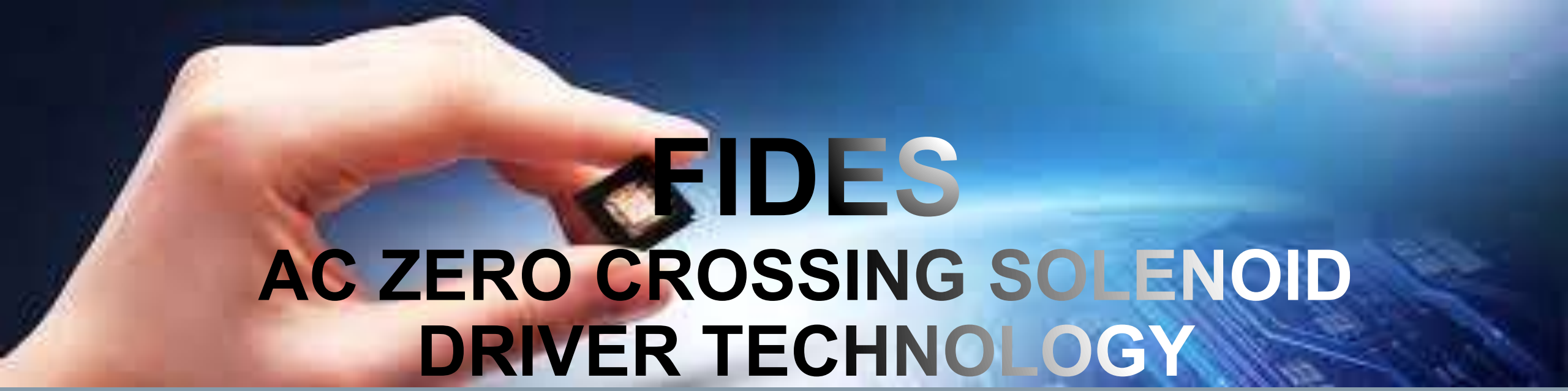

FIDES
AC ZERO CROSSING SOLENOID DRIVER TECHNOLOGY

Disruptive Innovation to Hybrid relay sustainability for Building automation

Novel Methodology of MCCB AC Power control of harsh environments

Tangible benefits in terms of reliability, Free maintenance, Small size and operating in extreme temperature environments

FIDES
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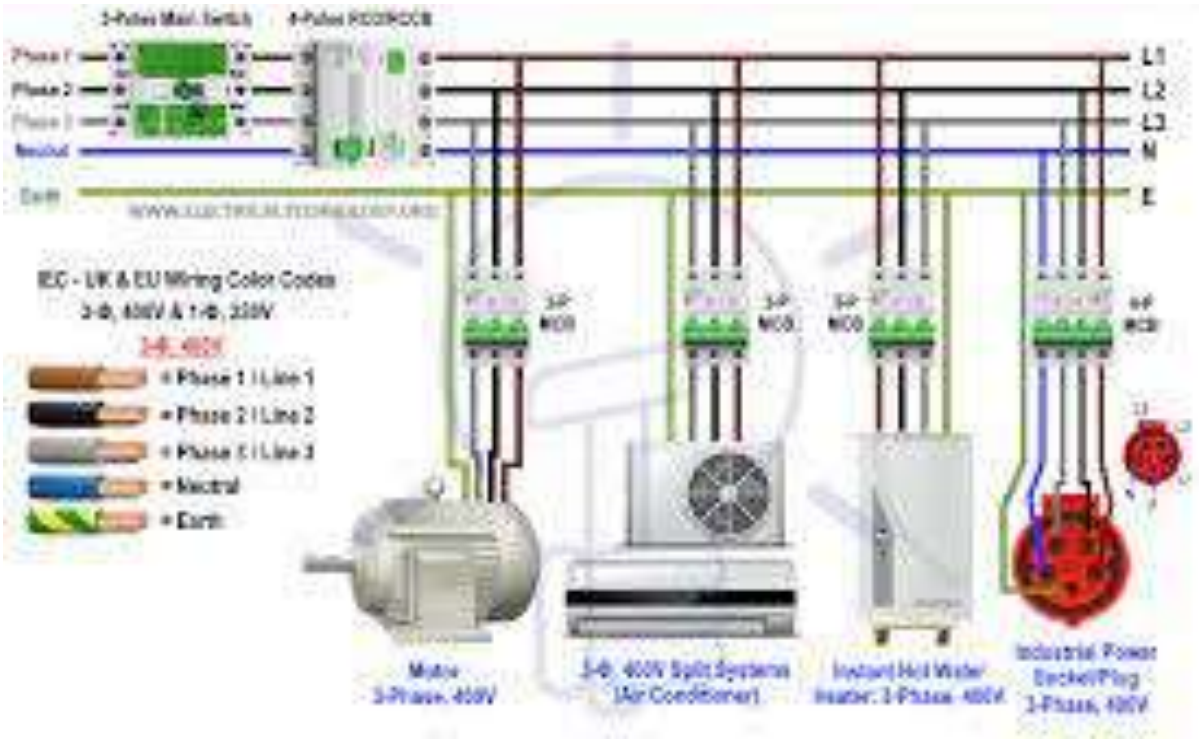
http://www.standbyzero.com

What is MCCB?



A molded case circuit breaker (MCCB) is **a type of electrical protection device that is used to protect the electrical circuit from excessive current, which can cause overload or short circuit**. MCCB are AC power switch under 1KV/800A.

Ordinary Magnetic Relay problems

Influence on electrical contacts

Influences	Parameter	Effect
Electrical	Current Voltage	Heating, melting, material migration, chemical reactions, frilling, electrical discharge, contact resistance
Thermal	Arc	Melting of contact material, material migration
Mechanical	Friction Pressure	Deformation, wear, cod welding, contact resistance
Ambient conditions	Dust Gases	Increased wear, particle, formation of chemical layers and corrosion
Chemical	Oxidation	Contact resistance, inorganic and organic layers, corrosion

Pic1, Failure of contact melting

Due to contact "flutter," arcs occur high resistance contact and over a long period of time, leading to the accumulation of nitrogen oxides in sealed relays. In conjunction with moisture, nitrous acid is formed, enabling significant corrosion.
At a contact time in peak voltage with inrush current makes contact melting.

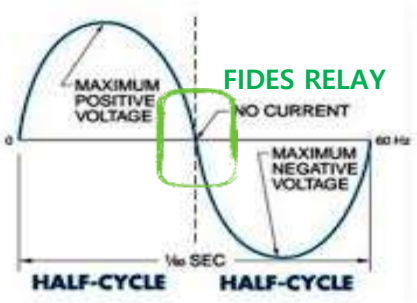
Switching times are common make time is 40 ms, while typical break time is 20 ms.

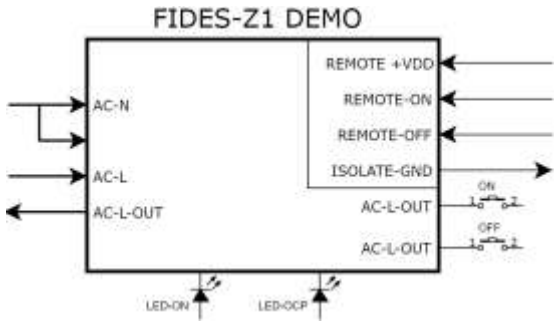
FIDES-ZERO MCCB(HEMR) DEMO

FIDES-ZERO (HEMR) Hybrid Electro Mechanical Relay advantages.

FIDES remote control relay module are contributes to improved reliability and dramatically driving without contact arcs and melt off.

- Trip time less 200uS
- Surge and noise resistant and EMI free
- No EMI noise and inrush current suppressed
- Contact resistance less 10mΩ
- Electrical life1×10$_5$ **IEC 60947-2**
- Mechanical life (On/Off durability) 1×10$_5$ **IEC 60947-2**
- Load current A to 50A (Over 100A(Special order)
- Rapid response(synchronized zero crossing at turn on)
- No leakage current(less 600uA)
- Over load Protection(50A@220V)
- Zero crossing supports (Avoid electric arcs even during vibration)
- Exquiste programmable overload type support
- No contact arcs and contact weld resistance.
- Optical isolation communication On/Off
- Instant setting Class A, B, C, D, K and Z Type or any desired OCP.
- Over temperature detection.
- Wide operating temperature -40~+85°C

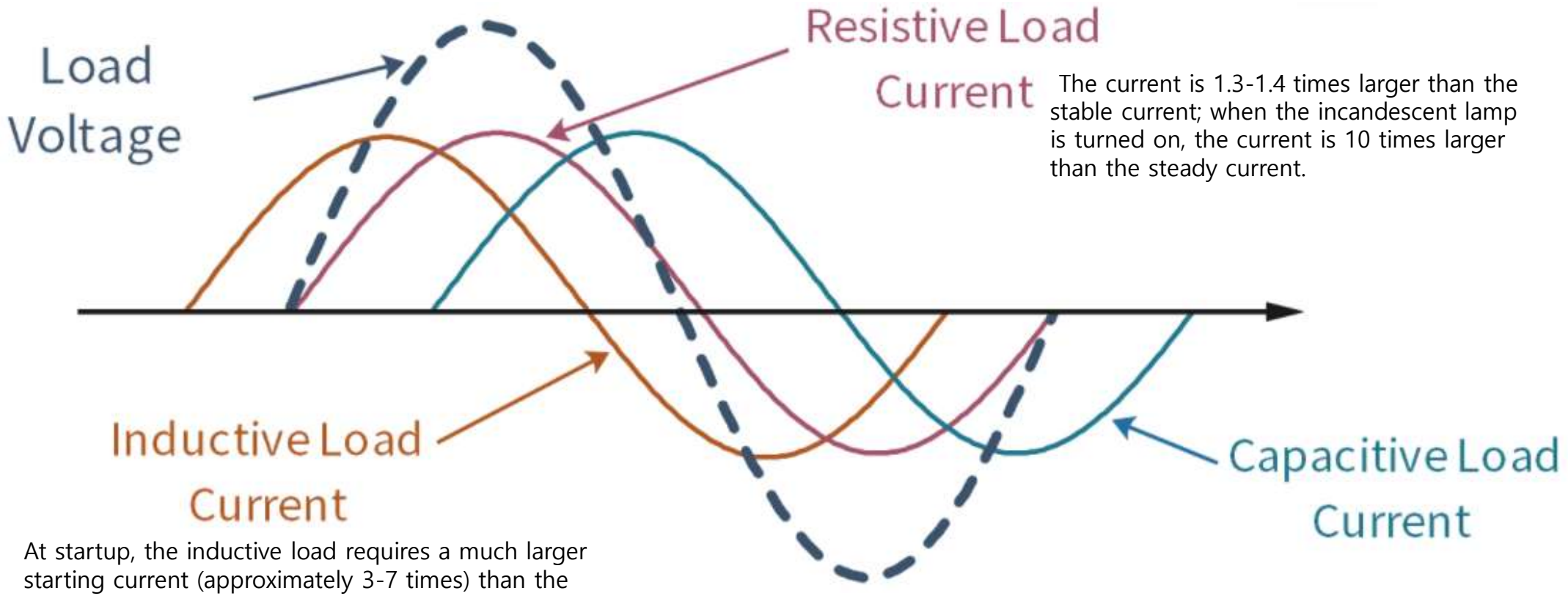




Ordinary SSR problems

Big heatsink and burn out problems

Load Type



The current is 1.3-1.4 times larger than the stable current; when the incandescent lamp is turned on, the current is 10 times larger than the steady current.

At startup, the inductive load requires a much larger starting current (approximately 3-7 times) than the current required to maintain normal operation.

MCCB's & FIDES-Z1

General MCCB are commonly big problems

1. Non zero-crossing contact support.
2. Arc and flutter problem.
3. Over current trip problem.
4. Contact melts and corrosion
5. Remote On/Off not support.
6. Short service life.

General MCCB are mechanical structures. Over current protection are too much tolerance and temperature drift of mechanical resistance. Not possible zero crossing makes big issue of contacts ARC and melting problem.

EV charger market demands.

1. Frequently On/Off.
2. Remote control.
3. Durability of contacts failure.
4. Small size.

EV charger MCCB required frequently On/Off AC power. Zero crossing MCCB are super durability by IEC60947-2 with independent operating temperature.

AC SSR switch are easy supports zero-crossing switching.

1. Need big thermal heatsink.
2. Required On/Off and OCP controller
3. Leakage current problem.
4. Big size and Price problem.

The SSR problems are weakness of capacitance or inductance load. High resistance of SSR issue of self thermal heating loss. Required control system for On/Off controller.

Smart city and Smart factory required sustainability

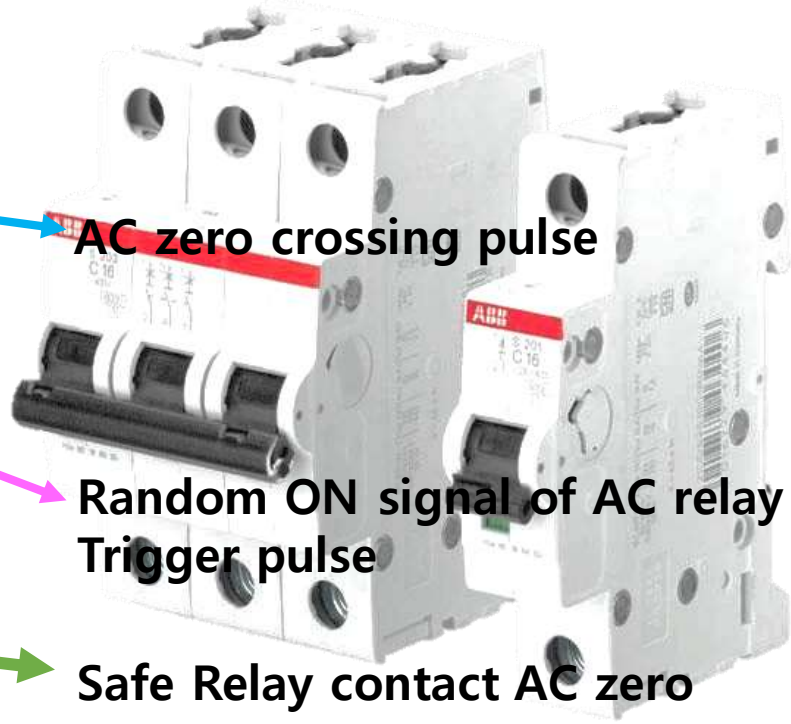
Building management and smart factory based on safty with durability of electric control system. FIDES technology supports electric MCCB easy to inplitation modern IoT by one of key AC power control makes sustainable system.

FIDES-ZERO CROSSING RELAY

Super durability FIDES HEMR :

Zero crossing are fast, frequent switching without contact erode.

Synchronized relay ON signal



AC zero crossing pulse

Random ON signal of AC relay Trigger pulse

Safe Relay contact AC zero current

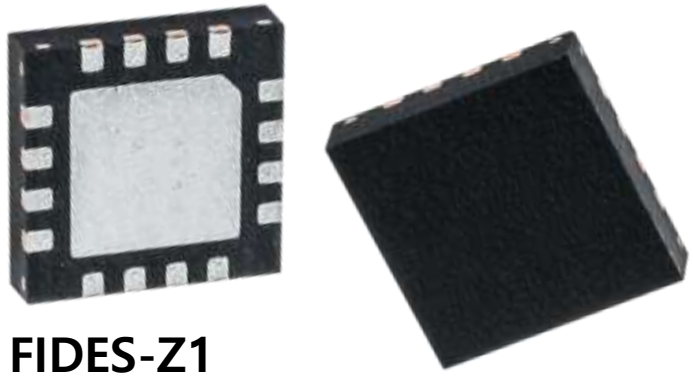
FIDES-Z1 DEMO Specification

	Min	Max	Notes
Manual On/Off		5mm	TBD
maximum allowable power		8.8KW	AC250V/60Hz
Command Delay Time	100uS	9mS	AC250V/60Hz(Random Input timing on ZCD syscronized condition)
Operating voltage	85V	380V	AC 60Hz
Leakage current		<600uA	AC220V/60Hz
Contact resistance		<10m	Ω
Vibration resistance		10~55Hz	1.5mm
Rated current		40A	Max current 50A +85°C
Contact-to-coil		4000VAC	1min
Over Load Protect		50A	AC250V/60Hz
Rated insulation voltage		4KVAC	
Rated impulse withstand voltage		8KV	Uimp
Standby power consumption		<50mW	@220V/60Hz
Electrical Service Life	100,000		Contact life count 220V/60Hz/40A(**IEC 60947-2)**

FIDES-Z1 IC

Main applications

- Battery management systems and DC charging stations for e-mobility applications
- Photovoltaic and energy storage systems
- Uninterruptable power supplies
- Building energy management and Industrial electric control breakers



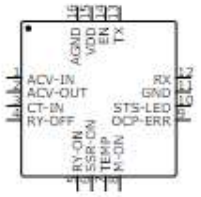
FIDES-Z1
Zero crossing MCB driver IC

Main features and benefits

- High current capability of up to AC 800A
- Rated operational voltage Ve 42-660 V AC
- Zero crossing contact are high-speed arc extinguishing
- Insulation voltage > 4000 V
- Extremely high speed contact time(less 100uS)
- EMI free
- Long service life
- Very low self power consumption
- All inside AC-DC, OCP, Temperature sensing, Isolation remote control

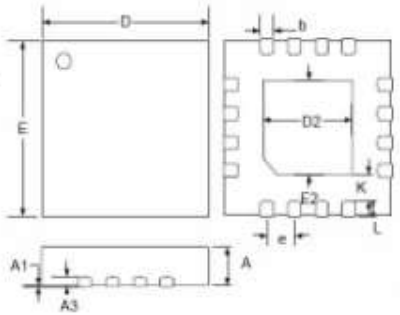
FIDES-Z1 MCCB Driver IC

FIDES-Z1



PIN	Function	Port
1 ACV-IN	AC voltage input Max 5Vp-p(Zero crossing and voltage reading 8bit A/D)	I
2 ACV-OUT	AC voltage output sensing (comparate AC voltage 100V / 220V / 380V)	I
3 CT-IN	Load current sensing input (OCP input DC 3V, 100mS OCP high to RY-OFF)	O
5 RY-ON	5mS delayed SSR-ON, RY-ON H = 40mS / I=max10mA	O
6 SSR-ON	Zero crossing synchronized relay out control signal Max=20mS	O
7 TEMP	External temperature sensing input (8bit A/D)	I
8 M-ON	Manual relay On / Off switch (L= Off, H= On)	I
9 OCP-ERR	Load over current surveillance error LED (OCP active at low)	O
10 STS-LED	Operating status LED output (current <10mA)	O
11 GND	Digital ground	
12 RX	TTL level custom protocol	I
13 TX	TTL level custom protocol	O
14 EN	RX/TX switching output (H=Tx, L=Rx)	O
15 VDD	2.7V~5.6V 1mA	I
16 AGND	Analog ground	

H level = VDD - 0.5VDD, L= 0.3V GND)

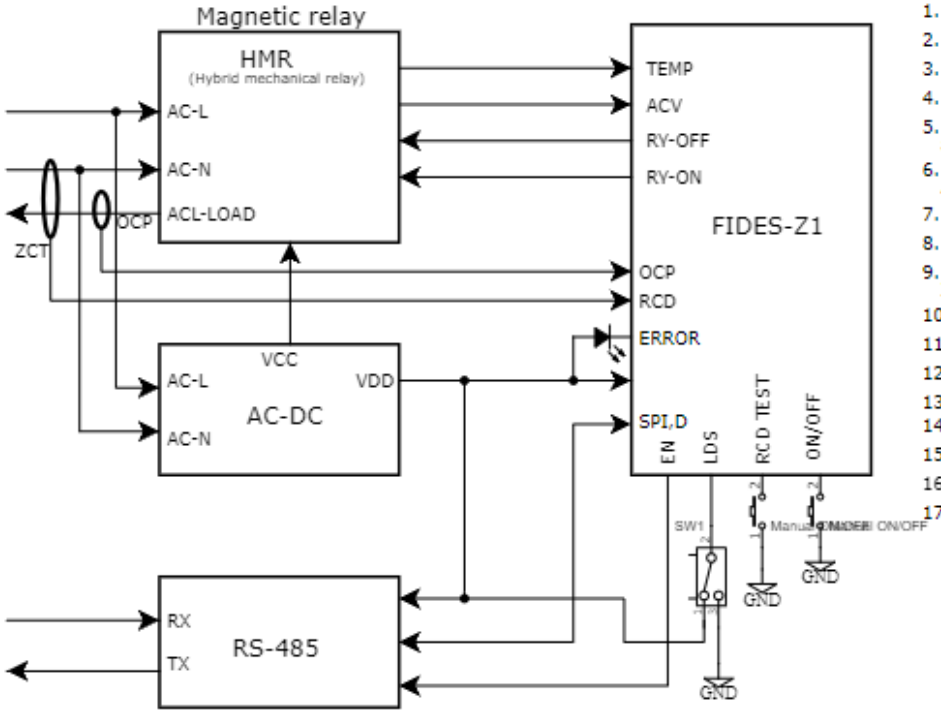


Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.60	0.018	0.024
A1	0	0.05	0	0.002
A3	0.13 REF		0.005 REF	
b	0.18	0.30	0.007	0.012
D	3.00 BSC		0.118 BSC	
E	3.00 BSC		0.118 BSC	
e	0.50 BSC		0.020 BSC	
D2	1.55	1.80	0.061	0.071
E2	1.55	1.80	0.061	0.071
K	0.2	-	0.008	-
L	0.2	0.4	0.007	0.016

Note:
1. Dimensions do not include mold flash or protrusions; these shall not exceed 0.155mm(.006") on any side. Lead dimension shall not include solder coverage.

TITLE: FIDES-z1 IC PIN ASSIGNMENT		REV: 1.0
FIDES	Company: FIDES	Sheet: 1/1
	Date: 2021-10-07 Drawn By: FIDES	

FIDES-Z1 DEMO FUNCTION BLOCK



1. SDI input (RS-485)
2. SDO output (RS-485)
3. Open will be RY-ON syncronized ZCD signal ACTIVE are "H" 50mS.
4. External Rx/Tx selector output SDO active then "H".
5. Manual ON/OFF relay by toggle input. (When RY-ON signal after Manual input will command to RY-OFF.
6. AC voltage ACV input measure zero crossing voltage. And actual AC voltage.div 1/200
7. AC load Current sensing input with Over current sensing. OCP
8. TEMP : Temperature sensing input by NTC.
9. Relay ON signal active "H" 40mS pulse start synchronized ZCD of internal ACV sensing.
10. Relay off signal RY-OFF active are "H" less 50mS.
11. ERROR is OCP error display LED
12. ZCD are zero crossing monitoring out.
13. LDS : Select Latching or normal relay drive.
14. Over current display driver output OCP error at "H"
15. VDD : +5V(Unegulated DC input +8V ~ +15V).
16. RCD
17. GND : Ground.

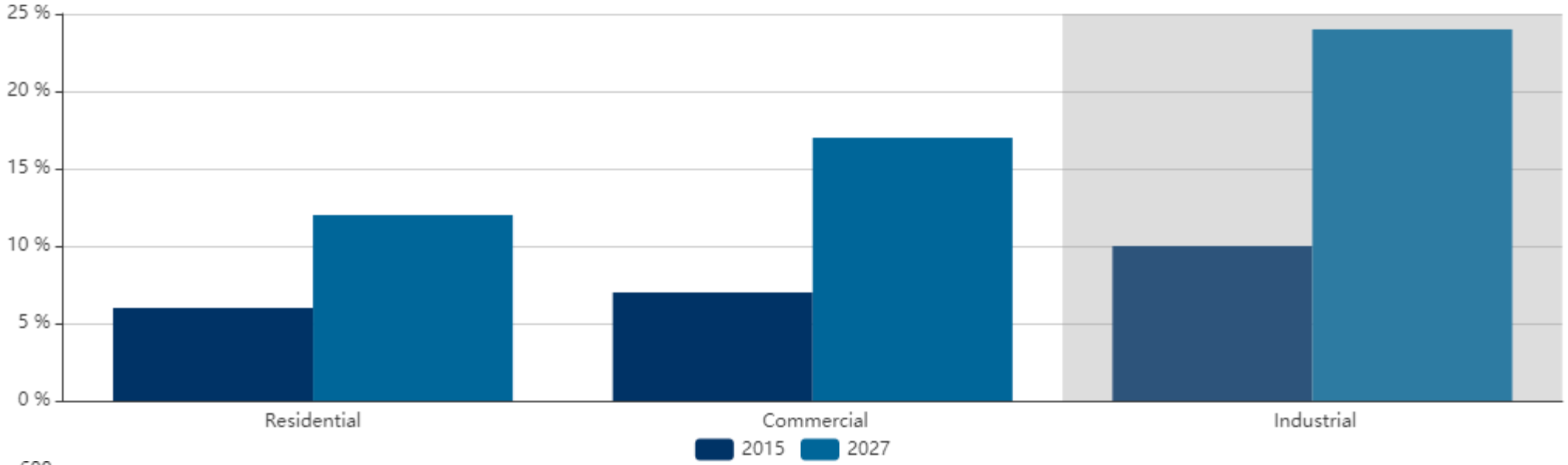
TITLE: FIDES-Z1 PIN FUNCTION		REV: 1.0
FIDES	Company: FIDES	Sheet: 1/1
	Date: 2021-10-29 Drawn By: FIDES	

HVC Series High Voltage-contactors

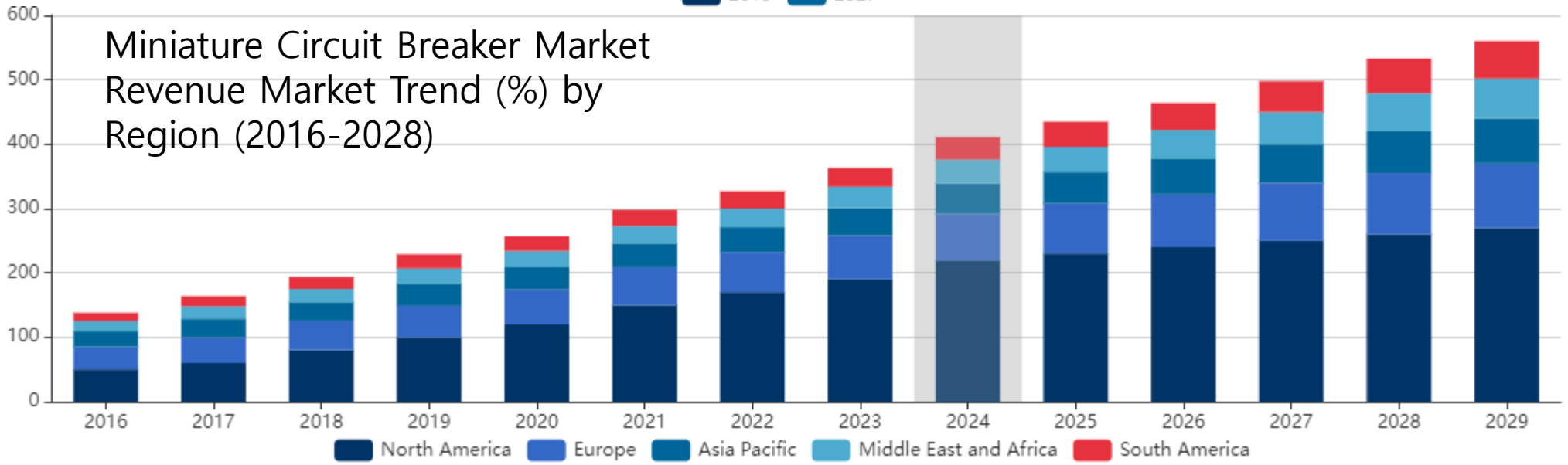
	FIDES-20	FIDES-50	FIDES-100	FIDES-200
Contact arrangement	1A	1A/2A	1A/2A/3A	1A/2A/3A
Phase	Single	Single	3Phase	3Phase
OCP	6.6KVA	13KVA	38KVA	76KVA
Ampacity	20amp	40amp	100amp	200amp
Terminal	Electroplate	Electroplate	Screw terminal	Screw terminal

UL 60947-4-3, CE preparation

Miniature-Circuit Breaker Market

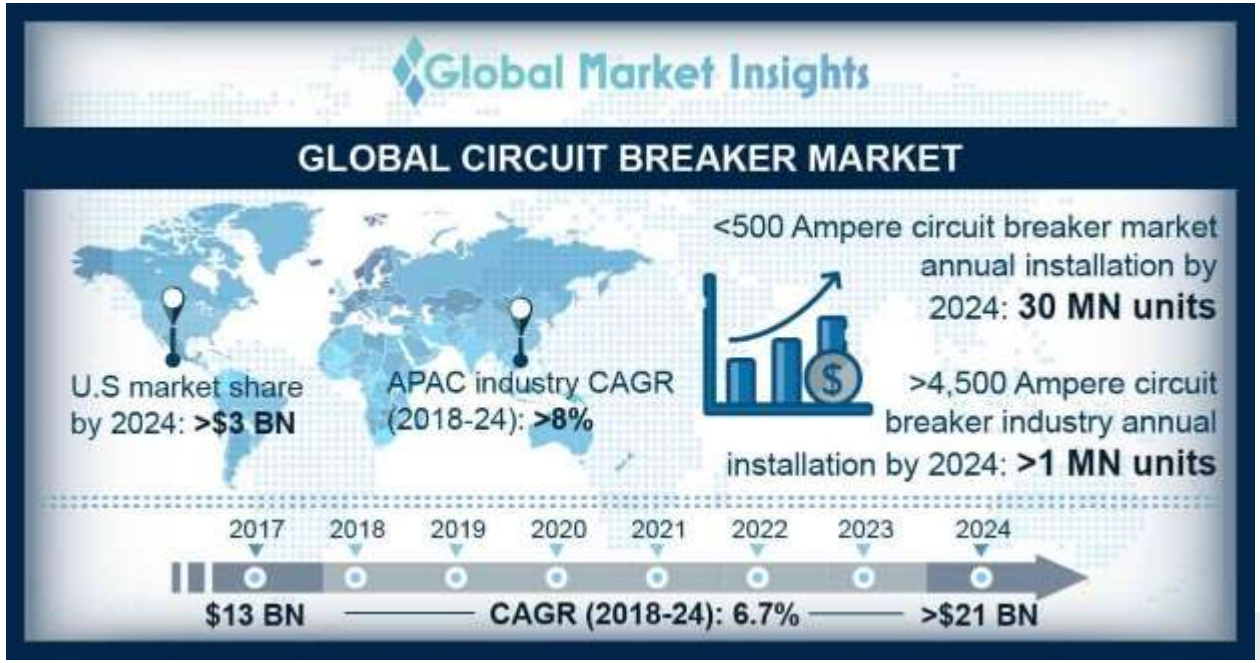


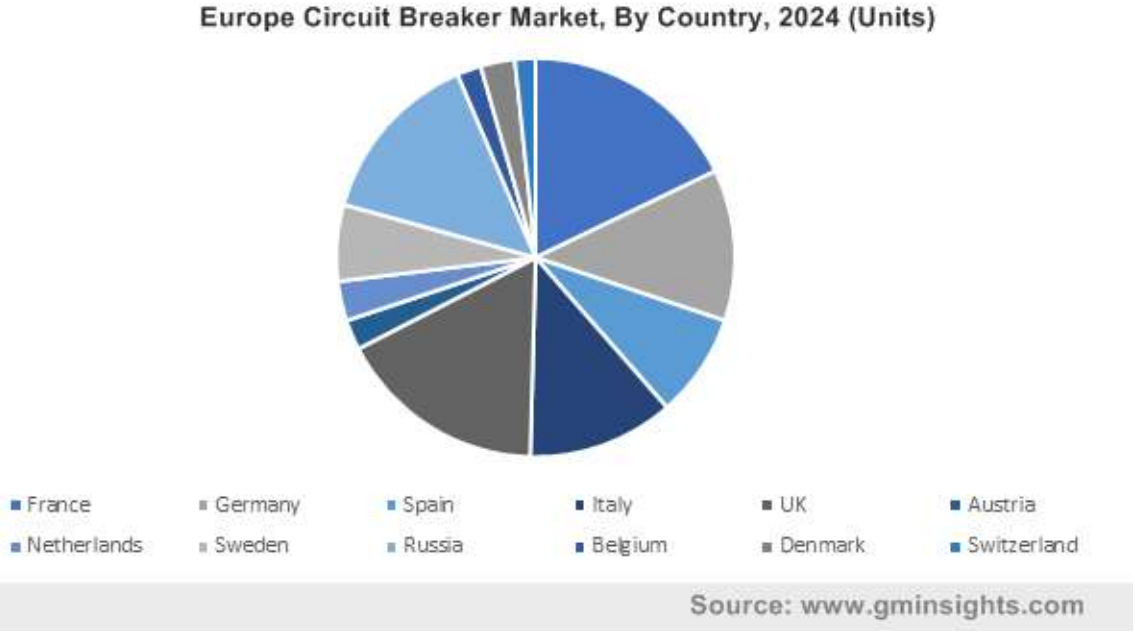
Miniature Circuit Breaker Market Revenue Market Trend (%) by Region (2016-2028)



Miniature-Circuit Breaker Global Market

Global Circuit Breaker Market size in 2017 was valued at over USD 13 billion and is anticipated to exceed an annual installation of over 40 million units by 2024.



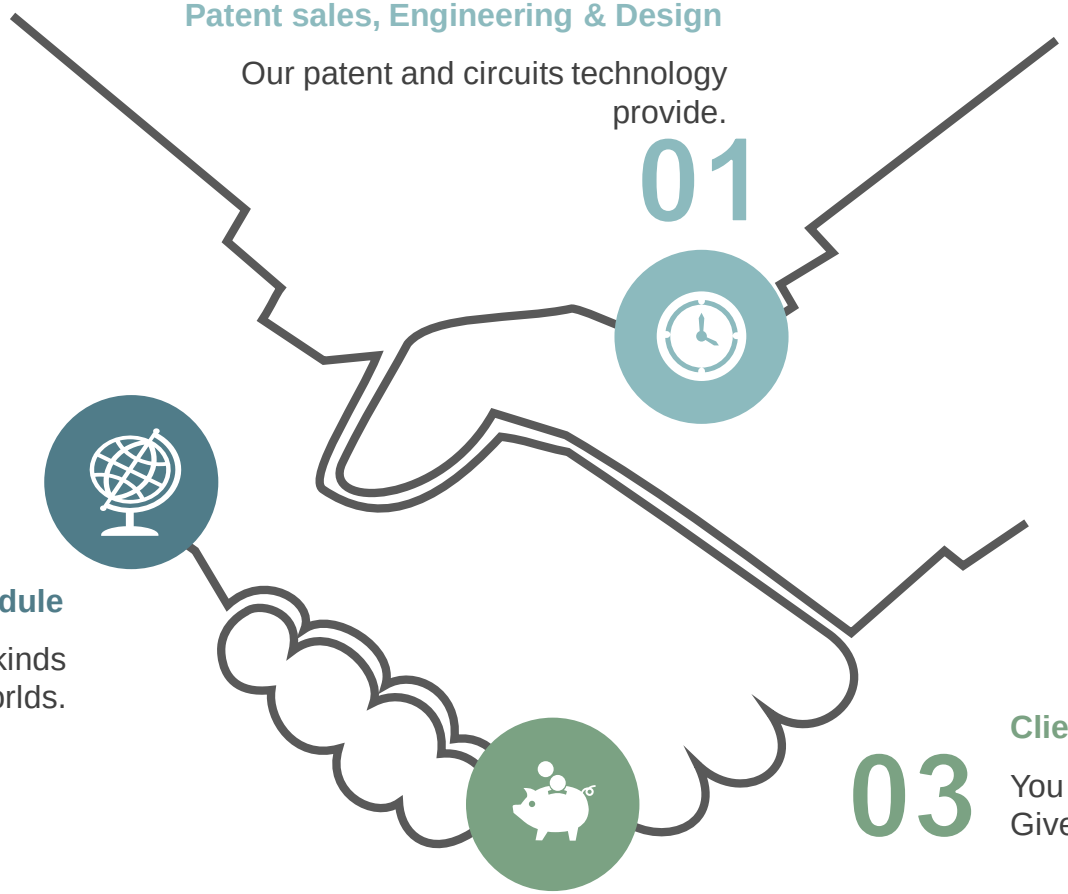


Business Strenths

Patent sales, Engineering & Design

Our patent and circuits technology provide.

01



02

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FIDES POWER

Thanks!

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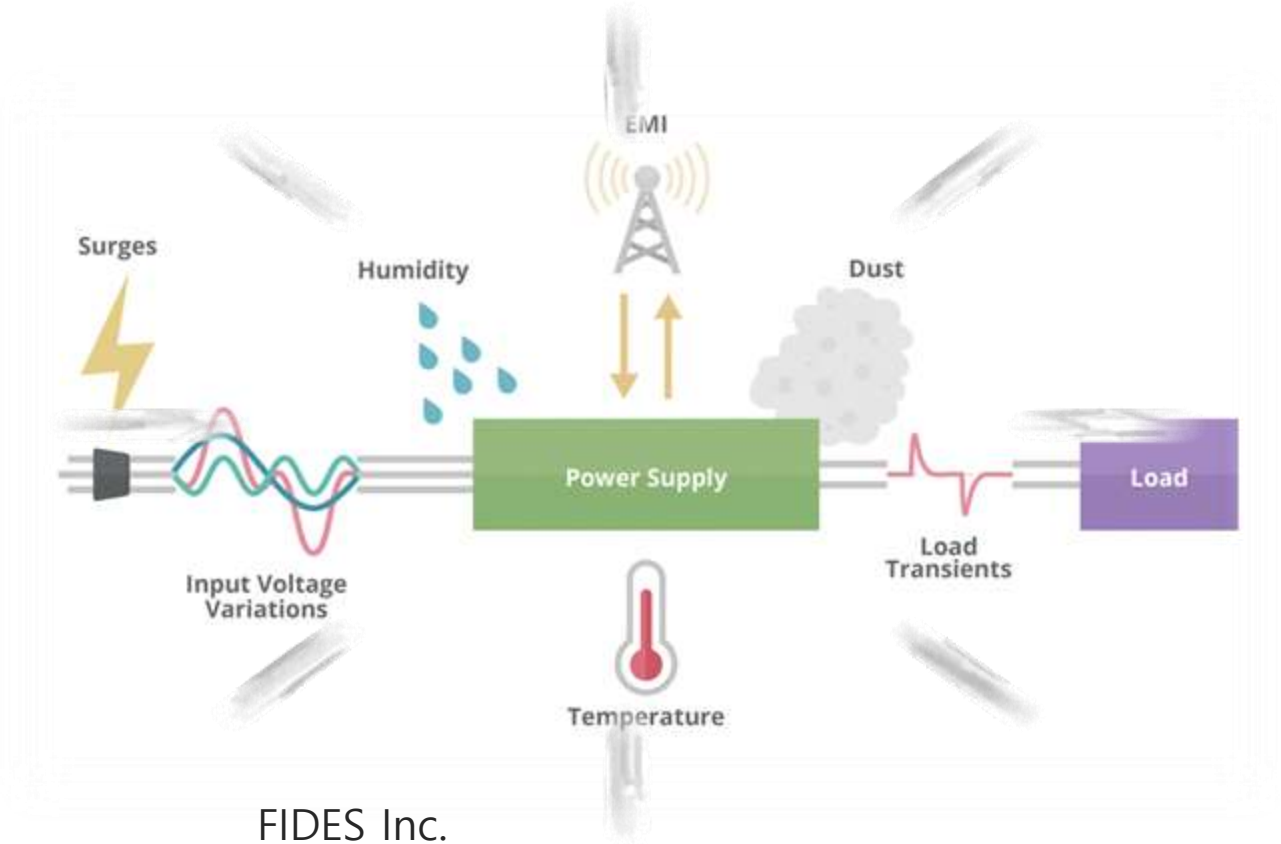

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