ZHILONG Electronics

Current transducer DXE500CAB

I_{PN} = 500 A

The DXE500CAB is a high-precision direct current sensor, mainly installed on the battery pack busbar, for monitoring measure the charging and discharging current. DXE500CAB adopts fluxgate technology, has advantages such as high accuracy and low hysteresis.

The zero bias current is less than 10mA due to the use of a flux gate principle, no hysteresis effect, still present after 1000A high current impact capable of maintaining low bias and high accuracy characteristics.

Especially suitable for high accuracy power battery level monitoring management system applications.

All functions and environmental usage conditions of the sensor meet the requirements of automotive grade level.

Features

- Good linearity-Linearity error<0.1%
- Wide voltage supply-Power supply voltage+11V -+30V
- Power protection function-Overvoltage automatic protection
- Good accuracy-Accuracy: 0.2%-Temperature drift<50ppm
- Digital communication-High speed CAN2.0 interface
- Sensor operating temperature range: -40 ℃ - +105 ℃

Application Domain

- Electric vehicle Battery management system (BMS)
- Electric Vehicle Battery System Distribution Box (BDU)
- High voltage distribution box (PDU) for electric vehicles
- Energy Management of Industrial Lithium Batteries
- Equipment Ground Tank Backup Power

Electrical data

Parameter	specifications			Condition
	Minimum value	Standard value	Maximum value	
Rated input $I_{PN=}$	-500A		500A	/
Measure range $I_{PM=}$	-600A		600A	
Power supply current U_C	11V	12V/24V	30V	
Working current @Ip=0A I_C		30mA		Uc=12V,T=25℃
Working current @I PM I_C		160mA		Uc=12V,T=25℃
Linearity Error L	-0.001		0.001	±30℃
Zero deviation @ Ip=0A I_o	-10mA		10mA	±30℃
Accuracy @ Ip=± 40A X_G	-60mA		-60mA	±30℃
Operating temperature T_A	-40℃		105℃	
Zero temperature drift Toff		0Ma/K		
Gain temperature drift Tgain	-50ppm/K		50ppm/K	±30℃
Output noise	-10mA		-10mA	

CAN Data Format

Message Description	CAN ID	Data length	Message launch type	Signal description	Signal name	Start bit	Length
Return Current IP (mA)	0X3C2	8 bytes	Cyclic transmitted message 10ms cycle	IP Value: 80000000H=0mA 7FFFFFFFH=-1mA 80000001H=1mA	IP-VALUE	24	32
				Error indication 0 = Normal 1 = Failure	ERROR INDICATION	32	1
				Error Information	CSM_FAIL	33	7
				NAME	PRODUCT_NAME	48	16
				CRC-8 POLY: 8+X2+X+1	CRC_8	56	8

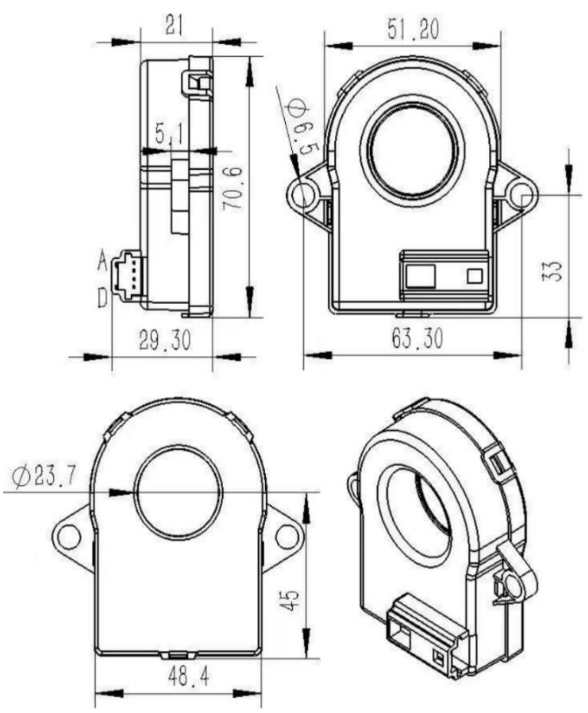
Error information

Error description	IP VALUE	ERROR INDICATION	ERROR INFORMATION
Invalidation error	FFFFF FFFH	1	40H
Current exceeds 600A	FFFFF FFFH	1	41H
Overfrequency oscillation exceeding 10ms（>2.5kHz）	FFFFF FFFH	1	44H
The magnetic ring does not oscillate more than 20ms	FFFFF FFFH	1	46H
Entering Failure Mode	FFFFF FFFH	1	47H
No signal exceeding 100ms	FFFFF FFFH	1	49H
Overvoltage（>32V）	FFFFF FFFH	1	4AH

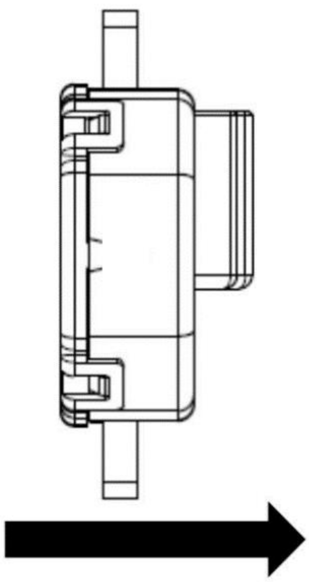
CAN electrical parameters

- CAN2.0
- CAN oscillator tolerance: 0.27%
- Baud rate: 250kpbs
- External resistance: 120Ω
- Data pattern: big-endian

Mechanical dimension



IP (Direction of primary current)



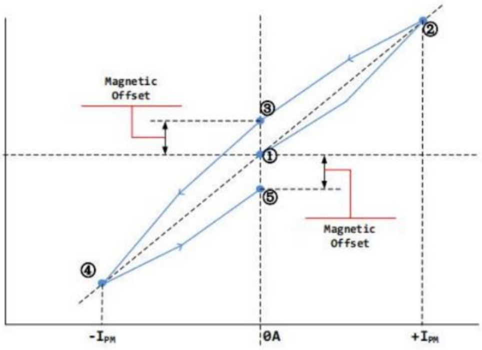
Mechanical characteristics

- General tolerance: ± 0.5 mm
- Other tolerance execution: GB/T 1804-2000-m
- Fixing hole size: Disc installation φ 6.5mm
- Fasten screw: M6
- Recommended fastening torque: 1.8Nm(± 10 %)
- Connector: Tyco AMP 1473672
- Shell material: PBT GF30
- Weight: 80g
- Pin material: tinned brass
- IP GRADE: IP56

Performance parameter definition

- Static output voltage (VQVO): Sensor output voltage in the absence of obvious magnetic field B=0G state
  -BR: The static voltage output VQVO has a constant ratio to the power supply voltage Vcc; VQVO= Vcc/2
- Sens (sensitivity): Sens is the slope of the reference output line $V_{OUT}=V_{CC}/2+2\times I_P/I_{P\_MAX}$, which refers to the change in output as the current changes. Its relationship with the current is : $Sens=2/I_{P\_MAX}$
- Zero temperature drift (Off set with Temperature): Due to the tolerances of internal components, stress and heat dissipation factors, the zero point may shift under stable working conditions
- Sensitivity temperature drift (Sensitivity with Temperature): Due to the influence of the internal temperature compensation coefficient, the sensitivity will change over the entire operating temperature compared to the expected value at room temperature
- Zero point electrical offset voltage (Electrical offset Voltage): The error caused by the noise of HALL components and the amplification factor of the internal operational amplifier itself is called offset voltage
- Response time : The response time of a sensor refers to the time interval between the final 90% of the applied current and the corresponding value of the sensor output to the applied current.

● Zero magnetic offset voltage (Magnetic Offset): When the primary current reaches its maximum value of $I_P \to 0$, the error generated at the output end due to the hysteresis phenomenon of the magnetic core material of the sensor is called the zero magnetic offset voltage.



● Zero offset voltage（Offset Voltage）: The zero offset voltage is the output voltage when the primary current is zero, and the ideal value is V_{QVO}=2.5, Therefore, the difference between V_{QVO} and the ideal value is called the total zero offset voltage error. This offset error is attributed to the zero offset voltage (due to the resolution adjusted by the internal QVO of the ASIC), magnetic offset, temperature drift, and hysteresis caused by temperature.

● Rise time: The rise time of the sensor refers to the time interval between the sensor output of 10% and reaching the final 90%

● Zero ratio error (QVO Ratio metricity error): When the power supply voltage V_{CC} changes from 5V to $4.75 < V_{CC1} < 5.25$, the deviation between the zero point output of the sensor and the theoretical value is defined as follows:

$$E_r = \left(1 - \frac{\frac{V_{QVO(V_{CC1})}}{V_{QVO(5V)}}}{VCC1\ \ /5}\right) \times 100\%$$

● Linearity Error: Non linearity is an indicator that measures the linearity of the sensor IC within the full current measurement range. Here, the end based straight line is used as the reference working straight line:

$$Lin_{ERR} = \frac{\Delta L_{max}}{Y_{FS}} \times 100\%$$

Wherein, Lin_{ERR}-Terminal linearity error of sensors

△L_{MAX}-The absolute value of the arithmetic mean of the output signal values measured multiple times in the forward and backward strokes at the same calibration point, and the maximum difference between the response point on the reference line

NOTE

● Incorrect wiring may cause damage to the sensor. After the sensor is connected to a 5V power supply, the measured current passes through the direction of the sensor arrow, and the corresponding voltage value can be measured at the output end.

● -BR mode: Zero point output voltage $V_{QVO}=V_{CC}/2$, Gain fixed at 2V, The output curve is :$V_{OUT}=V_{CC}/2+2\times I_P/I_{P\_MAX}$;

If the power supply voltage changes within a certain range, it will cause a change in V_{OUT};

For example, V_{CC} range 4.75V~5.25V, the static output voltage V_{CC} corresponding to 0A has an output range of 2.375V~2.625V, and the gain does not change with V_{CC}, fixed at 2V. Therefore, the output range of full scale $V_{OUT(IPMAX)}$ is 4.375V~4.625V.

-BF mode: Between V_{CC}= 4.75V ~ 5.25V, the zero output voltage is fixed at 2.5V and the fixed gain is 2V. The output curve is: $V_{OUT}=2.5+2\times I_P/I_{P\_MAX}$.