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Analogue Signal Transducer BM Series

User's Manual V1.1

Acrel Co., Ltd.

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1. Overview

Analogue signal transducer BM series can measure electrical parameters (e.g. current and voltage) and non-electrical parameters (e.g. temperature and resistance) rapidly and accurately and isolate and convert measured values to standard analogue output signal. It can be not only connected directly with pointer gauges and digital display meters but also integrated with automatic control instruments (e.g. PLC), various A/D converters and computer systems.

2. Model and specification

Input form	Input range	Output range	Auxiliary supply	Isolation voltage	Output settings	Other features	Model
Direct current	0-1mA 0-20mA 4-20mA 0-5A	4-20mA	/	2kV	2-wire 8.5-40VDC	Powered by output circuit	BM-DI/IS
Alternating current	0-1A 0-5A	4-20mA	/	2kV	2-wire 8.5-40VDC	Powered by output circuit	BM-AI/IS
Direct current	4-20mA	4-20mA	/	2kV	Self-powered by input circuit		BM-DIS/I
	4-20mA 0-5V	4-20mA	24VDC	2kV	Independent two circuits		BM-DI/II BM-DV/II BM-DI/IV BM-DV/IV
	4-20mA 0-20mA	4-20mA 0-20mA	24VDC	2kV	4-wire		BM-DI/I
		0-10V;0-5 V					BM-DI/V
	0-20mA	Two relays controlled by setting point	110/220V AC, DC	2kV	2 NO contact groups		BM-DI/J
Direct voltage	0-10V； 0-5V	4-20mA	/	2kV	2-wire 8.5-40VDC	Powered by output circuit	BM-DV/IS
	0-10V;0-5V	4-20mA 0-20mA	24VDC	2kV	4-wire		BM-DV/I
		0-10V;0-5 V					BM-DV/V
	0-10V	Two relays controlled by setting point	110/220V AC, DC	2kV	2 NO contact groups		BM-DV/J
Alternating voltage	0-125V AC 0-250V AC 0-450V AC	4-20mA	/	2kV	2-wire 8.5-40VDC	Powered by output circuit	BM-AV/IS
Thermocouple Thermal resistance	K,J graduation 0-250℃; 0-500℃ 1- 0-1000℃; 0-1200℃	4-20mA	24VDC	2kV	4-wire	RS485 communication output	BM-TC/I BM-TC/V
Thermal resistance	Pt100 0-50℃ ;0-100'C 0-150 ℃; 0-200℃ 0-250℃; 0-300℃	4-20mA	/	2kV	2-wire 8.5-40VDC	Powered by output circuit	BM-TR/IS
			24VDC	2kV	4-wire		BM-TR/I
Resistance	0-100Ω; 0-lkΩ 0-5kΩ; 0-10kΩ	4-20mA	/	2kV	2-wire 8.5-40VDC	Powered by output circuit	BM-R/IS
Potentiometer	0 ~350Ω(~10kΩ)	4-20mA	/	2kV	2-wire 8.5-40VDC	Powered by output circuit	BM-VR/IS

3. 2-wire isolator powered by output circuit

Application

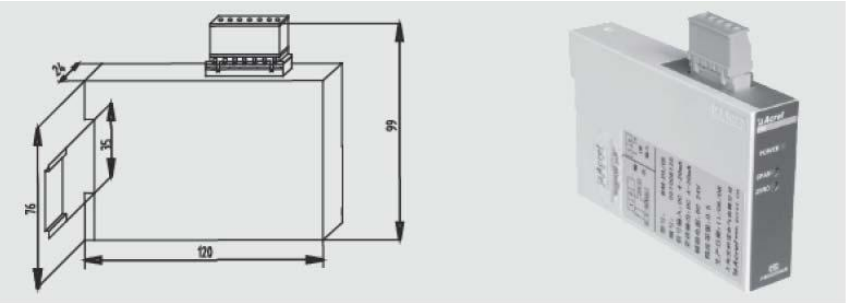
A 2-wire direct-current isolator powered by output circuit can isolate and convert direct current and voltage signals on site to 4-20mA output signal. The module is equipped with surge protection circuit so that it is suitable under severe conditions.

Specification of product

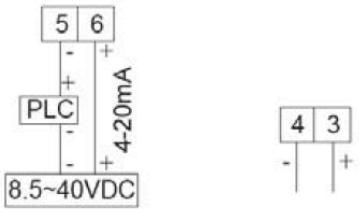
BM-DI/IS

BM-DV/IS

Overall dimensions



Wiring method



Output

Input

Technical data

Technical parameters		Index
Input	Range	Current: 4-20mA, 0-1mA, 0-20mA Voltage: 0-1V, 0-5V, 0-10V, 0-75mV, etc
	Impedance	Current: 0(4)-20mA, 100Ω 0-1mA, 1kΩ, voltage≥100Ω
	Overload	Current: 100mA or 1W Voltage: 50V at 0-10V
Output	Range	DC4~20mA
	Load	<500 Ω
	Zero adjustment	5%
	Span adjustment	5%
	Protection	Short circuit protection
Power supply	Range	Direct voltage: 8.5-40VDC, normally 24VDC/2W
	Max. current	24mA
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature effect	≤200ppm/℃
	Response time	≤400ms
	Isolation voltage	2kV between input and output
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃
	Installation method	With guide rail TS35

4. 1-input/2-output isolator

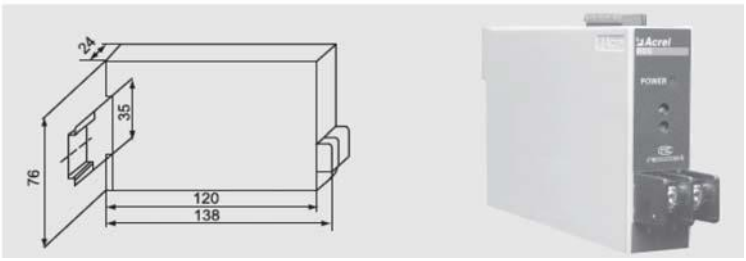
Application

The module isolates and converts single-circuit direct current or voltage input signals to mutually-independent two-circuit analogue outputs. It is suitable for the application where a transducer generates one signal circuit to programmer and the other signal circuit to an indicator on site. The module boasts a single input circuit. Therefore, the input voltage drop is almost constant, up to 3.5V and independent from loads. The maximum optocoupler isolation voltage can reach 2kV.

Specification of product

BM-DI/II BM-DV/II BM-DI/VI BM-DV/VI

Overall dimensions



Wiring method



DC24V or AC/DC220V Auxiliary supply

DC 4-20mA or DC 0-5V Input

DC 4-20mA or DC 0-5V Output 1

DC 4-20mA or DC 0-5V Output 2

Technical data

Technical parameters		Index
Input	Range	Direct current: 4-20mA, 0-20mA Direct voltage: DC 0-75mV, 0-5V, 0-10V, 0-300V
	Impedance	Variable, voltage drop up to 3.5V
	Overload	Current: 100mA or 1W Voltage: 50V at 0-10V
Output	Range	One circuit: DC 4-20mA; the other circuit: DC 4-20mA or DC 0-5V
	Load	Current: ≤500Ω; voltage: ≥1kΩ
	Zero adjustment	15%
	Span adjustment	15%
Power supply	Nominal value and range	DC 24V (alternatively DC 18V-36V)
Accuracy/linearity		Max. 0.5% of full span
Temperature coefficient		≤200ppm/℃
Response time		≤400ms
Isolation voltage		2kV between input and each output and between power supply to output
Surrounding conditions	Temperature	Operating temperature: -10 -+55℃; storage temperature: -25 -+70℃
	Humidity	≤95%RH, no condensation, place without corrosive gases
	Height above sea level	≤2000m
Installation method		With guide rail TS35

5. 4-wire isolator

Application

A 4-wire isolator provides 2kV 3-port isolation for all direct current and voltage signals and eliminates the earth return. It can be equipped with power supply of various standards.

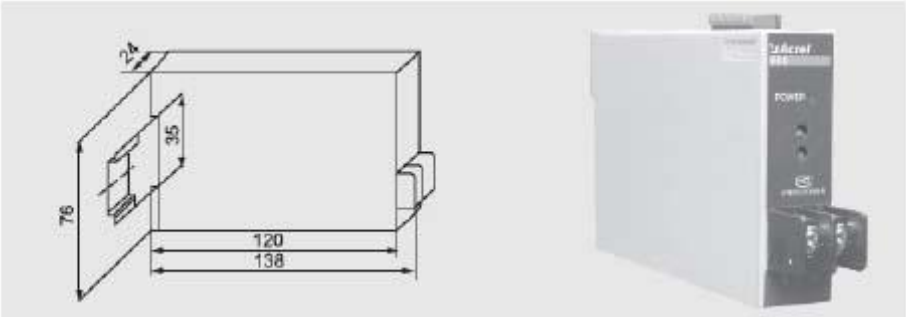
Features

The size of housing is compact. It can be mounted with guide rail TS35.

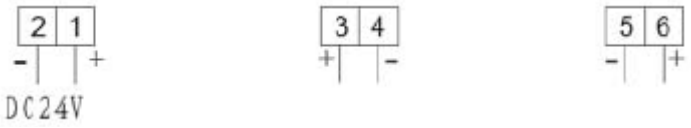
Specification of product

BM-DI/I BM-DI/V BM-DV/I DM-DV/V

Overall dimensions



Wiring method



Auxiliary supply Input Output

Technical data

Technical parameters		Index
Input	Range	Current:0-20 mA,4-20 mA,0-1 mA Voltage:0-5V, 0-10V, 0-300V,0-75mV
	Impedance	Current: 100Ω Voltage: ≥100Ω
	Max. input	Current: 100mA or 1W Voltage: 50 VDC
Output	Range	DC4~20mA
	Load	Current: ≤500Ω; voltage: ≥1kΩ
	Protection	Short circuit protection
	Zero adjustment (for some modules)	5%
	Span adjustment	5%
Power supply		DC 24V (alternatively DC 18V-36V)
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature coefficient	≤200ppm/℃
	Response time	≤400ms
	Isolation voltage	2kV between input and output and between input and power supply
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃
	Installation method	With guide rail TS35

6. Passive isolator

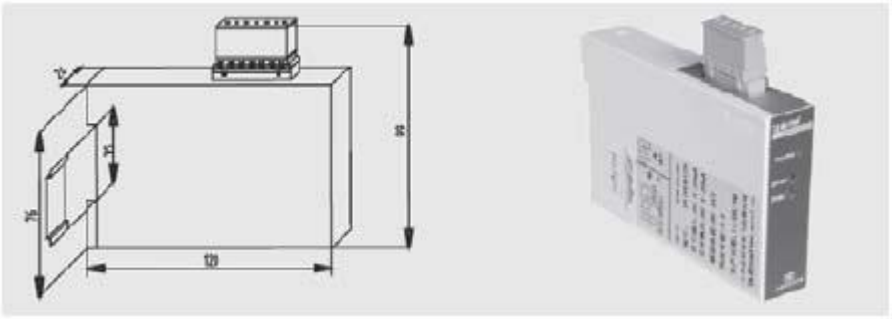
Application

The module converts standard input signals 4-20mA to output signals 4-20mA proportionally via 2kV isolation. It is suitable for applications where it is hard to use the power supply. The input signal powers the module and realizes the coupling via voltage transformer. Therefore, it needs no external power supply.

Specification of product

BM-DIS/I

Overall dimensions



Wiring method



Input Output

Technical data

Technical parameters		Index
Input	Range	DC4~20mA
	Impedance	Variable; voltage drop: 6V from input load
	Max. input	Current: 30mA
Output	Range	DC4~20mA
	Load	100-400Ω (non-linearity if load is smaller than 100Ω), default: 250Ω
	Span adjustment	Balancing dependent upon output load
	Protection	Short circuit protection
Power supply		DC 24V (alternatively DC 18V-36V)
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature coefficient	≤200ppm/℃
	Response time	≤400ms
	Isolation voltage	2kV between input and output and between input and power supply
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃

7. 2-wire alternating current isolator powered by output circuit

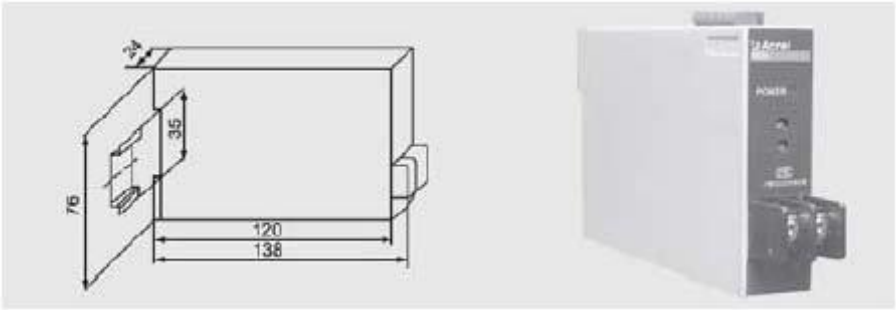
Application

The module can modulate maximum 5A AC or CT current directly and output the isolated 4-20mA signal. The working status and output level of circuit are indicated with LED. The module is equipped with surge protection circuit so that it is suitable under severe conditions.

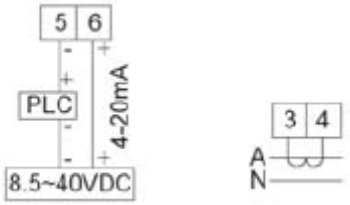
Specification of product

BM-AI/IS

Overall dimensions



Wiring method



Output Input

Technical data

Technical parameters		Index
Input	Range	AC 0 ~1A or AC 0 ~5A
	Impedance	0.01Ω
	Max. input	1.2 times continuously; 10 times for 1s transiently
Output	Range	DC4-20mA
	Load	≤500Ω
	Zero adjustment	5%
	Span adjustment	5%
	Protection	Short circuit protection
Power supply	Range	8.5-40VDC, normally 24VDC/2W
	Max. current	24mA
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature effect	≤200ppm/℃
	Response time	≤400ms
	Isolation voltage	2kV between input and output
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃

8. 2-wire alternating voltage isolator powered by output circuit

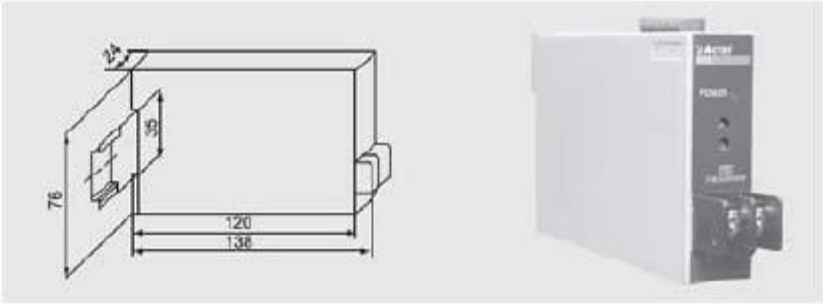
Application

The module can convert AC voltage (up to 450VAC) to standard isolated output current 4-20mA. It is equipped with surge protection mechanism and suitable for monitoring the startup and stop of motor.

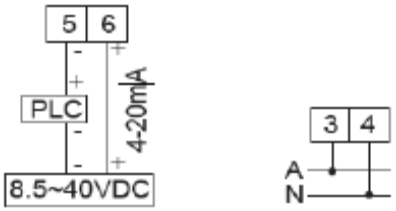
Specification of product

BM-AV/IS

Overall dimensions



Wiring method



Output Input

Technical data

Technical parameters		Index
Input	Range	AC100V, 220V, 380V, 450V
	Impedance	>100kΩ
	Max. input	1.2 times continuously; 10 times for 1s transiently
Output	Range	DC4-20mA
	Load	≤500Ω
	Zero adjustment	5%
	Span adjustment	5%
	Protection	Short circuit protection
Power supply	Range	8.5-40VDC, normally 24VDC/2W
	Max. current	24mA
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature effect	≤200ppm/℃
	Response time	≤400ms
	Isolation voltage	2kV between input and output
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃

9. Smart temperature transducer

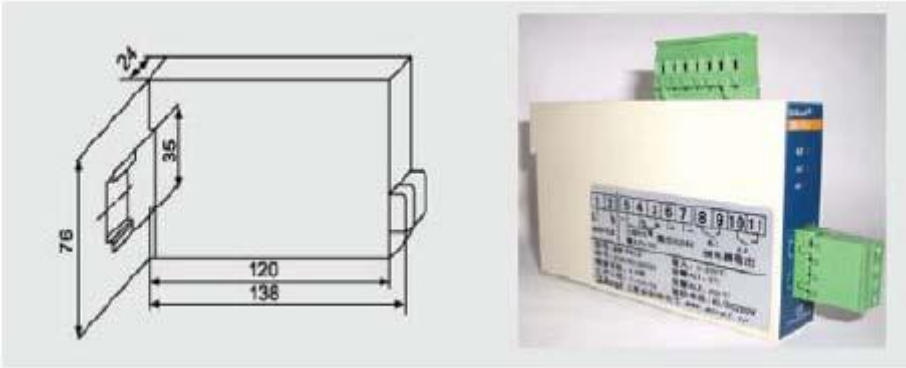
Application

The module receives inputs from thermocouple and thermal resistance and outputs signals DC0-20mA, 4-20mA, 0-5V or 0-10V linearly and proportionally. It boasts the automatic cold junction compensation (CJC), a surge protection circuit and RS485 communication ports. It can be connected with an external programmer to set parameters and indicate temperature.

Specification of product

BM-TC/I　BM-TC/V

Overall dimensions



Wiring method



Auxiliary supply　Input　Output　Communication

Technical data

Technical parameters		Index
Input	Type	Thermocouple (J, K, B, R, S, T, E, N), thermal resistance (PT100, Cu50)
	Range	-200℃~1300℃
Output	Range	DC4~20mA、 0~20mA、 0~5V、 0~10V
	Load	Current: ≤500Ωor voltage: ≥1kΩ
	Protection	Short circuit protection
Power supply	Range	24DC（alternatively 18-36V）
	Max. current	0.5% of full span
Other	Accuracy/linearity	±0.3℃
	Temperature effect	≤200ppm/℃
	Response time	≤400ms
	Isolation voltage	2kV between input and output
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃

10. Thermal resistance isolator

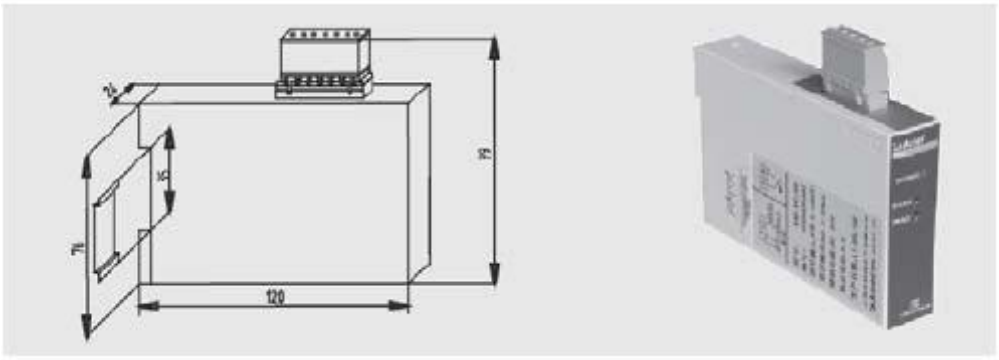
Application

The module receives inputs from RTD and outputs 2kV-isolated signals 4-20mA proportionally. It is equipped with surge protection circuit so that it is suitable under severe conditions.

Specification of product

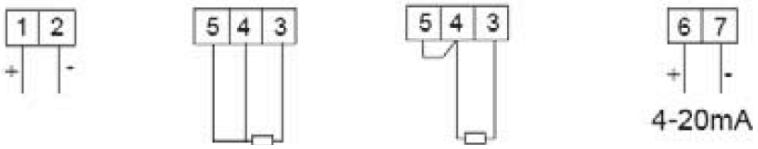
BM-TR/IS BM-TR/I BM-TR/V

Overall dimensions



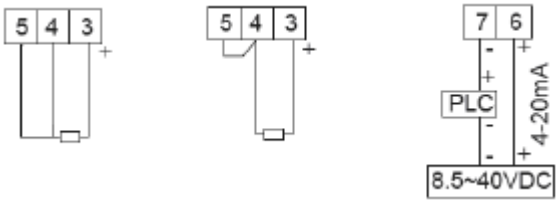
Wiring method

BM-TR/I BM-TR/V



Auxiliary supply 3-wire RTD input 2-wire RTD input Output

BM-TR/IS



3-wire RTD input 2-wire RTD input Output

Technical data

Technical parameters		Index
Input	Range	2-wire or 3-wire RTD Pt100 (α=0.00385), -100℃-300℃
	Other features	Linearly dependent upon temperature
Output	Range	DC 4~20mA、 0~5V、 0~10V
	Load	Current: ≤500Ω or voltage: ≥1kΩ
	Zero adjustment	5%
	Span adjustment	5%
	Protection	Short circuit protection
Power supply	Range	8.5-40VDC, normally 24VDC/2W
	Max. current	24mA
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature effect	≤200ppm/℃
	Response time	≤400ms
	Isolation voltage	2kV between input and output
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃

11. 2-wire resistance isolator powered by output circuit

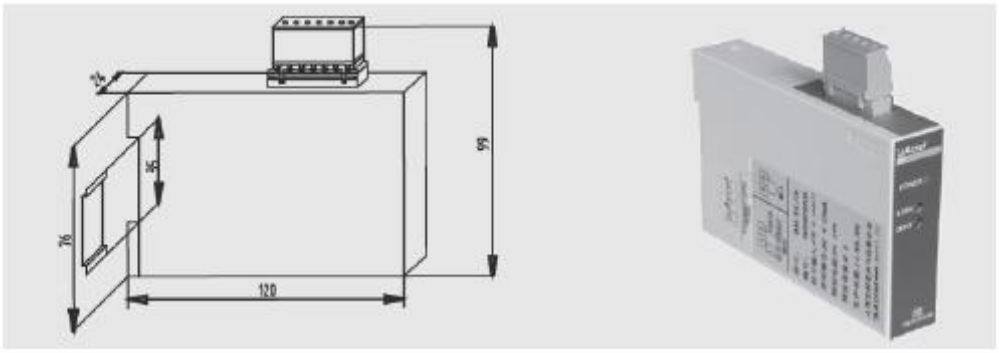
Application

It can provide the output 4-20mA and 2000V isolation for standard 2-wire resistance signal. Its accuracy is higher than 0.5%.

Specification of product

BM-R/IS

Overall dimensions



Wiring method



Output Input

Technical data

Technical parameters		Index
Input	Range	0-100Ω, 0-lkΩ, 0-5 kΩ, 0-10 kΩ
	Protection type	Zener diode
Output	Range	4-20mA
	Load	0-775 Q, Rmax=(Vs-8. 5/0. 02) Q
	Load influence	<0.1%
	Protection	Short circuit protection
	Zero adjustment	Min. 5%
	Span adjustment	Min. 5%
Power supply	Range	8.5-40VDC, normally 24VDC/2W
	Max. current	24mA
Other	Accuracy/linearity	Max. 0.5% of full span
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃

12. 2-wire potentiometer isolator powered by output circuit

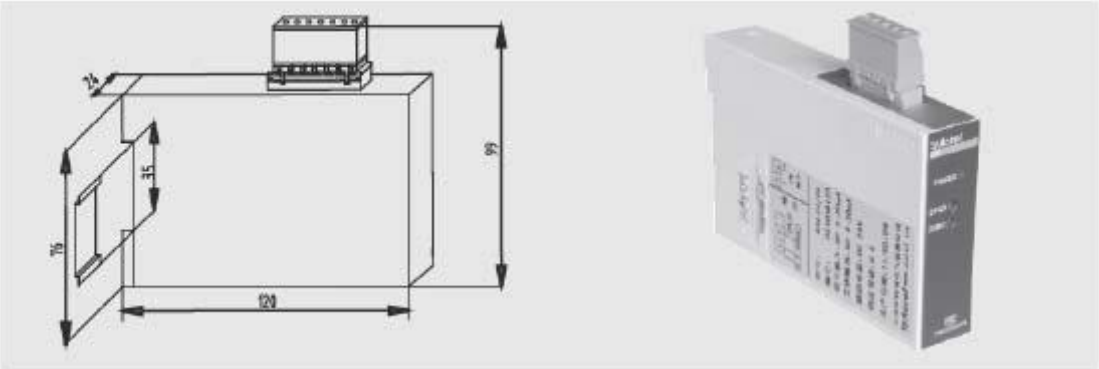
Application

A potentiometer isolator can provide the output 4-20mA and 2kV isolation for potentiometers ranging from 350Ω to 10kΩ. It accuracy reaches the class 0.5.

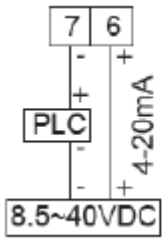
Specification of product

BM-VR/IS

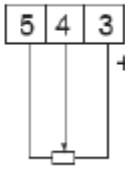
Overall dimensions



Wiring method



Output



Input

Technical data

Technical parameters		Index
Input	Range	0 ~350Ω (~10kΩ)
	Default setting	0 ~1kΩ
	Protection type	Zener diode
Output	Range	DC4-20mA
	Load	⩽500Ω
	Load influence	<0.1%
	Protection	Short circuit protection
	Zero adjustment	5%
	Span adjustment	5%
Power supply	Range	8.5-40VDC, normally 24VDC/2W
	Max. current	24mA
Other	Accuracy/linearity	Max. 0.5% of full span
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃
	Temperature drift	≤200ppm/℃
	Isolation	2kV between input and output

13. Direct current and voltage alarm with setting point

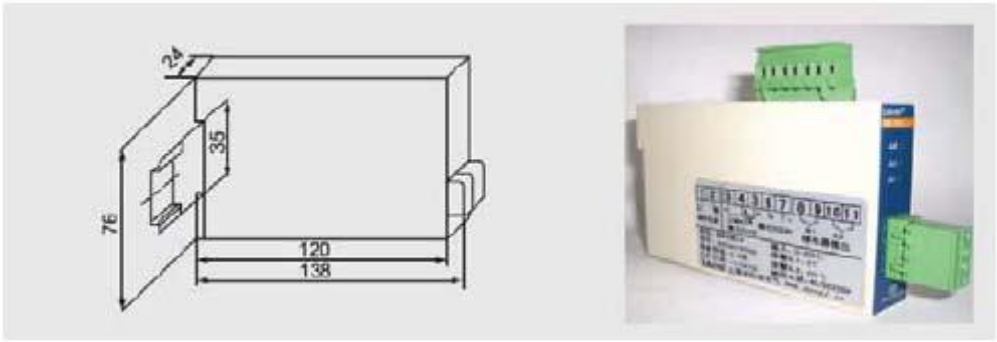
Application

It receives the direct current or voltage input and provides a dual-channel alarm output. It sends an alarm if a current or voltage signal exceeds its limit. Set an alarm point between 0% and 100% of input. The alarm point has a hysteresis error of 1% to eliminate the influence of relay contact chatter. The LED in the front can indicate the status of relay. The module can work as auxiliary supply DC24V (Imax =50mA) on site.

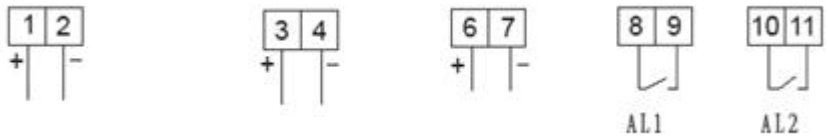
Specification of product

BM-DI/J BM-DV/J

Overall dimensions



Wiring method



Auxiliary supply Input DC24V output Relay output

Technical data

Technical parameters		Index
Input	Range	0~20mA / 0~10VDC
	Impedance	50Ω/1MΩ
	Max. input/ protection type	100mA or 1W/Zener diode 50VDC
	Field excitation	Max. 24VDC, 25mA
Output	Output range	Two independent relays, with high/ low jumper setting
	Contact load	10A 250VAC/30VDC (resistive load)
	Adjustment of setting point	0-100% of input span
	Alarm function	High (forward)/ low (reserve) alarm
	Protection	Additional protection is required if relay contacts are used to connect or disconnect inductive loads.
	Dead zone	Hysteresis error: 1% of full span
Power supply	Range	AC85 ~265V or DC100V ~350V
	Power consumption	< 20mA AC (2VA)
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature effect	< 0. 02% /℃
	Response time	(90% of span) <100ms
	Status of LED	A red LED is equipped with each relay. (The LED turns on if its corresponding relay is activated.)
	Isolation	2kV
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃

14. Thermal resistance alarm with setting point

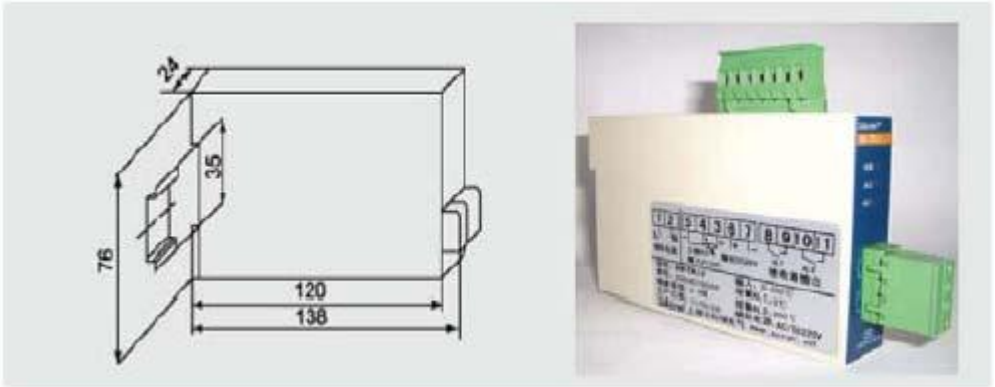
Application

It receives inputs from thermal resistance PT100 and provides a dual-channel alarm output. Set an alarm point between 0% and 100% of input. The alarm point has a hysteresis error of 1% to eliminate the influence of relay contact chatter. The LED in the front can indicate the status of relay. The module can work as auxiliary supply DC24V (Imax =50mA) on site. Set an (forward) or low (reverse) alarm with the jumper on the top.

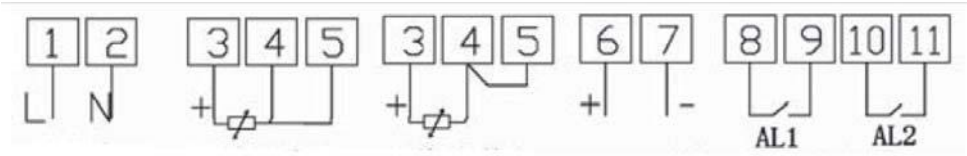
Specification of product

BM-TR/J

Overall dimensions



Wiring method



Auxiliary supply 3-wire RTD input 2-wire RTD input DC24V output Relay output

Technical data

Technical parameters		Index
Input	Input type	Thermal resistance PT100
	Input range	0~300℃
	Impedance	10MΩ
	Max. input/ protection type	100mA or 1W/Zener diode 50VDC
	Field excitation	Max. 24VDC, 25mA
Output	Output range	Two independent relays (NO contact)
	Contact load	10A 250VAC/30VDC (resistive load)
	Adjustment of setting point	0-100% of input span
	Alarm function	High (forward)/ low (reserve) alarm
	Protection	Additional protection is required if relay contacts are used to connect or disconnect inductive loads.
	Dead zone	Hysteresis error: 1% of full span
Power supply	Range	AC85 ~265V or DC100V ~350V
	Power consumption	< 20mA AC (2VA)
Other	Accuracy/linearity	Max. 0.5% of full span
	Temperature effect	≤200ppm/℃
	Response time	(90% of span) <100ms
	Status of LED	A red LED is equipped with each relay. (The LED turns on if its corresponding relay is activated.)
	Isolation	Input/ output/ power supply 2kV
	Operating/storage temperature	-10℃ ~+55℃/-25 ~+70℃