CDCE3 Low voltage smart capacitor compensation device

Product overview

CDCE3 series low-voltage smart capacitor compensation device (hereinafter referred to as smart capacitor) is a new compensation device which is based on self-healing low-voltage power capacitor and intelligent measurement and control processor as the control center. It adopts micro-electronic hardware and software technology to compensate the reactive power of 0.4kV low-voltage line. It adopts zero-crossing switching technology, which can greatly reduce the inrush current generated when switching capacitor, protect the compensation system, and extend the working life of capacitors and switching switches.

Product characteristics

The product has the characteristics of modularity, networking, miniaturization, and compared with the traditional low-voltage reactive power compensation technology, it has the advantages of simple operation, convenient installation, flexible combination and so on.

- Integration: The compact design enables one machine (smart capacitor) to replace multiple machines in the traditional compensation cabinet (reactive power compensator + switching device +) Capacitors), greatly reduce the volume of the product, reduce the difficulty of user installation and debugging.

- Low power consumption: Using low power design, the power consumption of the whole machine is much lower than the traditional reactive power compensation cabinet.

- Small inrush current: The use of equal potential input technology, closing inrush current is small, and rapid response , no need to wait for capacitor discharge, the shortest 2s after excising Can be reinvested; Zero cutting of overcurrent, opening without pulling arc; Compared with the traditional reactive power compensation cabinet, the power distribution can be greatly extended Equipment life, and reduce voltage fluctuations, inrush current and other pollution introduction.

- Automatic networking: can be handed over to the product automatic control networking, and to achieve automatic withdrawal of faulty products, new products automatically connected to the grid, suitable for a variety of occasions.

- Diversification: can achieve single-machine local compensation, multi-machine (up to 30) centralized compensation, multi-channel (up to 60) mixed compensation and other functions, to achieve a multi-purpose machine, convenient for users to choose.

- Multiple protection: The product has over voltage, under voltage, under current, overload, phase loss, harmonic, temperature and other protection functions to provide multiple protection for the system and improve the stability of the system.

This product with harmonic frequency over limit blocking protection, can effectively protect the power system and the product itself; In case of frequent switching caused by harmonic over-limit, this product can identify and effectively deal with it to ensure the stability of the power grid system.
Factory setting: Within 1 hour, the harmonic voltage in the compensation system exceeds 5% (or the current harmonic exceeds 30%) reaches 6 times, the compensation system enters the lock, the indicator light continues to flash, the lock time is 4h, the automatic unlock; During the period, you can also manually change the lock state to unlock (see article 43/44/45 in the factory parameter table, set item 43 to 0000 to disable this function).

Product application

Products are widely used in low-voltage inductive load power system, such as urban power grid, rural power grid, civil buildings, shopping malls, supermarkets and other fields of low-voltage distribution network reactive power compensation, can improve the power factor, reduce line loss, stabilize the grid voltage, ensure the quality of power supply, energy saving and consumption reduction effect is significant. The new generation of low-voltage reactive power compensation equipment has the characteristics of good compensation effect, smaller size, cost saving, flexible use, easy maintenance and high reliability, and ADAPTS to the higher requirements of modern power grid for reactive power compensation.

Product selection

Ontology order coding rules

Product name	Breaking capacity	Compensation mode	Capacitance rated voltage	Rated capacity (kvar)
CDCE3	Default：6kA/10kA	GB	450	0505
	H：15 kA	GB：Three-phase cocomplement	450：450V（cocomplement）	0505：5+5kvar 1005：10+5kvar 1010：10+10kvar 1510：15+10kvar 1515：15+15kvar 2010：20+10kvar 2020：20+20kvar 2525：25+25kvar 3020：30+20kvar 3030：30+30kvar
		FB：Single-phase compensation	250：250V（Fractional compensation）	0005：5 kvar 0010：10 kvar 0015：15 kvar 0020：20 kvar 0025：25 kvar 0030：30 kvar
		FB：Single-phase partial compensation	250：250V（Fractional compensation）	0505：5+5kvar 1005：10+5kvar 1010：10+10kvar 1510：15+10kvar 1515：15+15kvar 2010：20+10kvar 2015：20+15kvar 2020：20+20kvar 2525：25+25kvar
		HB：Hybrid compensation	450:450V (total supplement) 250:250V (partial supplement)	0505：450-05-D250-05 1005：450-10-D250-05 1010：450-10-D250-10 1510：450-15-D250-10 1515：450-15-D250-15 2010：450-20-D250-10 2015：450-20-D250-15 2020：450-20-D250-20 2525：450-25-D250-25 3030：450-30-D250-30

Controller and accessory model specifications

CDCE3C3G	CDCE3-C3-G	Controller (co-complement)
CDCE3C3H	CDCE3-C3-H	controller
CDCE31CT	CDCE3-1CT	Secondary current transformer (single phase)
CDCE33CT	CDCE3-3CT	Secondary current transformer (three-phase)
CDCE3L100	CDCE3-L100	Communication line 100cm
CDCE3L300	CDCE3-L300	Communication line 300cm

Controller selection description: Using external controller compensation, CDCE3C3G co-complement controller is selected when all products are co-complement capacitors; If there are co-replenishment + sub-replenishment or both are sub-replenishment capacitors, choose CDCE3C3H hybrid controller.

CDCE3 Low Voltage Smart Capacitor Compensation Device

Technical parameter

Working condition	
Ambient temperature (normal conditions)	-25℃～50℃
Storage temperature	-25℃～60℃（Within 24 hours, it can reach 70）
Altitude	2000m
Relative humidity	20℃时，no more than90%
Rated voltage(cocomplement)	AC400
Rated voltage(Fractional compensation)	AC230
Voltage deviation	-20%～+15%
Voltage waveform	Sine wave, the total distortion is not greater than 5%
Current waveform	Comply with GB/T 15576 public power grid harmonic current allowable value regulations If the field harmonics are more serious, the company's CDSVG, CDAPF products can be selected
Operating frequency	50Hz±5%
Reactive power compensation parameters	
Cut-through structure	Compound switch
Network connection	On-line 60 loops (double 2 loops, single 3 loops, double 6 loops, total 4 loops)
Error requirement	
Voltage measurement	0.5%（±20%）
Current measurement	±1%（1-6A）
Power factor	2.5%
Reactive power	±0.01
Temperature measurement	±1℃
Product performance	
Overtemperature protection	40 ° C to 80 ° C (Factory setting is 80 ° C）
Cutting surge current	3In
Voltage shock resistance	AC2500V
Running noise	-
Power consumption	< 0.5W or < 5W (standby and input)
Control accuracy	-
Allowed number of cuts	A million times
Annual failure rate	-
Class of protection	IP20
Place of use	Indoor type device
Feature	Telemetry, remote communication, remote control, remote adjustment
National standard	GB/T 15576 GB/T 7251.8
Certification certificate	CCC

Controller function	Cocomplement type	paratype
Protection function		
Undervoltage protection	■	■
Overvoltage protection	■	■
Undercurrent protection	■	■
Overcurrent protection	■	■
Unbalance protection	-	-
Power failure protection	■	■
Phase loss protection	■	■
Capacitance discharge protection	■	■
Overtemperature protection	■	■

- : None

■ : Standard

Factory parameters, co-complement (in parentheses are sub-complement parameters)

Label	Implication	Value range	unit	Instructions
01	Current change	1~999	/	Current transformer ratio. Default value =100. For example, a transformer of 500/5 is set to 100.
02	Simulated switching	0-1	-	The default value is 0. The switch is normal. =1, simulated switching;
03	Communication type	0-2	---	0: modbus protocol. 1: Hubei network adaptation: 2: DLT645 (Shandong/Hebei/Chongqing/Sichuan)
04	Network communication address	0-247	-	The default value is 0. The communication address is assigned automatically. The communication address is not assigned manually.
05	Background mailing address	0-247	-	Background mailing address; The default value is 0. 0 indicates the current capacitor address on the network.
06	Lower power factor limit	0.85-1.00	-	Lower limit of target power factor. The minimum value of the allowable switching capacitance to compensate the power factor. Below this value, the capacitor is put in. The default value is 0.95
07	Upper power factor limit	0.85-1.00	-	Target power factor upper limit. The maximum value of the allowed switching capacitor compensation power factor. Above this value, the capacitor is put in. The default value is 1.00
08	The first path capacity	0-40	kvar	Note the actual capacity of the first capacitor in the smart capacitor: =0 indicates no capacitor.
09	The second capacity	0-40	kvar	Note the actual capacity of the first capacitor in the smart capacitor: =0 indicates no capacitor.
10	Input delay	0-180	S	The default value of the network version is 10. Valid note for the host: =0 indicates no delay input.
11	Excision delay	0-180	S	Capacitor cutting delay time. Network version The default value is 10. Valid for the host: =0 indicates that there is no delay cutting.
12	Switching interval	2-180	S	The interval between capacitor removal and reapplication. The default value is 2
13	Overvoltage threshold	0-550	V	When the voltage is higher than this value, cut out the capacitor and block the output until the alarm is lifted. Total complement default =440, fractional complement default =253 Note: =0 indicates that the function is disabled.
14	Overpressure return differential	0-10	V	After the overvoltage alarm, the voltage falls below the overvoltage alarm threshold - the alarm is lifted at this value. The default value is 5
15	Overvoltage delay	0-180	S	The voltage is higher than the overvoltage alarm threshold, and the alarm will be output after N seconds. The default value is 3.
16	Undervoltage threshold	0-550	V	When the voltage is below this value, cut out the capacitor and close the output until the alarm is lifted. Total complement default value =340, subcomplement default value =195 Note: =0 indicates that the function is disabled.
17	Underpressure return difference	0-10	V	After the undervoltage alarm, the alarm is lifted when the voltage is higher than the undervoltage alarm threshold + this value. The default value is 5
18	Under calendering time	0-180	S	When the voltage is lower than the undervoltage alarm threshold and lasts for N seconds, the alarm will be output. Default value =3 When the total
19	Voltage harmonic threshold	0-99.9	%	voltage harmonic distortion rate is higher than this value, remove the capacitor and block the output until the alarm is lifted. The default value is 5. Note: =0 indicates that the function is disabled.
20	Voltage harmonic return difference	0-9.9	%	After the voltage harmonic alarm, the alarm is lifted when it is lower than the threshold -N. The default value is 1.0
21	Voltage harmonic delay	0-180	S	Voltage harmonic alarm is detected and output alarm after continuous Ns. The default value is 3
22	Current harmonic threshold	0-99.9	%	When the total current harmonic distortion rate is higher than this value, the capacitor is cut off and the output is blocked until the alarm is lifted. Default value =30.0 NOTE: =0 indicates that the function is disabled.
23	Current harmonic return difference	0-9.9	%	After the flow harmonic alarm, lower than the threshold -N, the alarm is lifted. The default value is 5.0
24	Current harmonic delay	0-180	S	The current harmonic alarm is detected and output the alarm after continuous Ns. The default value is 3
25	Overtemperature protection value	0-100	˚C	When the internal temperature of the capacitor is higher than this value, cut the capacitor and block the output until the alarm is lifted. Default value =80 NOTE: =0 indicates that the function is disabled.
26	Overtemperature protection back error	0-20	˚C	After the high temperature alarm, when it is lower than the threshold -N, the alarm is lifted. The default value is 10
27	Overflow threshold	0-5000	A	Overcurrent alarm threshold. Default value =0; Note: =0 indicates that the function is disabled.

Label	Implication	Value range	Unit	Instructions
28	Overflow threshold	0-5000	A	Overcurrent alarm threshold. Default value =0; Note: =0 indicates that the function is disabled.
29	Overcurrent	0-100	A	Overcurrent alarm return difference. Default value =5; Note: =0 indicates that the function is disabled.
30	returndifference overcurrent delay	0-180	S	After N seconds of triggering the overcurrent alarm, the overcurrent alarm is issued. The default value is 3;
31	Undercurrent threshold	0-500	mA	When the current is below this value, cut the capacitor and block the output until the alarm is removed. The default value is =100. Note: =0 indicates that the function is disabled.
32	Underflow return difference	0-50	mA	Undercurrent alarm return difference, default =20. Note: =0 indicates that the function
33	Undercurrent delay	0-180	S	is disabled. An undercurrent alarm is issued after N seconds of triggering the undercurrent alarm . The default value is 3;
34	Backlight mode	0-1	--	0: normal mode, 1: long on, default value =0.
35	Backlight time	1-1000	Min	In normal backlight mode, when no button is pressed, the backlight is on. The default value is 3
36	Voltage cut-off threshold	0-500	V	When the host detects that the network voltage is higher than the cut-off threshold, all capacitor devices in the network are removed. Total complement default =460, fractional complement default =265
37	Voltage throw threshold	0-500	V	When the host detects that the grid voltage is lower than the input threshold, all capacitor devices in the network are removed. The default value of co-complement =320 and the default value of sub-complement =184.
38	Phase sequence calibration flag bit	0-1	---	For phase sequence adjustment (standby) 0: normal phase sequence; 1: Internally reverses the current direction.
39	Device type	0-1	---	0: AD hoc network; 1: external controller If a controller is connected externally, set this parameter to 1 forcibly. To disable the controller from working independently, change 1 to 0 to restore the automatic network function.
40	Information baud rate	0-10	---	0 to 10: corresponds to 1200 to 115200
41	Return interval	0-999	Min	Automatically exit the parameter setting or manual state, and return to the automatic control state of the delay time, in minutes. Default =10 NOTE: 0 indicates that the switch is disabled.
42	Unified parameter adjustment	0-1	---	If host parameters are changed from 0 to 1, the host automatically synchronizes k ey parameters to the slave server for 10S, automatically disables this function, an d sets the parameter to 0.
43	The number of harmonic overruns	0-9	times	The maximum number of harmonic overruns that emit a blocking action, default =6.
44	Automatic release time	1-24	H	Automatic unlocking interval after harmonic overruns reach the maximum number of times. Default =4
45	Closed state	0-1	/	Block flag: =1 indicates a block, =0 indicates an unblock.
46	Alarm excision	1-180	S	After the alarm, the interval time for sequentially removing capacitors, default =2

Note: When the protection function threshold (e.g., overvoltage threshold, undervoltage threshold, voltage harmonic overlimit, current harmonic overlimit, etc.) is set to 0000, it indicates that the function is off. Due to the complex power grid environment, the shutdown may result in reduced product life, frequent trip of circuit breakers, and adhesion of magnetic holding relay contacts. Please set the parameters correctly. Incorrect Settings may result in inaccurate compensation or cyclic switching. The company will not be responsible for the failure caused by the shutdown of protection parameters or the wrong setting of parameters.

Attachments

■ Controller display and function

As shown in the figure, the display area can be divided into display and indication parts according to functions. The display part is realiz ed by the broken code LCD screen, and the indicator part is realized by the red LED light. Among them, the specific functions of the LE D light are as follows:

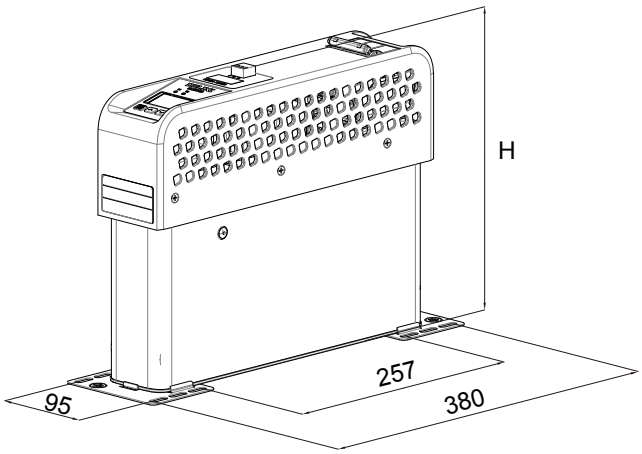
1) Normal operation: on indicates the input of the corresponding phase capacitor, off indicates the removal of the corresponding phase capacitor

2) Alarm: flashing indicates the corresponding alarm

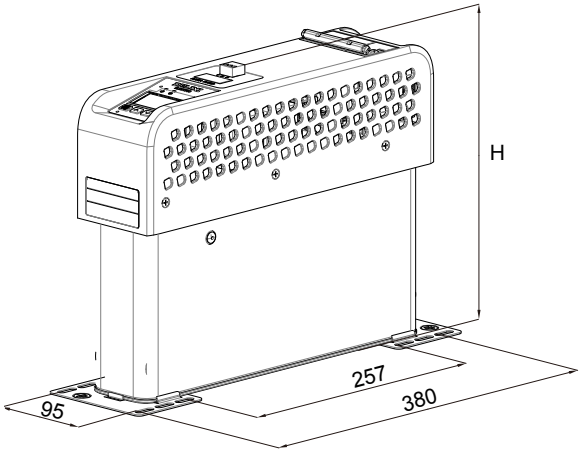
Key function description

名　称	功　能
自动/手动	长按：进入手动模式显示页面
^	向上翻页
v	向下翻页
执行	单击：进入二级菜单 长按：进入出厂参数列表

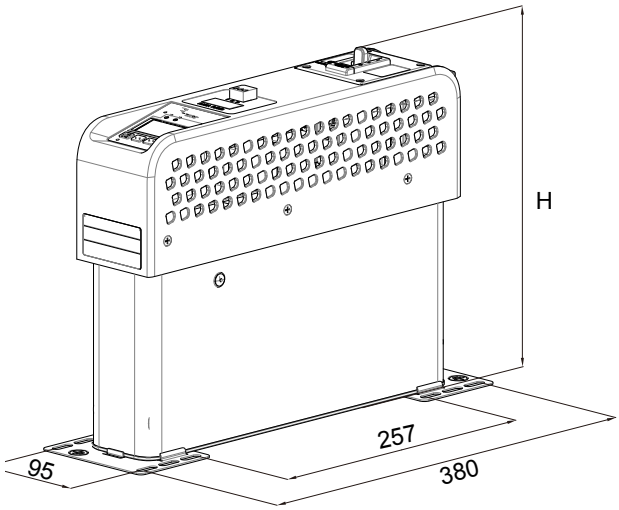
Outline and mounting dimensions



■ 图1



■ 图2



■ 图3

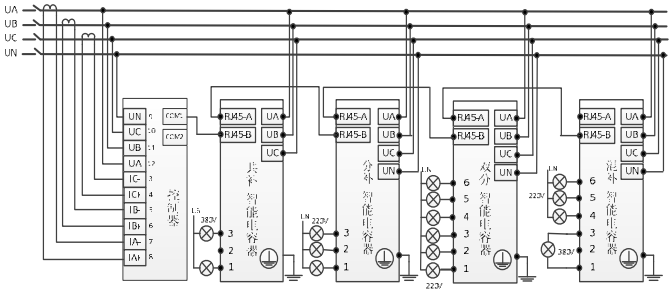
CDCE3 Compensation table

Material number	Material description	Rated capacity kvar	Rated current A	Product height Hmm	Map number
CDCE3GB04500505	CDCE3-GB450-0505	10	11.4	228	Figure1
CDCE3GB04501005	CDCE3-GB450-1005	15	17.1	228	Figure1
CDCE3GB04501010	CDCE3-GB450-1010	20	22.8	228	Figure1
CDCE3GB04501510	CDCE3-GB450-1510	25	28.5	278	Figure1
CDCE3GB04501515	CDCE3-GB450-1515	30	34.2	278	Figure 1
CDCE3GB04502010	CDCE3-GB450-2010	30	34.2	278	Figure 1
CDCE3GB04502020	CDCE3-GB450-2020	40	45.6	278	Figure 1
CDCE3GB04502525	CDCE3-GB450-2525	50	57.0	328	Figure 2
CDCE3GB04503020	CDCE3-GB450-3020	50	57.0	328	Figure 2
CDCE3GB04503030	CDCE3-GB450-3030	60	68.4	328	Figure 2
CDCE3FB02500005	CDCE3-FB250-05	5	6.1	228	Figure 1
CDCE3FB02500010	CDCE3-FB250-10	10	12.3	228	Figure 1
CDCE3FB02500015	CDCE3-FB250-15	15	18.4	278	Figure 1
CDCE3FB02500020	CDCE3-FB250-20	20	24.5	278	Figure 1
CDCE3FB02500025	CDCE3-FB250-25	25	30.7	278	Figure 1
CDCE3FB02500030	CDCE3-FB250-30	30	36.8	328	Figure 1
CDCE3FB02500505	CDCE3-FB250-0505	10	12.3	228	Figure 1
CDCE3FB02501005	CDCE3-FB250-1005	15	18.4	278	Figure 1
CDCE3FB02501010	CDCE3-FB250-1010	20	24.5	278	Figure 1
CDCE3FB02501510	CDCE3-FB250-1510	25	30.7	328	Figure 1
CDCE3FB02501515	CDCE3-FB250-1515	30	36.8	328	Figure 1
CDCE3FB02502010	CDCE3-FB250-2010	30	36.8	328	Figure 1
CDCE3FB02502015	CDCE3-FB250-2015	35	42.9	328	Figure 1
CDCE3FB02502020	CDCE3-FB250-2020	40	49.1	328	Figure 2
CDCE3FB02502525	CDCE3-FB250-2525	50	61.3	378	Figure 2
CDCE3HB04500505	CDCE3-HB450-05-D250-05	10	11.8	228	Figure 1
CDCE3HB04501005	CDCE3-HB450-10-D250-05	15	17.5	228	Figure 1
CDCE3HB04501010	CDCE3-HB450-10-D250-10	20	23.7	278	Figure 1
CDCE3HB04501510	CDCE3-HB450-15-D250-10	25	29.4	278	Figure 1
CDCE3HB04501515	CDCE3-HB450-15-D250-15	30	35.5	328	Figure 1
CDCE3HB04502010	CDCE3-HB450-20-D250-10	30	35.1	278	Figure 1
CDCE3HB04502015	CDCE3-HB450-20-D250-15	35	41.2	328	Figure 1
CDCE3HB04502020	CDCE3-HB450-20-D250-20	40	47.3	328	Figure 1
CDCE3HB04502525	CDCE3-HB450-25-D250-25	50	59.2	378	Figure 2
CDCE3HB04503030	CDCE3-HB450-30-D250-30	60	71.0	378	Figure 2
CDCE3HFB02500005	CDCE3-H-FB250-05	5	6.1	235	Figure 3
CDCE3HFB02500010	CDCE3-H-FB250-10	10	12.3	235	Figure 3
CDCE3HFB02500015	CDCE3-H-FB250-15	15	18.4	285	Figure 3
CDCE3HFB02500020	CDCE3-H-FB250-20	20	24.5	285	Figure 3
CDCE3HFB02500025	CDCE3-H-FB250-25	25	30.7	285	Figure 3
CDCE3HFB02500030	CDCE3-H-FB250-30	30	36.8	335	Figure 3
CDCE3HGB04500505	CDCE3-H-GB450-0505	10	11.4	235	Figure 3
CDCE3HGB04501005	CDCE3-H-GB450-1005	15	17.1	235	Figure 3

Material number	Material description	Rated capacity kvar	Rated current A	Product height Hmm	Map number
CDCE3HGB04501010	CDCE3-H-GB450-1010	20	22.8	235	Figure 3
CDCE3HGB04501510	CDCE3-H-GB450-1510	25	28.5	285	Figure 3
CDCE3HGB04501515	CDCE3-H-GB450-1515	30	34.2	285	Figure 3
CDCE3HGB04502010	CDCE3-H-GB450-2010	30	34.2	285	Figure 3
CDCE3HGB04502020	CDCE3-H-GB450-2020	40	45.6	285	Figure 3
CDCE3HGB04502525	CDCE3-H-GB450-2525	50	57.0	335	Figure 3
CDCE3HGB04503020	CDCE3-H-GB450-3020	50	57.0	335	Figure 3
CDCE3HGB04503030	CDCE3-H-GB450-3030	60	68.4	335	Figure 3
CDCE3HFB02500505	CDCE3-H-FB250-0505	10	12.3	235	Figure 3
CDCE3HFB02501005	CDCE3-H-FB250-1005	15	18.4	285	Figure 3
CDCE3HFB02501010	CDCE3-H-FB250-1010	20	24.5	285	Figure 3
CDCE3HFB02501510	CDCE3-H-FB250-1510	25	30.7	335	Figure 3
CDCE3HFB02501515	CDCE3-H-FB250-1515	30	36.8	335	Figure 3
CDCE3HFB02502010	CDCE3-H-FB250-2010	30	36.8	335	Figure 3
CDCE3HFB02502015	CDCE3-H-FB250-2015	35	42.9	335	Figure 3
CDCE3HFB02502020	CDCE3-H-FB250-2020	40	49.1	335	Figure 3
CDCE3HFB02502525	CDCE3-H-FB250-2525	50	61.3	385	Figure 3
CDCE3HHB04500505	CDCE3-H-HB450-05-D250-05	10	11.8	235	Figure 3
CDCE3HHB04501005	CDCE3-H-HB450-10-D250-05	15	17.5	235	Figure 3
CDCE3HHB04501010	CDCE3-H-HB450-10-D250-10	20	23.7	285	Figure 3
CDCE3HHB04501510	CDCE3-H-HB450-15-D250-10	25	29.4	285	Figure 3
CDCE3HHB04501515	CDCE3-H-HB450-15-D250-15	30	35.5	335	Figure 3
CDCE3HHB04502010	CDCE3-H-HB450-20-D250-10	30	35.1	285	Figure 3
CDCE3HHB04502015	CDCE3-H-HB450-20-D250-15	35	41.2	335	Figure 3
CDCE3HHB04502020	CDCE3-H-HB450-20-D250-20	40	47.3	335	Figure 3
CDCE3HHB04502525	CDCE3-H-HB450-25-D250-25	50	59.2	385	Figure 3
CDCE3HHB04503030	CDCE3-H-HB450-30-D250-30	60	71.0	385	Figure 3

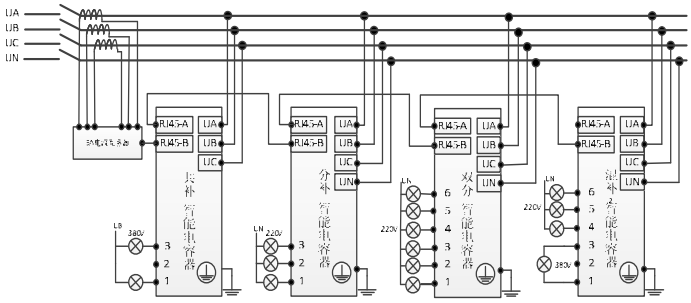
Product wiring diagram

The number of all intelligent capacitors in the compensation network sh
all not exceed 30, and the number of capacitor channels shall not exce
ed 60. A. Connect the external controller to compensate



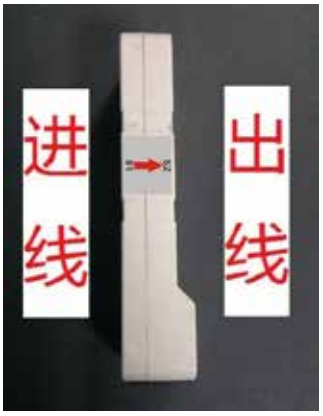
Connection mode with controller

B. AD hoc network (without controller) Hybrid compensation cable connection



AD hoc network connection mode

C. AD hoc network (without controller) Connection mode of the secondary current transformer
The current transformer sampling is connected to the RJ45 port of any capacitor. The plane of the current transformer is the incoming line, and the convex head with A, B, and C is the outgoing line (the incoming and outgoing lines must be connected correctly), as sho wn in the following figure



Note 1: The A/B/C three-phase current signal must be connected to the sub-complement, if only the co-complement, only the B phase current signal needs to be connected.
Note 2: The default network address of intelligent capacitors is automatically assigned. When the external controller is connected, the controller acts as the host, and all intelligent capacitors in the network are automatically configured as the slave.
No new hosts are created. If there is no controller connected in the network, the supplementary intelligent capacitor becomes the host first, followed by the supplementary intelligent capacitor.
The co-compensating intelligent capacitor has the lowest priority, and the entire networking process does not require manual intervention.
Note 3: The smart capacitor matches the distribution terminal, and the address is automatically allocated by the system without setting. The white and orange lines in the network cable of 568B connection mode are 485 communication A, and the white and blue lines are 485 communication B.