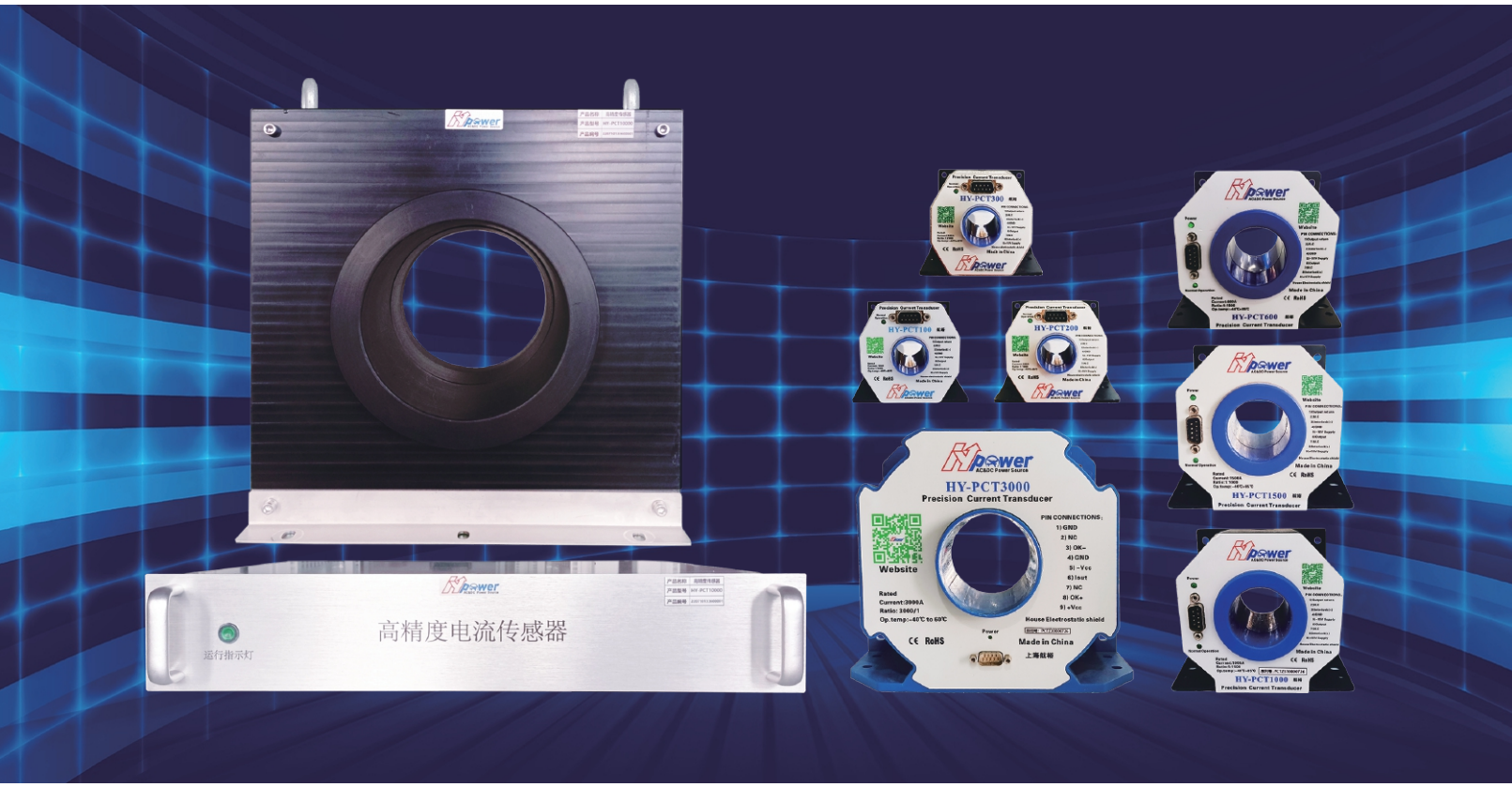
AC&DC Power Source

HY-PCTSU Series High Precision Current Sensor



High precision

Zero drift small

Full scale range

Intelligentize

Application Field

- Medical equipment: scanner, MRI
- Rail transportation: high-speed train, subway, tram, trolley bus
- Aerospace: satellites, rockets
- Instrumentation: power analyzer, high precision power supply
- Smart grid: power generation, battery monitoring, medium and low voltage substation
- Ships: electric powered ships
- Power: converter, inverter
- Measurement: verification and calibration
- Cars: electric cars
- New energy: photovoltaic, wind energy
- Industrial control: industrial motor drive, UPS, welding, robot, crane, elevator, ski lift

Industrial Medical And Electrical Measuring Equipment Field

- Measurement of instantaneous current and voltage value in isolation state, current can be measured in contactless mode, measuring range from 0.1A to 5000A.

Electric Vehicle Field

- It can be used for power management and motor drive of cars, buses and trucks.
- Contributes to energy saving and environmental protection, and reduces energy consumption through current control in high energy consumption applications.

High-Speed EMU Field

- Measure the instantaneous current and voltage value in isolation state.
- Select contactless mode to measure current, ranging from 0.1A to 5000A.
- The installation of a highly flexible modular design to meet the different market requirements of railway systems.
- Achieve high performance indicators, accuracy from 5-20ppm, short-circuit response to real-time response.
- Wide temperature range, high insulation voltage resistance and electromagnetic compatibility design, meet different national railway standards.

Field Of Energy Equipment

- Advanced AC and DC induction technology and signal adjustment circuit (RMS value, real value, threshold detection, etc.) are integrated.
- Output switch signals, relay formation signals, electrical isolation standard models (such as DC 0-5V, DC 0-10V, or 4-20mA) can be directly connected to programmable controllers or monitoring devices.
- The use of advanced technology and process, many times in the production process adjustment, calibration, so that the product to meet the performance and quality standards required by the market.

HY-PCTSU Series High Precision Current Sensor

For a long time, domestic sensors in high precision, high stability, low temperature drift and special applications and imported sensors there is a gap, high-precision sensors have been monopolized by foreign countries.Hangyu Power after years of technology precipitation, has always been committed to high-end high-precision sensor import substitution,continuously improve the quality of sensors in measurement accuracy, temperature characteristics, response time, stability, reliability and other aspects,launched HY-PCTSU series high-precision sensor,not only AC and DC universal, but also with high precision, low zero drift, low temperature drift, intelligent and other advantages,while comprehensively replacing imported sensors, it reduces acquisition costs and meets the needs of bulk purchase to expand production.

Core technology

- Excitation flux closed-loop control technology
- Self-excitation demagnetization technology
- Multi-point zero flux technology
- Multi-range automatic switching technology
- Temperature control compensation technology

Performance Characteristics

- Isolation measurement of primary and secondary edges
- Excellent linearity and accuracy
- Strong resistance to electromagnetic interference
- Wide band and low response time

Product Features

Full Scale Range
Many kinds
Many models

High Precision
Accuracy:5ppm、10ppm、50ppm optional
2ppm can be customized

AC-DC Universal
Can measure AC, DC, pulse current

Zero Drift Small
Zero drift: 2PPM

Temperature Drift Is Small Good Consistency
Temperature impact: 1ppm/10 degrees

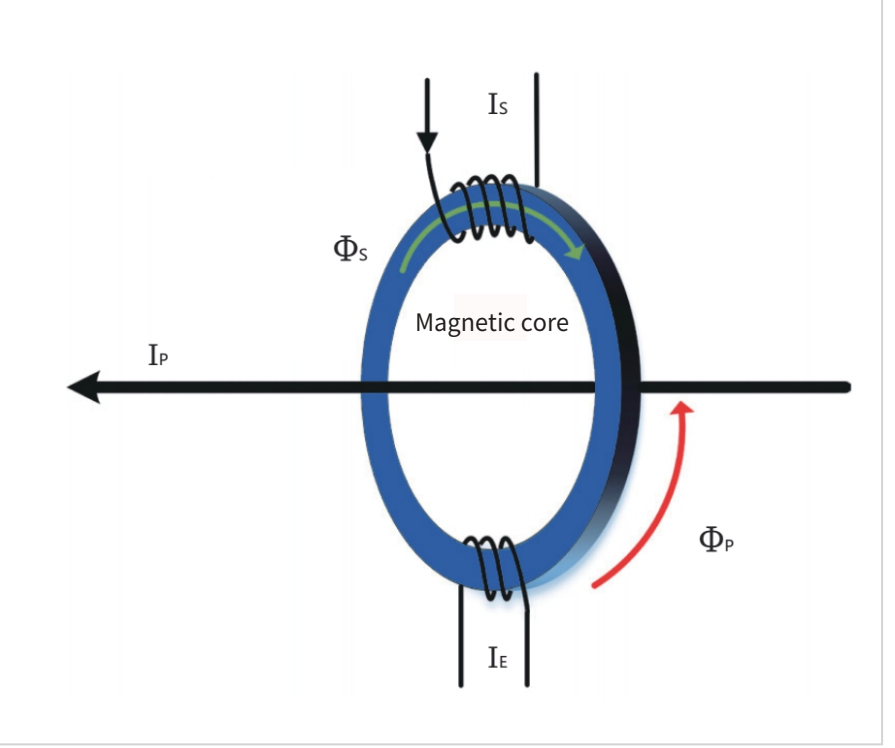
Intelligentize
Start with load
Overload protection, self-recovery

Technical principle

The magnetic core is stimulated by I_E to reach the magnetic balance state, the introduction of the input current I_P breaks the magnetic balance and generates the magnetic link Φ_P.Based on this, one or more currents in the opposite direction, I_S, are applied to the magnetic core to produce a flux Φ_S in the opposite direction,eventually resulted in the total magnetic flux in the core of 0.The known number of turns of the coil applying I_S current IS N, then:

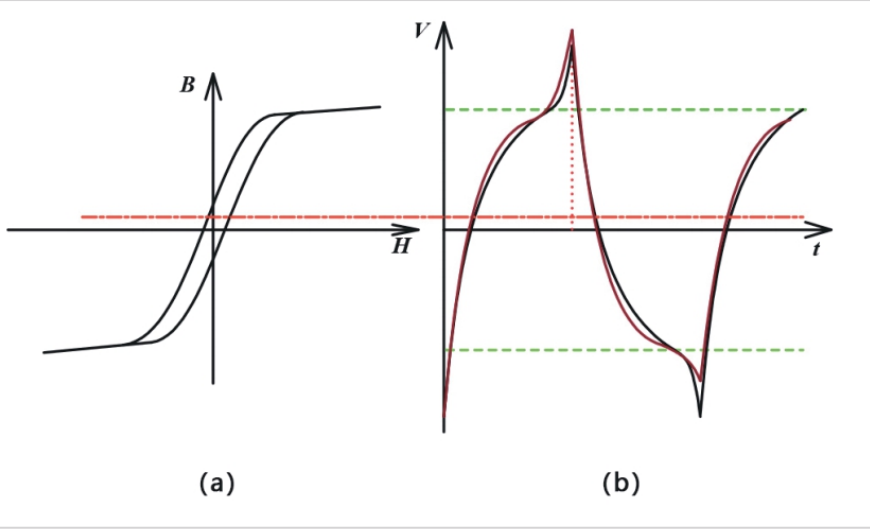
$I_P=N \cdot I_S$

The theory is based on the need for a sophisticated zero-flux detector,in order to ensure the linearity, stability, noise factor, frequency response and other technical parameters of the whole system,the zero flux detector must be sufficiently sensitive and not easily disturbed by flux chains outside of itself.

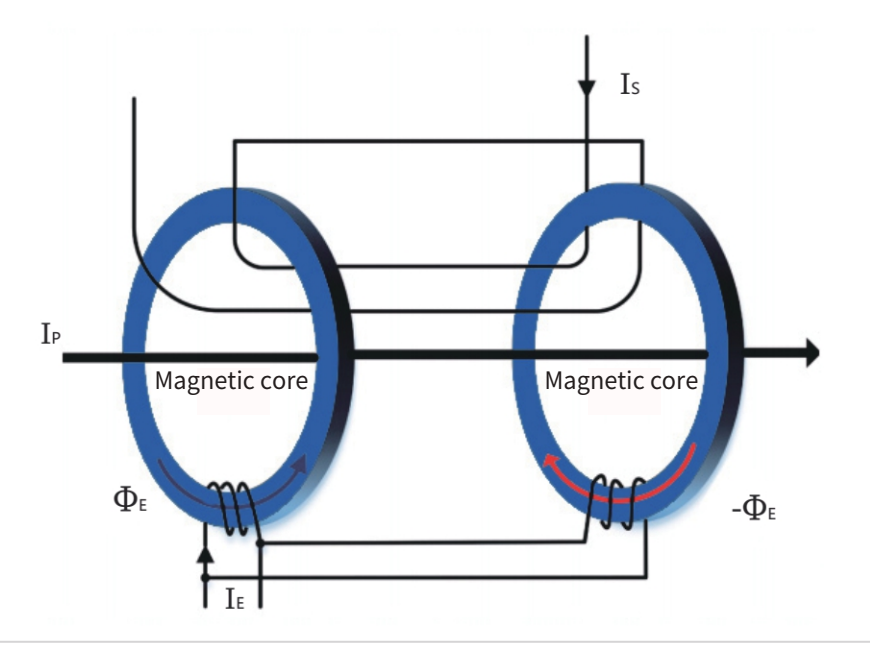


The zero-flux detector relies on the nonlinear relationship between the magnetic field strength H and the magnetic flux density B near the saturation of the magnetic field of the ferromagnetic material, as shown in Figure (a) on the right.

The current waveform in the magnetic core is shown in Figure (b). The region shown by the peak is that the coil is in a near saturation state, the AC impedance is reduced, and the current in the coil increases or decreases exponentially.When the primary current $I_P \neq 0$, the magnetic flux Φ_S generated by I_P will break the balance, so that the magnetic induction intensity in the direction of the coil I_P flux will increase, the current will increase, and the current on the other hand will decrease, the current I_P size can be obtained by detecting the changing current.



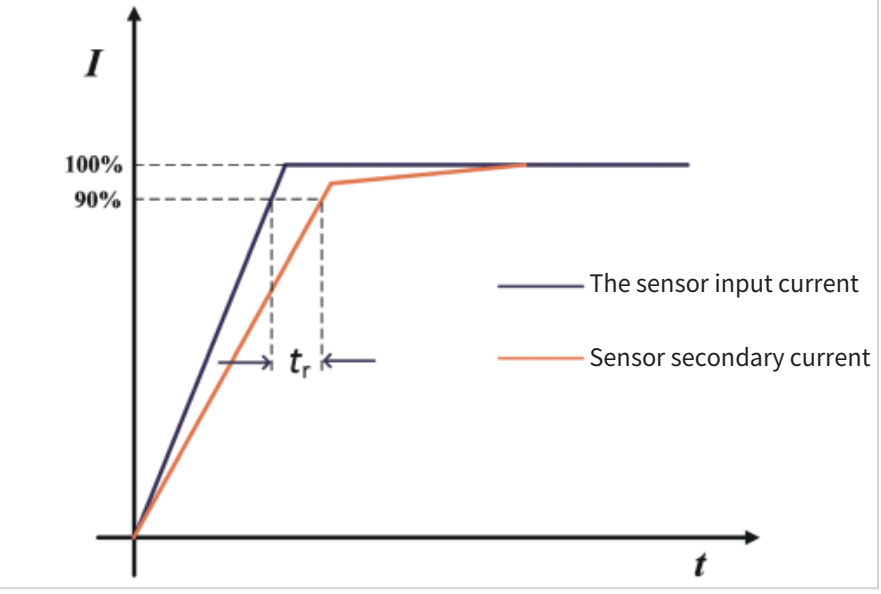
At the same time, due to the transformer effect, I_E will induce current on the I_P, affecting the measurement results.To reduce this error source, add an additional core that is the same as the excitation signal,and apply excitation signals of equal magnitude and opposite direction,so the magnetic field generated by induction is greatly reduced, which eliminates the disturbance on the primary conductor,as shown in the figure on the right, adding an AC response winding dedicated to improving the entire detection system can extend the frequency response of the entire sensor to hun dreds of kHz.



Response time

The response time of the sensor refers to the speed of the secondary current establishment time of the sensor,as shown in the figure on the right, the measurement of the secondary current of the sensor will definitely lag behind the establishment time of the input current.when the measured current of the sensor reaches 90% of the nominal value of the current, the time difference obtained by comparing the curve with the input current is the response time of the sensor.

The faster the sensor's response time, the better its performance.



Product Selection

Product model	Effective value of the rated current at the input end	Overload capacity	Output terminal rated signal	Precision	Supply voltage (±5%)	Band width (-3dB)	Aperture (mm)
HY-PCTSU6000	±6000A	±6600A	1000mA	50ppm	±220V	50kHz	Ø90
HY-PCTSU5000	±5000A	±5500A	1000mA	50ppm	±220V	50kHz	Ø90
HY-PCTSU4000	±4000A	±4400A	1000mA	50ppm	±220V	50kHz	Ø70
HY-PCTSU3000	±3000A	±3300A	1000mA	50ppm	±220V	100kHz	Ø70
HY-PCTSU2000	±2000A	±2200A	1000mA	50ppm	±220V	100kHz	Ø50
HY-PCTSU1500	±1500A	±1600A	1500mA	10ppm	±15V	500kHz	Ø38
HY-PCTSU1000	±1000A	±1200A	667mA	10ppm	±15V	500kHz	Ø38
HY-PCTSU600	±600A	±720A	400mA	10ppm	±15V	500kHz	Ø38
HY-PCTSU500	±500A	±600A	333mA	10ppm	±15V	500kHz	Ø38
HY-PCTSU400	±400A	±480A	200mA	10ppm	±15V	500kHz	Ø26
HY-PCTSU300	±300A	±360A	150mA	10ppm	±15V	500kHz	Ø26
HY-PCTSU200	±200A	±240A	200mA	10ppm	±15V	500kHz	Ø26
HY-PCTSU100	±100A	±120A	100mA	10ppm	±15V	500kHz	Ø26
HY-PCTSU60	±60A	±72A	100mA	10ppm	±15V	500kHz	Ø26

Electrical Performance

Item	Symbol	Test condition	Minimum value	Nominal	Maximum value	Unit
Input terminal rated DC current	I_{PN_DC}	—	—	±500	—	Adc
Input terminal rated AC current*	I_{PN}	—	—	353	—	Aac
Overload current at the input	I_{PM}	1 minute	—	—	±600	Adc
Operating voltage	V_C	—	±14.2	±15	±15.8	V
Power consumption current	I_{PWR}	Input current rating	±30	±363	±430	mA
Current variable ratio	K_N	Input: Output	1500:1	1500:1	1500:1	—
Rated output current	I_{SN}	Input current rating	—	±0.333	—	A
Measuring resistance	R_M	See Figure 1	0	3	10	Ω

∗ Refers to AC valid value

Measurement Of Accuracy

Item	Symbol	Test condition	Minimum value	Nominal	Maximum value	Unit
Accuracy	X_G	Input DC,25±10°C	—	—	10	ppm
Linearity	ε_L	—	—	—	2	ppm
Temperature stability	T_C	—	—	—	0.1	pm/K
Time stability	T_T	—	—	—	0.2	ppm/month
Power supply anti-interference	T_V	—	—	—	1	ppm/V
Zero offset current	I_O	@25°C	—	—	1 (User adjustable zero)	μA
Ripple current	I_N	DC-10Hz	—	—	0.5	ppm
Dynamic response time	t_r	di/dt=100A/μs,rising to 90%I_{PN}	—	—	1	μ
Rate of current change	di/dt	—	100	—	—	A/μs
Band width (-3dB)	F	—	0	—	500	kHz
Zero offset current	I_{OT}	Full temperature range	—	—	±5	μA

Safety Feature

Item	Symbol	Test condition	Numerical value	Unit
Isolation voltage / Between input and output	Vd	50Hz,1min	5	KV
Transient isolation withstand voltage/ Between input and output	Vw	50μs	10	KV
Creepage distance / Between the input and the shell	dCp	—	11	mm
Electrical clearance distance / Between the input and the shell	dCi	—	11	mm
Comparative tracking index (CTI)	CTI	IEC-60112	600	V

General Characteristic

Item	Symbol	Test condition	Minimum value	Nominal	Maximum value	Unit
Operating temperature range	T_A	—	-40	—	+85	°C
Storage temperature range	T_S	—	-40	—	+85	°C
Relative humidity	RH	—	20	—	80	%
Quality	M	—		1150±80		g

Instructions For Load Resistors

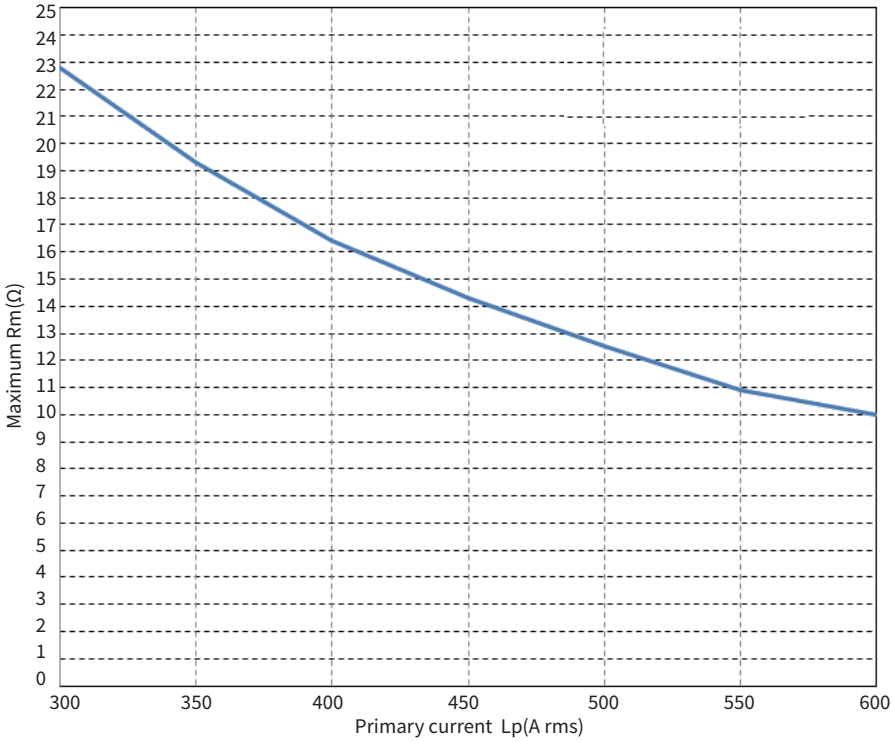


Figure 1: Load resistance and measured current relationship.

Running Status Description

◇ During normal operation, the green light is always on:

After the device is powered on, when the device is working normally, the green indicator light is always on,the third and eighth pins of the D-Sub9 interface are conducted.

◇ When the current is overloaded or the power supply is abnormal, the green light is off:

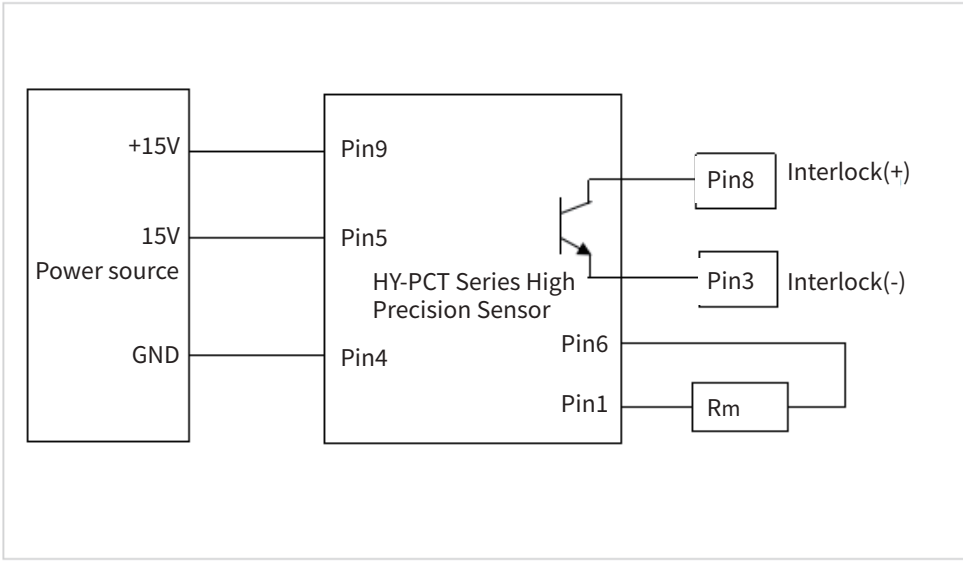
When the green light is not on, it should first check whether the power supply of the sensor is normal.When the power supply is normal, if the green indicator is off, the current sensor is in the non-zero flux state.At this time, if the bus input current amplitude exceeds the specified range of the sensor, the sensor enters the overload working mode, and the output current is no longer proportional to the input current signal.In overload mode, the sensor output current is always maintained at the maximum output state, and the green indicator is off.When the input current returns to the specified measured current range, the sensor output current returns to normal, and the green indicator light is always on.

◇ In overload mode, pin 3 and pin 8 of the D-Sub9 interface are disconnected.

Application Connection And Description

1 D-Sub9 Connection terminal pin function definition

Pin Number	1	2、7	3	4	5	6	8	9
Definition	I_Output return	N.C	Interlock(-)	GND	-15V Supply	I_Output	Interlock(+)	+15V Supply



Test instructions:

The input current can be obtained by measuring the test current I_S flowing through the R_M, or the voltage U_R at both ends of the R_M

$I_P = K_N * I_S = K_N * (U_R/R_M)$

2.Interlock Port connection description:

Interlock Port connection mode, According to the user's actual application, there are two design methods as follows, As shown in Figure A and Figure B respectively:

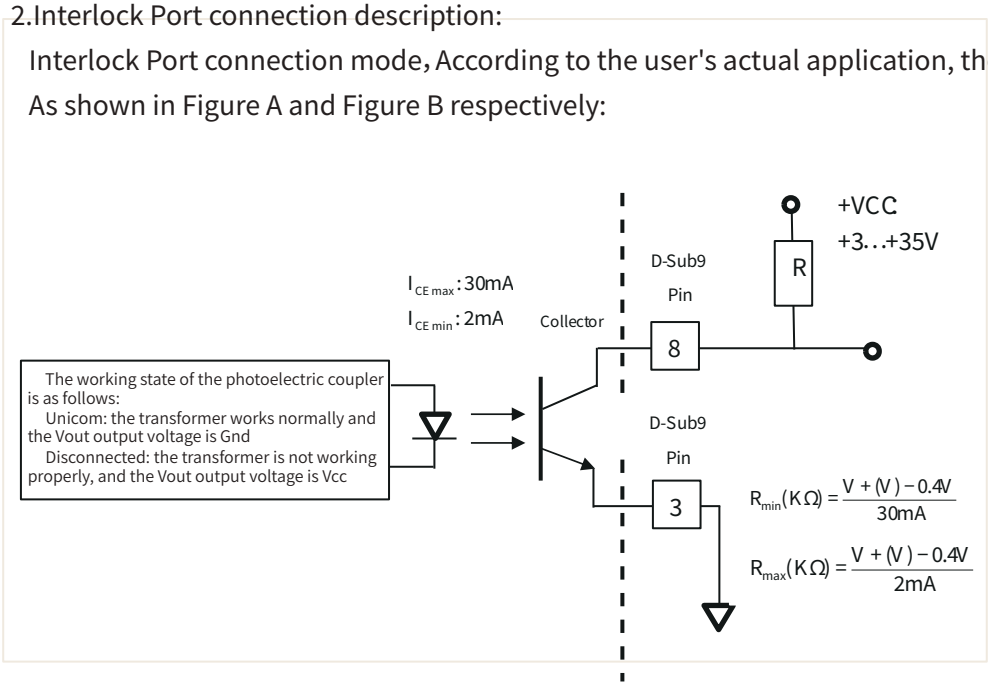


Figure A: Low level output during normal operation of the sensor

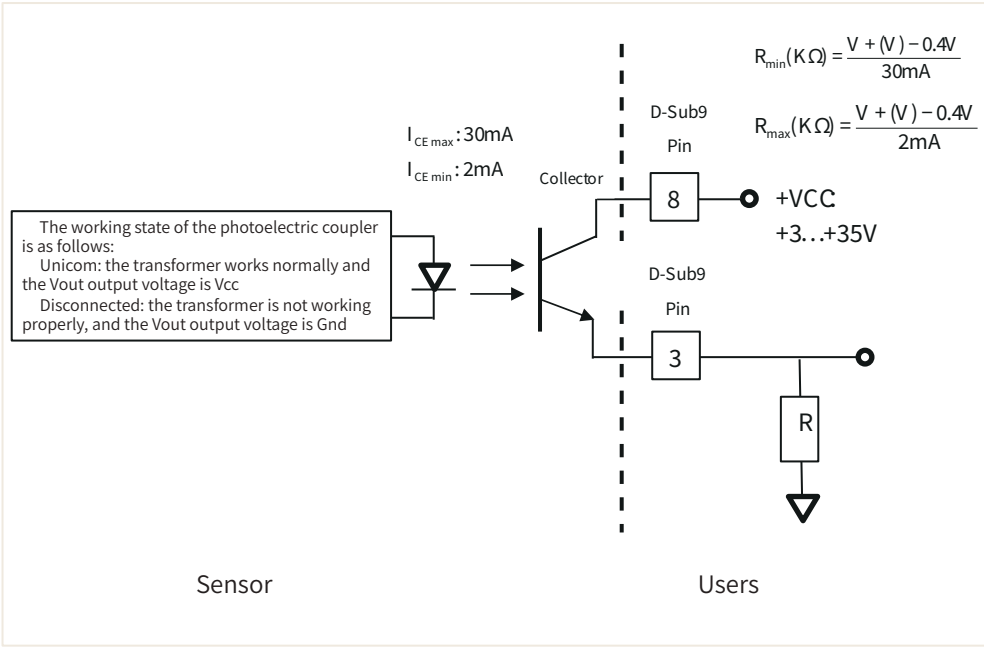
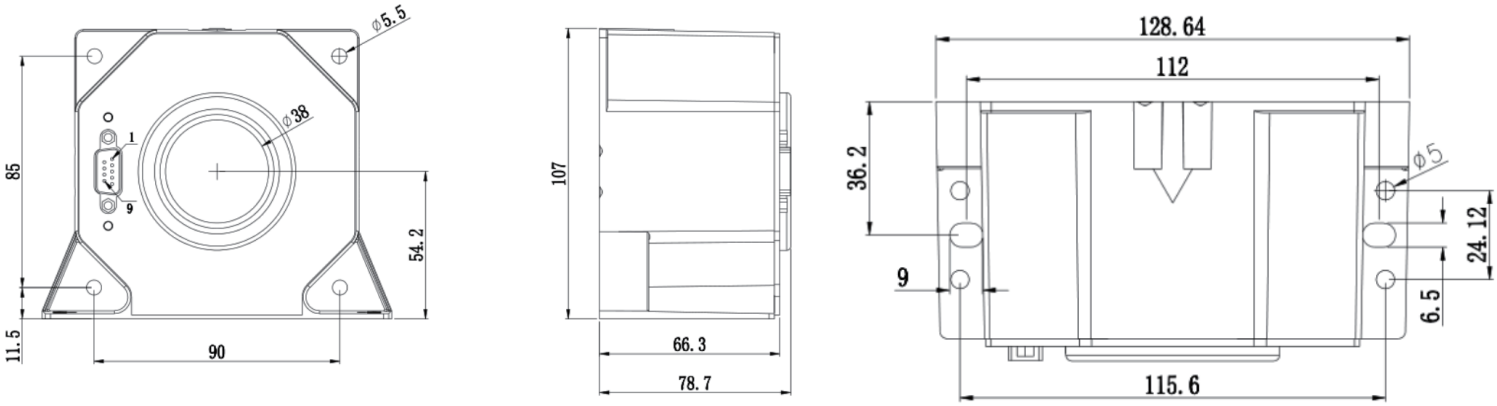


Figure B: High level output when the sensor is operating normally

3. The output of pin Vout in the photoelectric coupler is related to the client design circuit, as shown in the following table:

Project	Vout	Description
Figure A	<0.2V	Sensor operating status is normal
	Vcc	Sensor operating status is abnormal,in the overload mode or abnormal power supply
Picture B	<0.2V	Sensor operating status is abnormal,in the overload mode or abnormal power supply
	Vcc	Sensor operating status is normal

Overall dimension specification



Unit: mm

This product is aluminum die casting, the material is ADC10, the shape and size tolerance according to GB/T15114-2009 and GB6414-2017-DCTG7 standards

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Contact us

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Authorized distributor：