



Power quality management  
**PRODUCTS CATALOGUE**



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## Introduction

BTB ELECTRIC Company is a European standard electrical equipment manufacturer. We provide solutions to improve power quality, products include Capacitors, Harmonic Filter Reactors, Power Factor Controllers, Active harmonic filters, Intelligent combined low voltage power capacitor.

Our products are manufactured in a high-class fully automated manufacturing unit under expert supervision. Each product goes through various stages of stringent quality checks to ensure the best quality. Our Products are exported throughout the world, and we have earned a great reputation from customers world wide. We believe that developing the most unique and superior products is the best way to meet/exceed customers' expectations. We strive to provide our clients new products, advanced designs, and patented innovations so that they can stay on the top of their markets.

BTB Electric carries out production in strict accordance with the ISO9001 quality management system.

## Basic characteristics

Many electrical devices, equipments and systems needs an electromagnetic field for their standard operation. This physical necessity leads to a consumption of reactive power which is used to provide basic function but not any active power. It means that transmission and distribution system is loaded with this reactive power and that's not an economically effective use and therefore it's penalized by electrical utility companies.

The solution is to use local power factor compensation to provide the required rective power from power capacitors directly to the appliance to avoid undesired load of the mains network.

## Application Fields

Widely used in power distribution systems: State Grid Power Corporation, factory power distribution systems, medical, commercial buildings, communities, and other power distribution systems.

## Standard and Environment

Standard	EN 61000-6 IEC/EN 60831-1/ 2, IEC/EN 60076-6 IEC/EN 60947-4-1, IEC/EN 61921 JB/T 9663-2013, JB/T 11067-2011 GB/T15576-2008 2014/30/EU (EMC)
Certificate	CPRI / CQC / LCIE
Ambient air temperature	Storage: -30°C ~ +65°C Operation: -5°C ~ +55°C
Operating altitude	2000m

# Calculate the required reactive power

## Calculation table

Original cosφ <sub>1</sub>	k coefficient for target cosφ <sub>2</sub>										
	0,90	0,91	0,92	0,93	0,94	0,95	0,96	0,97	0,98	0,99	1,00
0,70	0,54	0,56	0,59	0,62	0,66	0,69	0,73	0,77	0,82	0,88	1,02
0,75	0,40	0,43	0,46	0,49	0,52	0,55	0,59	0,63	0,68	0,74	0,88
0,80	0,27	0,29	0,32	0,35	0,39	0,42	0,46	0,50	0,55	0,61	0,75
0,82	0,21	0,24	0,27	0,30	0,34	0,37	0,41	0,45	0,49	0,56	0,70
0,84	0,16	0,19	0,22	0,25	0,28	0,32	0,35	0,40	0,44	0,50	0,65
0,85	0,14	0,16	0,19	0,22	0,26	0,29	0,33	0,37	0,42	0,48	0,62
0,86	0,11	0,14	0,17	0,20	0,23	0,26	0,30	0,34	0,39	0,45	0,59
0,87	0,08	0,11	0,14	0,17	0,20	0,24	0,28	0,32	0,36	0,42	0,57
0,88	0,06	0,08	0,11	0,14	0,18	0,21	0,25	0,29	0,34	0,40	0,54
0,89	0,03	0,06	0,09	0,12	0,15	0,18	0,22	0,26	0,31	0,37	0,51
0,90		0,03	0,06	0,09	0,12	0,16	0,19	0,23	0,28	0,34	0,48
0,91			0,03	0,06	0,09	0,13	0,16	0,20	0,25	0,31	0,46
0,92				0,03	0,06	0,10	0,13	0,18	0,22	0,28	0,43
0,93					0,03	0,07	0,10	0,14	0,19	0,25	0,40
0,94						0,03	0,07	0,11	0,16	0,22	0,36
0,95							0,04	0,08	0,13	0,19	0,33

## Formula for required reactive power

$$Q_c = P * k = P * (\tan\phi_1 - \tan\phi_2)$$

$$P = S * \cos\phi$$

- Q<sub>c</sub> - Reactive power of the required power capacitor
- P - Active power of the load to be corrected
- k - Conversion coefficient
- φ<sub>1</sub> - Original cosφ
- φ<sub>2</sub> - Target cosφ

## Calculation example

Load power P = 100 kW  
 Original cosφ<sub>1</sub> = 0,75  
 Target cosφ<sub>2</sub> = 0,95  
 k coeff. (from table) = 0,55



Capacitor reactive power Q<sub>c</sub>

$$Q_c = P * k = 100 * 0,55 = 55 \text{ kvar}$$

## Basic formulas for detuned power factor corection

$$U_c = \frac{U_N}{1 - \frac{P}{100\%}}$$

$$P = \frac{X_L}{X_C} * 100\%$$

$$f_r = f_N \sqrt{\frac{100\%}{P}}$$

- U<sub>c</sub> - Capacitor voltage – rms value of required voltage of the capacitor. The reactor cause increase of the mains voltage at capacitor
- P - Detuning factor – ratio of reactor inductance and capacitor capacitance reactances
- f<sub>r</sub> - Serie resonance frequency between reactor and capacitor
- U<sub>N</sub> - Nominal (rated) mains voltage
- f<sub>N</sub> - Nominal (rated) mains frequency

# Dry Power Capacitors

## Application

Three-phased Cylindrical - Dry Power Capacitors is used to correct power factor for motors, low voltage transformers and inside industrial switchboard. It is sometimes used with blocking reactors with harmonics presence.



## Salient features

- Dry type, cylindrical aluminium case
- Available for rated voltage 440V / 3 phase connection
- Maximum permissible current 1.5 In
- Maximum inrush current 200 In
- Loss < 0,2W/kVAR
- Statistical Life Expectancy > 130,000 operating hours
- Equipped with pressure activated series interruptor
- Compliance to standard IEC/EN 60831-1 & 2

## Technical specifications

General characteristics	
Standards	IEC/EN 60831-1/ 2
Type	Dry, Self healing
Rated Voltage (Un)	240V to 690V
Frequency (fn)	50/60Hz
Connection	3-phase (Internal delta)
Power range	1 to 50 kvar
Capacitance tolerance	-5% / +10%
Dielectric loss	≤ 0.2W / kVAR
Testing voltage between terminals / time	2.15 Un / 10s
Testing voltage between terminals and container / time	4kV / 10s
Lighting impulse test between terminal and container	8kV (Peak)
Maximum permissible voltage	1.1 Un (8hours in evenry 24hours) 1.15 Un (30minutes in evenry 24hours) 1.2 Un (5minutes) 1.3 Un (1minute)
Discharge resistor	Fitted, parameters in the table
Construction	
External terminal box & casing finishing	Extruded aluminum casing
Dielectric	Metallized polypropylene film with Zn/Al alloy.
Plate	Zinc-Aluminum alloy (*)
Impregnation	Non-PCB, biodegradable soft resin
Working conditions	
Temperature category	- 25°C to +55°C (class D)
Max altitude	2000 m
Max relative humidity	95%
Maximum permissible current	1.5 In
Maximum inrush current	200 In
Statistical life expectancy	> 130,000 Operating hours (**)
IP rating	IP20
Installation characteristics	
Mounting position	Indoor, upright & horizontal
Fastening / earthing	Threaded M12 stud at the bottom (≤ 15Nm)
Terminals	Screw terminal top deck
Safety features	
Safety Device	Auto disconnect, when capacitor has trouble (Pressure Active Series Interruptor)
Protection	IP20
Note	
(*) Special resisity & profile, special edge - Wave-cut (THD ≤4%)	
(**) Respect the manufacturer's technique	

## Dimension and structure

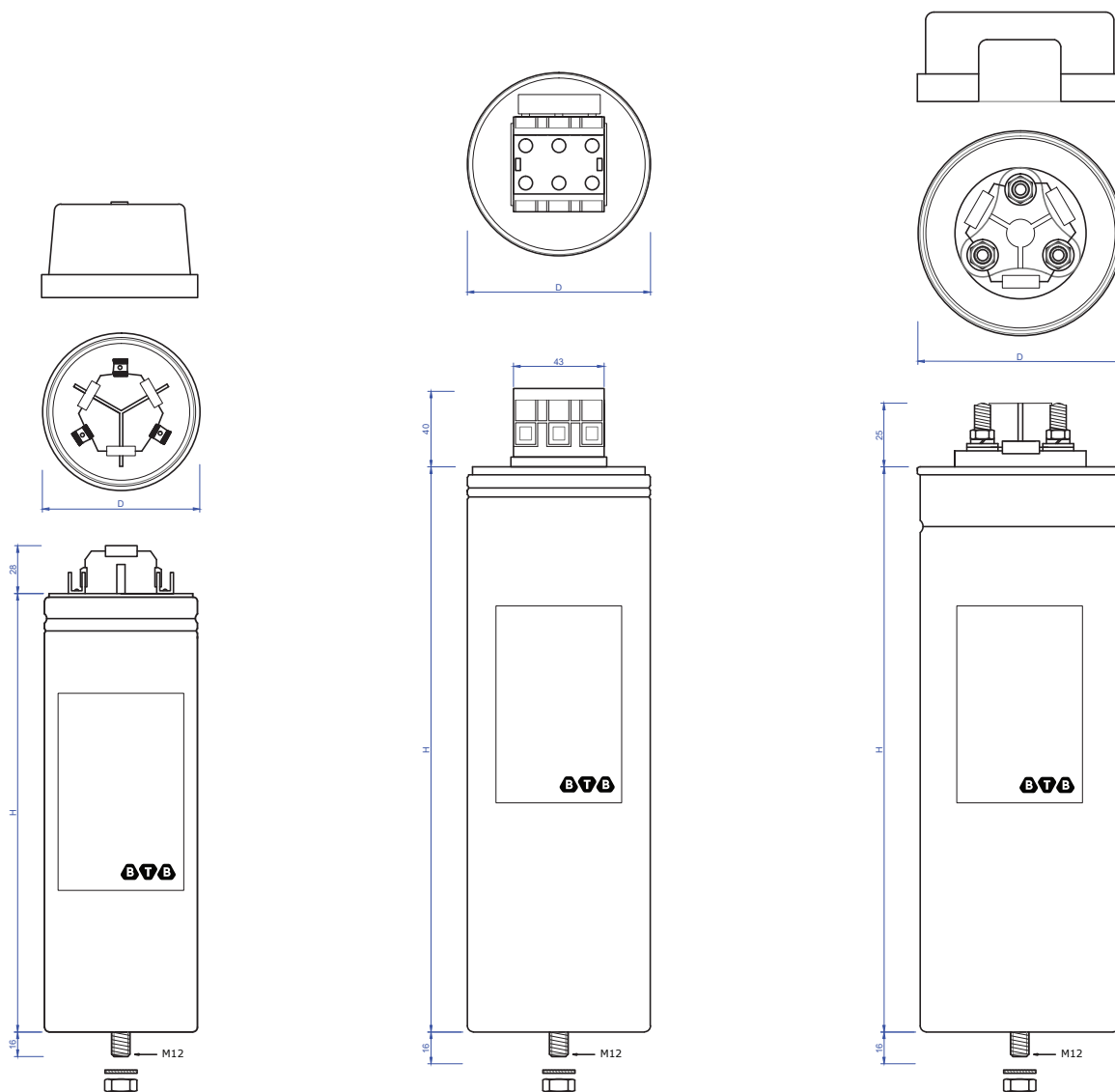


Fig A

Fig B

Fig C

## Capacitor code M data sheet - 240V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor (k $\Omega$ )	Weight $\pm 0.1$ (kg)	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing D$	H			
BDC2405M	240	50	5	3x97	12	86	225	100	1.4	Fig B
BDC2410M	240	50	10	3x194	24	100	287	100	2.5	Fig B
BDC2415M	240	50	15	3x276	36	120	287	100	3.0	Fig B



## Capacitor code I data sheet - 250V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor	Weight $\pm 0.1$	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing$ D	H	(k $\Omega$ )	(kg)	
BDC2505I	250	50	5	3x85	11.5	75	200	100	1.1	Fig C
BDC2510I	250	50	10	3x170	23	85	300	100	2.0	Fig C
BDC2515I	250	50	15	3x255	35	100	300	100	2.6	Fig C
BDC2520I	250	50	20	3x340	46	116	300	80	3.5	Fig C
BDC2525I	250	50	25	3x424	58	136	300	80	4.6	Fig C

## Capacitor code M data sheet - 415V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor	Weight $\pm 0.1$	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing$ D	H	(k $\Omega$ )	(kg)	
BDC4105M	415	50	5	3x31	7	65	206	680	0.5	Fig A
BDC4110M	415	50	10	3x62	14	75	225	100	1.4	Fig B
BDC4115M	415	50	15	3x93	21	86	225	100	1.5	Fig B
BDC4120M	415	50	20	3x123	28	86	287	100	1.8	Fig B
BDC4125M	415	50	25	3x154	35	100	287	100	2.4	Fig B
BDC4130M	415	50	30	3x185	42	100	287	100	2.5	Fig B

## Capacitor code I data sheet - 415V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor	Weight $\pm 0.1$	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing$ D	H	(k $\Omega$ )	(kg)	
BDC4105I	415	50	5	3x31	7	63	200	680	0.7	Fig A
BDC4110I	415	50	10	3x62	14	85	200	100	1.3	Fig B/C
BDC4115I	415	50	15	3x93	21	85	300	100	2.0	Fig B/C
BDC4120I	415	50	20	3x123	28	90	300	100	2.3	Fig B/C
BDC4125I	415	50	25	3x154	35	100	300	100	2.6	Fig B/C
BDC4130I	415	50	30	3x185	42	116	300	100	3.2	Fig B/C

## Capacitor code M data sheet - 440V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor	Weight $\pm 0.1$	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing$ D	H	(k $\Omega$ )	(kg)	
BDC4405M	440	50	5	3x27	7	60	153	680	0.5	Fig A
BDC4410M	440	50	10	3x55	13	75	225	100	1.3	Fig B
BDC4415M	440	50	15	3x82	20	75	225	100	1.3	Fig B
BDC4420M	440	50	20	3x110	26	75	287	100	2.0	Fig B
BDC4425M	440	50	25	3x137	33	86	287	100	2.1	Fig B
BDC4430M	440	50	30	3x164	39	86	329	100	2.5	Fig B

### Capacitor code I data sheet - 440V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor	Weight $\pm 0.1$	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing$ D	H	(k $\Omega$ )	(kg)	
BDC4405I	440	50	5	3x27	7	63	200	680	0.7	Fig A
BDC4410I	440	50	10	3x55	13	75	200	100	1.1	Fig B/C
BDC4415I	440	50	15	3x82	20	75	300	100	1.5	Fig B/C
BDC4420I	440	50	20	3x110	26	85	300	100	2.0	Fig B/C
BDC4425I	440	50	25	3x137	33	90	300	100	2.3	Fig B/C
BDC4430I	440	50	30	3x164	39	100	300	100	2.6	Fig B/C

### Capacitor code M data sheet - 480V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor	Weight $\pm 0.1$	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing$ D	H	(k $\Omega$ )	(kg)	
BDC4805M	480	50	5	3x23	6	65	206	680	0.8	Fig A
BDC4810M	480	50	10	3x46	12	75	225	100	1.4	Fig B
BDC4815M	480	50	15	3x69	18	86	287	100	1.8	Fig B
BDC4820M	480	50	20	3x92	24	86	287	100	2.4	Fig B
BDC4825M	480	50	25	3x115	30	86	329	100	2.5	Fig B
BDC4830M	480	50	30	3x138	36	120	287	100	2.9	Fig B

### Capacitor code M data sheet - 525V/50Hz

Product Code	$U_N$	$f_N$	$Q_N$	$C_N$	$I_N$	Dimension (mm)		Resistor	Weight $\pm 0.1$	Figure
	(V)	(Hz)	(kVAR)	( $\mu$ F)	(A)	$\varnothing$ D	H	(k $\Omega$ )	(kg)	
BDC5205M	525	50	5	3x19	5	65	206	680	0.5	Fig A
BDC5210M	525	50	10	3x38	11	75	225	100	1.3	Fig B
BDC5215M	525	50	15	3x58	16	75	287	100	1.4	Fig B
BDC5220M	525	50	20	3x77	22	86	287	100	1.8	Fig B
BDC5225M	525	50	25	3x96	27	86	287	100	2.4	Fig B
BDC5230M	525	50	30	3x115	33	86	329	100	2.5	Fig B

# Intelligent Capacitor

## Application

BIC series intelligent combined low voltage power capacitor compensation device (intelligent power capacitor) is an intelligent reactive power compensation device applied to 0.4kV low voltage distribution network to reduce line loss, improve power factor and power quality.

This product can be used in industrial areas like steel, chemical, construction materials, papermaking, textile, minel, electricity, telecommunications, aluminium, shipping ports, tabacoo, brewing, carmaking, precision electronics, and precision machinery.

BIC3 series typically integrate modern measurement and control equipment, power electronics, communication networks, automation controls, capacitors and other advanced technologies.

BIC37 series with reactors are designed primarily for high-performance power situations harmonics and traditional capacitors cannot work. It's not possible only meets reactive power compensation, improving power factor, but also limits the influence of corresponding harmonics on the capacitor and improve power quality.



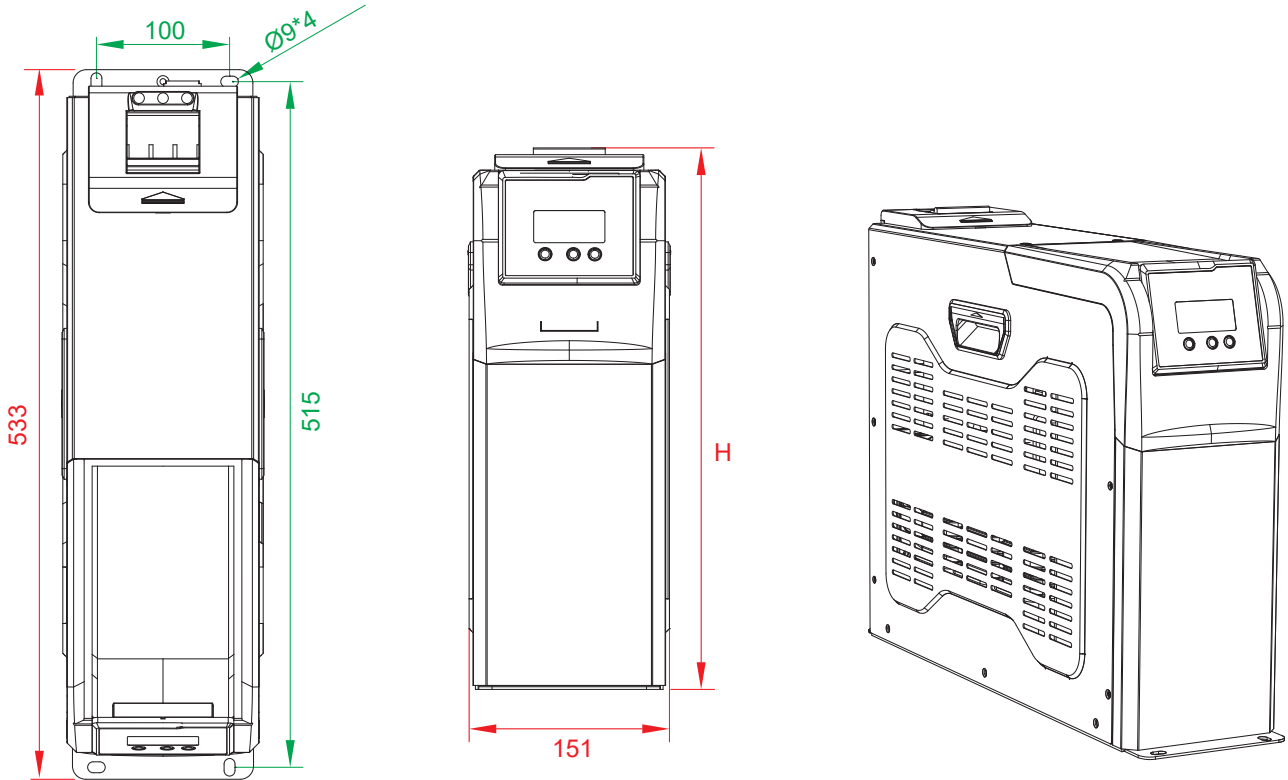
## Salient features

- New generation box type
- Automatic control
- Communication protocol Modbus / DL645 protocol
- Protective function U / I / THD / over-temperature
- Integrated 7% & 14% Harmonic Resistance
- Reduce installation time
- Compliance to standard GB/T15576-2008

## Technical specifications

General characteristics	
Standards	IEC/EN 61921 & GB/T15576-2008
Type	New generation box type, Self healing
Rated Voltage (Un)	250V to 525V $\pm 20\%$
Frequency (fn)	50Hz $\pm 10\%$
Connection	3-phase
Power range	5 to 60 kvar
Capacitance tolerance	-5% / +10%
Reactance ratio (%)	7% / 14% (for BIC series with reactors)
Dielectric	Metallized polypropylene film with Zn/Al alloy
Impregnation	Non-PCB, biodegradable soft resin
Maximum permissible voltage	1.1 Un (8hours in evenry 24hours) 1.15 Un (30minutes in evenry 24hours) 1.2 Un (5minutes) 1.3 Un (1minute)
Discharge resistor	Fitted, parameters in the table
Measurement and control	
Measurement tolerance	Voltage: $\leq \pm 0.5\%$ (0.8~1.2Un), current: $\leq \pm 0.5\%$ (0.2~1.2In) active power: $\leq \pm 2\%$ , power factor: $\leq \pm 1\%$ , temperature: $\pm 1^\circ\text{C}$
Protection tolerance	Voltage: $\leq \pm 1\%$ , current: $\leq \pm 1\%$ , temperature: $\pm 1^\circ\text{C}$ , time: $\pm 0.1\text{s}$
Reactive compensation parameters	Reactive power compensation tolerance: $\leq 50\%$ of the min. capacitor capacity, capacitor switching time: $\geq 10\text{s}$ , can be set between 10s and 180s
Reliability paramete	Control accuracy: 100%, allowable switching times: 1 million times, capacitor capacity running time attenuation rate: $\leq 1\%$ / year, capacitor capacity switching attenuation rate: $\leq 0.1\%$ / 10,000 times
Working conditions	
Temperature category	- 25°C to +55°C (class D)
Max altitude	2000 m
Max relative humidity	Relative humidity $\leq 50\%$ at 40°C; $\leq 90\%$ at 20°C
Environmental condition	No harmful gas and steam, no conductive or explosive dust, no severe mechanical vibration
Mounting position	Indoor, upright
THDv	$\leq 4\%$ and $\leq 5\%$ (for BIC series with reactors)
THDi	$\leq 20\%$
Safety features	
Protective function	Over-voltage protection, under-voltage protection, short-circuit protection, over-current protection, over-harmonic protection, over-temperature protection, drive failure protection
Communication monitoring capability	
Communication interface	RS485
Communication protocol	Modbus protocol / DL645

## Dimension and structure



## Functional equivalence diagram of intelligent capacitor



*The reactor appears in the Intelligent anti-harmonic capacitor*

## Intelligent Capacitor data sheet (three phase)

Product Code	$U_N$ (V)	$f_N$ (Hz)	$Q_N$ (kVAR)	Dimension WxDxH (mm)
BIC3-4505/05	450	50	10	80×395×215
BIC3-4510/05	450	50	15	80×395×235
BIC3-4510/10	450	50	20	80×395×235
BIC3-4515/15	450	50	30	80×395×315
BIC3-4520/10	450	50	30	80×395×315
BIC3-4520/20	450	50	40	80×395×315
BIC3-4525/25	450	50	50	80×395×345
BIC3-4530/30	450	50	60	80×395×345

*When equipped with controller, can be only used PFR-Z32 controller.*

## Intelligent Capacitor data sheet (split phase)

Product Code	$U_N$ (V)	$f_N$ (Hz)	$Q_N$ (kVAR)	Dimension WxDxH (mm)
BIC1-2505	250	50	5	80×395×215
BIC1-2510	250	50	10	80×395×215
BIC1-2515	250	50	15	80×395×235
BIC1-2520	250	50	20	80×395×265
BIC1-2525	250	50	25	80×395×315
BIC1-2530	250	50	30	80×395×315

B

Intelligent  
Capacitor

## Intelligent anti-harmonic capacitor data sheet (split phase)

Product Code	$U_N$ (V)	$f_N$ (Hz)	$Q_N$ (kVAR)	Reactance ratio	Dimension WxDxH (mm)
BIC17-2805	280	50	5	7%	150x533x357
BIC17-2810	280	50	10	7%	150x533x357
BIC17-2815	280	50	15	7%	150x533x357
BIC17-2820	280	50	20	7%	150x533x357
BIC17-2825	280	50	25	7%	150x533x407
BIC17-2830	280	50	30	7%	150x533x407

Product Code	$U_N$ (V)	$f_N$ (Hz)	$Q_N$ (kVAR)	Reactance ratio	Dimension WxDxH (mm)
BIC114-3005	300	50	5	14%	150x533x357
BIC114-3010	300	50	10	14%	150x533x357
BIC114-3015	300	50	15	14%	150x533x357
BIC114-3020	300	50	20	14%	150x533x357
BIC114-3025	300	50	25	14%	150x533x407
BIC114-3030	300	50	30	14%	150x533x407

## Intelligent anti-harmonic capacitor data sheet (three phase)

Product Code	$U_N$ (V)	$f_N$ (Hz)	$Q_N$ (kVAR)	Reactance ratio	Dimension WxDxH (mm)
BIC37-4810	480	50	10	7%	150x533x357
BIC37-4820	480	50	20	7%	150x533x357
BIC37-4830	480	50	30	7%	150x533x407
BIC37-4840	480	50	40	7%	150x533x407
BIC37-4850	480	50	50	7%	270x482x430
BIC37-4860	480	50	60	7%	270x482x430
BIC37-4870	480	50	70	7%	270x482x430

When equipped with controller, can be only used PFR-Z32 controller.

## Intelligent anti-harmonic capacitor data sheet (three phase)

Product Code	$U_N$ (V)	$f_N$ (Hz)	$Q_N$ (kVAR)	Reactance ratio	Dimension WxDxH (mm)
BIC314-5210	525	50	10	14%	150x533x357
BIC314-5220	525	50	20	14%	150x533x357
BIC314-5230	525	50	30	14%	150x533x407
BIC314-5240	525	50	40	14%	150x533x407
BIC314-5250	525	50	50	14%	270x482x430
BIC314-5260	525	50	60	14%	270x482x430
BIC314-5270	525	50	70	14%	270x482x430

When equipped with controller, can be only used PFR-Z32 controller.

## Accessories (additional purchased)

### Secondary current transformer





Three phase compensation type secondary current transformer



Split phase (mixed) compensation type secondary current transformer



### Communication cable

Specification	Length	Picture	Usage
W20	20cm		Connection of two adjacent intelligent capacitors
W80	80cm		Connection of upper and lower layers of intelligent capacitors
W260	260cm		Connection of intelligent capacitors in main and sub cabinet
D300-W	300cm		Connection of intelligent capacitor and controller

## Description of the model

B	IC	3	7	-	48	10	/	10
1	2	3	4		5	6		7

1	Enterprise code: BTB Electric	5	Capacitor voltage: 25: 250V; 30: 28: 280V;	
2	Code: Intelligent Capacitor		30: 300V; 45: 450V; 52: 525V	
3	3: 3 phase; 1: 1 phase	6	Capacitor capacity: 10: 10kVAR; 20: 20kVAR...	
4	Reactance ratio: 7% or 14% (anti-harmonic)	7	2nd capacitor capacity (if any)	

# Low voltage reactors

## Application

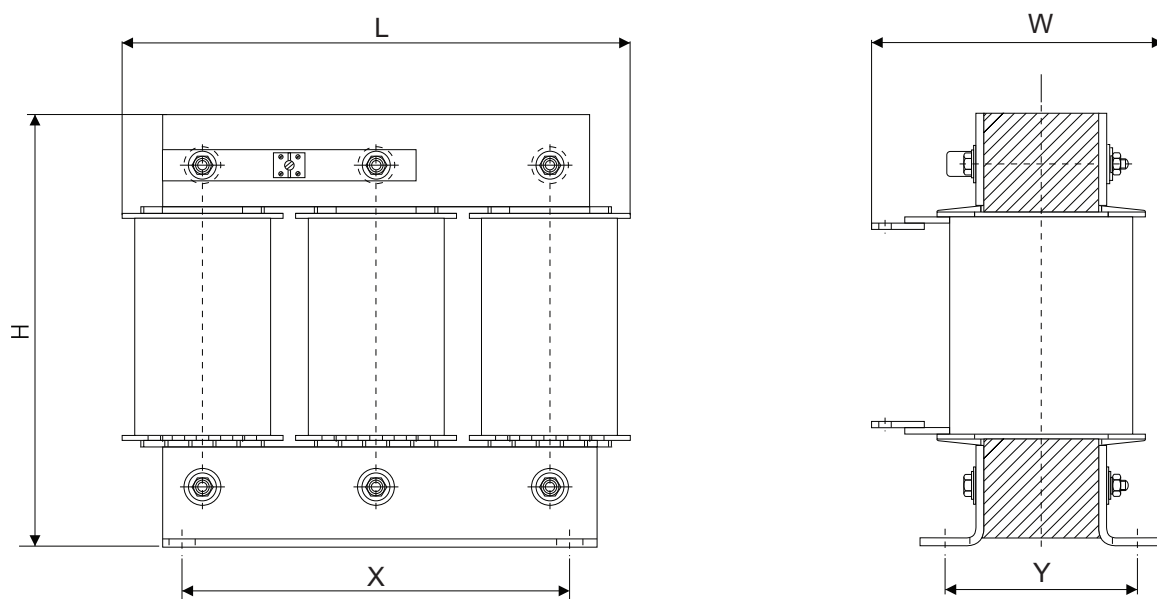
Frequent use of power electronic devices with nonlinear loads leads to harmonic distortion in electrical system. This nonsinusoidal load causes increase of effective current of power capacitor and other components of the system as well as the possibility of capacitor resonance with other inductive loads. Finally it may lead to problems or even failures in the installation. The solution is to use detuning (filtering) reactors, which creates a series resonant circuit with power capacitors. This detuned system prevents the installation from resonance effect and also acts as a filter for higher harmonic content. Usually there is recommended to use detuning reactors for the total voltage distortion THD-U higher than 3 %.

## Salient features

- Special Design with High-Level Saturation
- Superior Performance
- High-Grade Laminations in Magnetic Circuit
- Easy Pad Termination & Mounting
- Low Power Losses
- Protection from Excess Temperature



## Dimension and structure





## Technical specifications

General characteristics	
Standards	IEC/EN60076-6
Rated voltage (Un)	200V to 690V
Frequency (In)	50Hz
Power range	10 to 100 kvar (Ordered for special sizes)
Resonance frequency	6% - 204Hz / 7% - 189 Hz / 14% - 134Hz
Impedance ratio / model	P= 6% of Capacitor Value / BRH3-6 P= 7% of Capacitor Value / BRH3-7 P= 14% of Capacitor Value / BRH3-14
Tolerance of inductance	+/- 3% at Effective Current (Ieff)
The harmonic content of line voltage	U3 = 0.5%, U5 = 6%, U7 = 5%, U11 = 3.5%, U13 = 3%
Maximum current including harmonics overload	1.5 Times the Capacitor current
Insulation level	1.1 kV
Insulation strength testing voltage	3kV / 1min
Construction	
Design	Three phase, iron core with multi air gap
Coil winding material	Aluminium [Copper on request]
Duty cycle	Continuous
Vacuum impregnation	Yes
Working conditions	
Temperature category	- 25°C to +55°C
Maximum reactor operating temperature	135°C at ambient temperature 45°C
Insulation class	Class F / H (155°C / 180°C)
Max altitude	2000 m
Max relative humidity	95%
Linearity of Inductance	1.8 x Ic
Statistical life expectancy	> 200 000 hours
Installation characteristics	
Ventilation	Air-Cooled
IP Class	IP 00 [Indoor]
Noise level	Below 63db
Safety features	
Thermal overvload protection	Built-in thermostat cut off at 135°C

**For p = 7% reactor, with 440V/50Hz capacitor at 380-400V/50Hz only**

Product code	Q <sub>c</sub> (440V)	Reactor Inductance	Dimension (mm)					Fixing Holes	Irms	R	Total Loss
	kVAR	mH	L	W	H	X	Y	mm	A	mOhm	W
BRH3 7/400/10	10	4.31	190	136	205	150	85	Φ8x12	14.5	35.8	74.8
BRH3 7/400/15	15	2.88	190	144	205	150	95	Φ8x12	21.8	30.2	82.3
BRH3 7/400/20	20	2.16	225	165	195	210	105	Φ10x20	28.6	14.66	113
BRH3 7/400/25	25	1.73	240	165	200	210	110	Φ10x20	35.7	14.66	143
BRH3 7/400/30	30	1.44	250	170	200	210	115	Φ10x20	42.8	12.48	161
BRH3 7/400/40	40	1.08	275	175	230	210	130	Φ10x20	57.1	8.77	215
BRH3 7/400/50	50	0.86	275	175	230	210	130	Φ10x20	71.5	6.51	240
BRH3 7/400/60	60	0.72	300	180	260	210	130	Φ10x20	85.7	4.19	260
BRH3 7/400/70	70	0.62	300	210	260	265	130	Φ10x20	100.0	3.57	281
BRH3 7/400/75	75	0.58	300	220	260	265	140	Φ10x20	107.0	3.20	308
BRH3 7/400/80	80	0.54	300	220	260	265	145	Φ13x22	114.2	3.20	327
BRH3 7/400/100	100	0.43	300	230	290	265	150	Φ13x22	142.8	2.07	380

C  
Low voltage  
series reactor

**For p = 14% reactor, with 525V/50Hz capacitor at 380-415V/50Hz only**

Product code	Q <sub>c</sub> (525V)	Reactor Inductance	Dimension (mm)					Fixing Holes	Irms	R	Total Loss
	kVAR	mH	L	W	H	X	Y	mm	A	mOhm	W
BRH3 14/400/10	10	12.3	190	156	205	150	105	Φ8x12	11.0	126.7	82.7
BRH3 14/400/15	15	8.19	240	161	210	210	115	Φ10x22	16.5	76.3	119.4
BRH3 14/400/20	20	6.14	290	171	210	210	125	Φ10x20	22.0	44.3	180
BRH3 14/400/25	25	4.91	290	185	235	210	130	Φ10x20	27.5	28.7	215
BRH3 14/400/30	30	4.09	295	195	235	210	140	Φ10x20	33	23.6	238
BRH3 14/400/40	40	3.07	300	200	265	265	150	Φ10x20	44	16.2	242
BRH3 14/400/50	50	2.46	330	200	290	265	150	Φ10x20	55	11.0	268
BRH3 14/400/60	60	2.05	330	200	290	265	150	Φ10x20	66	8.5	288
BRH3 14/400/70	70	1.76	350	215	315	265	175	Φ10x20	77	7.2	334
BRH3 14/400/75	75	1.64	350	215	315	265	175	Φ10x20	82.5	6.5	340
BRH3 14/400/80	80	1.54	350	240	315	265	175	Φ13x22	88	5.9	350
BRH3 14/400/100	100	1.23	420	250	315	265	150	Φ13x22	110	3.8	382

# Medium voltage series reactor

## Application

The products, also called detuned reactors or filter reactors, are generally used in series with medium voltage capacitors in PFC system, in order to reach its target induced current. It possesses the functions of increasing power factors and limiting harmonic current.



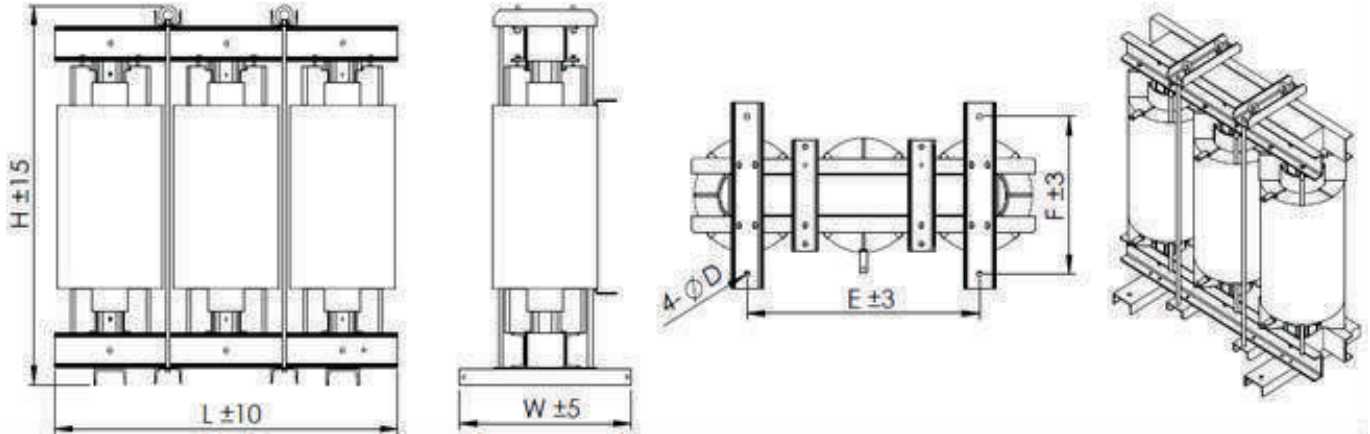
## Salient Features

- Very higher linearity
- Lower temperature rising
- Stand 25 times short circuit current in one second
- Easy Pad Termination & Mounting
- VPI process control
- Copper connections
- EN standard type testing

## Technical specifications

General characteristics	
Standards	IEC/EN60076-6
Rated voltage (Un)	1kV to 35kV
Frequency (In)	50Hz
Power range	100 to 2500 kvar (Ordered for special sizes)
Resonance frequency	6% - 204Hz / 7% - 189 Hz / 14% - 134Hz
Impedance ratio / model	P= 6% of Capacitor Value P= 7% of Capacitor Value P= 14% of Capacitor Value
Tolerance of inductance	+/- 3% at Effective Current (Ieff)
The harmonic content of line voltage	U3 = 0.5%, U5 = 6%, U7 = 5%, U11 = 3.5%, U13 = 3%
Construction	
Design	Three phase, iron core with multi air gap
Coil winding material	Aluminium [Copper on request]
Duty cycle	Continuous
Vacuum impregnation	Yes
Working conditions	
Temperature category	- 25°C to +55°C
Maximum reactor operating temperature	135°C at ambient temperature 45°C
Insulation class	Class H (180°C)
Max altitude	2000 m
Max relative humidity	95%
Linearity of Inductance	1.55 ~ 2.2 x Ic
Statistical life expectancy	> 200 000 hours
Installation characteristics	
Cooling method	Natural air
Terminals	Copper bar
IP Class	IP 00 [Indoor]
Noise level	Below 65db

## Dimension and structure



### Reactor p = 7%

Product code	Q <sub>C</sub>	U <sub>N</sub> /U <sub>C</sub>	L <sub>N</sub>	Dimension (mm)		I <sub>rms</sub>	Weight
	kVAR	kV	mH	L x W x H	E x F	A	kg
BRH3 7/6.3/100	100	6.3/6.9	106	700 x 400 x 720	460 x 300	9.5	125
BRH3 7/6.3/150	150		70.7	700 x 400 x 785	460 x 300	14.2	140
BRH3 7/6.3/200	200		53.0	700 x 400 x 855	460 x 300	18.9	155
BRH3 7/6.3/300	300		35.4	750 x 400 x 1000	500 x 300	28.4	180
BRH3 7/6.3/600	600		17.7	800 x 450 x 1070	540 x 350	56.7	300
BRH3 7/6.3/900	900		11.8	950 x 500 x 1060	640 x 400	85.1	420
BRH3 7/6.3/1500	1500		7.07	1100 x 550 x 930	720 x 450	141.8	520

BRH3 7/11/150	150	11/12	214	800 x 400 x 740	540 x 300	8.1	200
BRH3 7/11/300	300		107	850 x 400 x 970	580 x 300	16.3	282
BRH3 7/11/500	500		64.2	950 x 450 x 990	640 x 350	27.2	310
BRH3 7/11/600	600		53.5	950 x 500 x 1110	640 x 400	32.7	350
BRH3 7/11/900	900		35.7	1000 x 500 x 1100	660 x 400	48.9	450
BRH3 7/11/1500	1500		21.4	1150 x 550 x 1280	780 x 450	81.6	550

# Discharge Reactor

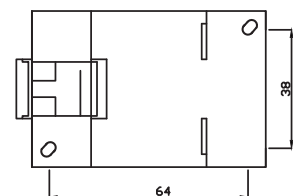
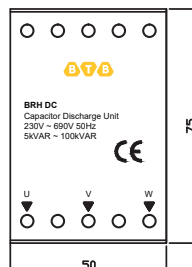
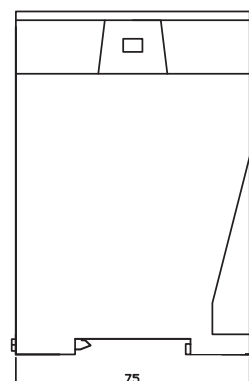
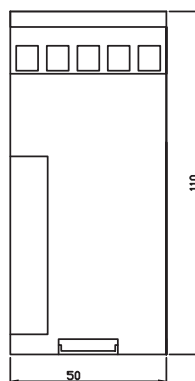
## Application

In a volatile reactive power environment, discharge reactors reduced discharge time and increase the life-time of the capacitors in a power factor correction system.

## Salient Features

- Reduces discharge time of capacitors for fast changing reactive power demands
- Low Loss
- Compact Design
- Up to 100 kVAR discharging
- Up to 690V operation voltage
- Din Rail mountable shockproof casin
- CE sign and manufactured under ISO 9001 quality management system

## Dimension and structure



## Technical specifications

General characteristics	
Product code	BRH DC
Design	Resistors
Resistance value	6k $\Omega$
Rated voltage (Un)	200V to 690V
Frequency (In)	50Hz
Capacitor capacity	5 to 100 kvar
Working conditions	
Temperature category	- 5°C to +55°C
Max altitude	2000 m
Max relative humidity	95%
Insulation strength testing voltage	3kV
Statistical life expectancy	> 200 000 hours
Installation characteristics	
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)
Location in diagram	Mounted behind the Contactor
IP Class	IP 00 [Indoor]
Time to discharge voltage below 50V	
Discharge time 250V	up to 25 kVAr < 10 s up to 50 kVAr < 20 s
Discharge time 400V - 525V	up to 25 kVAr < 5 s up to 50 kVAr < 10 s up to 100 kVAr < 20 s
Discharge time 690V	up to 25 kVAr < 3 s up to 50 kVAr < 5 s up to 100 kVAr < 10 s

# Power Factor Relay

## Application

Power Factor Controllers are used for measurement and control of power factor control units for central reactive power compensation. The power factor measured by PFR is compared with the set point values in order to provide necessary compensation, Power Factor Controller switches capacitor steps ON and OFF automatically. PFR is microcontroller relay, designed for flush mounting with rear plug-in connectors. In addition it displays the system's Cos $\phi$ , in Automatic Operating Mode, PFR displays the RMS value of Voltage (V), Current (I), Active Power (W), Reactive Power (kvar) and Apparent Power (VA) of measuring phase.

## Salient Features

- Manual, auto switching control
- Automatic C/K and rated step adjustment
- Automatic CT polarity correction
- Alarm Relay
- User-friendly setting
- Complies with IEC 61000-6-2 standard

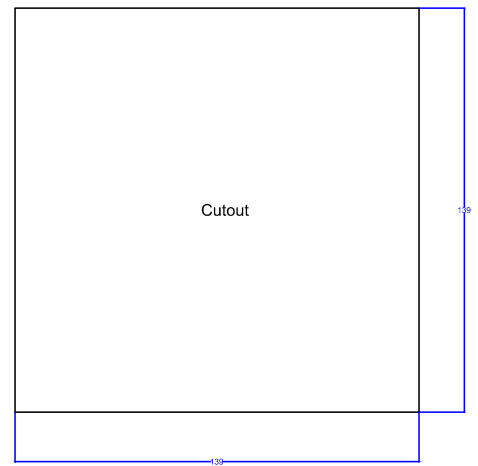
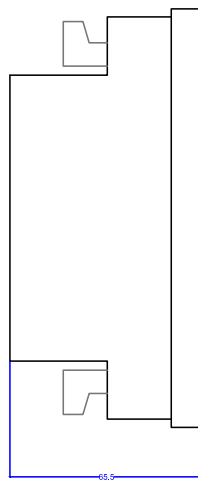
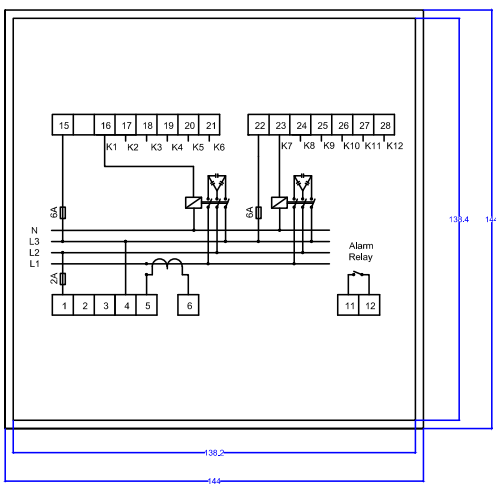
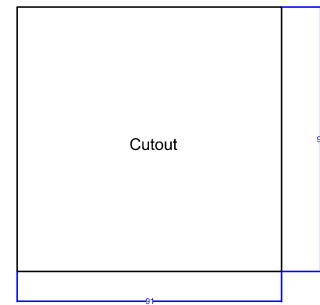
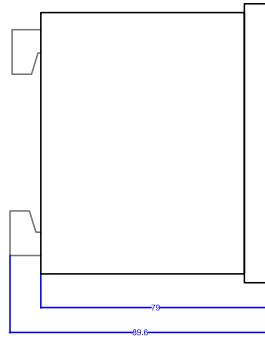
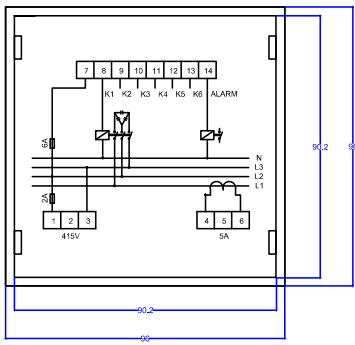




## Technical specifications

<b>Auxiliary Supply</b>	
Rated voltage (Un)	240V/415V
Operating voltage Range	±10%
Frequency (In)	50/60Hz
Power consumption	3VA – 10VA
<b>Current Input</b>	
Rated current (In)	5A
Operating current range	50mA ~ 5.5A
Power consumption	2VA max
Frequency (In)	50/60Hz
<b>Relay Output</b>	
Numbers of outputs	6 / 8 / 12 (PFR96b, PFR60b/ PFR80b / PFR120b)
Output contact	5 A, 250V (NO Contact)
Expected electrical life	> 100000 operations at rated current
Expected mechanical life	> 5000000 operations
No-Volt Feature	In case of power failure longer than 200 msec.all capacitor steps are disconnected automatically
Alam relay	1 (NO Contact)
<b>Control Range</b>	
Cosφ setting	0.85 (ind.) - 1.00
C/k setting	Automatic / 0.02-1.0
CT value	5 - 10000/5
Time delay (on, off)	Between 2 sec.-1800 sec; (2 sec - 50 sec for 96b)
Over voltage values	240-275V (265) / 410-480V (475)
Switching program	PS1 – PS5
<b>Display</b>	
Display screen	LED
Measure	Cosφ, PF, V, I, W, Var, VA
<b>Environmental Conditions</b>	
Ambient temperature	-5°C - 55°C
Humidity	5% - 95% non-condensing
Protection class	IP 40
Terminal block protection class	IP 00
Equipment protection class	Double Insulation-Class II
<b>Mechanical</b>	
Mounting	Panel mounting
Connections	Socket terminals with screw
Dimension (HxWxD)	143x143x67mm / 96x96x91mm
Switchboard cut-out	139x139mm / 91x91mm
Weight	0.8 kg

## Dimension and structure



## Ordering Information

Product code	Explain
PFR96b-415	6 steps, system voltage is 415V, dimensions 96x96mm
PFR60b-415	6 steps, system voltage is 415V, dimensions 144x144mm
PFR80b-415	8 steps, system voltage is 415V, dimensions 144x144mm
PFR120b-415	12 steps, system voltage is 415V, dimensions 144x144mm
PFR96b-240	6 steps, system voltage is 240V, dimensions 96x96mm
PFR60b-240	6 steps, system voltage is 240, dimensions 144x144mm
PFR80b-240	8 steps, system voltage is 240, dimensions 144x144mm
PFR120b-240	12 steps, system voltage is 240, dimensions 144x144mm

Power Factor Relay

# Intelligent power factor relay

## Application

PFR-Z is an integrated controller for reactive power compensation and power distribution monitoring. It integrates data acquisition, communication, reactive power compensation, grid parameter measurement, and analysis. RS485 communication control 32 pieces of intelligent capacitors (mixed or three phase compensation).

## Salient Features

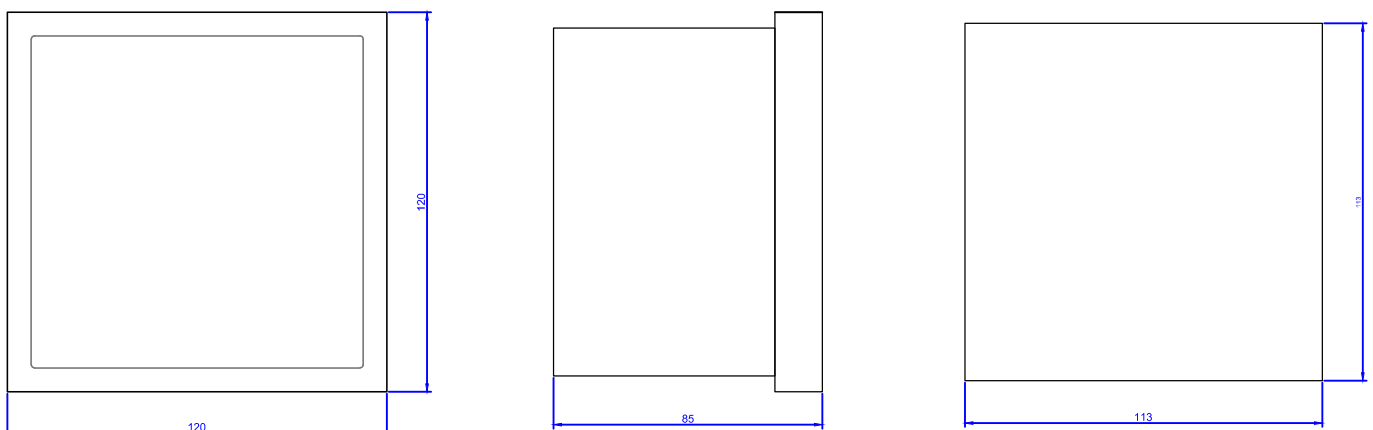
- Control 32 intelligent capacitors
- Mixed or three-phase compensation control
- Protective function  $U>$ ,  $U<$ ,  $I>$ , THD
- Communication interface RS485



## Technical specifications

General characteristics	
Standards	JB/T 9663-2013
Product code	PFR-Z / PFR-D
Rated voltage (Un)	220V ±20%
Frequency (fn)	50Hz ±10%
Measurement and control	
Measurement accuracy	Voltage: $\leq \pm 0.5\%$ (0.8~1.2Un), current: $\leq \pm 0.5\%$ (0.2~1.2In) reactive power: $\leq \pm 2\%$ , power factor: $\leq \pm 1\%$
Control quantity	PFR-Z RS485 communication control 32 pieces of intelligent capacitors (mixed or three phase compensation) or 16 pieces of communication type composite switches. PFR-D 12V output control 12 steps or 16 steps (composite switch node)
Compensation method	Mixed or three phase compensation
Working conditions	
Temperature category	- 25°C to +55°C (class D)
Max altitude	2000 m
Max relative humidity	Relative humidity $\leq 50\%$ at 40°C; $\leq 90\%$ at 20°C
Environmental condition	No harmful gas and steam, no conductive or explosive dust, no severe mechanical vibration
Mounting position	Indoor, upright
THDv	$\leq 5\%$
Safety features	
Protective function	Over-voltage protection, under-voltage protection, over-current protection, over-harmonic protection
Communication monitoring capability	
Communication interface	RS485
Communication protocol	Modbus protocol

## Dimension and structure

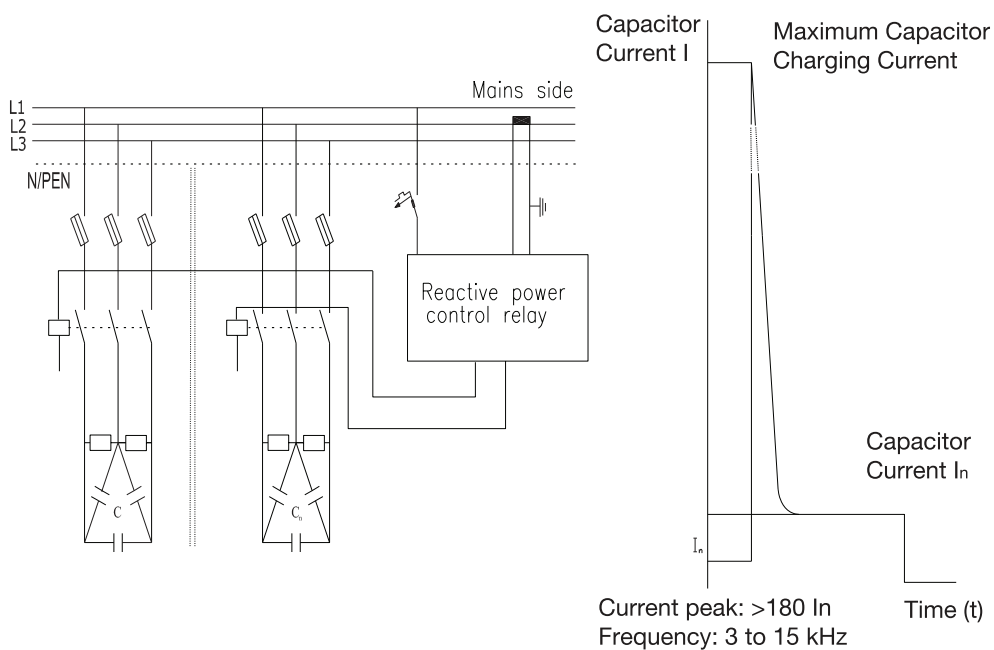


# Capacitor Duty Contactor

## Application

In low voltage installations, when a Capacitor is switched-on, it results in resonant circuit damped to a greater degree. In addition to the rated current, over current of high amplitude ( $> 180 I_n$ ) and high frequencies (3 ~ 15 kHz) occur during transit period (1 to 2 ms). The resultant high in-rush current peaks, caused due to capacitor switching, depends upon following factors (Network inductances, Transformer power and short circuit voltage, Harmonics presence in the system...). The in-rush current of such high magnitudes is undesirable and it is likely to weld main poles of any standard contactor.

Capacitor contactor are specially designed to meet stringent requirements of capacitor switching as deliberated above. The contactor are fitted with front-mounted block of 3 early make auxiliary contact in series with quick discharge damping six-resistors – 2 per phase to limit peak current to value within contactor making capacity such that normal rated capacitor current is carried by main contacts which, after closing effectively short out the resistors.



## Salient Features

- Damping of inrush current
- Low ohmic losses
- Power quality improvement
- Enhanced equipment life
- Low maintenance and down – time
- Optimized solution cost
- Capacitor bank switching in parallel without derating (Permanent current that can reach 1.5 time the nominal current of capacitor bank)



## Technical specifications

General characteristics	
Reference Standard	IEC 60947-4-1
Number of poles	3 poles
Rated Operational Voltage (Ue)	690V
Rated Insulation Voltage (Ui)	690V
Impulse Withstand Voltage (Uimp)	8kV
Rated Frequency	50/60Hz
Contactors fitted with a block of early make poles and damping resistors	Yes
Prospective peak current at switch-on	200In
Electrical durability at nominal load (all contactor ratings)	400V: 300000 operating cycles 690V: 200000 operating cycles

Product Code	Operating power at 50/60Hz $\theta \leq 55^\circ\text{C}$ (kVA <sub>r</sub> )*			Rated current (A)	Instantaneous auxiliary contacts ***		Maximum operating rate (Operations/hours)	Weight kg
	200/240V	400/440V	660/690V		NO	NC		
BCC05K11**	4	7	10.2	10	1	1	240	0.5
BCC10K11**	5.5	10	14.3	14	1	1	240	0.5
BCC12K11**	6.7	12.5	18	18	1	1	240	0.5
BCC15K11**	8.5	16.7	24	24	1	1	240	0.5
BCC20K11**	10	20	30	29	1	1	240	0.7
BCC25K11**	15	25	36	36	1	1	240	0.7
BCC30K12**	20	33.3	48	48	1	2	240	1.5
BCC40K12**	25	40	58	58	1	2	100	1.5
BCC50K12**	30	50	72	70	1	2	100	1.5
BCC60K12**	40	60	92	92	1	2	100	1.8
BCC75K12**	45	75	120	108	1	2	100	1.8
BCC100K12**	60	100	143	144	1	2	100	2.5

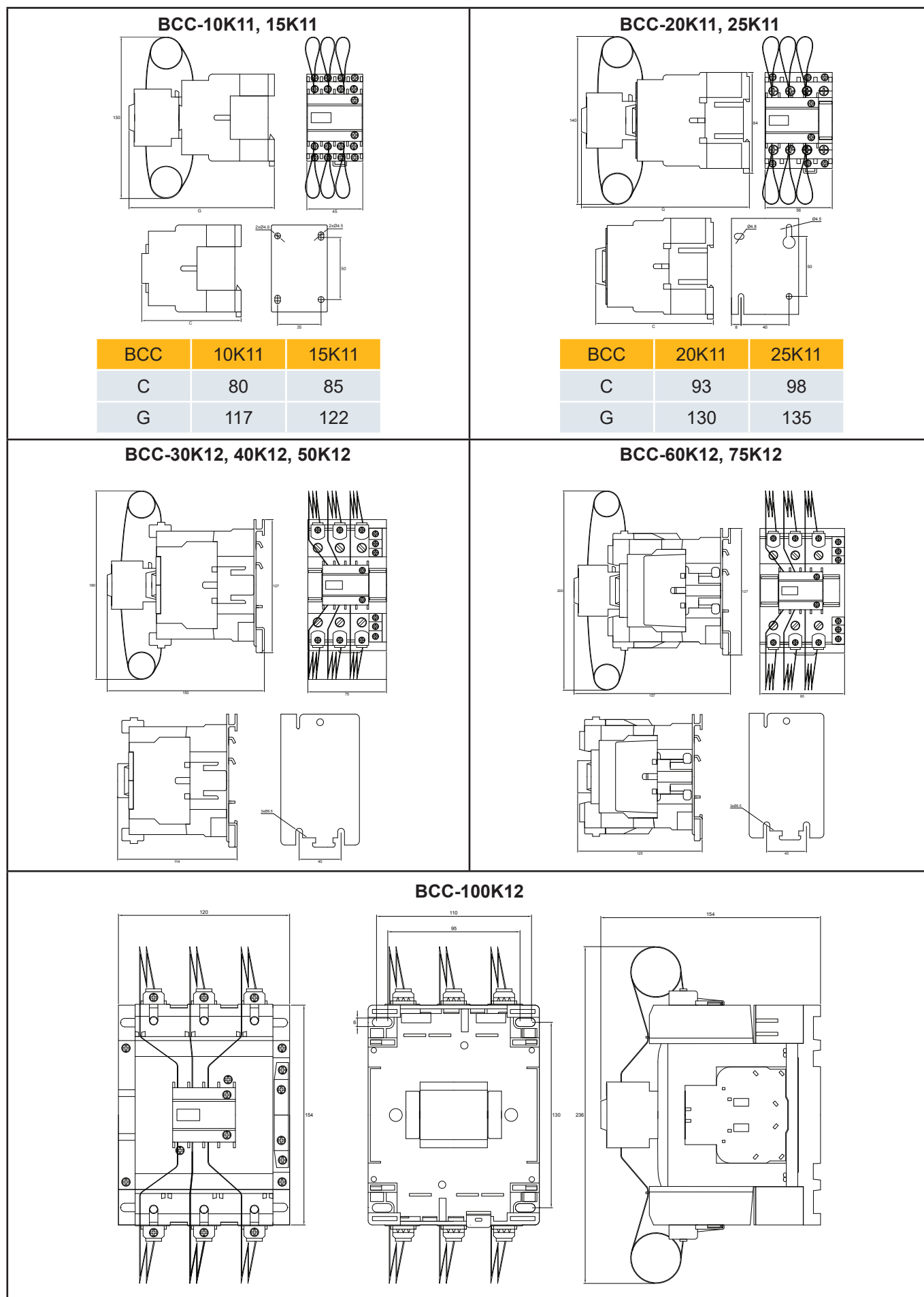
\*) The average temperature over a 24-hour period, in accordance with standards IEC 60070 and 60831 is 45°C

\*\*\*) Contactor coil code

\*\*\*) Maximum instantaneous auxiliary contact option 2NO+3NC

Control circuit voltage (Uc)	24V	110V	220V	240V	415V
Coil code 50Hz	B5	F5	M5	U5	N5
Coil code 50/60Hz	B7	F7	M7	U7	N7
Operating range at $\leq 60^\circ\text{C}$	0.8 ~ 1.1Uc				
Drop-out	0.3 ~ 0.6 Uc				

## Dimension and structure



# Switch Series

## Application

BCS series composite switch uses thyristor switch and magnetic holding switch to run in parallel. It has the advantages of thyristor zero-crossing switching at the moment of switching on and off, and has the advantages of zero power consumption of magnetic holding switch during normal switching on. This switch has the obvious advantages of no shock, low power consumption, long service life, etc., it can replace contactor or thyristor switch, and is widely used in low voltage reactive power compensation.



## Salient Features

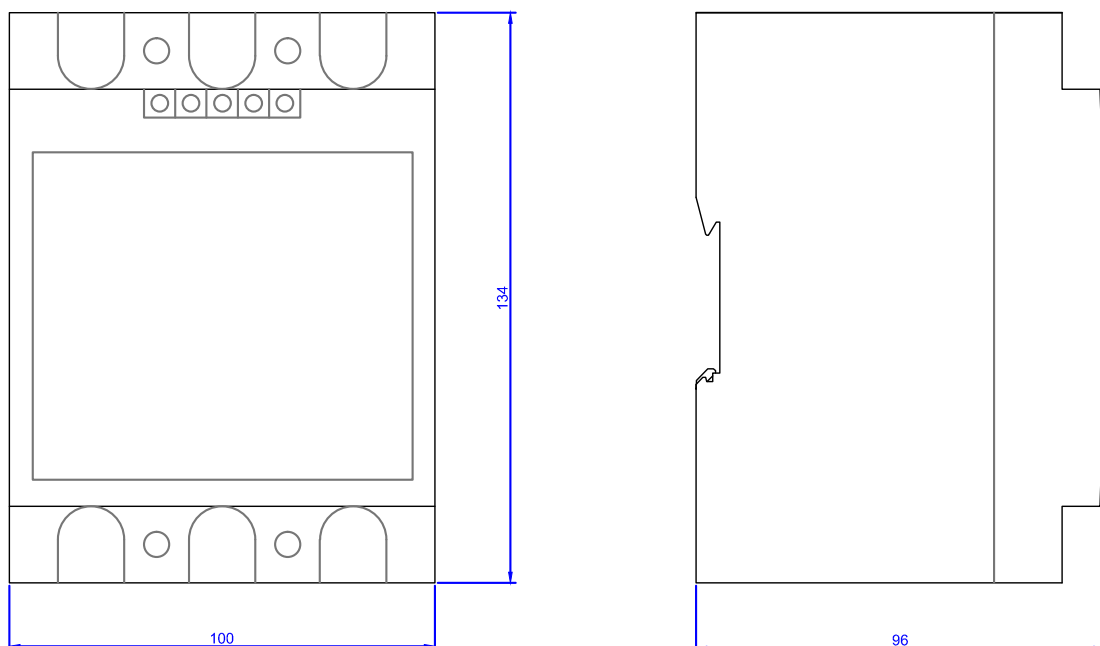
- Built-in microprocessor and intelligent software, can intelligently control capacitor switching
- The product achieves zero crossing switching, no arc, no inrush current, fast response
- On-resistance is zero, no harmonics are generated
- Non-heating, can be installed in a closed box
- Low failure rate and much longer service life than thyristors and contactors



## Technical specifications

General characteristics	
Standards	IEC 60947-4-1
Product code	BCW
Rated voltage (Un)	380VAC $\pm$ 20%
Frequency (fn)	50Hz $\pm$ 10%
Performance	
Rated working current	2mA
DC control voltage	DC8~18V
DC control current	2~10mA
Service life	300000 time
Working conditions	
Temperature category	- 25°C to +55°C (class D)
Max altitude	2500 m
Max relative humidity	Relative humidity $\leq$ 50% at 40°C; $\leq$ 90% at 20°C
Environmental condition	No harmful gas and steam, no conductive or explosive dust, no severe mechanical vibration
Mounting position	Indoor
Rail or bolt mounting	35mm rail installation; or M4x 35mm bolt installation, mounting size: 117 × 28mm
BCS	
380-45- $\Delta$ (Z) three phase compensation	Control capacity $\leq$ 30, control current 45A, control number of poles 3P
380-70- $\Delta$ (Z) three phase compensation	Control capacity $\leq$ 40, control current 70A, control number of poles 3P
220-45-Y (Z) split phase compensation	Control capacity $\leq$ 10kvar / phase $\times$ 3, control current 45A, control number of poles A + B + C
220-70-Y (Z) split phase compensation	Control capacity $\leq$ 13kvar / phase $\times$ 3, control current 70A, control number of poles A + B + C

## Dimension and structure



# Active Harmonic Filter

## Application

AHF connected in parallel to the low-voltage side of the power grid to improve the power quality. Featuring smart control, high efficiency, rapid dynamic response, and stable and reliable operation, they eliminate the complicated power quality problems and make it possible to achieve perfect power quality.



## Salient Features

- Harmonic compensation: AHF can filter 2 ~ 50 times random harmonics at the same time
- Reactive power compensation: Capacitive & Inductive (-1 ~ 1) stepless compensation
- Fast response
- Design life is more than 100,000 hours (more than ten years)

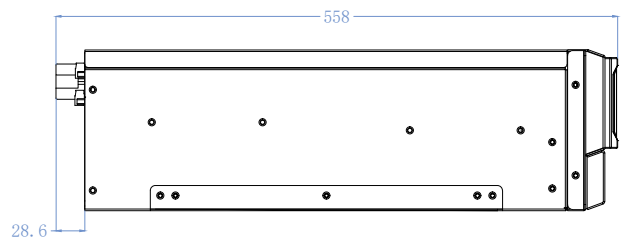
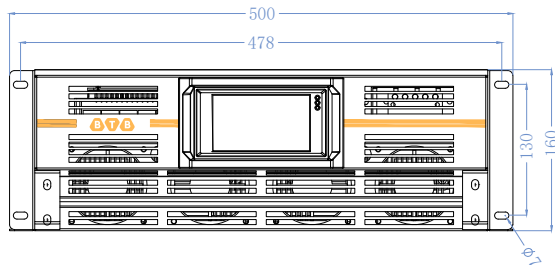
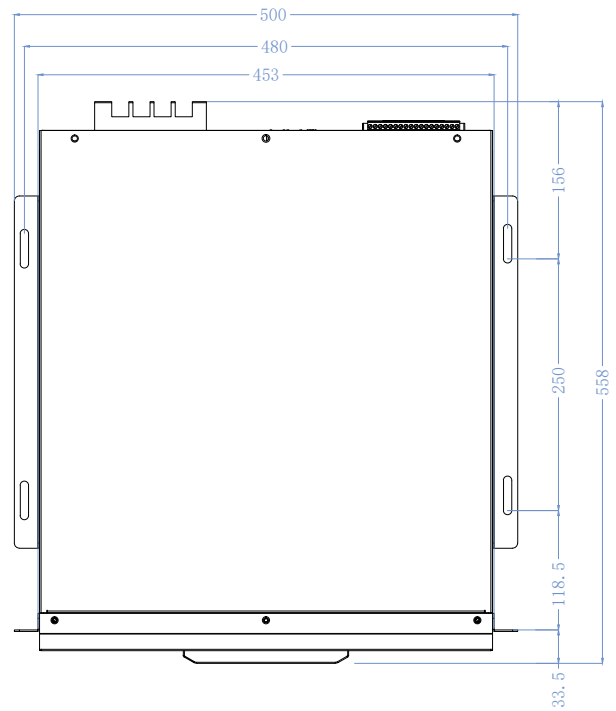
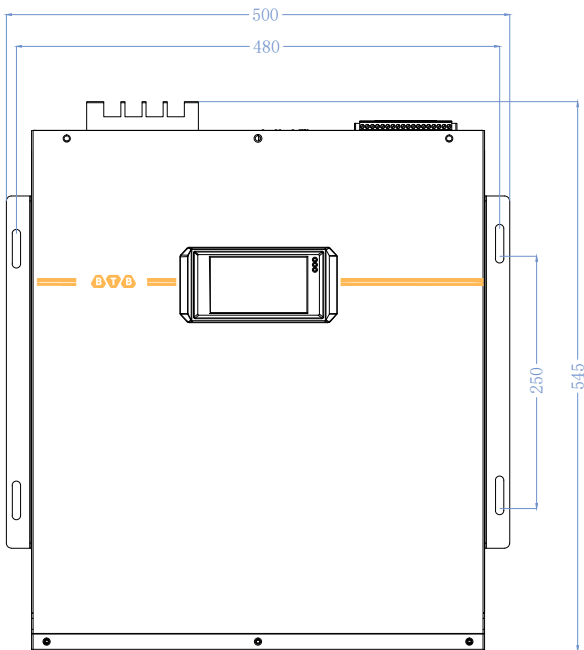
## Technical specifications

General characteristics	
Standards	JB/T 11067-2011, DL/T 1216-2013 IEC/EN 60439-1, 2014/30/EU, EN 61000-6
Rated input line voltage	380V ±20%
Frequency (fn)	50Hz ±10%
Compensation current	50A, 75A, 100A, 150A per module 200A, 300A, 400A, 450A, 500A, 600A per cabinet
Power grid structure	3P3W / 3P4W
Performance specifications	
Operating mode	Active harmonic filtering / Power factor correction / Load balancing
Compensation efficiency	≥ 97%
Harmonic spectrum	2nd to 50th harmonics
Harmonic compensation selection	2nd to 50th harmonics all can be selected individually
Response time	Instantaneous response time < 0.1ms Full response time < 10ms
Power factor correction	Power factor programmable from 1 (inductive) to -1 (capacitive)
Load balancing	Programmable load balancing between phases
Protections	Over-voltage protection, under-voltage protection, short-circuit protection, over-current protection, over-temperature protection, drive fault protection
Operation configuration	
Parallel operation	Up to 8 modules (different rated currents capable)
CT requirements	3 CTs required (100/5A ~ 5000/5A, class 0.5)
Circuit topology	Three-level
Power loss	Less than 3% of rated power
Communication monitoring capability	
Communication interface	RS485, CAN interface
Communication protocol	Modbus protocol
Module display interface	LCD multi-function touch color screen (optional)
Error alarm	Support independent monitoring or centralized monitoring
Environmental conditions	
Operation temperature	-10 ~ 40°C (higher operation temperature allowed with derating)
Humidity	≤ 95% non-condensation
Altitude	≤ 1500m, 1500~3000m (derating 1% per 100m)
Environmental conditions	No harmful gas and steam, no conductive or explosive dust, no severe mechanical vibration
Intelligent air cooling	Excellent ventilation
Protection class	IP20 (higher protection class available on request)
Noise level	Below 65db

# Dimension and structure

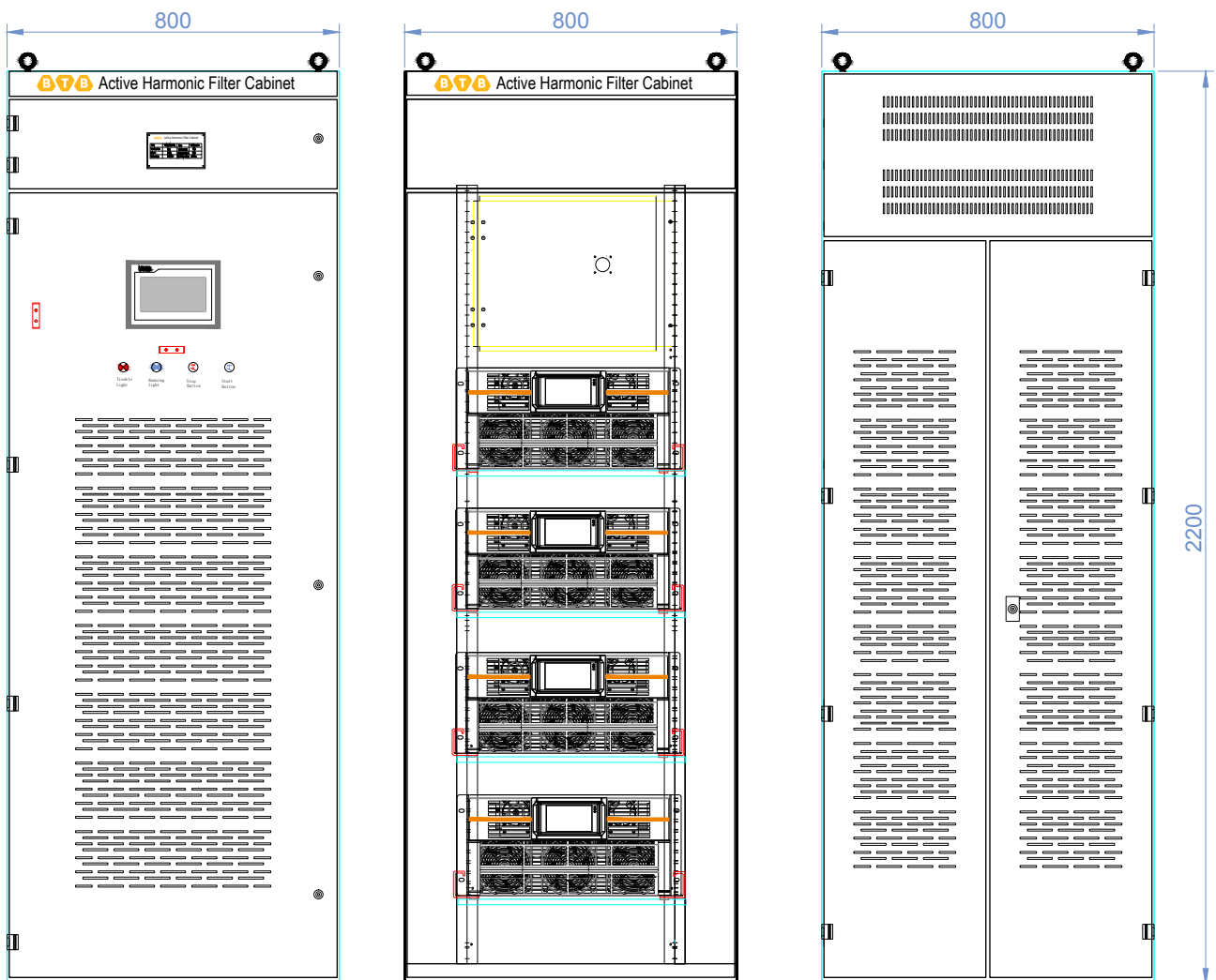
## 1. Drawer type and wall-mounted type

Code	Dimension (W×H×D) mm		Mounting dimension(W×H) mm	
	Drawer type	Wall-mounted type	Drawer type	Wall-mounted type
BF3-050-4-4L/D(W)	500×160×558	500×545×173	478×130 480×250	480×250
BF3-075-4-4L/D(W)	500×160×558	500×545×173	478×130 480×250	480×250
BF3-100-4-4L/D(W)	555×260×665	555×665x260	530x150 535x350	535x350
BF3-150-4-4L/D(W)	555×260×665	555×665x260	530x150 535x350	535x350



## 2. Cabinet type

Code	Installation	Dimension (W×H×D) mm
BF3-200-4-4L/C	2 modules	800x2200x800
BF3-250-4-4L/C	2 modules	
BF3-300-4-4L/C	2 modules or 3 modules	
BF3-350-4-4L/C	3 modules	
BF3-400-4-4L/C	3 modules or 4 modules	
BF3-450-4-4L/C	3 modules or 4 modules	
BF3-500-4-4L/C	4 modules	
BF3-600-4-4L/C	4 modules	





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