品概述

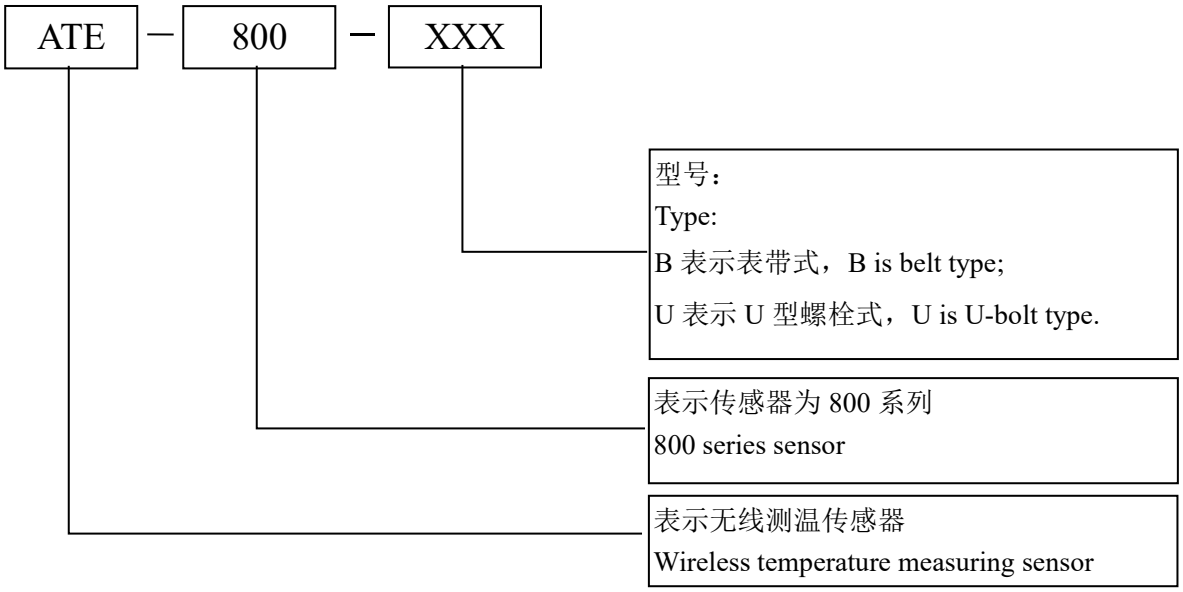
1.1 Product Introduction

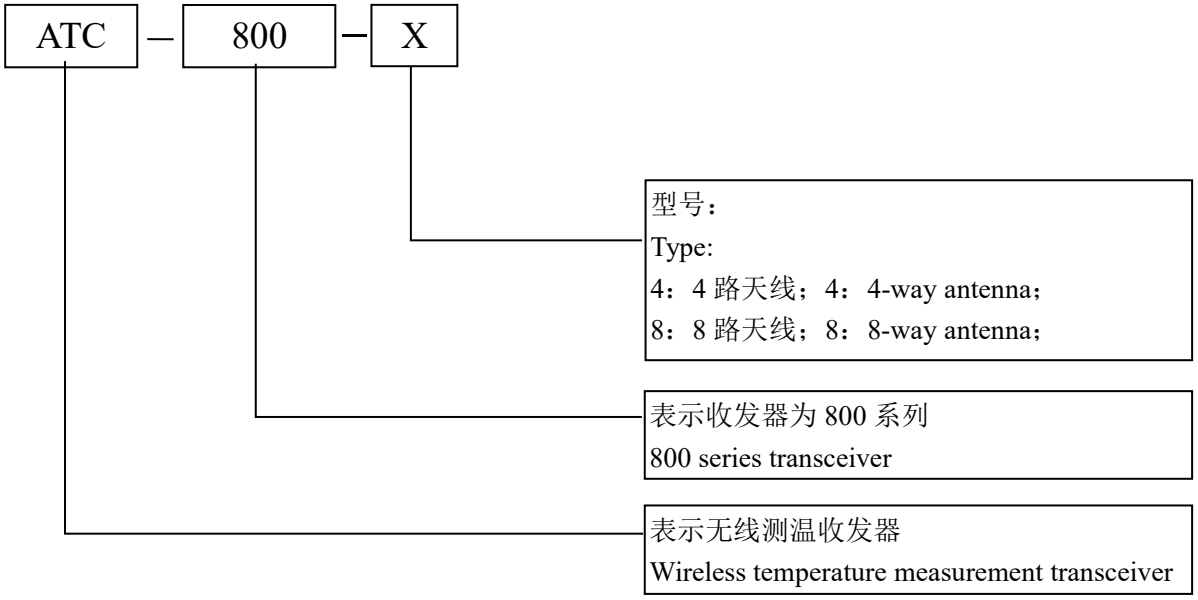
ATE800 系列 RFID 无线测温装置可用于中压开关柜内母排搭接点，断路器触头，电缆接头等金属部位的温度监测，具有隔离彻底、安装方便、抗干扰能力强、工作可靠的特点。ATE800 系列产品组成：接收器，天线，传感器。ATC800 接收器通过天线向 ATE800 无线测温传感器发射 RFID 射频信号，传感器接收到射频能量之后，激活电路，开始进行温度数据采集，并将数据通过无线信号回传至天线；天线通过射频电缆将数据传输至接收器，最终可由接收器将数据上传到远程监控系统。

The ATE800 series RFID wireless temperature measurement device can be used for temperature monitoring of metal parts such as bus bar connections in medium voltage switchgear, circuit breaker contacts, cable joints, etc. It features thorough isolation, easy installation, strong anti-interference capability, and reliable operation. The components of the ATE800 series products include: receiver, antenna, and sensor. The ATC800 receiver emits RFID radio frequency signals to the ATE800 wireless temperature measurement sensor via the antenna. Once the sensor receives the radio frequency energy, it activates the circuit, starts temperature data collection, and sends the data back to the antenna through wireless signals. The antenna transmits the data to the receiver via radio frequency cables, and ultimately the data can be uploaded to a remote monitoring system by the receiver.

1.2 型号说明

1.2 Type Introduction





1.3 配置方案

1.3 Configuration Plan

名称 Name	**型号** Type	**数量** Number
触摸屏 HMI	ATP007/ATP010	1
无线温度收发器 Wireless temperature transceiver	ATC800-4	10（每个 ATC800-4 最多跨 2 面柜子） 10 (up to 2 sides per ATC800-4)
无线测温天线 Wireless temperature antenna	ATC800-ANT-5	40
无线测温传感器 Wireless temperature transceiver	ATE800-B/ATE800-U	180（天线满配，每面柜子 9 点） 180 (antenna is fully matched, 9 points per cabinet)

名称 Name	**型号** Type	**数量** Number
触摸屏 HMI	ATU116	1
无线温度收发器 Wireless temperature transceiver	ATC800-8	6（每个 ATC800-8 最多跨 4 面柜子） 5 (up to 4 sides per ATC800-8)
无线测温天线 Wireless temperature antenna	ATC800-ANT-5	36
无线测温天线 Wireless temperature antenna	ATC800-ANT-10	4
无线测温传感器 Wireless temperature transceiver	ATE800-B/ATE800-U	180（天线满配，每面柜子 9 点） 180 (antenna is fully matched, 9 points per cabinet)

1.4 技术指标

1.4 Technical Features

型号 **Models** **参数** **Parameters**	ATE800-B	ATE800-U
名称 Name	温度传感器 Temperature sensor	

工作电源 Power source	RFID 射频电磁波供能 RFID Radio frequency electromagnetic wave power supply	
安装方式 Installation	表带式（带长 404mm） Belt type（Band length 404mm）	螺栓式（内径 12mm） Bolt type（Inner diameter 12mm）
应用范围 Application	开关柜内断路器触头/电缆接头/铜排搭接点等各种金属环境下的测温 Temperature measurement in various metal environments such as circuit breaker contacts, cable joints, and busbar overlaps inside the switch cabinet.	
通讯距离 Communication distance	空旷距离为 2 米 The open distance is 2 meters	
测温范围 Range of temperature	-40℃~+125℃	
测温精度 Precision	±1℃	
环境要求 Environment	温度：-20 ℃～+55 ℃；相对湿度≤95% Temperature:-20 ℃～+55 ℃；Humidity:≤95%	
工作环境 Environment	IP67	

型号 Models **参数 Parameters**	ATC800-4	ATC800-8
名称 Name	接收器 Receiver	
工作电源 Power source	AC85~265V/DC100~300V	

功耗 Power Consumption	≤10W	
天线通道 Antenna channel	4 路天线 4-way antenna	8 路天线 8-way antenna
天线连接线长度 The length of the antenna cable	5 米（ATC800-ANT-5）/10 米（ATC800-ANT-10） 5m（ATC800-ANT-5）/10m（ATC800-ANT-10）	
采样时间 Sample time	10ms ~ 32000ms，默认 100ms（可设） 10ms ~ 32000ms，default 100ms (optional)	
测温点数 Temperature points	240 点 240 points	
分辨率 Resolution	0.1℃	
无线距离 Wireless distance	空旷距离为 2 米 The open distance is 2 meters	
无线频率 Wireless frequency	840~960Mhz	
灵敏度 Sensitivity	< -78dbm	
射频功率 RF POWER	30dbm	
通讯端口 Communication	2 路 RS485；以太网接口；TTL 2-channel RS485；Ethernet interface；TTL	
波特率(bps) Baud rate (bps)	RS485：2400、4800、9600、19200、38400、57600、115200; Ethernet: 100M	

协议 Protocol	MODBUS-RTU(RS485)、 MODBUS-TCP (Ethernet)
继电器输出 Relay output	2 路无源出口，容量 10A/AC250V，5A/DC30V 2 passive exits, capacity 10A/AC250V，5A/DC30V
工作环境 Environment	温度：-20 ℃～+55 ℃；相对湿度≤95% Temperature:-20 ℃～+55 ℃；Humidity:≤95%

参数 Parameters	ATC800-ANT-5/10
驻波比 Standing-wave ratio	< 1.3
增益 Gain	4dbi
极化方式 Polarization mode	圆极化 Circular polarized
接口阻抗 Interface impedance	50Ω
接头型号 Connector model	SMA-JB2
安装方式 Installation method	螺丝固定 Screw fixation

1.5 ATE800 产品安装

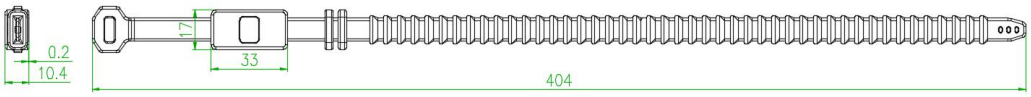
1.5 ATE800 Product Installation

ATE800 无线温度传感器共有多种型号，分别对应表带式固定，螺栓式固定等安装方式。

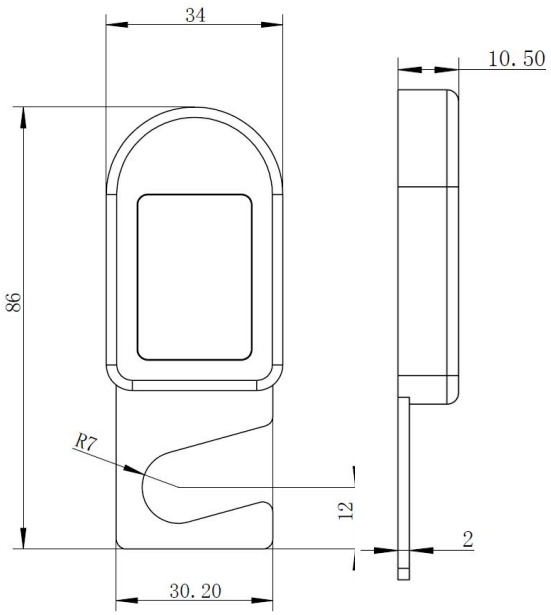
There are several types of ATE800 wireless temperature sensors and mounting methods correspondingly, i.e. belt and bolted.

1.5.1 外形尺寸

1.5.1 Dimensions



ATE800-B



ATE800-U

1.5.2 安装方法

1.5.2 Installation Method

ATE800-B 表带式无线测温传感器适用于断路器动触头、电缆接头等处。

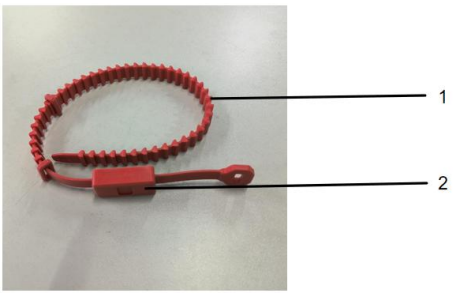
The ATE800-B belt wireless temperature sensor is suitable for circuit breaker moving contacts, cable joints, copper bars, etc.

ATE800-B 表带式无线温度传感器结构说明:

Structure introduction of ATE800-B:

1 —— 表带 Strap

2 —— 无线温度传感器主体 The core of wireless temperature sensor ATE800-B



将传感器主体固定在安装位置，将表带绕过安装母排或者触头穿过表带，表带头收紧，最后将表带尾用锁扣锁紧。表带长度为 404mm，过长可以剪掉多余部分，表带过短可以联系我司增订。

Fixing the body of sensor on the position, then strapping it on the bus bar or breaker contact and frapping it through the hole on the strap, fixing the strap by hasp.The strap length is 404mm, clipping the strap if it is too long when finished, if it is too short, contacting us for strap parts before installation.

ATE800-U 螺栓式无线测温传感器适用于电缆接头、铜排等处。

The ATE800-U bolt wireless temperature sensor is suitable for cable joints, copper bars, etc.

ATE800-U 螺栓式无线温度传感器结构说明:

Structure introduction of ATE800-U:

1 —— 螺栓固定孔 Bolt fixing hole

2 —— 无线温度传感器主体 The core of wireless temperature sensor ATE800-U

拆下安装位置搭接处的螺丝，将传感器固定在安装位置，对准合金底板的开孔，然后旋紧螺丝固定。

Remove the screw from the joints, and fixing the sensor on the position with the hole on the alloy baseplate, then tighten the screw

1.6 ATC800 产品安装

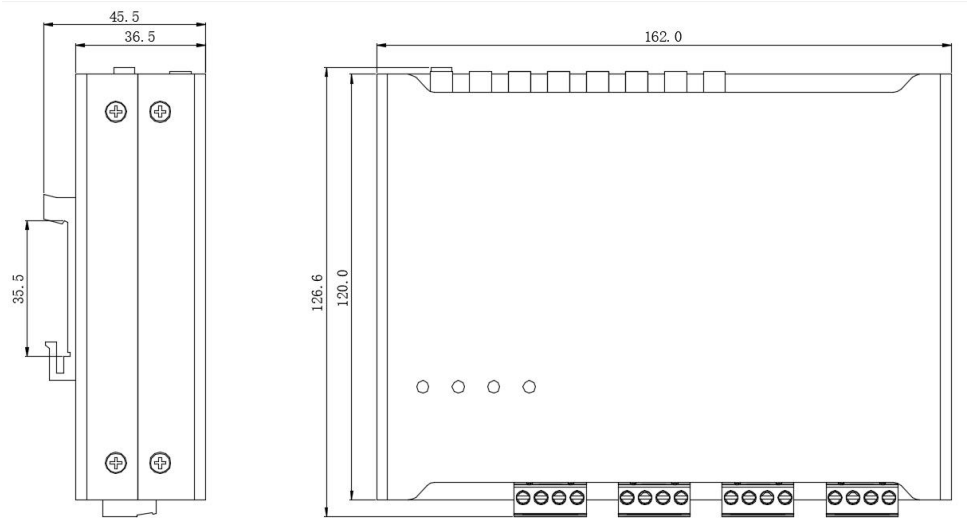
1.6 ATC800 Product Installation

1.6.1 外形尺寸

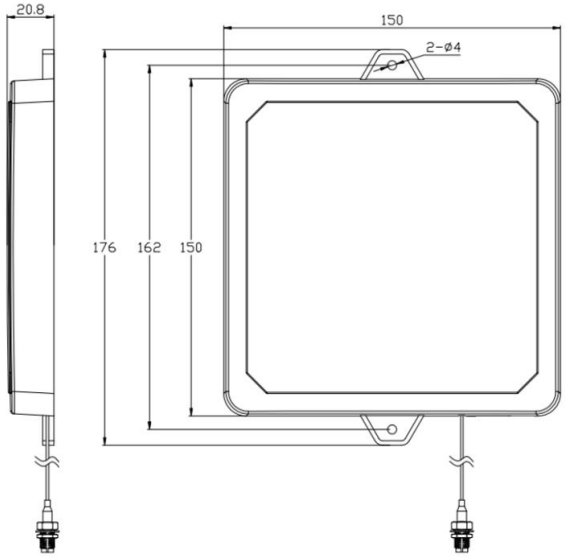
1.6.1 Dimensions

ATC800 无线测温接收器，采用导轨（DIN35mm）安装方式，主体尺寸 162mm*126.6mm*45.5mm。

ATC800 wireless temperature measurement receiver,, using guide rail (DIN35mm) installation, the main body size 162mm*126.6mm*45.5mm.



ATE800



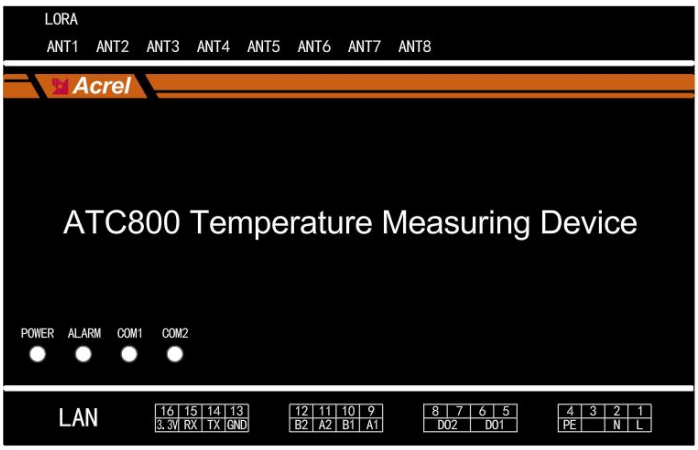
ATC800-ANT

1.6.2 接线方法

1.6.2 Wiring

如图所示，ATC800 电气接点温度在线监测装置接线端子图。装置底行标注的 1、2 为电源端子 L、N，5、6 为 DO1 输出，7、8 为 DO2 输出，9、10 为第一路 RS485 接口的 A、B 端子，11、12 为第二路 RS485 接口的 A、B 端子，13、14、15、16 为一路 TTL 接口，LAN 为一路以太网接口。

As shown in the figure, the wiring terminal diagram of the ATC800 electrical contact temperature online monitoring device. The 1 and 2 marked on the bottom row of the device are power terminals L and N, 5 and 5 are DO1 outputs, 7 and 8 are DO2 outputs, 9 and 10 are the A and B terminals of the first RS485 interface, 11 and 12 are the A and B terminals of the second RS485 interface, 13, 14, 15, and 16 are one TTL interface, and LAN is one Ethernet interface.



1.7 标签说明

1.7 Label State

ATC800-4

ATC800-8

ATE800-U

ATE800-B

如图所示，如果安装 ATE800-B/ATE800-U，其组号应与 ATC800-4/ATC800-8 的组号一致，安装位置依照标签文字安装，**“编码：001”**建议安装在第一个柜子的第一个测温点，再依次按照测温点顺序安装。

As shown in the figure, if ATE800-B/ATE800-U is installed, its group number should be consistent with that of ATC800-4/ATC800-8, and the installation position should be installed according to the label text. **"Code: 001"** is recommended to be installed at the first temperature measurement point of the first cabinet, and then installed in the order of temperature measurement points.

1.8 安装实例

1.8 Install an instance

1）中压断路器触头测温安装说明

1）Medium Voltage Circuit Breaker Contact Temperature Monitoring Installation

传感器与接收器天线在断路器室的安装位置如下图所示，图 1 为 ATE800-B 表带式传感器在断路器动触头的安装位置，图 2 为天线的安装位置。**当天线安装在断路器室的右侧柜壁时，传感器主体的方向要朝向天线位置**，如图 1 所示，保证传感器主体与天线的方向处于面对面状态。

The installation locations of the sensor and the receiver antenna in the circuit breaker room are shown

in the figure below. Figure 1 shows the installation position of the ATE800-B sensor on the moving contact of the circuit breaker, and Figure 2 shows the installation position of the antenna. **When the antenna is installed on the right side wall of the circuit breaker room, the direction of the sensor body should face the position of the antenna,** as shown in Figure 1, ensuring that the direction of the sensor body is in a face-to-face position with the antenna.

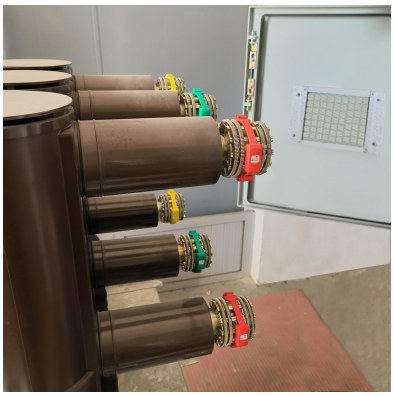


图 1

图 2

2）中压电缆室电缆测温安装说明

2）Installation Instructions for Cable Temperature Measurement in Medium Voltage Cable Rooms

传感器与天线在出线电缆室的安装位置如下图所示，图 1 为 ATE800-B 表带式传感器在电缆的安装位置，图 2 为天线的安装位置。**当天线安装在断路器室的左侧柜壁时，传感器主体的方向要朝向天线位置**，如图 2 所示，保证传感器主体与天线的方向处于面对面状态。

The installation positions of the sensors and antennas in the cable exit chamber are shown in the figure below. Figure 1 shows the installation position of the ATE800-B wristband sensor on the cable, while Figure 2 shows the installation position of the antenna. **When the antenna is installed on the left side cabinet wall of the circuit breaker room, the direction of the sensor body should face the antenna position**, as shown in Figure 2, to ensure that the direction of the sensor body is facing the antenna.

图 1

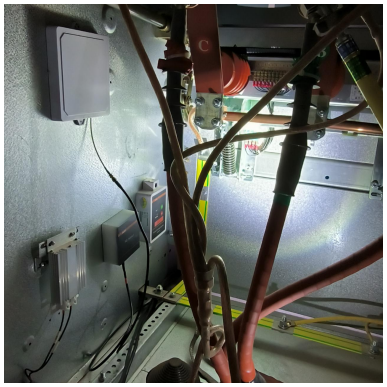


图 2

3）中压母线室铜排测温安装说明

3）Medium Voltage Busbar Temperature Monitoring Installation

传感器与天线在进线母排室的安装位置如下图所示，1 为 ATE800-U 螺栓式传感器主体的位置，2 为天线的位置，**保证传感器主体与天线处于相对的位置**。

The installation positions of sensors and antennas in the incoming busbar room are shown in the following figure. 1 is the position of the sensor body, and 2 is the position of the antenna, **ensuring that the sensor body and the antenna are in relative positions.**

注意事项：以上三个安装位置为典型场景，在其他应用场景也要保证传感器主体贴紧金属表面，传感器主体与接收器天线处于面对面的位置。

Attention: The above three installation positions are typical scenarios, and in other application scenarios, it is also necessary to ensure that the sensor body is tightly attached to the metal surface, and the sensor body and receiver antenna are in a face-to-face position.

2. 通讯指南

2. Communications

在本章主要讲述如何利用软件通过通讯口来操控无线测温接收器。本章内容的掌握需要您具有 MODBUS 协议的知识储备并且通读了本册其他章节所有内容，对本产品功能和应用概念有较全面的了解。本章内容包括：通讯应用格式详解，本机的参量地址表。

This chapter focuses on how to use software to control the device through RS485 communication port. The mastery of the content in this chapter requires that you have the knowledge reserve of Modbus protocol and read all the contents of other chapters in this manual, and have a comprehensive understanding of the functions and application concepts of the device. The contents of this chapter include: details of communication format, details of product application and parameter address table of the device.

2.1 通讯格式详解

2.1 Communication Examples

本节所举实例将尽可能的使用如下表所示的格式，数据为十六进制。

The examples in this section will use the format shown in the following table as much as possible, the number is hexadecimal.

2.1.1 读取数据（功能码 03H/04H）

2.1.1 Read Data (Function code 03H/04H)

此功能允许用户获得设备采集与记录的数据及系统参数。主机一次请求的数据个数没有限制，但不能超出定义的地址范围。

This function allows the user to get the data measured and system parameters recorded by slave. There is no limit of data length for asking data, but it cannot exceed the range of defined address.

例如，主机发送查询数据帧：

For example, master send data frame:

地址 Address	功能码 Fun	起始地址 Start address		寄存器数量 Register Count		CRC16 校验码 CRC16	
		高 Hi	低 Lo	高 Hi	低 Lo	低 Lo	高 Hi
01H	03H	00H	00H	00H	03H	05H	CBH

装置返回响应数据帧：

Slave answer data frame:

地址 Address	功能码 Fun	字节数 Byte count	数据 1 Data 1		数据 2 Data 2		数据 3 Data 3		CRC16 校验码 CRC16	
			高 Hi	低 Lo	高 Hi	低 Lo	高 Hi	低 Lo	低 Lo	高 Hi
01H	03H	06H	00H	01H	25H	80H	00H	00H	16H	51H

2.1.2 预置单个寄存器（功能码 06H）

2.1.2 Preset Single Register (Function code 06H)

此功能码允许用户改变单个寄存器的内容，可通过此功能码将工作参数写入装置。

User can write active parameter into the single register with this function code.

例如，主机发送：

For example, master send data frame:

地址 Address	功能码 Fun	寄存器地址 Start address		预置值 Value		CRC16 校验码 CRC16	
		高 Hi	低 Lo	高 Hi	低 Lo	低 Lo	高 Hi
01H	06H	00H	00H	00H	02H	08H	0BH

装置返回响应数据帧：

Slave answer data frame:

地址 Address	功能码 Fun	寄存器地址 Start address	预置值 Value	CRC16 校验码 CRC16

		高 Hi	低 Lo	高 Hi	低 Lo	低 Lo	高 Hi
01H	06H	00H	00H	00H	02H	08H	0BH

2.1.3 预置多个寄存器（功能码 10H）

2.1.3 Preset Multi Register (Function code 10H)

此功能码允许用户改变多个寄存器的内容，可通过此功能码将工作参数写入装置。

User can write active parameter into the multi registers with this function code.

例如，主机发送：

For example, master send data frame:

地址 Address	功能码 Fun	寄存器地址 Start address		寄存器数量 Register Count		字节数 Byte Count	预置值 1 Value 1		预置值 2 Value 2		CRC16 校验码 CRC16	
		高 Hi	低 Lo	高 Hi	低 Lo		高 Hi	低 Lo	高 Hi	低 Lo	低 Lo	高 Hi
01H	10H	00H	00H	00H	02H	04H	00H	02H	25H	80H	49H	5FH

装置返回响应数据帧：

Slave answer data frame:

地址 Address	功能码 Fun	起始地址 Start address		寄存器数量 Register Count		CRC16 校验码 CRC16	
		高字节 Hi	低字节 Lo	高字节 Hi	低字节 Lo	低字节 Lo	高字节 Hi
01H	10H	00H	00H	00H	02H	41H	C8H

2.2 通讯地址表

2.2 Parameter address table

2.2.1 ATC800 地址表

2.2.1 ATC800 address table

地址 Address	**参数 Parameter**	**属性 Attribute**	**数值范围 Range**	**数据类型 Data type**
0000H	通讯地址 1 Address1	R/W	1-247，默认为 1 1-247，Default is 1	Uword
0001H	通讯波特率 1 Baud rate1	R/W	范围：1~7，分别对应 2400，4800，9600，19200，38400，57600，115200，默认为 3；	Uword

			Range：1~7，corresponds 2400，4800，9600，19200，38400，57600，115200，default is 3.	
0002H	通讯地址 2 Address2	R/W	1-247，默认为 1 1-247，Default is 1	Uword
0003H	通讯波特率 2 Baud rate2	R/W	范围：1~7，分别对应 2400，4800，9600，19200，38400，57600，115200，默认为 3； Range：1~7，corresponds 2400，4800，9600，19200，38400，57600，115200，default is 3.	Uword
0004H	继电器输出 Relay output	R	0-正常；1-报警。bit0~bit1 分别对应：AL1 告警与 AL2 告警 0 - normal; 1- Alarm. bit0~bit1 corresponds: AL1 and AL2 alarms	Uword
0005H	天线通道 Antenna channel	R	0-退出；1-投入。bit0~bit7 分别对应：1~8 路天线 0- exit; 1- Input。bit0~bit7 corresponds to 1~8 antennas	Uword
0006H	无线功率 Wireless power	R/W	范围：5~33dbm，默认：33dbm Range: 5~33dbm, default: 33dbm	Uword
0007H	无线频率 Wireless frequency	R/W	00 01：北美(902~928)Mhz； 00 06：中国 1(920~925)Mhz； 00 08：欧频(865~867)Mhz； 00 0A:中国 2(840~845)Mhz； 00 FF:全频段(840~960)Mhz。 00 01: North America (902~928) Mhz; 00 06: China 1 (920~925) Mhz; 00 08: European frequency (865~867)Mhz; 00 0A: China 2(840~845)Mhz; 00 FF: Full band (840~960) Mhz.	Uword
0008H	采样时间 Sampling time	R/W	单位：毫秒(ms)，范围：10~32000，默认：100ms Unit: millisecond (ms), range: 10~32000, default: 100ms	Uword
0009H ~00F8H	无线测温传感器 1~240 号温度值 Wireless temperature sensor 1~240 temperature value	R	-40℃~+125℃(×10)，默认：-50℃ -40℃~+125℃(×10)，default: -50 ℃	Word
00F9H ~0170H	保留 Reserve	R	Wireless temperature sensor 1 to 240 RSSI values	Word

0171H ~0260H	无线测温传感器 1~240 号 ID Wireless temperature sensor 1~240 ID	R/W	1~65534，65535 表示未绑定传感器 1~65534,65535 means that the sensor is not bound	Uword
0261H ~026FH	无线测温传感器 1~240 号告警投退 Wireless temperature sensor Alarm No. 1~240 is returned	R/W	0-退出；1-投入。bit0~bit239 分别对应：1~240 号传感器告警投退，默认：1 0- exit; 1- Input。bit0~bit239 corresponds to the alarm of sensor No. 1~240 , default: 1	Uword
0270H ~027EH	无线测温传感器 1~240 号 AL1 告警设置 Wireless temperature sensor AL1 alarm settings for No. 1~240	R/W	0-低温；1-高温。bit0~bit239 分别对应：1~240 号传感器 AL1 告警设置，默认：1 0- low temperature; 1- High temperature。bit0~bit239 corresponds: 1~240 sensor AL1 alarm setting , default: 1	Uword
027FH ~028DH	无线测温传感器 1~240 号 AL2 告警设置 Wireless temperature sensor AL2 alarm settings for No. 1~240	R/W	0-低温；1-高温。bit0~bit239 分别对应：1~240 号传感器 AL2 告警设置，默认：1 0- low temperature; 1- High temperature。bit0~bit239 corresponds to: 1~240 sensor AL2 alarm setting , default: 1	Uword
028EH ~037DH	无线测温传感器 AL1 告警定值 Wireless temperature sensor AL1 alarm values	R/W	范围：-40℃~+125℃(×10)； AL1 告警定值默认为+60℃(×10) Range: -40°C~+125°C(×10); The default alarm value of AL1 is +60°C (×10)	Word
037EH ~046DH	无线测温传感器 AL2 告警定值 Wireless temperature sensor AL2 alarm values	R/W	范围：-40℃~+125℃(×10)； AL2 告警定值默认为+80℃(×10) Range: -40°C~+125°C(×10); The default value of AL2 alarm is +80°C (×10)	Word
046EH ~047CH	无线测温传感器 1~240 号 AL1 告警标志位 Wireless temperature sensor No. 1~240 AL1 alarm Flags	R	0-正常；1-报警。bit0~bit239 分别对应 1~240 号传感器 AL1 告警。 0 - normal; 1- Alarm. bit0~bit239 correspond to the AL1 alarm of sensor 1~240 respectively.	Uword
047DH ~048BH	无线测温传感器 1~240 号 AL2 告警标志位 Wireless temperature	R	0-正常；1-报警。bit0~bit239 分别对应 1~240 号传感器 AL2 告警。 0 - normal; 1- Alarm. bit0~bit239 correspond to the alarm of sensor AL2 of	Uword

	sensor No. 1~240AL2 alarm Flags		sensor 1~240respectively.	
048CH	AL1(DO1)回滞量 AL1 (DO1) hysteresis	R/W	范围：0℃~+125℃(×10) Range: 0℃~+125℃(×10)	Word
048DH	AL2(DO2)回滞量 AL2 (DO2) hysteresis	R/W	范围：0℃~+125℃(×10) Range: 0℃~+125℃(×10)	Word
048EH ~048FH	IP 地址 IP Address	R/W		Uword
0490H ~0492H	MAC 地址 MAC Address	R/W		Uword
0493H ~0494H	子网掩码 Subnet Mask	R/W		Uword
0495H ~0496H	默认网关 Default gateway	R/W		Uword
0497H ~049EH	端口号 Port number	R/W		Uword
049FH	TTL 设备地址 TTL device address	R/W		Uword
04A0H	TTL 波特率 TTL baud rate	R/W		Uword

注：[1] R—只读；W—只写； R/W—读/写。[2] ×10—通讯值为实际值的 10 倍，×100—通讯值为实际值的 100 倍。

[1]R—Read;W—Write；R/W—Read/Write.[2] ×10—Read with the ratio and write with the ratio in the table, ×100—Read with the ratio and write with the ratio in the table.

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