The product models and specifications published in this manual are for reference only, and everything is subject to the actual product and product description.

Due to product upgrades and version updates, the content described in this manual is subject to the actual product. If there are any errors, omissions, or other inappropriate aspects, we kindly ask for your understanding.

OPERATION INSTRUCTIONS

FK Series

Intelligent composite switch

CONTENTS

1. Main Technical Features

1.1 Zero crossing switching:

FK composite switch is a combination of intelligent chips, digital circuits, and magnetic holding relays to achieve voltage zero crossing conduction and current zero crossing cutoff, allowing the switch to completely switch over at the moment of connection and disconnection without generating overvoltage. Switches have many advantages such as no inrush current, extremely low power consumption, high lifespan, and low failure rate, and are widely used in the field of low-voltage reactive power compensation.

1.2 Protection function:

The use of microprocessors to monitor the operation status of switch relays, input power supplies, and loads has comprehensive protection functions.

- ◆ Overvoltage and undervoltage protection of the power grid: When overvoltage or undervoltage occurs, it will automatically disconnect and the power light will flash as a warning.
- ◆ Phase loss protection: When any phase is lost, it will automatically disconnect and the power light will flash as a warning.
- ◆ Power outage protection: In case of sudden power outage after connection, it will automatically disconnect.
- ◆ Empty load protection: Refuse to close when not connected to a load, and flash the indicator light as a warning; The compound switch of the compensation type will continuously cycle to detect the phase, and the indicator light will scan and flash repeatedly.
- ◆ Phase indicator switch status: power light, long on indicates normal; flashing indicates overvoltage, undervoltage, or phase loss; A/B/C phase status lights, long on indicates switch closure; The flashing of a certain phase indicates a fault in that phase, or a delay in the discharge of a certain phase capacitor.
- ◆ Self diagnostic fault: If any phase malfunctions, the action will be refused and the indicator light will flash to warn.

1.3 The composite switch does not require a neutral wire (N wire) to be connected.

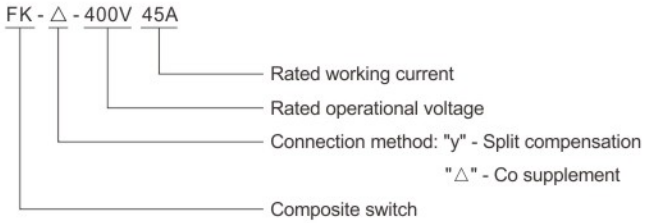
1.4 Low power consumption: The magnetic holding relay only consumes power at the moment of switching, and consumes almost no power normally, thus achieving energy conservation and consumption reduction.

1.5 Auxiliary contacts with switch status feedback; Facilitate the controller to collect the online status of the composite switch.

1.6 Work safety:

All control input signals are safely isolated from internal circuits, and advanced intelligent control technology is adopted. Compared with similar products, it has extremely high performance advantages in terms of surge current and safety reliability. The input signal is optically isolated from the composite switch, with high EMC protection measures, strong anti-interference ability, and safe and reliable operation.

2. Model Description



2.1 Product Classification

Co complementary type: The connection method of capacitors is triangular connection

Split compensation type: The connection method of capacitors is star connection

2.2 Product Model Table

Model specifications	Electrical wiring method	Rated current	Rated capacity
FK-△-400V-45A	Triangular connection method, jointly supplemented	45A	20kvar
FK-△-400V-63A		63A	30kvar
FK-△-400V-80A		80A	40kvar
FK-Y-250V-45A	Star connection method, separate supplement	45A	3×6.7kvar
FK-Y-250V-63A		63A	3×10kvar
FK-Y-250V-80A		80A	3×13.3kvar

2.3 Indicator Light Status Table (Example)

ShiP	Power light	A phase	B phase	C phase
Three phase connection	●	●	●	●
Three phase disconnection	●	○	○	○
A-phase capacitor discharge state	●	☼	☼	○
A-phase fault	●	☼	×	×
Overvoltage/undervoltage/phase loss	☼	×	×	×

● Long on light: indicates connection

○ Long off light: indicates disconnection

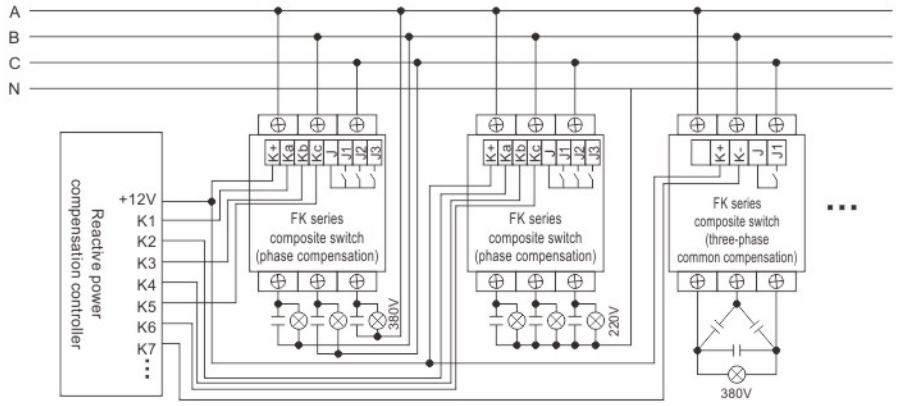
☼ Alternating on/off: Warning

× Any state

3. Main Technical Parameters

Ambient temperature	-20℃~+55℃
Relative humidity	At 40℃, 20%~90%
Rated voltage	380V/220V three-phase four wire AC 50Hz
Allowable deviation	The synchronous variation of three-phase voltage shall not exceed ± 20%
Voltage distortion rate	<5%
Rated frequency	50Hz
Rated current	≤63A (regular type); ≤80A (with circuit breaker type)
Service life	500,000 times
Number of phases	Three phase (△ connection method); Single phase (Y-shaped connection method)
Three phase control capacity	≤30Kvar
Single phase control capacity	≤10Kvar
Power consumption	≤1.5VA
Contact voltage drop	≤100mV
Contact voltage withstand	>1600V
Response time	≤1000ms
Interval between each connection and disconnection	≥5s
Interval between two consecutive connections	≥35s
Control signal	DC12V ±20%; Communication/Exchange (optional)
Input impedance	≥6.8K
On-resistance	≤0.003Ω
Flashy flow	Less than 1.5 times the rated current
Rated current of feedback contact	1A (input for connection)

4. Electrical Wiring Diagram



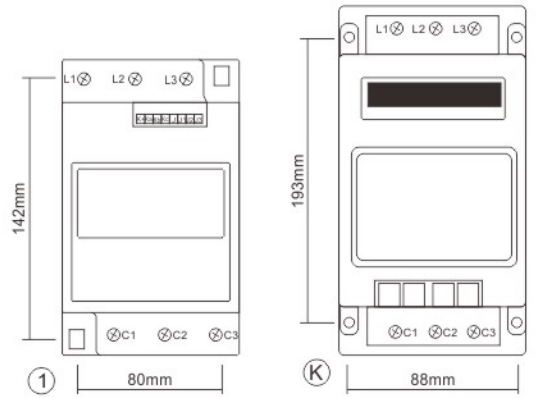
5. Installation and wiring

The appropriate multi-core copper wire should be selected for the incoming wire of this composite switch according to the total three-phase capacity of the product. If the total capacity is less than 30Kvar, a multi-core copper wire of 10mm^2 can be used. For 30Kvar and above, a multi-core copper wire of 16mm^2 or thicker cross-sectional area should be used. When crimping the wire head, the screw must be tightened to confirm that it is very firm.

Auxiliary contact feedback terminal status: When the composite switch is activated, the common terminal J is connected to the feedback terminals J1/J2/J3.

	K+	K-	J	J1

K+	Ka	Kb	Kc	J	J1	J2	J3



Installation dimensions of composite switch with circuit breaker

	①	Ⓚ
Dimensions (length×width×thickness)	160×96×90mm	210×100×77mm
Fixed hole spacing (length×width)	142×80mm	193×88mm

6. Precautions ★ Customers must read carefully

★**6.1 The composite switch for switching capacitors is only suitable for switching compensating capacitors! It is strictly prohibited to connect other inductive loads.**

6.2 When using composite switches in situations where the harmonic content is greater than 5%, it is recommended to take harmonic control measures according to the situation.

6.3 Verify that the rated voltage, rated current, and requirements of the composite switch are consistent.

6.4 The connection between the input and output terminals should be tightly crimped and not loose; Communication input and output must not be reversed.

6.5 The output terminal must not be short circuited, otherwise it may cause damage to the internal components of the composite switch; When the output terminal is not connected to a capacitor, there will be a sampling leakage current of nearly 2mA, which can light up the signal indicator light (it is recommended to connect a 40W incandescent lamp as a load at the output terminal during debugging)

★**6.6 The polarity and wiring terminals of the 12V control signal should be correct.**

6.7 Joint compensation type composite switch B-phase through live: Pay attention to safety during inspection and operation.

★**6.8 The output terminal of the common compensation type composite switch is only allowed to be connected to three-phase common compensation capacitors, and it is strictly prohibited to connect to the neutral line.**

6.9 The neutral wire of the capacitor at the output end of the compensating composite switch must be reliably connected to neutral (N). When powered on for the first time, if abnormal closure occurs due to power outage, transportation, strong collision, etc., the internal relay will automatically reset within about 1 second; If the residual voltage of the capacitor is high, it may increase the detection phase time.

7. Common Problems and Solutions

No.	Phenomenon	Possible reasons	Solution
1	When powered on, the working indicator light of the composite switch does not light up.	The input terminal of the composite switch is not connected to the working voltage; Input open circuit.	Connect the working voltage (primary line) to the composite switch
2	The indicator light of the composite switch power supply flashes, and the DC12 signal is connected to the K+and K ends, but the switch does not operate.	The input terminal of the composite switch is protected against overvoltage, undervoltage, and phase loss.	Check if the three-phase voltage is normal
3	The output terminal of the composite switch is connected to a capacitor bank, but no input signal is given. The capacitor indicator light on the cabinet is on.	The capacitance indicator light on the capacitive screen may be connected between phase and ground, but not as required.	Connect the capacitance indicator light between phases
4	After the composite switch is put into operation, the air switch trips or the fuse melts.	Overvoltage and distortion rate lead to overcurrent.	Check capacitor current and grid parameters
		The output terminal of the composite switch is short circuited.	Eliminating short circuits