

## ARCS01C

Residual current detection module for AC charging equipment

- 6mA DC residual current (IEC 62955)
- 6mA DC and Type A 30mA AC residual current (IEC 62752; IEC 61008-1/60947-2 + IEC 62955)



- Optional 5V DC or 12V DC interface versions to fully meet different design requirements
- DC 6mA and Type-A 30mA +DC 6mA two-circuit independent fault alarm
- The shell is equipped with a self-test button and indicator light to facilitate production line and on-site problem troubleshooting
- Can be flexibly hung on the charging cable or fixed inside the charging pile
- A cost-effective product designed for new national and European standard AC charging equipment

**Specifications**

#	Technical Parameters	ARCS01C-05-H1	ARCS01C-12-H1
101	Monitoring circuit	Rated working voltage	230/400VAC
102		Rated working current	≤ 32A
103		Pole number	1P+N / 3P+N
104		Rated frequency	50Hz
105		Rated impulse withstand voltage	6kV
106		Overvoltage category	III
201	Rated supply voltage of control circuit, Vcc	5VDC±3%	12VDC±20%
202	Power consumption	<500mW	<500mW
203	Control circuit pin 1	Vcc 5VDC	GND
204	Control circuit pin 2	AC&DC trip signal	+12VDC
205	Control circuit pin 3	GND	Test
206	Control circuit pin 4	CAL	DC trip signal
207	Control circuit pin 5	Test	AC&DC trip signal
208	Control circuit pin 6	DC trip signal	-
301	Rated residual DC operating current I $\Delta$ dc	6mA	6mA
302	Rated residual DC non-operating current I $\Delta$ ndc	3mA	3mA
303	Rated residual AC operating current I $\Delta$ n	30mA	30mA
304	Rated residual AC non-operating current I $\Delta$ nc	15mA	15mA
305	Electrical life	20,000	20,000
306	Operating temperature	-40~85 °C	-40~85 °C
307	Pollution degree	2	2

**Residual current detection related characteristics**

**Action current**

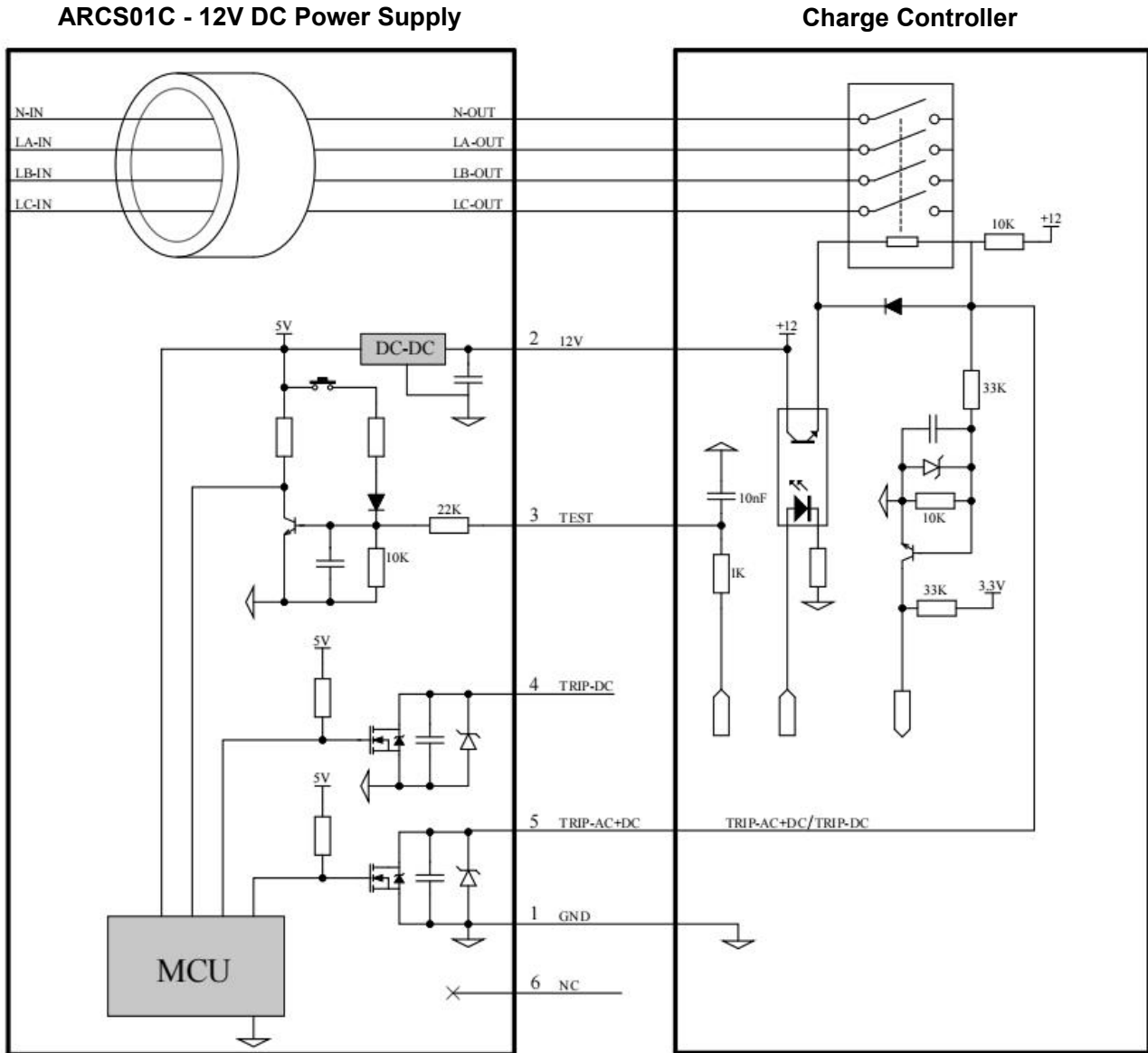
#	Description		AC&DC fault alarm pin Action current	DC fault alarm pin Action current
401	Residual Action Current	Smoothed DC	4.0~6.0 mA	4.0~6.0 mA
402		Two-phase rectification	4.0~7.0 mA	4.0~7.0 mA
403		Three-phase rectification	4.0~6.2 mA	4.0~6.2 mA
404		Sinusoidal AC	22.0~28.0 mA	-
405		Pulsating DC A0 degree	10.5~42.0 mA	-
406		Pulsating DC A90 degree	7.5~42.0 mA	-
407		Pulsating DC A135 degrees	3.3~42.0 mA	-

**Action time**

#	Description			AC&DC fault alarm pin Action time	DC fault alarm pin Action time
501	Residual Current Action Time	Smooth DC	6mA	≤ 500 ms	≤ 500 ms
502			60mA	≤ 200 ms	≤ 200 ms
503			200mA	≤ 70 ms	≤ 70 ms
504			300mA	≤ 20 ms	-
505		Two-phase rectification	60mA	≤ 200 ms	≤ 200 ms
506			200mA	≤ 70 ms	≤ 70 ms
507			300mA	≤ 20 ms	-
508		Three-phase rectification	60mA	≤ 200 ms	≤ 200 ms
509			200mA	≤ 70 ms	≤ 70 ms
510			300mA	≤ 20 ms	-
511		Sinusoidal AC	30mA	≤ 80 ms	> 10000 ms
512			60mA	≤ 60 ms	> 300 ms
513			150mA	≤ 20 ms	> 80 ms
514			5A	≤ 20 ms	> 80 ms

**12V DC Power Supply Version Application Introduction**

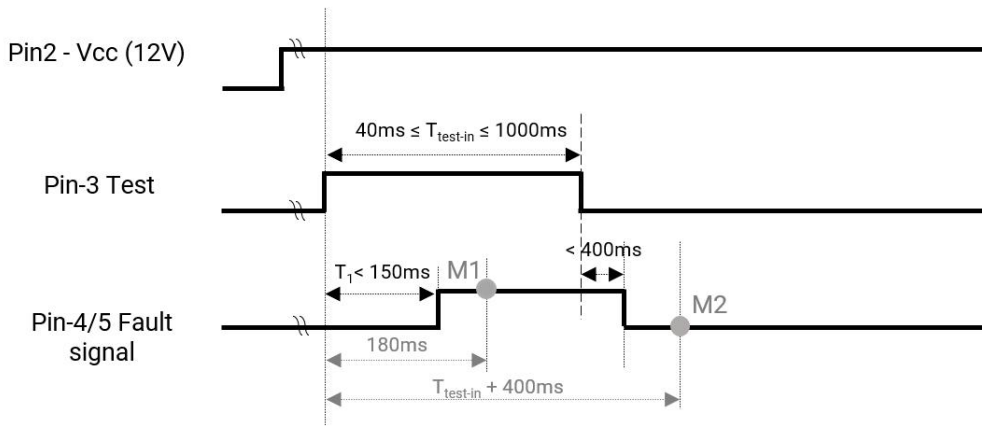
**Typical Application Integration**



**Note:**

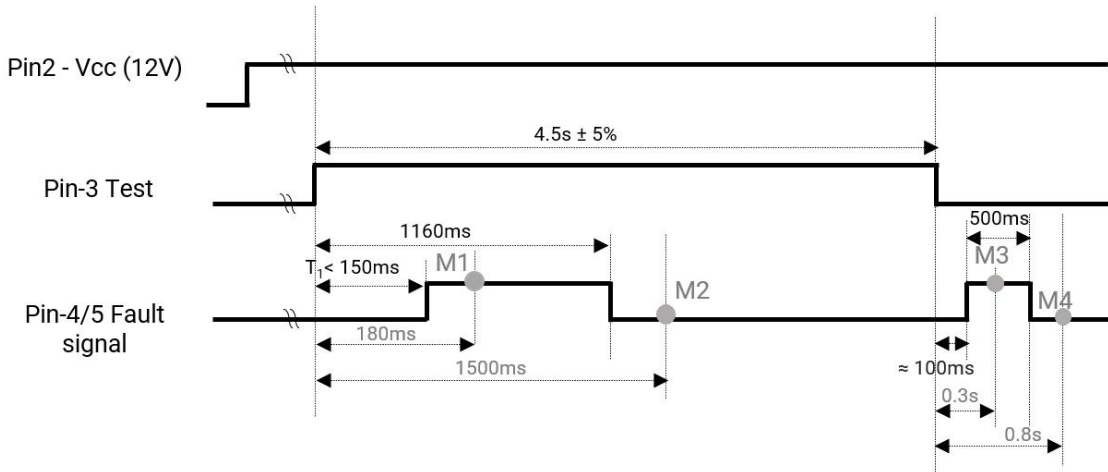
- The 12V DC power supply version has a Mosfet integrated inside the module, and its maximum on-off current is 500mA.
- Control circuit pin 6 is only used inside the module and should be left floating without connection

**Self-test Timing Diagram**



If the control circuit Pin 3 - Test is connected to a high level for 40ms to 1000ms, the self-test procedure without calibration is activated.  $t_1$  is the response time to the simulated leakage current inside the module.

**Calibration Timing Diagram**



If the control circuit Pin 3 - Test is connected to a high level for  $4.5\text{s} \pm 5\%$ , calibration is performed after the module self-test is completed. Calibration can be performed regularly (for example, during the charging pile startup self-test) or after a special event (for example, a main circuit short circuit).

**Note:** During calibration, the main circuit must be disconnected, and no residual current or any other current can flow through the sensor to prevent abnormal product calibration values. In addition, the power supply voltage of the control circuit Pin 2 - Vcc should be maintained at  $12\text{VDC} \pm 20\%$

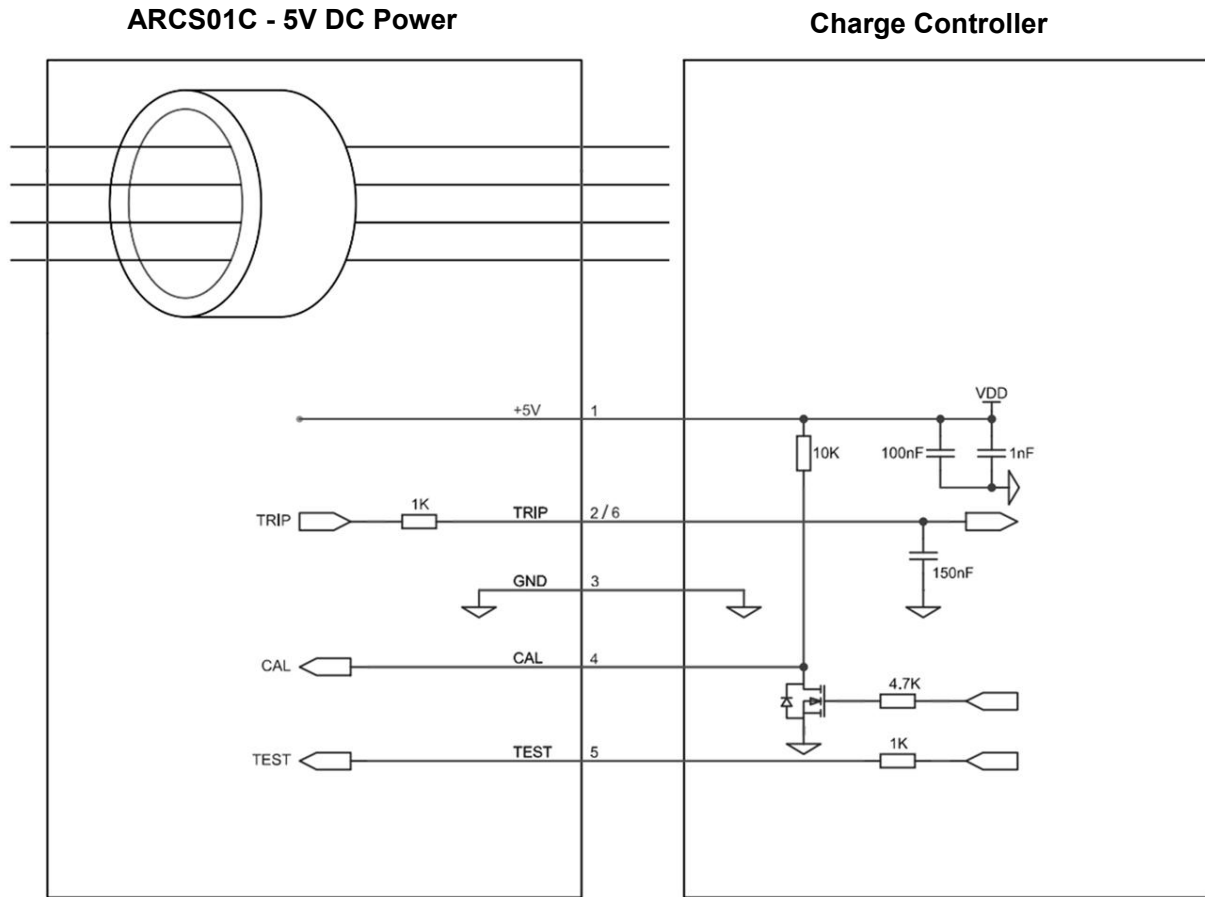
**Output Status Table**

Status	PIN 4 Output (DC Failure Alarm)	PIN 5 Output (AC & DC Failure Alarm)
Normal Status	GND	GND
$I_{\Delta} \geq 6 \text{ mA DC}$	High impedance	High impedance
$I_{\Delta} \geq 30 \text{ mA AC}$	GND <sup>1)</sup>	High impedance
$I_{\Delta} \geq 30 \text{ mA AC} \ \& \ I_{\Delta} \geq 6 \text{ mA DC}$	High impedance	High impedance

1) A state change from GND to high impedance is permitted in accordance with IEC 62955.

**5V DC Power Supply Version Application Introduction**

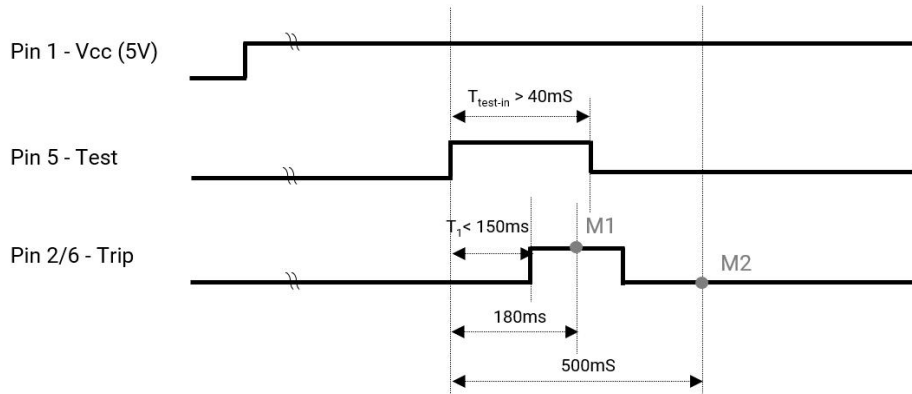
**Typical Application Integration**



**Note:**

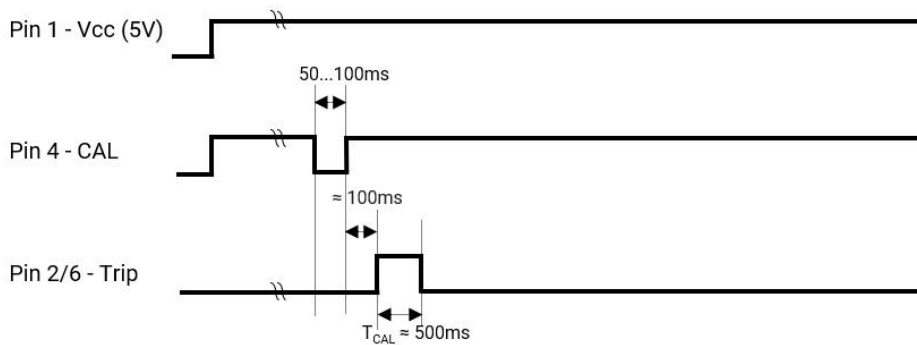
- It is strictly forbidden to directly connect the control circuit pin 2/6 to the on-off device such as relay or contactor, otherwise it may cause product damage. It is recommended that the control circuit pin 2/6 fault alarm signal be monitored by the MCU of the charging controller.

**Self-test Timing Diagram**



If the control circuit Pin 5 - Test is connected to a high level for more than 40ms, the self-test procedure without calibration is activated.  $t_1$  is the response time to the simulated leakage current inside the module.

**Calibration Timing Diagram**



If the control loop Pin 4 - CAL is pulled low to GND and lasts for 50ms to 100ms, the module enters calibration mode. Calibration can be performed regularly (for example, during the self-test process of the charging pile startup) or after a special event occurs (for example, the main circuit is short-circuited).

**Note:** The main circuit must be disconnected during calibration, and no residual current or any other current can flow through the sensor to prevent abnormal product calibration values. In addition, the power supply voltage of the control circuit Pin 1 - Vcc should be maintained at 5VDC ± 3%

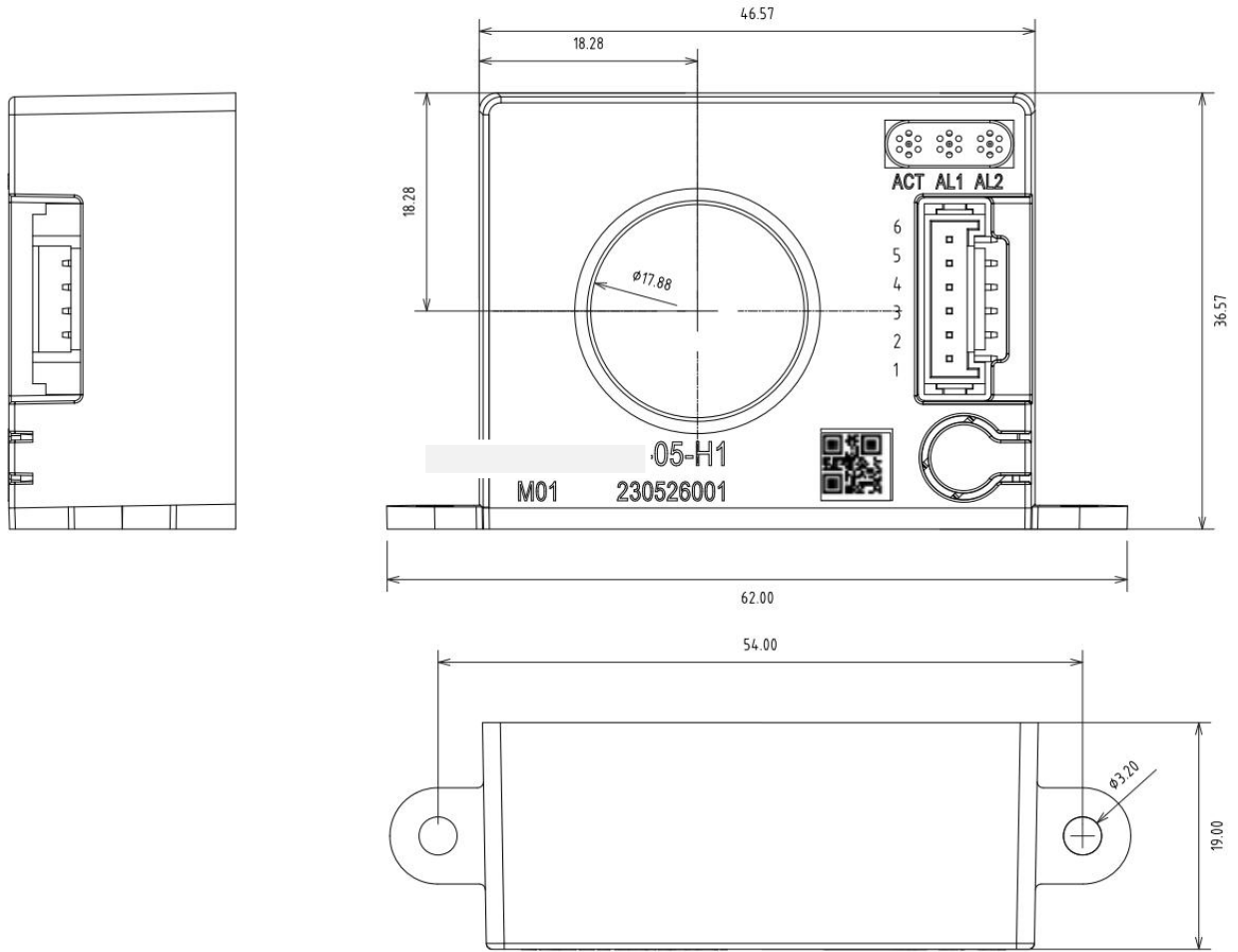
**Output Status Table**

Status	Pin 2 Output (AC & DC fault alarm)	PIN 6 Output (DC fault alarm)
Normal Status	GND	GND
$I_{\Delta} \geq 6 \text{ mA DC}$	High level	High level
$I_{\Delta} \geq 30 \text{ mA AC}$	High level	GND <sup>1)</sup>
$I_{\Delta} \geq 30 \text{ mA AC} \ \& \ I_{\Delta} \geq 6 \text{ mA DC}$	High level	High level

1) A state change from GND to high level is permitted in accordance with IEC 62955.

**Mechanical Dimensions**

**ARCS01C-05-H1 / ARCS03C-12-H1:**



	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
ARCS01C-05-H1	5V DC	AC & DC Trip	GND	CAL	Test	DC Trip
ARCS01C-12-H1	GND	+12V DC	TEST	DC Trip	AC & DC Trip	NC

**Ordering Information**

#	Product No.	Product Description
1	ARCS01C-05-H1	ARCS01C Residual current detection module 5V DC interface, Type A 30 mA+DC6mA / DC6mA, 32A, 1P+N / 3P+N HY 2.0 -6 pin
2	ARCS01C-12-H1	ARCS01C Residual current detection module 12V DC interface, Type A 30 mA+DC6mA / DC6mA, 32A, 1P+N / 3P+N HY 2.0 -6 pin

**Additional Information**



- Do not allow strong static electricity to approach the residual current detection module, as static electricity can damage the chip inside the module. Take electrostatic protection measures when handling the module.
- Do not drop the module or apply any other mechanical stress to the module, as such stress may change the performance characteristics of the module.
- To ensure accurate detection of the module, keep a proper distance from components that generate strong magnetic fields, such as relays or contactors.
- When designing AC charging equipment with integrated residual current protection function, please strictly comply with the product standards for relevant residual current protection devices.



The module is easily damaged by electrostatic discharge (ESD) events, and electrostatic protection measures should be taken when handling the module.

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