

ACM Central Air-Conditioning Heat Meter Specification

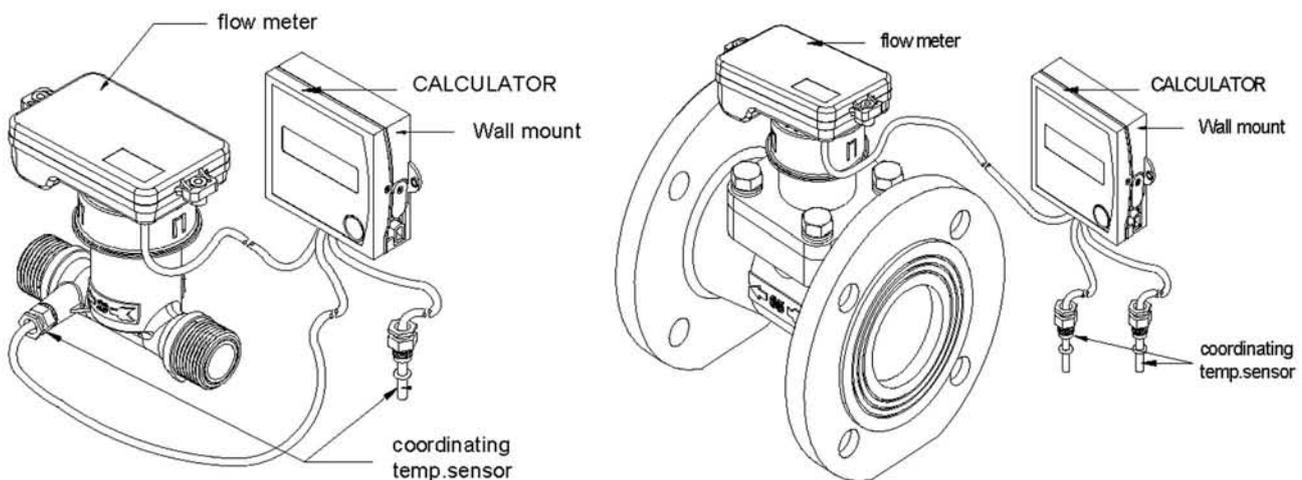
1. Functions and features

ACM series heat meter is a new generation of central air-conditioning/ heat measuring meter, which is developed according to the Heat Meter Standard CJ128-2000 and Heat Meter Verification Regulation JJG125-2001. It is designed on the basis of two patents of BASIC. No magnetism design for radial impeller flow sensor is fit for working in chilled water, which has bad quality in central air-conditioning pipe; it features advanced arithmetic, low power loss, accurate measurement and hard to be blocked. Considering the temperature of the chilled water of the heat exchange loop is lower than ambient temperature, all electric circuit of the ACM meters are dampness-proof designed.

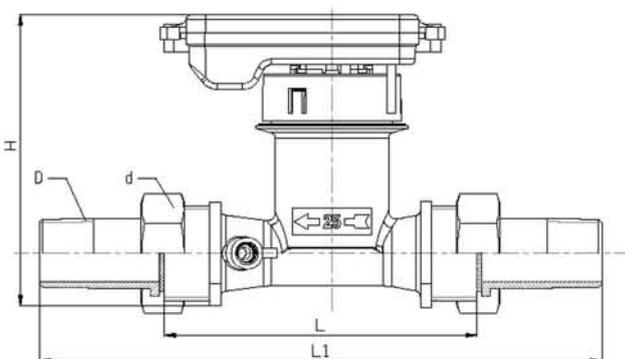
130 series ACM is combined model heat meter. The radial impeller flow sensor, which is powered by lithium battery, is either standalone or combined applied. The available distance between the calculator and the flow meter should be less than 10m; the factory standard length is 1.5m. The temperature sensor cable with the standard factory-left length is 1.5m, but the maximum extending length should not more than 25m.

2. Outline size

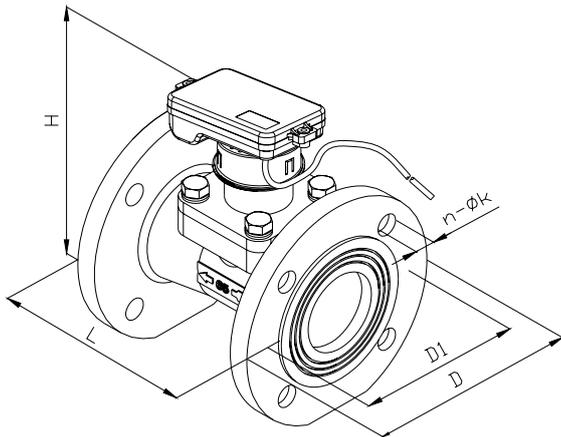
2.1 130 series outline diagram



2.2 130 series outline size



type	ACM-20	ACM-25	ACM-32	ACM-40	ACM-50
length L	132	138	154	164	189
height H	128	130	137	143	158
install length L1	236	252	278	298	333
connect nut thread d	G1"	G1 1/4"	G1 1/2"	G2"	G2 1/2"
pipe terminal thread D	G3/4"	G1"	G1 1/4"	G1 1/2"	G2"



type size (mm)	ACM-50	ACM-65	ACM-80	ACM-100	ACM-125	ACM-150	ACM-200
length L	200	200	224	257	250	300	350
height H	213	230	243	251	290	318	356
install length D	165	185	200	220	250	285	340
bolt hole central circle diameter D1	125	145	160	180	210	240	295
unilateral point bolt number and hole diameter n-φk	4-φ19	4-φ19	8-φ19	8-φ19	8-φ19	8-φ23	12-φ23

3.Main technical parameter

3.1 Working conditions and technical data

Products series	Parameter	130 series
Main parameter	Environment class	CJ128-2000 A , relative humanity <80%RH
	Protection class	IP52
	Products standard	Q/(QY) BCKJ 4-2006
	Energy measuring accuracy	Class 3
	Products structure	Combined
Display	Display	LCD, 8 digits
	Unit	kWh - kW - m ³ /h - m ³ - °C
	Max. reading	999999.99
	Display content	Energy-power-flow-rate-temperature
Temperature input	Temp. sensor model	PT 1000-two wire
	Temp. resolution	0.1°C
	Range of Temperature measuring	4°C ~ 95°C
	Range of temp.difference	3K ~ 60K
	Temp.difference for start measuring	DN20~DN40 = 1.0K, DN50~DN200 = 0.7K
	Max.temperature for cooling application	Leave factory default value: 15°C
	Min.temperature for heating application	Leave factory default value: 40°C
Flow meter	Structure format	Radial impeller flow meter
	Ambient pressure	≤1.6MPa
	Pressure loss	≤10kPa
	Working current	≤100uA
Network interface	Network serial interface	M-BUS
	Communication protocol	BASIC enterprise standard or CJ/T188-2004
	Baud rate	2400bps
Other interface	Chain measuring input	No-voltage contact
	Arrearage cut-off output	DC 3V/3mA (operating with BASIC's MDU-003 model)
Power	External power supply from M-BUS	DC 21V~33V, working current<1.5mA
	Internal lithium battery 1	AA specification 3.6V/2AH
	Internal lithium battery 2	C specification 3.6V/7.5AH
	Static working current	≤25uA

Energy measuring	Measuring for different time-segment	valid (set by the user)
	Total time-segments	4
	Energy records of time-sharing	4 independence time-segments energy value
	Time-segments and modes for weekend	1 time-segment (Saturday, Sunday), 4 modes
	Time-segments for working day	3 time-segments (Monday ~ Friday, setting freely in 24 hours)

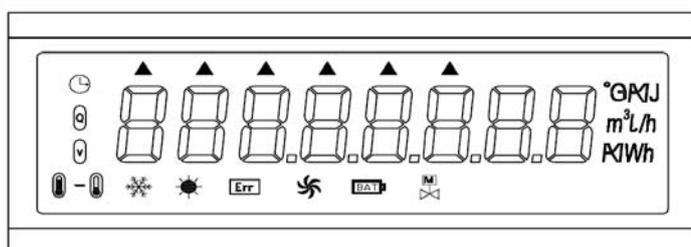
3.2 Flow-rate parameter.

Meter type	DN	Nominal flow-rate m ³ /h	Max. flow-rate m ³ /h	Min. flow-rate m ³ /h
ACM-20	20	2.5	5	0.15
ACM-25	25	3.5	7	0.2
ACM-32	32	6	12	0.35
ACM-40	40	10	20	0.45
ACM-50	50	15	30	0.8

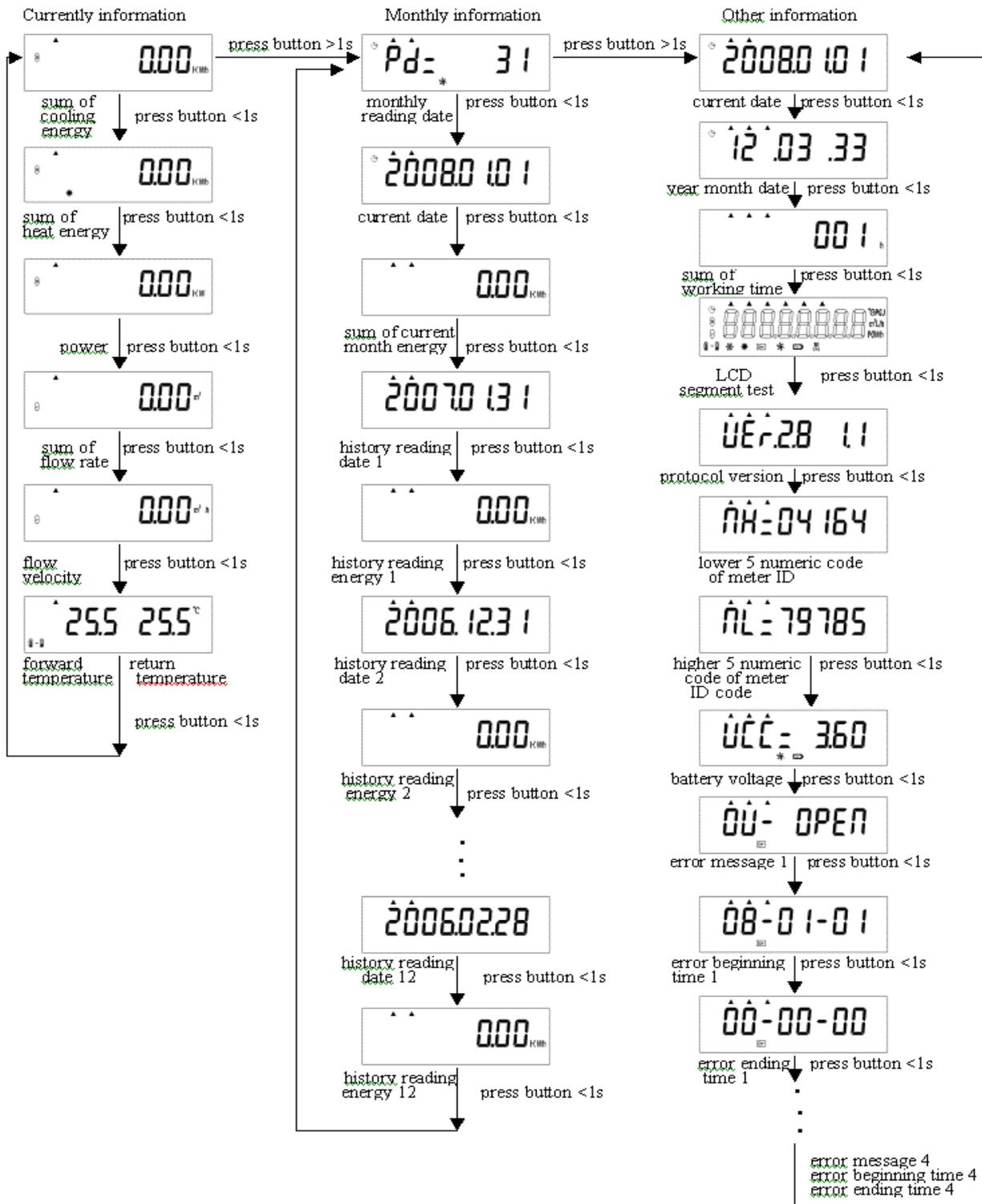
Meter type	DN	Nominal flow-rate m ³ /h	Max. flow-rate m ³ /h	Min. flow-rate m ³ /h
ACM-50F	50	15	30	0.8
ACM-65F	65	25	50	2.0
ACM-80F	80	40	80	3.2
ACM-100F	100	60	120	4.8
ACM-125F	125	100	200	8.00
ACM-150F	150	150	300	12.0
ACM-200F	200	250	500	20.0

4.Key operation and display

4.1 The displaying LCD menu.



4.2 The detail explanation for the displaying information.



4.2.1 "Monthly reading date" displays "PD=XX", in which XX means the end date of current month's energy cumulating. The leave factory default displaying is 31, which means the current month 's cumulating energy will be conserved at this day and will begin the next month's energy recording.

4.2.2 "Sum of working hour" displays the time unit is hour "h"

4.2.3"Software and protocol edition " displays as "VER. X.X X.X". The first X.X is the software edition and the second is the communicating protocol edition.

4.2.4"Factory code" means the physical address number, which should coincide with the one on external label. This code is a unique number set by the factory; it is also the unique communication address in M-BUS system.

4.2.5"Battery voltage" displays "VCC=X.X" with a default unit is V. When the voltage is lower than 2.9 ± 0.1 v, it will display "BAT".

4.2.6 Fan status display: When the chain measuring function of the fan coil unit is opened, the logo "  " can be seen.

4.2.7"Error message": If there are errors have not been solved, the end date will display "00.00.00". If error records are less than four, it will only show the existed one.

Error message table:

Error Message	Explanation
IN—CLOSE	Supply temp.sensor short circuit
IN—OPEN	Supply temp.sensor open circuit
OU—CLOSE	Return temp.sensor short circuit
OU—OPEN	Return temp.sensor open circuit
COD=XXXX	error in malfunction record. "XXXX" is the error code

4.3 Display unit

We adopt standard units of energy with KWh and the flow-rate unit with M³ for our products. Any other needs with the measuring unit should descript in the order.

5. Installation

5.1 ACM flow meter installation

5.1.1 Installation position

The meter should be installed in the position with proper temperature and humidity. Considering a convenient maintenance, it should be installed in the position where the meter is easy to be moved and the pipe should get out of vibration and stress.

Considering to protect measuring fittings, the meter should be far away from the heat radiation and outside strong magnetism, the equipments of electronic cleaner, the frequency inverter and motor.

5.2 ACM should be installed on the supply pipe. The orientation of the arrow signed on the outside meter body should be the same with the water orientation. Installed a straight pipe up to 10D(D is the nominal diameter of meter) at the upstream and a straight pipe up to 5D at the downstream of the meter. As in figure 8, A and B are right installation position while C, D, E are improper. The meter should be installed with a gradient no larger than 5 degree to left or to right, as showed in figure 9.

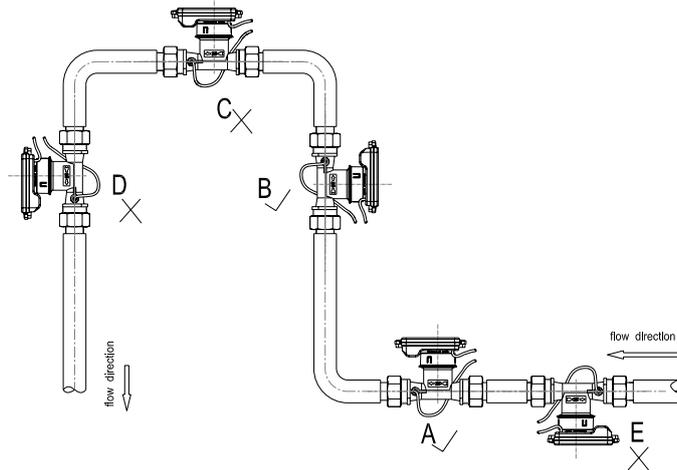


Figure 8. Installation position illustration

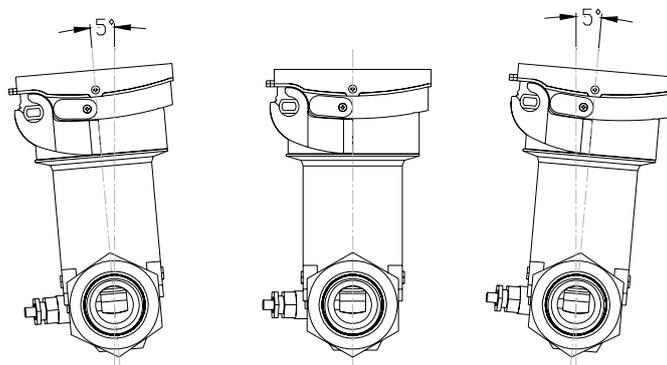


Figure 9. ACM installation illustration

5.3 The installation of temperature sensor

There is a temperature sensors pair for ACM of DN20-40mm, one of which (with red tag) has been mounted on the valve of ACM in factory, another (with blue tag) will be mounted on the corresponding return pipe. The return temperature sensor is inserted into return pipe directly by a connector and a reducing tee, so that the return temperature measuring will not be effected . As figure 12(A) show.

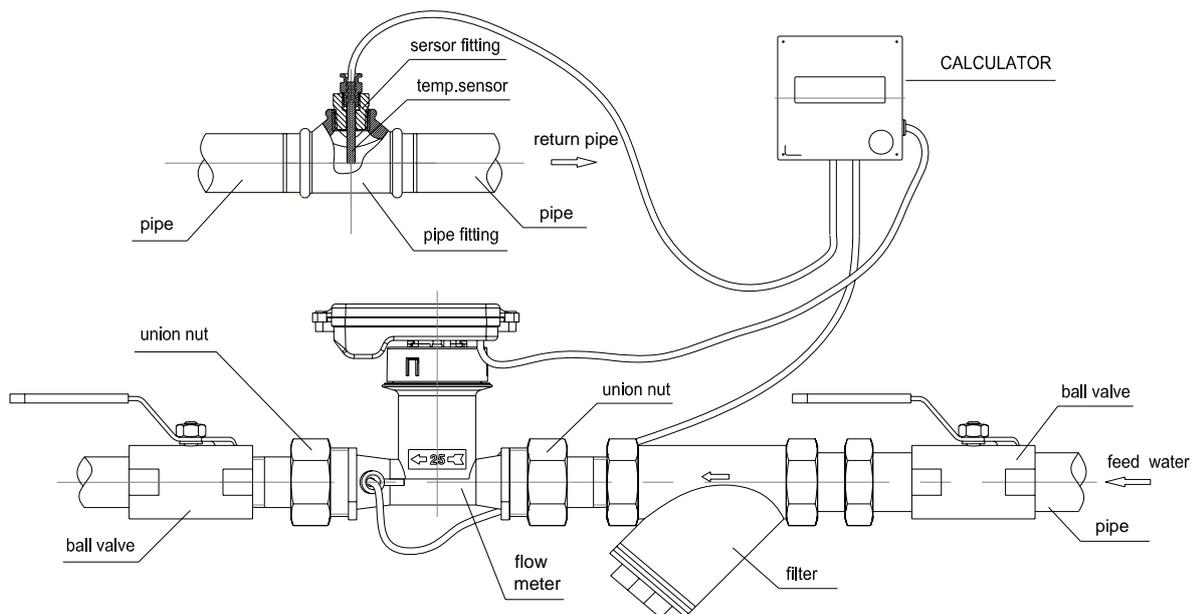


Figure 10. Installing diagram for ACM temperature sensor (20-40mm)

Temperature sensors of ACM of DN50-200mm are installed on the flow and return pipe by a sleeve.

Drilling a hole of $\phi 20$ on the pipe, welding the straight-way on the pipe. Then install the sleeve on the straightway, insert the temperature sensor into the sleeve to the bottom; At last, installing the rubber sealed ring and the lock nut in order, screw them tightly. The installation diagram as figure 11 and figure 12(B)

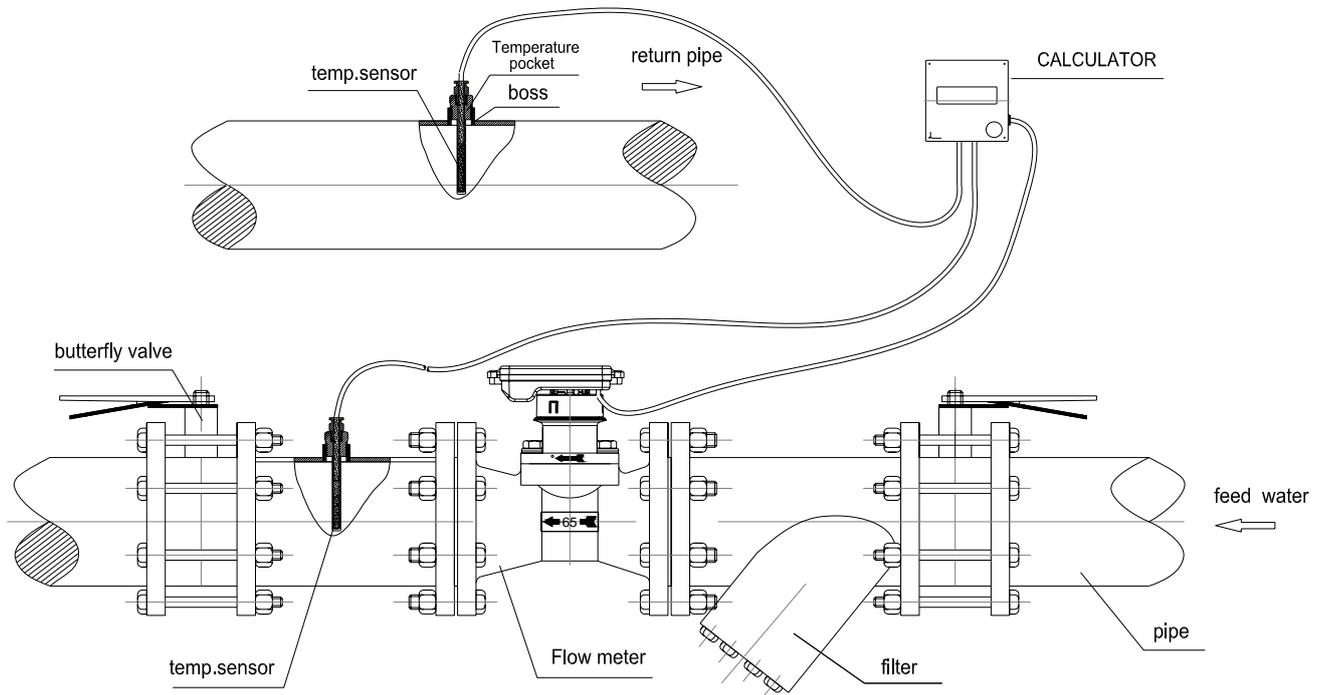


Figure 11. Installation diagram for ACM temperature sensor(50~200mm)

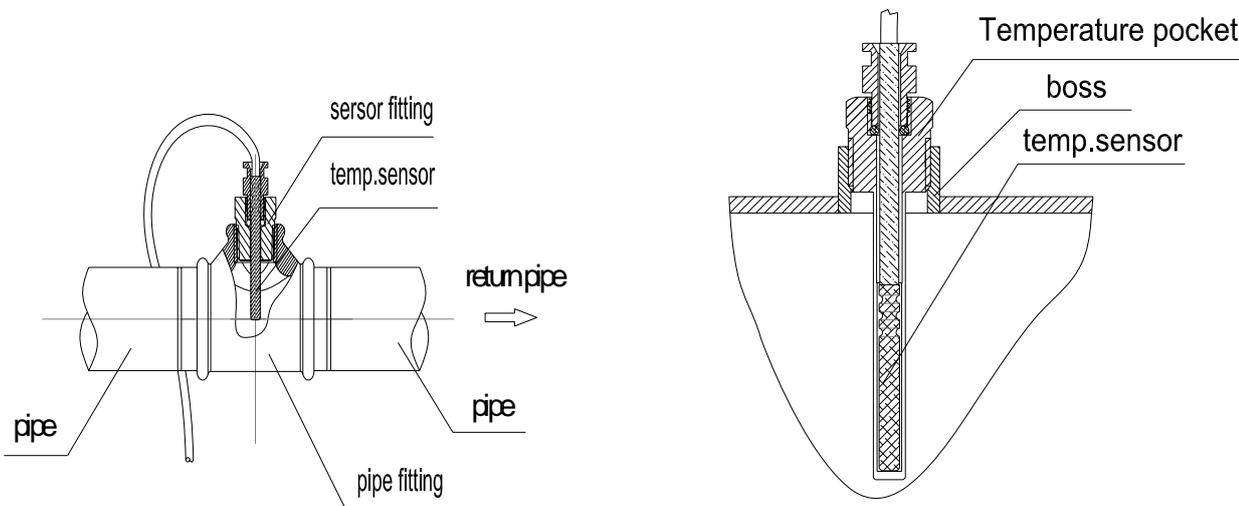


Figure12 (A)

Figure 12 (B)

5.4 The installation of chain measuring module SCB-03

SCB-03 is a special module designed for ACM's chain measuring, by which ensure the meter's reliable measurement.

The function is default as "detecting invalid" when leaving factory, it can be set as "detecting valid" by the Local Management Software(LMS) to start the function when it is necessary.

The cable that used to connect SCB-03 and the fan coil unit should be not small than $RVV0.75mm^2$ with length will not exceed 20m. One fan coil unit should be connected to one SCB-03 module in principle. The valve control is useless when this module is operating. A standard 86 box is adopted to install SCB-03; the connecting diagram is

<input type="checkbox"/> Heat value	0.0	↕
<input type="checkbox"/> Flow value	0.00	↕
<input type="checkbox"/> Working Mode	Cooling	▼
<input checked="" type="checkbox"/> Fan coil check	Detecting Valid	▼

shown in figure 13.

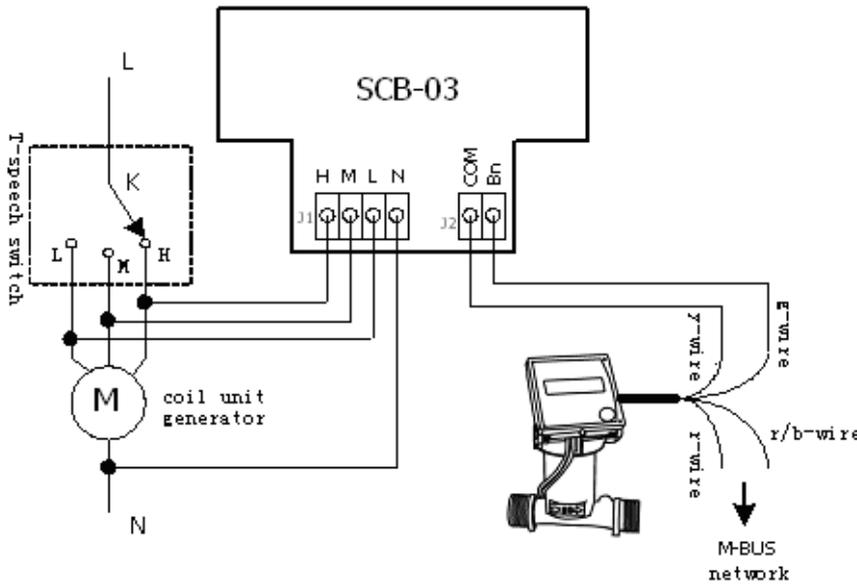


Figure 13. Connecting diagram of chain measuring module

5.5 Installation for cutting - off module MDU-003

MDU-003 is a cut-off control module, which is specially used to control ACM to cut off the power supply to fan coil unit, then stop supplying air-conditioning to users who don't pay the fee. The cable for connecting the ACM, the MDU-003 and the motorized valve should be not smaller than RVV 0.75 mm² and the length no more than 20m. The module can control the maximum five motorized valves at the same time.

The function is set "valid" in the factory. Operating the function, firstly checking in the Local Management Software (LMS) to set the "Fan coil check" column as "detecting invalid".

The connecting diagram of the monitor valve with two-wire spring switch and three-wire electric switch are showed in figure 14 and figure 15 respectively.

<input type="checkbox"/> Heat value	0.0	↕
<input type="checkbox"/> Flow value	0.00	↕
<input type="checkbox"/> Working Mode	Cooling	▼
<input checked="" type="checkbox"/> Fan coil check	Detecting Invalid	▼

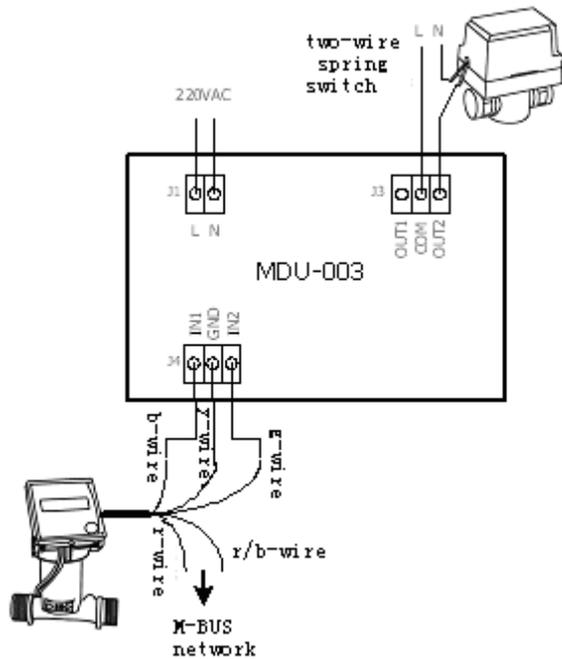


Figure 14. Two-wire spring switch connecting

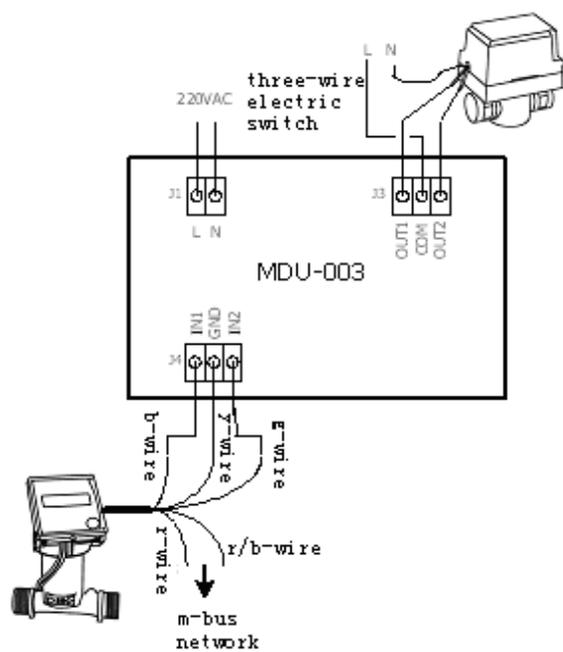


Figure 15. Three-wire electric switch connecting

Explaining the terminals in MDU-003A module:

- 1) J1 L: connect to live cable N: connect to neutral cable
- 2) J3 - OUT1 COM OUT2: switch closing/opening signal output. in switch closing state, OUT2 COM are closed and OUT1 COM are opened; in switch opening state, OUT2 COM are opened, and OUT1 COM are closed.
- 3) J4 - IN1 GND IN2: switch closing/opening signal input. IN1 is switch closing signal input, IN2 is switch opening signal input.
- 4) LED1: switch closing/opening indicating; closing will be green LED, opening will be red LED.
- 5) LED2: power indicating LED.

8. ACM External connecting

M-BUS network model ACM connecting specification:

Red cable: M-BUS network

Red or black cable: M-BUS network

All shield screens of network cable should be earth in one point.

9. Note

- 9.1 Install the meter according to the specification.
- 9.2 Pay attention to the protection of the meter. The place to install the meter should be water-proof, moisture-proof, tremble-proof and protection against artificial damage. Prohibit installing in bathroom, restroom and the location with direct water pouring.
- 9.3 The product is powered by battery. Check regularly with the equipments' operating states and battery state; the battery should be changed in period of time.
- 9.4 Write down the ACM address, the installing position or the room number when installing,.
- 9.5 The plastic shell of the meter cannot be pressed hardly.
- 9.6 Connect wire correctly and stably, no cable loosen.
- 9.7 Install a filter in the ACM's upstream position.
- 9.8 Make sure to cut-off the power before installation and to check carefully before turning on the power.
- 9.9 No pipe joint fitting and connecting nut is supplied.

10. Maintenance items

The maintenance terms accords with the contract, the following condition is not included in the maintenance items:

- 10.1 Lost parts.
- 10.2 Damages caused by bad delivery or other artificial reasons; the parts with seal opened.
- 10.3 The flow meter is damaged because of blocking by too much impurity in the pipe of heat/cooling exchange loop.
- 10.4 Damages caused by improper operation and installation.