



BTU METER BTU MEASUREMENT SYSTEM

Household metering to achieve low-carbon lifestyle



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AKE BTU Meter

(Mode: C03P)

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1 Company introduction

Foshan AKE Electronic Engineering Co., Ltd. founded in 1997, is a high-tech enterprise with data acquisition and information processing as its core technology. The main products AKE has are Network Thermostat System, BTU Measurement System, Building Energy Management System, Parking Guidance System and Urban Parking Guidance System.

AKE has obtained 6 patents, and passed ISO9001: 2000 Quality Management System in 2005. By the end of 2010, AKE has made over 800 projects all over China and gets high appraisal from local and overseas customers. The culture AKE pursues is Innovation, Pragmaticism, Dedication and Development.

Customer-oriented, AKE pursues maximum customer satisfaction by providing efficient service throughout the whole cooperation. We can say that AKE would make a promising and trust-worthy partner in your business.

2 AKE milestone

- In 1998, the 1st generation of AKE BTU Measurement System was developed;
- In 1999, AKE BTU Measurement System was installed and put into practice, which was also the 1st project in China;
- In 2000, obtained the 1st national patent of BTU Measurement System in China;
- In 2001, obtained the “Innovation and Technology Fund” from Guangdong Province;
- In 2002, AKE products were chosen as the key new product in Guangdong Province;
- In 2003, obtained Prize for Progress in Science and Technology of Foshan;
- In 2004, obtained the “Innovation and Technology Fund” from Guangdong again;
- In 2005, passed ISO9001 Quality Management System;
- In 2006, obtained the authentication of hi-tech enterprises of Guangdong province and named as "Outstanding Enterprise for Self-innovation in Architecture Technology."
- In 2007, named as The Most Influential Enterprise for Building Energy Conservation in China.
- In 2008, obtained the patent prize of Foshan and obtained the certification of hi-tech enterprise of Guangdong province again;
- In 2009, chosen as the Chinese Industry Standard(GIS) drafting organization to compile Time-based BTU Measurement System standard.



3 Brief introduction

3.1 Background

Along with the fast growth of economics, chilled water system is widely used. Regarding the energy consumption, in the past the consumer was simple paid by area shared, whether they used it or not, regardless how much they used, the consumer should bear the same fee. To a certain extent this method leads to waste energy, meanwhile the building owner also bear more energy cost. How to charge the energy cost of chilled water system became a big problem.

AKE C03P BTU meter is designed to measure individual energy consumption when chilled water system is installed. Besides, it is also used to measure performance of energy saving system or the loss of efficiency which is directly tied to loss of revenue.

❖ Operation mode: Heating mode, Cooling mode, Heating&Cooling mode.

3.2 Applications

- Combination Heating/Cooling Systems
- Heating Systems
- Cooling Systems
- Solar Systems
- Geothermal Systems
- Efficiency Measuring/Verification
- Heat Recovery System

3.3 Component Description

AKE BTU meter consists of the following components:

1) Calculator (Model C03P) – Solid state circuitry for accurate and reliable operation with automatic compensation for water density. Receive signal from flowmeter and a couple of temperature sensors, calculate and indicate flow, temperature and energy consumption;

2) Flowmeter – **Electromagnetic flowmeter** is strongly recommended to ensure accuracy and minimize maintenance;

3) A Pair of Temperature Sensor – 4-wire PT1000, fast response and high accuracy, with longer wiring for flexible installation but no affect in accuracy.

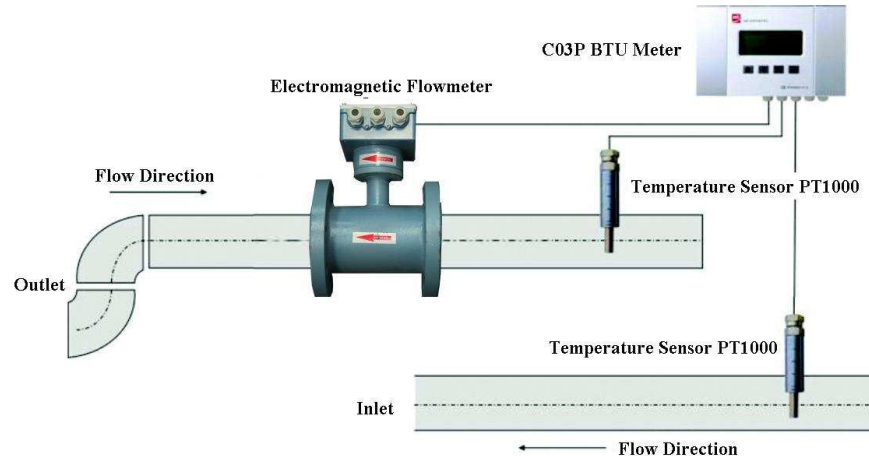
4 Working Principle

AKE BTU meter measures heating/cooling usage according to Heat Exchange Principle:

$$Q = \int_{\tau_0}^{\tau_1} q_m \Delta h d\tau = \int_{\tau_0}^{\tau_1} \rho q_v \Delta h d\tau$$

As energy-conveying liquid (water or other liquid) passes through the system piping, flowmeter measures the instantaneous flow velocity ‘q’ and temperature sensors test inlet temperature ‘T1’ and outlet temperature ‘T2’, then all the data is sent to C03P Calculator.

According to the formula above, C03P Calculator integrates cooling or heating consumption. If T1>T2, cooling consumption is integrated, otherwise heat consumption. Finally the data is stored in C03P Calculator and displayed on LCD screen.



5 Product introduction

5.1 BTU meter



5.1.1 Features

- Complies with OIML R75 and EN 1434 standards;
- Large LCD screen, 4-row-display on each page;
- Shows historic data with bar chart on a daily/monthly/yearly basis;
- Multi-level password prevents data missing or illegal modification;
- Current input (4-20mA) and pulse input (0-200Hz) are compatible;
- Modbus protocol based on RS485 communication;
- Adopts optocoupler, good anti-interference performance;
- Programmable minimal flow can be ignored;
- Secure storage: automatically store data in case of power failure;
- Remote alarm and clock function, remotely calibrates clock periodically;
- Data output interface; easy to integrate into Auto Meter Reading system;

5.1.2 Technical parameter

Basic Parameter	
Operating Voltage:	220VAC \pm 10% ,50 \pm 1Hz
Accuracy Class	Class 2
Environment Class	Class A
Calculation Range	(0 \sim 999999.999999)MWh
Resolution	0.000001MWh
Dimension	250mm \times 150mm \times 60mm
Communication	
Communication Interface	RS-485
Communication	Modbus
Baud Rate	9600bps
Maximum communication distance	400m
Flow Rate	
Flow Rate Range	(0 \sim 9999.99)m ³ /h
Flow Rate Rccuracy	\pm 1.5%
Input Signal	Pulse or Current
Signal Range	Pulse mode: 0 \sim 200Hz Current mode: 4-20mA
Temperature	
Temperature range	(0.0 \sim 99.9) $^{\circ}$ C
Temperature Resolution	\pm 0.1 $^{\circ}$ C
Temperature Sensor Pair	4-wires PT1000

5.2 Electromagnetic flowmeter

5.2.1 Features

- High accuracy;
- No mechanical movement part, long lifetime and maintenance free;
- Excellent for high pressure application;
- Suitable for different kinds of conducting medium such as pure water, waste water, slurry, paper pulp etc and the testing result won't be affected by temperature, pressure, density or conductivity, etc.



5.2.2 Technical Parameter

Mode	EMF-8000 (Flanged Version)
Sensor Size	DN25-500
Pow supply	AC 220V±10%
Output	4-20mA
Accuracy	±0.5%
Conductivity	≥5uS/cm
IP	IP65, IP67
Pressure Rating	DN25-DN80: PN≤2.5Mpa DN100-DN150: PN≤1.6Mpa DN200-DN500: PN≤1.0Mpa
Straight Pipe	10 * pipe diameter up / 5 * pipe diameter down
Housing	carbon steel, stainless steel
Liner	FEP, Ne, PTFE
Electrode	316L, HB, HC, Ta, Ti, Tungsten Carbide
Medium Temp.	Ne: -40-80℃ PTEF, PTFE: -40-180℃
Ambient Temp.	-25-60℃

5.3 Temperature sensor pair



5.3.1 Feature

- Platinum RTD type ensures high accuracy, stability and long-term reliability;
- Accuracy: 1 mK;
- Wide output signal and high sensitivity: 1 level higher than other thermoelectric thermometer;
- Wide testing range with good and stable performance. Able to keep stability below 0.1 °C for a long time under circumstances of small vibration;
- 4-wire mode, testing results won't be affected if the wire is extended.

5.3.2 Installation

5.3.2.1 Installation P1000 which is below DN50

- **Composition**
PT1000






Sleeve



Tee



➤ Installation

Step	Action	Picture
Step 1	Screws PT1000 into sleeve	
Step 2	Screws PT1000&sleeves into Tee; (uses waterproof tape when screw it, must be tighten screwed)	
Step 3	Finishes and screws it into water pipe	

5.3.2.2 Installation P1000 which is over DN50

- Opens a hole (diameter 30mm) on the measured pipe;
- Solders Fitting seat on measured pipe;
- Screws Sleeve into Fitting seat;
- Puts PT1000 into sleeve and inserts it on the bottom of sleeve and then screws it tightly.

