

HV Shunt Capacitor and Capacitor Bank Model Manual

Catalogue for
HV Shunt Capacitor and Capacitor



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HV shunt capacitor

1. General description

Capacitor is consist of core, shell, outgoing bushing and etc., two side of the container is welded install bracket, the other side bracket is equipped with earthing bolt. Core of capacitor is consist of several elements and insulation part. To suitable for different voltage, core is consist of several small element in parallel and then in series. Inside the capacitor there is discharge resistor, outer shell is welded by stainless steel.

2. Standard

- GB/T 11024-2010 《Shunt capacitors for AC power systems with a nominal voltage of 1 kV or more》
DL/T 840-2003 《Technical specification for high voltage shunt capacitors》

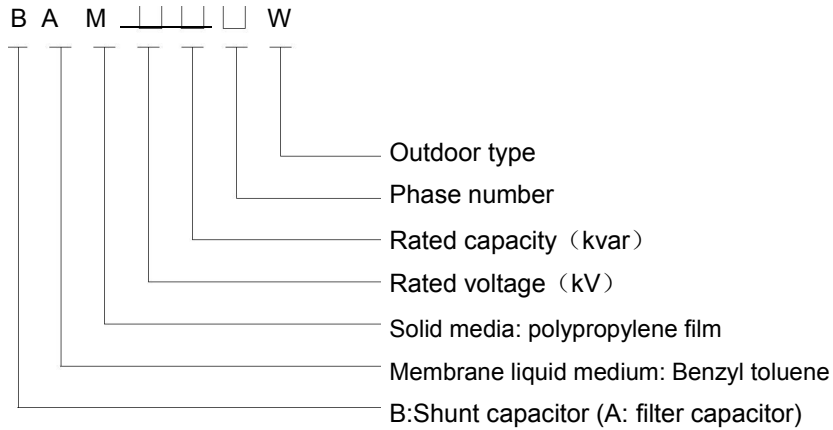
3. Usage

HV shunt capacitor is suitable for 50Hz AC power system, used for improve power frequency system power factor, reduce line loss, improve power supply voltage quality, increase transformer active power output

4. Product characteristics

- 4.1 Bushing: Adopts cold pressure, antifouling sleeve, creepage distance not less than 31mm/kV.
- 4.2 Mature internal fuse technology
 - 4.2.1 After test, internal fuse can isolate the fault elements during 0.2ms, energy release of the fault point will not more than 0.3kJ, other good elements will not be influenced.
 - 4.2.2 Advanced concealed internal fuse structure, use oil gap for arc extinction, reduce the possibility of capacitor tank blasting.
 - 4.2.3 Internal fuse protection and relay protection with perfect combine standards, to ensure the safe and reliable operation of the whole device.
- 4.3 Insulation margin is large, after test, the capacitor can withstand the $4U_n$ instant effect, tolerance $2.5U_n$ 5min.
- 4.4 Liquid medium: 100% benzyl toluene (M/DBT), the liquid has excellent low temperature performance and partial discharge performance.
- 4.5 The main insulation adopts compound insulation structure, which ensures excellent electrical performance, but also has a certain mechanical strength, to ensure that the insulation of capacitor bank to ground under no protection 100% reliable.
 - 4.6 Good sealing performance: the annual leakage rate is less than 0.1%, through the automatic argon arc welding, kerosene test leak, vacuum leak test, thermal aging and other measures to ensure the sealing performance of the capacitor.
 - 4.7 Partial discharge level: the extinguishing voltage is not less than $1.5U_n$, and the partial discharge test is performed in each capacitor factory test.

Meaning of model symbol:



6. Technical data

6.1 Main parameter

6.1.1 Rated voltage: 6.6/ $\sqrt{3}$, 6.9/ $\sqrt{3}$, 7.2/ $\sqrt{3}$, 10.5/ $\sqrt{3}$, 10.5/2 $\sqrt{3}$, 11/ $\sqrt{3}$, 11.5/ $\sqrt{3}$, 11/2 $\sqrt{3}$, 12/ $\sqrt{3}$, 12/2 $\sqrt{3}$, 11/2, 12/2, 12.5/2, 11, 12, 19, 21, 21/2, 22/2, 23/2, 24/2, 22/ $\sqrt{3}$, 22/2 $\sqrt{3}$, 24/ $\sqrt{3}$, 24/2 $\sqrt{3}$;

6.1.2 Rated frequency : 50Hz;

6.1.3 Rated capacity: 100. 200. 250. 300. 334. 400. 417. 500. 535. 550. 570. 600. 625. 667.

800kvar, Special specifications can be negotiated;

6.1.4 Loss $\tan(\tan\delta)$: not more than 0.0003;

6.1.5 Phase number: single phase or three-phase;

6.1.6 Insulation level:: 42/75kV, 68/125kV;

6.1.7 Outline and installation dimensions: See Figure 1;

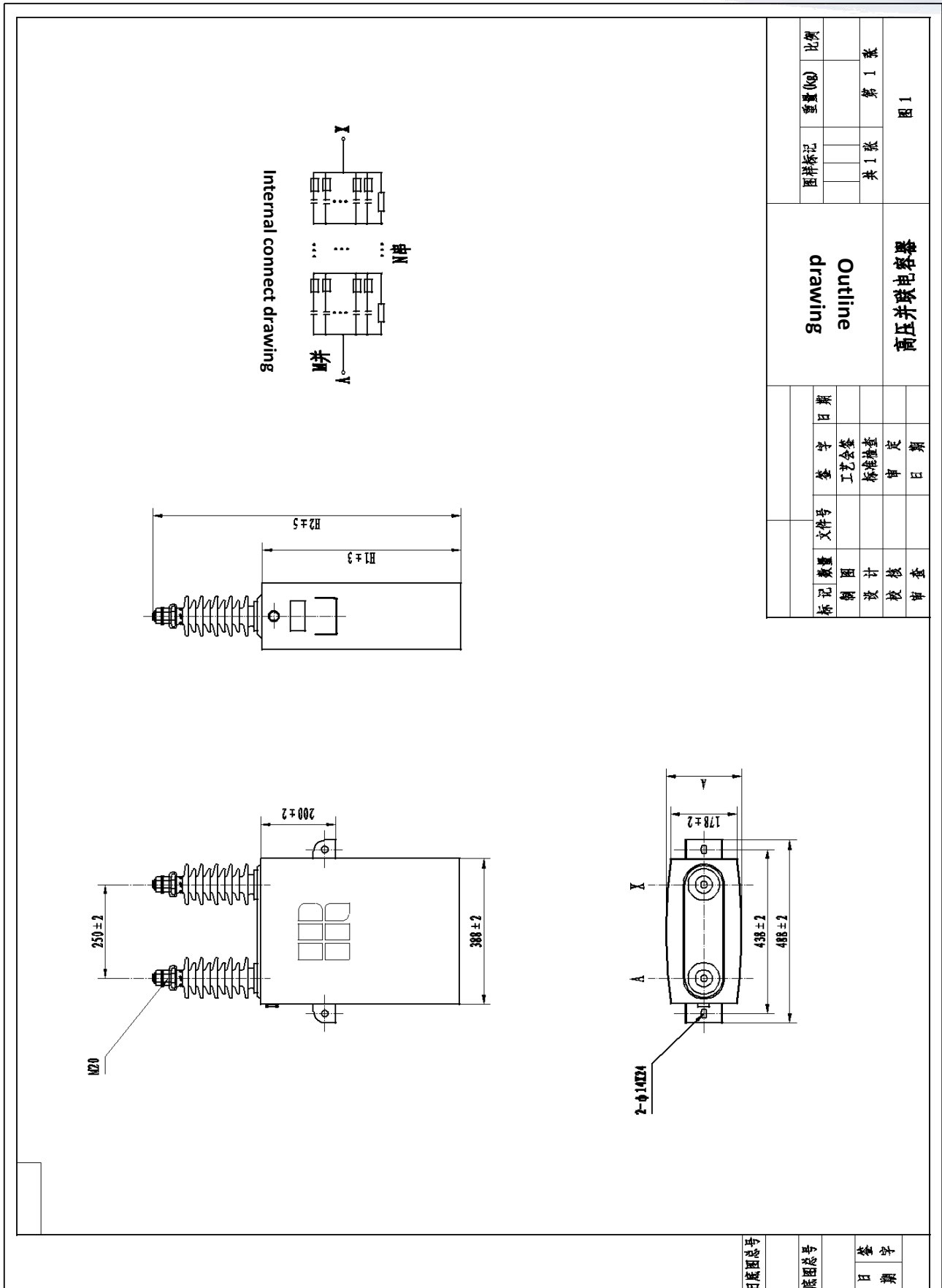
6.1.8 Discharge resistor: The capacitor is equipped with discharge resistor, disconnect from the power grid, The voltage on the terminal can be reduced to below 75V in 10 minutes;

6.1.9 Capacitance deviation: -3%~+5%;

HV Shunt capacitor product technical parameter

No.	Model	Rated capacity (kvar)	Nominal capacitance (μF)	Weight (kg)	Internal fuse	Series No.	Parallel No.	Shell height H1 (mm)	Total height H2 (mm)
1	BAM6.6/ $\sqrt{3}$ —100-1W	100	21.93	24	no	2	6	230	526
2	BAM6.6/ $\sqrt{3}$ —200-1W	200	43.87	40	yes	2	12	390	686
3	BAM6.6/ $\sqrt{3}$ —250-1W	250	54.83	48	yes	2	14	460	756
4	BAM6.6/ $\sqrt{3}$ —300-1W	300	65.8	55	yes	2	17	530	826
5	BAM6.6/ $\sqrt{3}$ —334-1W	334	73.22	62	yes	2	20	600	896
6	BAM6.6/ $\sqrt{3}$ —400-1W	400	73.25	72	yes	2	24	700	996
7	BAM7.2/ $\sqrt{3}$ —100-1W	100	87.73	24	no	2	5	230	526
8	BAM7.2/ $\sqrt{3}$ —150-1W	150	18.43	28	no	2	8	270	566
9	BAM7.2/ $\sqrt{3}$ —200-1W	200	27.65	37	yes	2	12	360	656
10	BAM7.2/ $\sqrt{3}$ —267-1W	267	36.86	48	yes	2	16	460	756
11	BAM10.5/ $\sqrt{3}$ —100-1W	100	8.67	24	no	3	4	230	526
12	BAM10.5/ $\sqrt{3}$ —150-1W	150	13.0	27	no	3	6	280	576
13	BAM10.5/ $\sqrt{3}$ —200-1W	200	17.33	33	no	3	7	340	636
14	BAM10.5/ $\sqrt{3}$ —334-1W	334	28.94	55	yes	3	12	530	826
15	BAM10.5/2 $\sqrt{3}$ —334-1W	334	115.78	57	yes	2	19	550	846
16	BAM10.5/2 $\sqrt{3}$ —417-1W	417	144.55	69	yes	2	24	670	966
17	BAM11—200-1W	200	5.26	34	no	5	4	340	636
18	BAM11—300-1W	300	7.89	48	no	5	6	460	756
19	BAM11—334-1W	334	8.79	53	no	5	7	510	806
20	BAM11—417-1W	417	10.97	69	yes	5	10	670	966
21	BAM11—500-1W	500	13.16	80	yes	5	12	790	1086
22	BAM11—550-1W	550	14.47	88	yes	5	13	850	1146
23	BAM11/ $\sqrt{3}$ —100-1W	100	7.89	24	no	3	4	230	526
24	BAM11/ $\sqrt{3}$ —150-1W	150	11.84	27	no	3	5	260	556
25	BAM11/ $\sqrt{3}$ —200-1W	200	15.79	33	no	3	7	320	616
26	BAM11/ $\sqrt{3}$ —250-1W	250	19.73	42	yes	3	10	410	706
27	BAM11/ $\sqrt{3}$ —300-1W	300	23.69	49	yes	3	10	470	766
28	BAM11/ $\sqrt{3}$ —334-1W	334	26.37	55	yes	3	12	530	826
29	BAM11/ $\sqrt{3}$ —360-1W	360	28.42	57	yes	3	12	550	846
30	BAM11/ $\sqrt{3}$ —400-1W	400	31.58	67	yes	3	14	650	946
31	BAM11/ $\sqrt{3}$ —417-1W	417	32.93	67	yes	3	14	650	946
32	BAM11/ $\sqrt{3}$ —500-1W	500	39.48	78	yes	3	17	750	1046
33	BAM11/ $\sqrt{3}$ —600-1W	600	47.38	91	yes	3	22	890	1186
34	BAM11/ $\sqrt{3}$ —667-1W	667	52.67	102	yes	3	25	990	1286
35	BAM11/ $\sqrt{3}$ —800-1W	800	63.13	122	yes	3	33	1180	1476
36	BAM11/2—334-1W	334	35.16	55	yes	3	12	530	826
37	BAM11/2—417-1W	417	43.9	67	yes	3	15	650	946
38	BAM11/2—450-1W	450	47.38	74	yes	3	18	720	1016
39	BAM11/2—500-1W	500	52.64	80	yes	3	18	770	1066
40	BAM11/2—550-1W	550	57.9	91	yes	3	23	880	1176
41	BAM11/2 $\sqrt{3}$ —200-1W	200	63.17	37	yes	2	11	360	656
42	BAM11/2 $\sqrt{3}$ —334-1W	334	105.49	57	yes	2	19	550	846
43	BAM11/2 $\sqrt{3}$ —417-1W	417	131.7	69	yes	2	24	670	966
44	BAM11.5/ $\sqrt{3}$ —400-1W	400	28.89	67	yes	3	15	650	946
45	BAM11.5/2—417-1W	417	40.16	74	yes	3	17	720	1016
46	BAM11.5/2—500-1W	500	48.16	88	yes	3	21	850	1146

No.	Model	Rated capacity (kvar)	Nominal capacitance (μF)	Weight (kg)	Internal fuse	Series No.	Parallel No.	Shell height H1 (mm)	Total height H2 (mm)
47	BAM11.5/2—535-1W	535	51.53	95	yes	3	22	920	1216
48	BAM11.5/2—550-1W	550	52.98	95	yes	3	22	920	1216
49	BAM12—100-1W	100	2.21	24	no	6	2	230	526
50	BAM12—150-1W	150	3.31	28	no	6	3	280	576
51	BAM12—200-1W	200	4.42	35	no	6	4	340	636
52	BAM12—250-1W	250	5.52	42	no	6	5	410	706
53	BAM12—300-1W	300	6.63	48	no	6	5	470	766
54	BAM12—334-1W	334	7.39	53	no	6	6	520	816
55	BAM12—400-1W	400	8.84	62	no	6	8	610	906
56	BAM12—417-1W	417	9.22	69	yes	6	9	690	986
57	BAM12—500-1W	500	11.06	84	yes	6	11	810	1106
58	BAM12—556-1W	556	12.29	91	yes	6	12	890	1186
59	BAM12—625-1W	625	13.82	102	yes	6	14	1000	1296
60	BAM12/ $\sqrt{3}$ —134-1W	134	8.89	26	no	4	4	250	546
61	BAM12/ $\sqrt{3}$ —150-1W	150	9.95	27	no	4	4	270	566
62	BAM12/ $\sqrt{3}$ —200-1W	200	13.27	33	no	4	6	340	636
63	BAM12/ $\sqrt{3}$ —250-1W	250	16.59	39	no	4	7	400	696
64	BAM12/ $\sqrt{3}$ —275-1W	275	18.24	49	yes	4	9	470	766
65	BAM12/ $\sqrt{3}$ —300-1W	300	19.9	51	yes	4	9	490	786
66	BAM12/ $\sqrt{3}$ —334-1W	334	22.16	55	yes	4	9	530	826
67	BAM12/ $\sqrt{3}$ —400-1W	400	26.54	67	yes	4	12	650	946
68	BAM12/ $\sqrt{3}$ —417-1W	417	27.66	67	yes	4	12	650	946
69	BAM12/ $\sqrt{3}$ —450-1W	450	29.88	74	yes	4	14	720	1016
70	BAM12/ $\sqrt{3}$ —500-1W	500	33.17	80	yes	4	14	770	1066
71	BAM12/ $\sqrt{3}$ —550-1W	550	36.49	88	yes	4	16	850	1146
72	BAM12/ $\sqrt{3}$ —600-1W	600	39.81	95	yes	4	18	920	1216
73	BAM12/2—334-1W	334	29.55	55	yes	3	12	550	846
74	BAM12/2—375-1W	375	33.17	62	yes	3	14	600	896
75	BAM12/2—417-1W	417	36.89	67	yes	3	15	650	946
76	BAM12/2—500-1W	500	44.23	80	yes	3	18	770	1066
77	BAM12/2—625-1W	625	55.29	100	yes	3	24	970	1266
78	BAM12/2 $\sqrt{3}$ —200-1W	200	53.08	37	yes	2	11	360	656
79	BAM12/2 $\sqrt{3}$ —300-1W	300	79.61	51	yes	2	17	490	786
80	BAM12/2 $\sqrt{3}$ —334-1W	334	88.6	57	yes	2	19	550	846
81	BAM12/2 $\sqrt{3}$ —400-1W	400	106.15	67	yes	2	24	650	946
82	BAM12/2 $\sqrt{3}$ —417-1W	417	110.67	67	yes	2	24	650	946
83	BAM12.5/ $\sqrt{3}$ —200-1W	200	12.23	34	no	4	5	330	626
84	BAM12.5/2—625-1W	625	50.96	95	yes	3	23	950	1246
85	BAM21—334-1W	334	2.41	55	no	10	4	520	900
86	BAM21/2—417-1W	417	12.05	71	yes	5	9	670	1050
87	BAM21/2—500-1W	500	14.44	82	yes	5	11	770	1150
88	BAM22/2—417-1W	417	10.98	71	yes	5	9	670	1050
89	BAM22/2 $\sqrt{3}$ —500-1W	500	39.48	82	yes	3	18	770	1150
90	BAM23/2—417-1W	417	10.04	71	yes	5	9	670	1050
91	BAM23/2—500-1W	500	12.04	82	yes	5	11	770	1150
92	BAM24/2—500-1W	500	11.06	82	yes	6	9	800	1180
93	BAM24/2 $\sqrt{3}$ —500-1W	500	33.17	82	yes	4	14	770	1150



Assembly HV Shunt capacitor

1. Product standard

Product performance meet standard:

JB 7112-2000 《Assembly type high voltage shunt capacitor》

DL/T 628-1997 《Technical requirements for assembly high voltage shunt capacitors》

GB/T 11024-2010 《Shunt capacitors for AC power systems with nominal voltages above 1kV》

2. Usage

Mainly used for the frequency of 50Hz. rated voltage 35kV. 66kV 10kV. power system for reactive power compensation. Improve the power factor, reduce the line loss, improve the quality of the power supply voltage.

3. Characteristic

- 3.1 Anti explosion, fire prevention, safety and reliability.
- 3.2 Simple infrastructure.
- 3.3 Simple maintenance.
- 3.4 Small floor area.
- 3.5 High rate of operation.

4. Technical data

4.1 Main parameter

- 4.1.1 The main parameters of the capacitor. Dimensions. Anchor installation dimensions see Table 3 and figure 1-10.
- 4.1.2 Rated frequency: 50Hz
- 4.1.3 Loss tangent: $\tan \delta$ is not greater than 0.0003
- 4.1.4 Phase number: three phase or single phase

4.1.5 Capacitance deviations: deviations between measured capacitance and rated value is not more than 0 ~ +5%, ratio between maximum and minimum value of the three-phase capacitor capacitance between any two line terminal should not exceed 1.01.

- 4.2 The capacitor can be operated at 1.1 times the rated voltage.
- 4.3 The capacitor can run continuously at 1.3 times the current of its rated current.
- 4.4 Bushing: creepage distance is greater than or equal to 35kV/mm.
- 4.5 Bushing pollution level: IV

5. Structure

5.1 Medium: all film benzyl toluene.

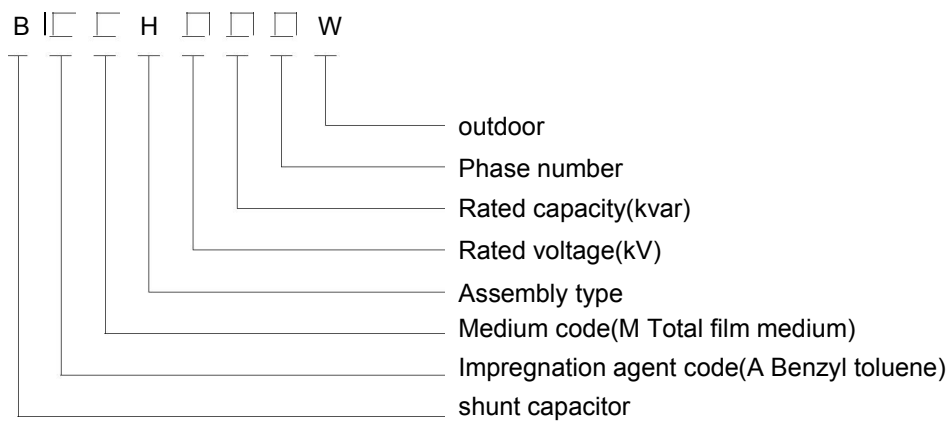
5.2 Assembling shunt capacitor mainly comprises a core, shell, tank, heat dissipation device, the bushing and other parts. The core consists of small sealed capacitor unit number and string. A small capacitor unit inside the element with internal fuse protection.

5.3 The shell is filled with insulating cooling oil, and oil flows along the oil ducts of core body, radiate the heat from small capacitor to heat dissipation plate.

5.4 There are two kinds of heat dissipation structure of assembly shunt capacitor, one is chip radiator, The upper part of the cover is provided with an oil storage, Inside the tank is compensated by the expander on the tank. One is corrugated plate structure, combine both heat and oil compensate, The capacitor is a fully sealed structure, and the interior of the box is not communicated with the atmosphere.

6. Product model symbol meaning

6.1 Assembly type capacitor:



Example: BAMH11/√3-3600-1×3W

Means: Benzyl benzyl toluene, Whole film medium assembly shunt capacitor. Rated voltage is 11/√3 kV. Rated capacity is 3600kvar. Three phase. Outdoor type.

7. Conditions of use

7.1 The installation site is not more than 1000 meters above sea level. More than 1000 meters in the plateau region, can use the company's high altitude type assembly shunt capacitors.

7.2 Using ambient temperature: -40/50°C.

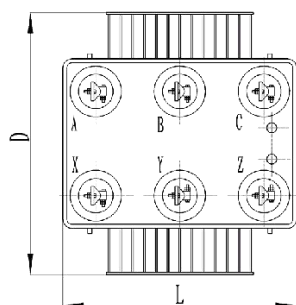
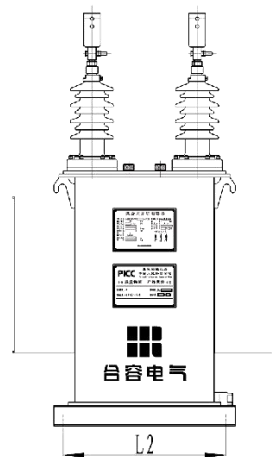
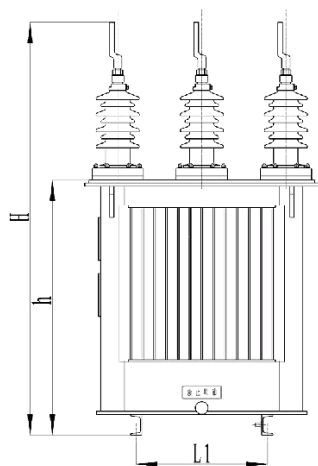
7.3 There is no serious corrosive gas or vapor, no electrical conductivity or explosive dust, no severe mechanical vibration.

8. Other

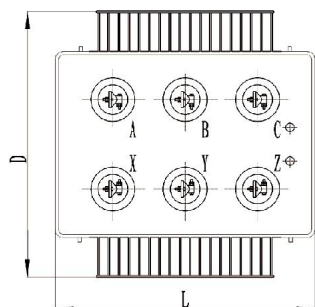
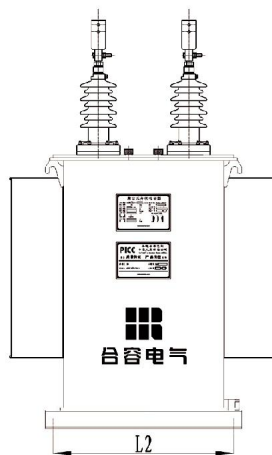
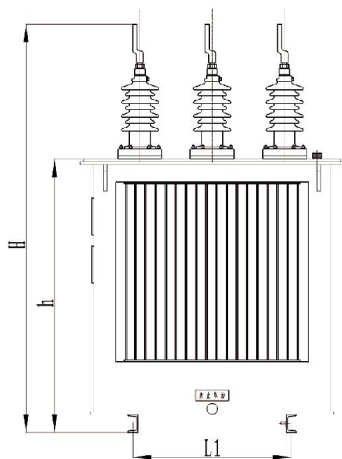
The company can produce electric railway assembly type capacitor, but also to provide users with a special specification model of the assembly shunt capacitors.

No.	capacitor model	Dimension (mm)				Install size (mm)		Total weight (kg)	Oil weight (kg)	Code	remarks
		L	D	H	h	L1	L2				
10kV capacitor											
1	BAMH11/√3-800-1×3W	890	1006	1642	1037	500	620	829	235	1	6 bushings
2	BAMH11/√3-900-1×3W	890	1006	1712	1107	500	620	870	246	1	6 bushings
3	BAMH11/√3-1000-1×3W	890	1006	1752	1147	500	620	928	259	1	6 bushings
4	BAMH11/√3-1200-1×3W	890	1006	1862	1257	500	620	986	277	1	6 bushings
5	BAMH11/√3-1500-1×3W	890	1006	2052	1447	500	620	1132	315	1	6 bushings
6	BAMH11/√3-1600-1×3W	1150	1186	1642	1037	700	800	1038	393	2	6 bushings
7	BAMH11/√3-1800-1×3W	1150	1186	1712	1107	700	800	1410	412	2	6 bushings
8	BAMH11/√3-2000-1×3W	1150	1186	1752	1147	700	800	1508	431	2	6 bushings
9	BAMH11/√3-2400-1×3W	1150	1186	1862	1257	700	800	1610	460	2	6 bushings
10	BAMH11/√3-2500-1×3W	1150	1186	1907	1302	700	800	1671	472	2	6 bushings
11	BAMH11/√3-2700-1×3W	1210	1506	1732	1127	700	1120	1985	635	3	6 bushings
12	BAMH11/√3-3000-1×3W	1210	1506	1772	1167	700	1120	2111	659	3	6 bushings
13	BAMH11/√3-3600-1×3W	1210	1506	1882	1277	700	1120	2261	706	3	6 bushings
14	BAMH11/√3-4000-1×3W	1400	1506	1767	1162	1000	1120	2278	573	4	6 bushings
15	BAMH11/√3-4500-1×3W	1210	1506	2072	1467	700	1120	2618	796	3	6 bushings
16	BAMH11/√3-4800-1×3W	1400	1506	1877	1272	1000	1120	2499	627	4	6 bushings
17	BAMH11/√3-5000-1×3W	1400	1506	1922	1317	1000	1120	2575	644	4	6 bushings
18	BAMH11/√3-6000-1×3W	1400	1506	2067	1462	1000	1120	2687	707	4	6 bushings
19	BAMH11/√3-7200-1×3W	1800	1640	2437	1832	1200	1160	4885	1530	5	6 bushings
20	BAMH11/√3-8000-1×3W	1800	1680	2437	1832	1200	1200	5050	1580	5	6 bushings
21	BAMH11/√3-9600-1×3W	1800	1790	2437	1832	1200	1310	5500	1670	5	6 bushings
22	BAMH11/√3-10000-1×3W	1800	1835	2437	1832	1200	1355	5695	1740	5	6 bushings
23	BAMH12/√3-800-1×3W	890	1006	1622	1017	500	620	817	231	1	6 bushings
24	BAMH12/√3-900-1×3W	890	1006	1662	1057	500	620	841	238	1	6 bushings
25	BAMH12/√3-1000-1×3W	890	1006	1722	1117	500	620	909	252	1	6 bushings
26	BAMH12/√3-1200-1×3W	890	1006	1832	1227	500	620	972	272	1	6 bushings
27	BAMH12/√3-1500-1×3W	890	1006	2022	1417	500	620	1105	310	1	6 bushings
28	BAMH12/√3-1600-1×3W	1150	1186	1622	1017	700	800	1317	388	2	6 bushings
29	BAMH12/√3-1800-1×3W	1150	1186	1662	1057	700	800	1358	398	2	6 bushings
30	BAMH12/√3-2000-1×3W	1150	1186	1722	1117	700	800	1482	426	2	6 bushings
31	BAMH12/√3-2400-1×3W	1150	1186	1832	1227	700	800	1585	452	2	6 bushings
32	BAMH12/√3-2500-1×3W	1150	1186	1862	1257	700	800	1610	460	2	6 bushings
33	BAMH12/√3-2700-1×3W	1210	1506	1682	1077	700	1120	1908	614	3	6 bushings

No.	capacitor model	Dimension (mm)				Install size (mm)		Total weight (kg)	Oil weight (kg)	Code	remarks
		L	D	H	h	L1	L2				
34	BAMH12/ $\sqrt{3}$ -3000-1×3W	1210	1506	1752	1147	700	1120	2072	651	3	6 bushings
35	BAMH12/ $\sqrt{3}$ -3600-1×3W	1210	1506	1852	1247	700	1120	2224	693	3	6 bushings
36	BAMH12/ $\sqrt{3}$ -4000-1×3W	1400	1506	1747	1142	1000	1120	2232	555	4	6 bushings
37	BAMH12/ $\sqrt{3}$ -4500-1×3W	1210	1506	2042	1437	700	1120	2555	783	3	6 bushings
38	BAMH12/ $\sqrt{3}$ -4800-1×3W	1400	1506	1847	1242	1000	1120	2439	609	4	6 bushings
39	BAMH12/ $\sqrt{3}$ -5000-1×3W	1400	1506	1875	1270	1000	1120	2499	626	4	6 bushings
40	BAMH12/ $\sqrt{3}$ -6000-1×3W	1400	1506	2037	1432	1000	1120	2827	689	4	6 bushings
41	BAMH12/ $\sqrt{3}$ -7200-1×3W	1800	1590	2437	1832	1200	1110	4680	1480	5	6 bushings
42	BAMH12/ $\sqrt{3}$ -8000-1×3W	1800	1660	2437	1832	1200	1180	4965	1550	5	6 bushings
43	BAMH12/ $\sqrt{3}$ -9600-1×3W	1800	1760	2437	1832	1200	1280	5390	1650	5	6 bushings
44	BAMH12/ $\sqrt{3}$ -10000-1×3W	1800	1790	2437	1832	1200	1310	5500	1670	5	6 bushings
35kVcapacitor											
45	BAMH38.5/ $\sqrt{3}$ -3334-1W	1330	1556	2360	1450	900	1200	2669	1040	6	3 bushings
46	BAMH38.5/ $\sqrt{3}$ -6667-1W	1640	1980	3480	2560	1200	1600	7783	2477	7	3 bushings
47	BAMH38.5/ $\sqrt{3}$ -10000-1W	1640	2360	3480	2560	1200	1980	8576	2729	8	3 bushings
48	BAMH38.5/ $\sqrt{3}$ -20000-1W	3035	2450	3950	2620	2160	1930	17124	5450	9	6 bushings
49	BAMH42/ $\sqrt{3}$ -3334-1W	1330	1556	2310	1400	900	1200	2614	1020	6	3 bushings
50	BAMH42/ $\sqrt{3}$ -6667-1W	1640	1980	3480	2560	1200	1600	7783	2477	7	3 bushings
51	BAMH42/ $\sqrt{3}$ -10000-1W	1640	2360	3480	2560	1200	1980	8576	2729	8	3 bushings
52	BAMH42/ $\sqrt{3}$ -20000-1W	3035	2450	3950	2620	2160	1930	17124	5450	9	6 bushings
66kVcapacitor											
53	BAMH73/ $\sqrt{3}$ -20000-1W	3320	2130	4250	2650	3320	1755	18536	7500	10	4 bushings
54	BAMH79/ $\sqrt{3}$ -20000-1W	3320	2130	4250	2650	3320	1755	18536	7500	10	4 bushings



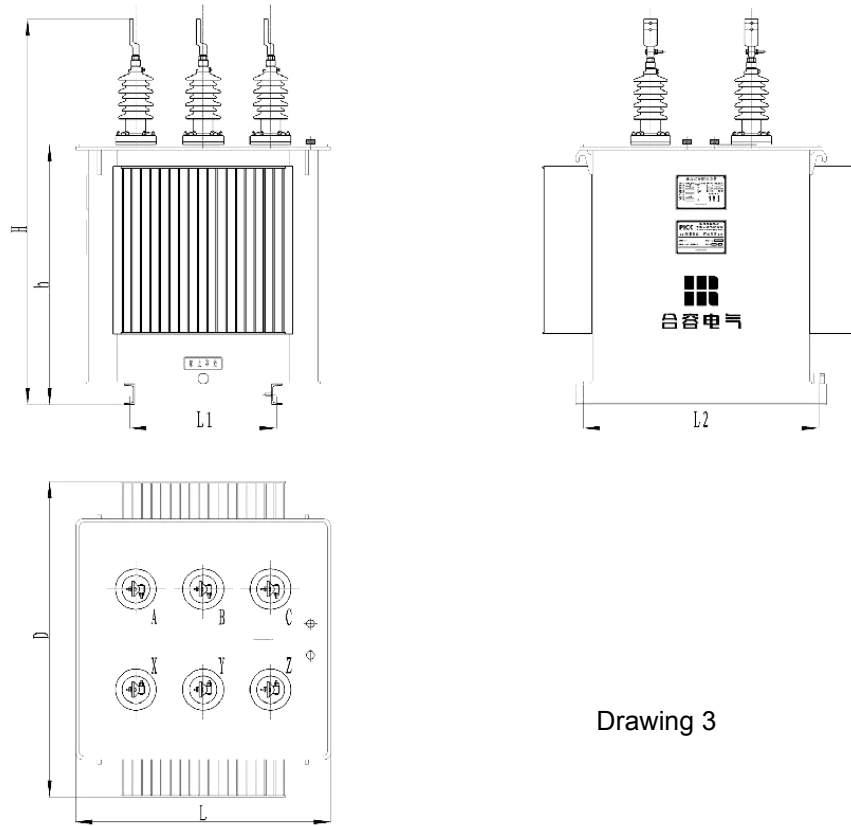
drawing1



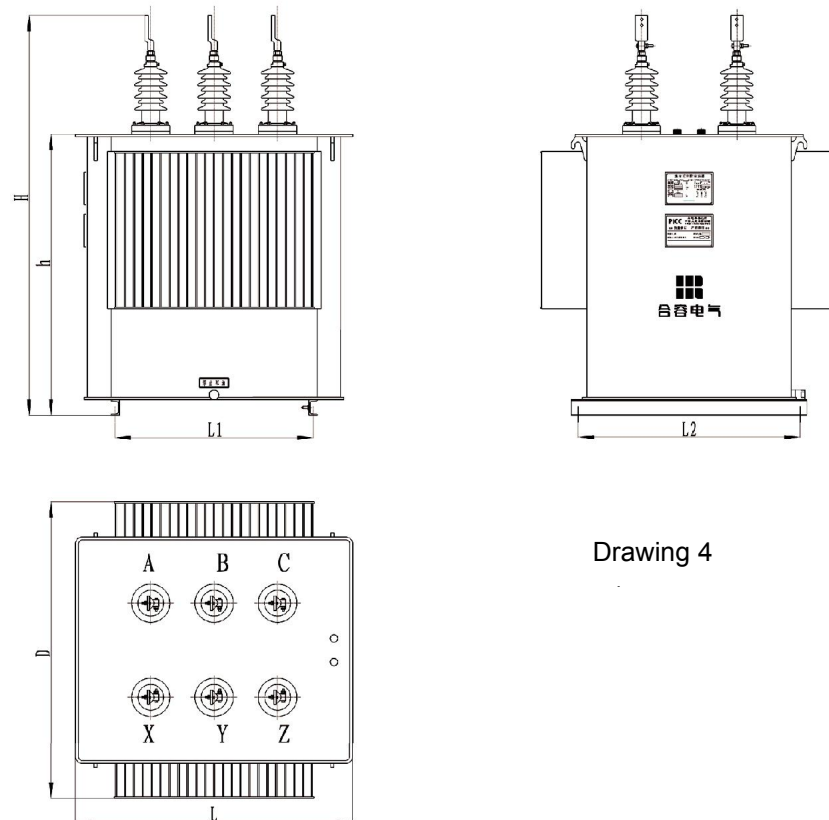
Drawing 2



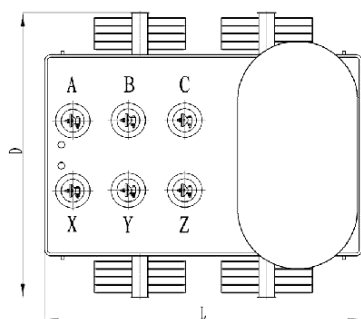
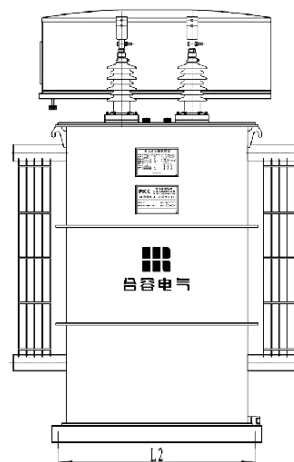
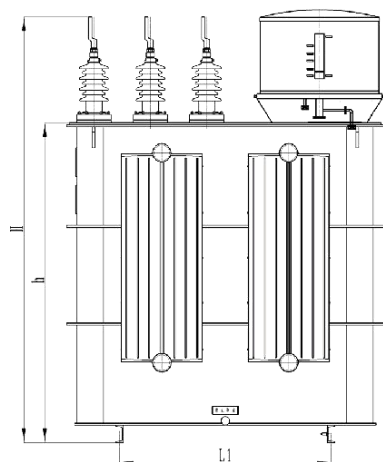
高压并联 capacitor 及其成套装置选型样本



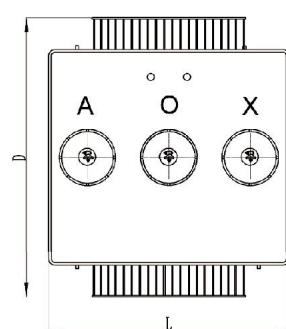
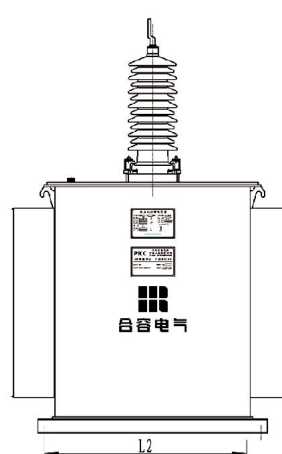
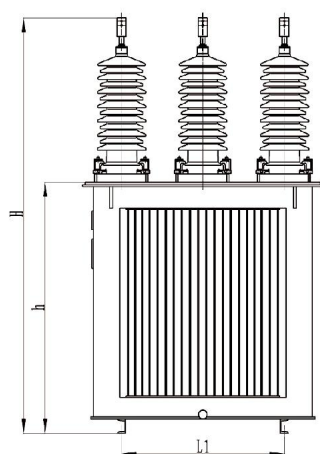
Drawing 3



Drawing 4

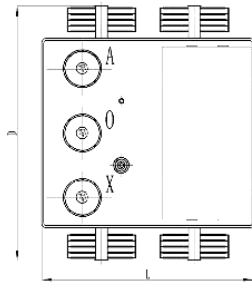
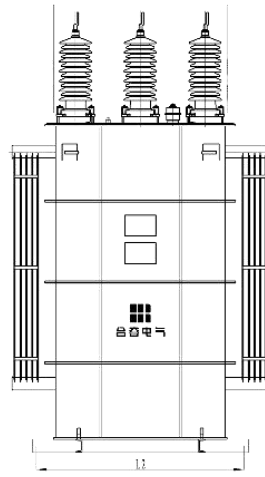
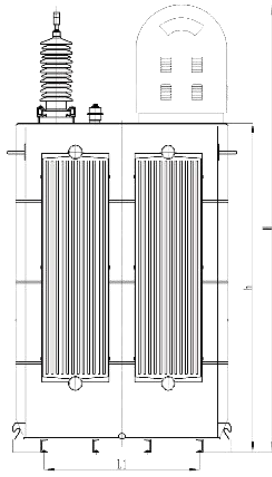


Drawing 5

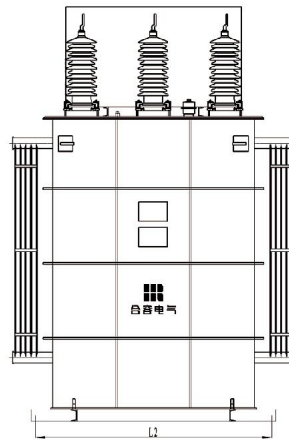
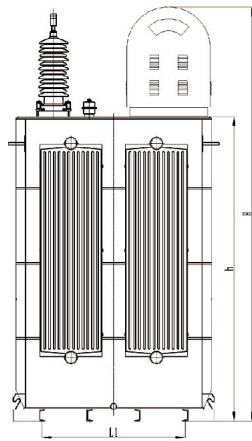


Drawing 6

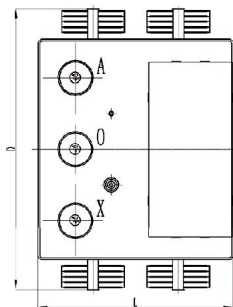
高压并联 capacitor 及其成套装置选型样本

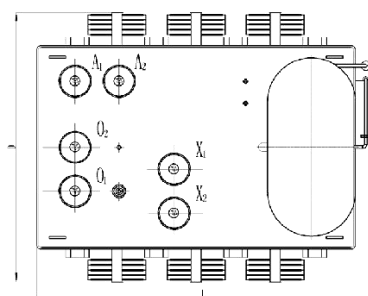
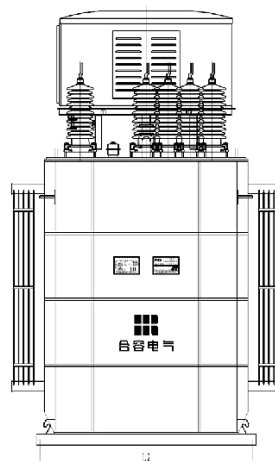
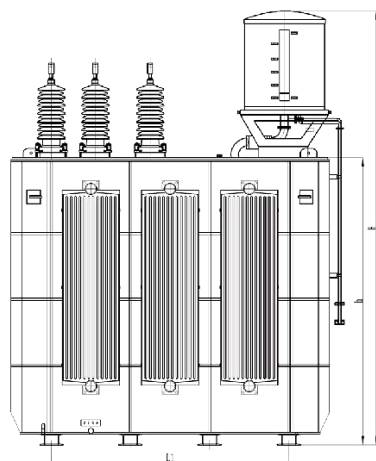


Drawing 7

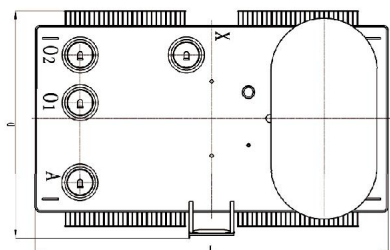
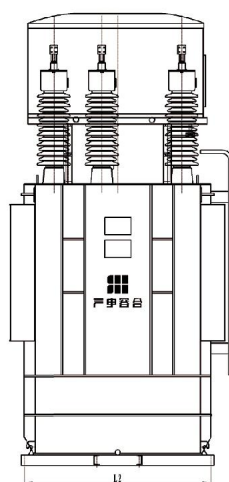
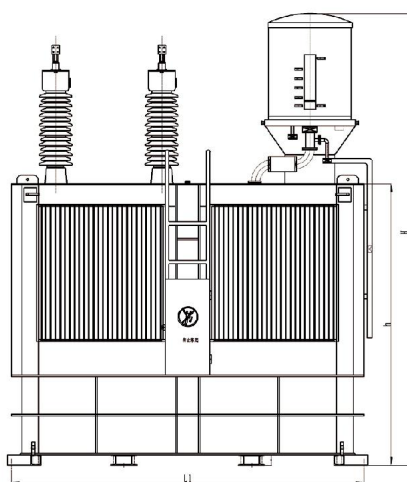


Drawing 8





Drawing 9



Drawing 10

High voltage shunt capacitor device



1. General

High voltage shunt capacitor device mainly comprises the following equipment: high voltage shunt capacitor. Series reactor. Discharge coil. Zinc Oxide arrester. Isolation grounding switch. Frame. Bus. Connecting line. Post insulator. The cabinet or fence. According to the user's needs, the capacitor switching device, its protection device and controller can be supplied in the scope.

High voltage shunt capacitor device is mainly used in power frequency three-phase AC power system, Used to increase the power factor of the system, reduce the loss of transformer and line, Improve the power grid voltage quality, improve the utilization of equipment.

1.1 The high voltage shunt capacitor is the main component of parallel compensation, generating capacitive reactive current.

1.2 Series reactor install in capacitor circuit in series, for harmonic suppression, reduce the inrush current. Reactance rate of reactor used for limit the inrush current is 0.1% ~ 1%; used to suppress the harmonics of 5 times and above, the reactor should choose 4.5% ~ 6% reactance rate; inhibit 3 times and above harmonics, reactor should choose 12% ~ 13% reactance rate.

1.3 The discharging coil is connected in parallel with the capacitor circuit, After the capacitor device is out of operation, the residual voltage on the capacitor in the 5S from the root $\sqrt{2}U_N$ to below 50V.

1.4 Zinc Oxide surge arrester connected to the bus in parallel, used to limit the operation over voltage when the capacitor bank switching.

1.5 The main function of the isolated grounding switch is to disconnect the capacitor device and the circuit breaker, to make a visible disconnect, at the same time, when the power cut off, the capacitor device is connected to the ground, to ensure the safety of the maintenance personnel.

1.6 The charged display device is mainly used to display the state of the device, and to provide the decision condition for the device to realize the five proof locking.

1.7 Special vacuum contactor: Special vacuum contactor added in capacitor circuit is Mainly to achieve load regulation and automatic regulation of the capacity of the capacitor

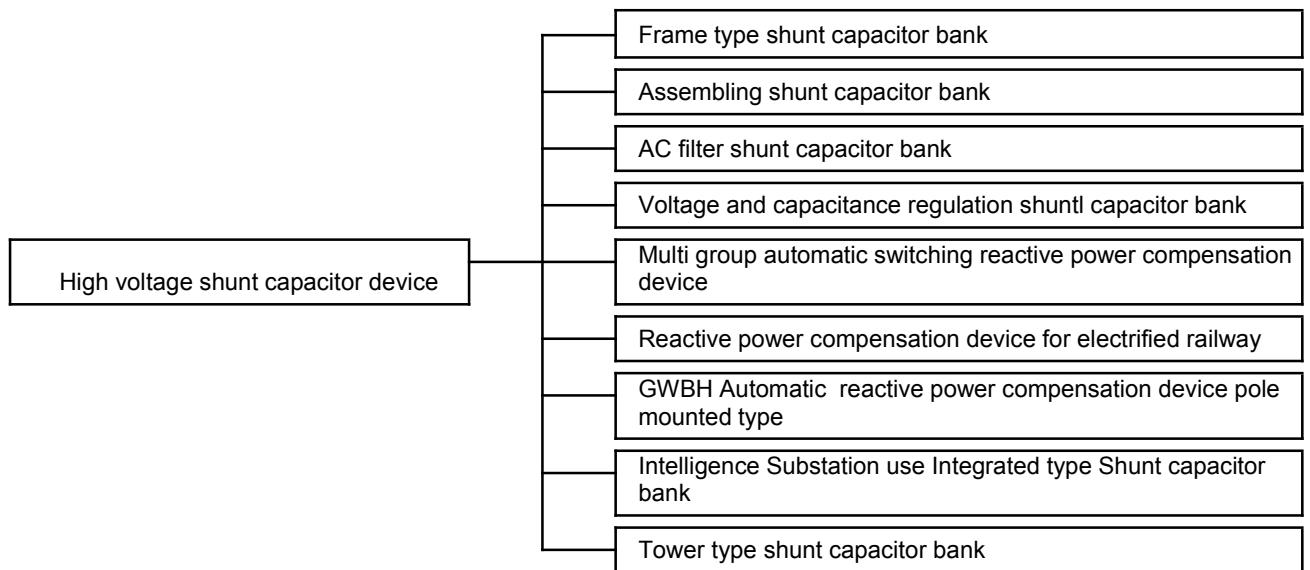
1.8 Controller: according to the parameters of the system (the current and voltage signal of the system) to automatically control the switching of the capacitor bank



2. Service conditions

- 2.1 Location: indoor or outdoor.
- 2.2 Altitude: not more than 2000m (more than 2000m before order need explain).
- 2.3 Ambient temperature: -25 degrees to +45 degrees C (special operating environment before order need explain).
- 2.4 The installation and operation place of the device should have no severe mechanical vibration, No harmful gas and steam, no conductive or explosive dust.
- 2.5 relative humidity: Month average not more than 90% on average, daily average is not more than 95%.
- 2.6 Earthquake intensity: ≤ 8

3. Type of high voltage shunt capacitor



4. Implementation standards

- GB/T 11024 《Shunt capacitors for AC power systems with nominal voltages above 1kV》
- JB/T 7111 《High voltage shunt capacitor bank》
- GB 50227 《Specification for design of shunt capacitors》
- DL/T 604 《Technical specification for high voltage shunt capacitor installation》
- DL/T 840 《Technical specification for high voltage shunt capacitors》
- JB/T 10558 《Pole mounted type high voltage reactive power compensation device》

5. Quality Assurance

The company provides the following technical services and quality assurance:

- 5.1 The company provides technical support for the life of the product.
- 5.2 From the date of shipment, The company's supply "3 guarantee(repair, exchange, return)" within three years because of defects of the product quality
- 5.3 The company provides three years of free warranty service for the main parts of the product (capacitor, reactor, discharge coil).
- 5.4 The company provides free guidance and installation services for the product for free one time.

Frame type shunt capacitor bank



1. General description

Frame type shunt capacitor bank main components are: High voltage shunt capacitor, series reactor, discharge coil, Zinc Oxide arrester, isolation grounding switch, frame, bus, connecting wire, post insulator, fence, etc.

Mounting frame of frame type shunt capacitor device is made of steel, mainly is horizontal arrangement, modular design.

10kV and the following capacitor installation frame is direct floor installation, 35kV and above the capacitor installation framework for the installation is on its insulation platform, keep the insulation from the ground.

2. main features

- The whole set of design adopts the horizontal type, compact structure and small floor area..
- The frame of the capacitor is modular design, convenient transportation and installation.
- Maintenance is convenient, the structure is stable.

3. technical parameter

- rated voltage : 6. 10. 35. 66. 110kV.
- rated capacity : 1000~120000kvar 等.
- The ratio of the maximum and minimum of the three-phase capacitor is not more than 1.01.
- The capacitor device can be operated under 1.1Un for a long time..

- The capacitor bank can be operated long time when the current is not more than 1.3 times the rated current

4. Model description

for example: TBB10-3000/334-AKW

T: capacitor bank

BB: Shunt capacitor device

10: Nominal system voltage 10kV

3000:rated capacity 3000kvar

334: Capacity of one capacitor unit 334kvar

A: Single star connection(B: Double star connection)

K: Open delta voltage protection(C: Phase voltage differential protection; L: Neutral point unbalance current protection; Q: Bridge type differential current protection)

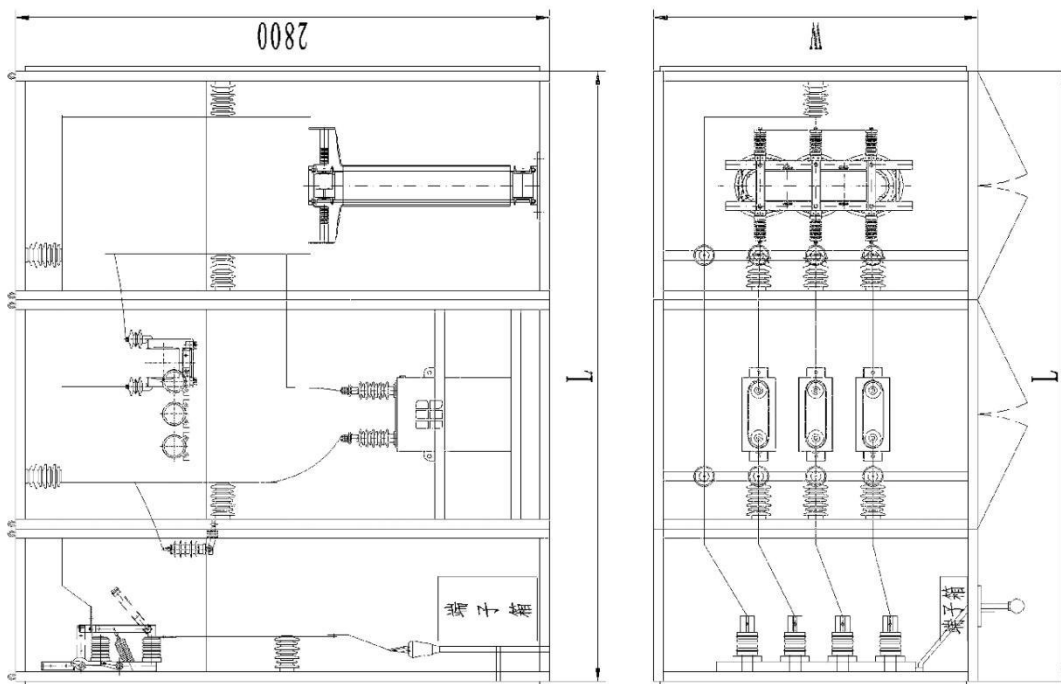
W: Outdoor use(Do not write the indoor use)

5.Frame type shunt capacitor bank typical configuration technology parameter table

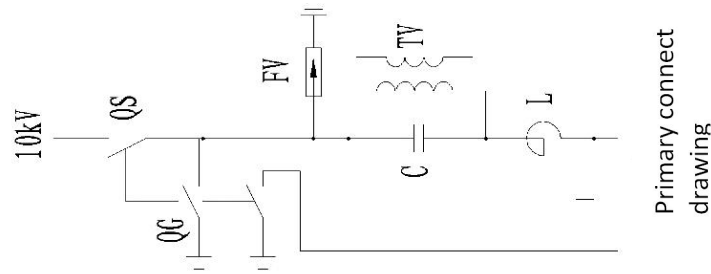
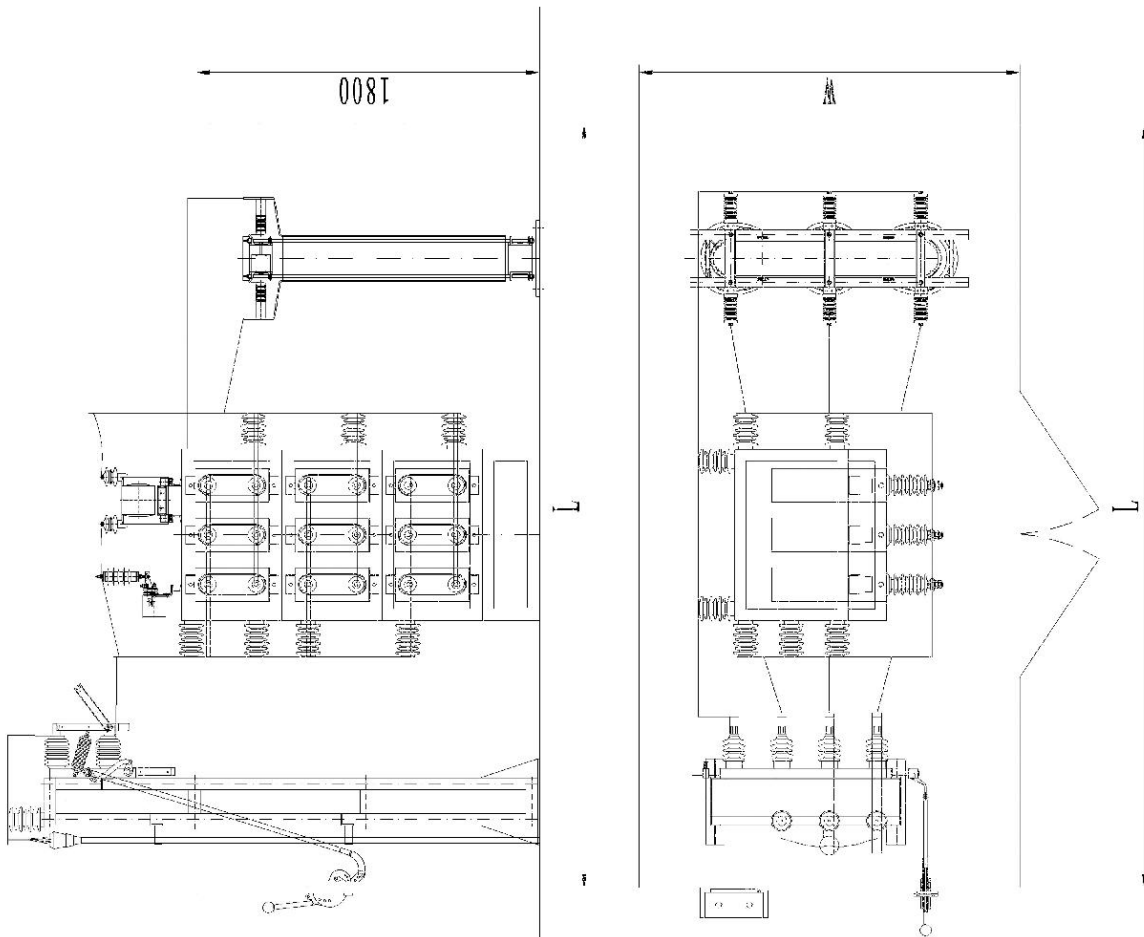
10kV Frame type shunt capacitor bank(indoor)Typical configuration technology parameter table

No.	Model	Capacitor unit model	length L(mm)	width W(mm)	drawing code
1	TBB10-1002/334-AK	BAM11/ $\sqrt{3}$ -334-1W	3200	1700	drawing1
		BAM12/ $\sqrt{3}$ -334-1W			
2	TBB10-2004/334-AK	BAM11/ $\sqrt{3}$ -334-1W	3200	1700	drawing1
		BAM12/ $\sqrt{3}$ -334-1W			
3	TBB10-3006/334-AK	BAM11/ $\sqrt{3}$ -334-1W	4000	2000	drawing1. drawing2
		BAM12/ $\sqrt{3}$ -334-1W			
4	TBB10-3600/200-AK	BAM11/ $\sqrt{3}$ -200-1W	5000	2000	drawing2
		BAM12/ $\sqrt{3}$ -200-1W			
5	TBB10-4008/334-AK	BAM11/ $\sqrt{3}$ -334-1W	4400	2000	drawing1. drawing2
		BAM12/ $\sqrt{3}$ -334-1W			
6	TBB10-4800/200-AC	BAM11/2 $\sqrt{3}$ -200-1W	5500	2000	drawing3
		BAM12/2 $\sqrt{3}$ -200-1W			
7	TBB10-5004/417-AK	BAM11/ $\sqrt{3}$ -417-1W	5500	2000	drawing1. drawing2
		BAM12/ $\sqrt{3}$ -417-1W			
8	TBB10-6012/334-AC	BAM11/2 $\sqrt{3}$ -334-1W	5200	2200	drawing3
		BAM12/2 $\sqrt{3}$ -334-1W			
9	TBB10-8016/334-AC	BAM11/2 $\sqrt{3}$ -334-1W	5500	2200	drawing3
		BAM12/2 $\sqrt{3}$ -334-1W			
10	TBB10-6012/334-BL	BAM11/ $\sqrt{3}$ -334-1W	4200	2600	drawing4
		BAM12/ $\sqrt{3}$ -334-1W			
11	TBB10-8016/334-BL	BAM11/ $\sqrt{3}$ -334-1W	4500	2600	drawing4
		BAM12/ $\sqrt{3}$ -334-1W			

HV shunt capacitor and capacitor bank



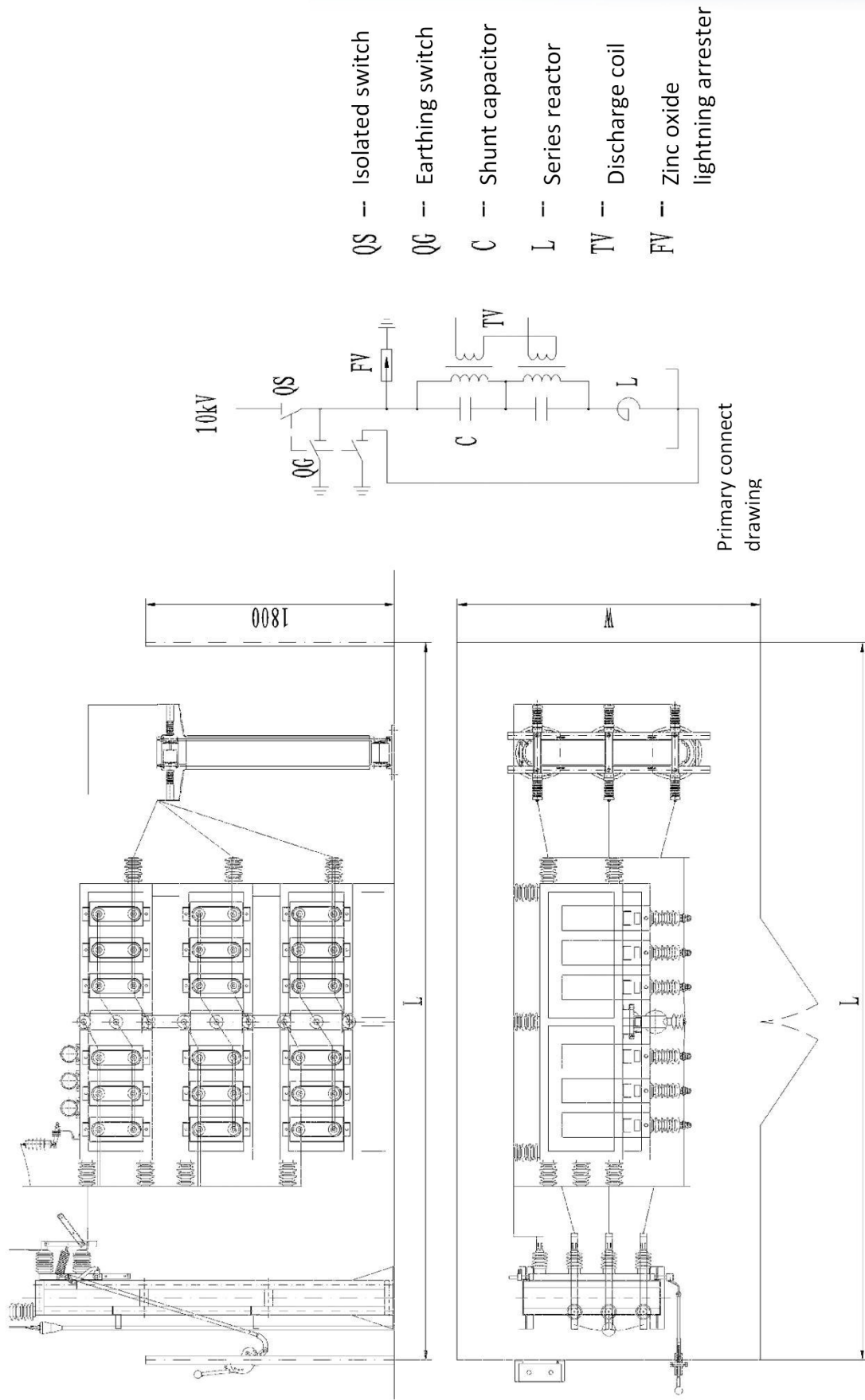
- QS -- Isolated switch
- QG -- Earthing switch
- C -- Shunt capacitor
- L -- Series reactor
- TV -- Discharge coil
- FV -- Zinc oxide lightning arrester



- QS -- Isolated switch
- QG -- Earthing switch
- C -- Shunt capacitor
- L -- Series reactor
- TV -- Discharge coil
- FV -- Zinc oxide lightning arrester

Drawing 2

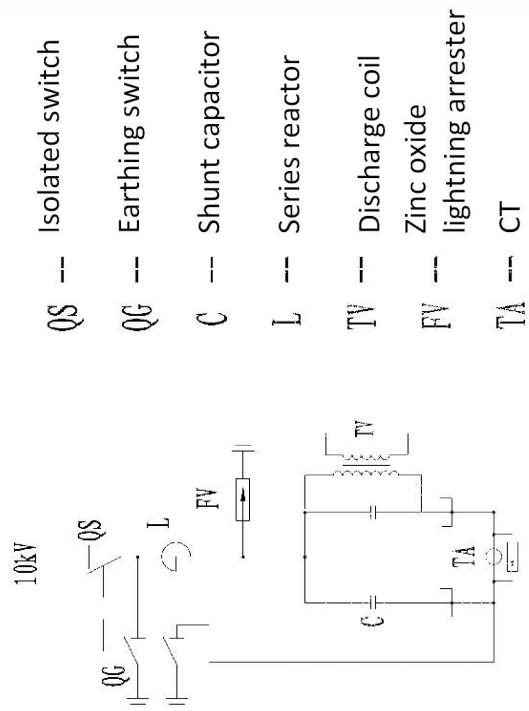
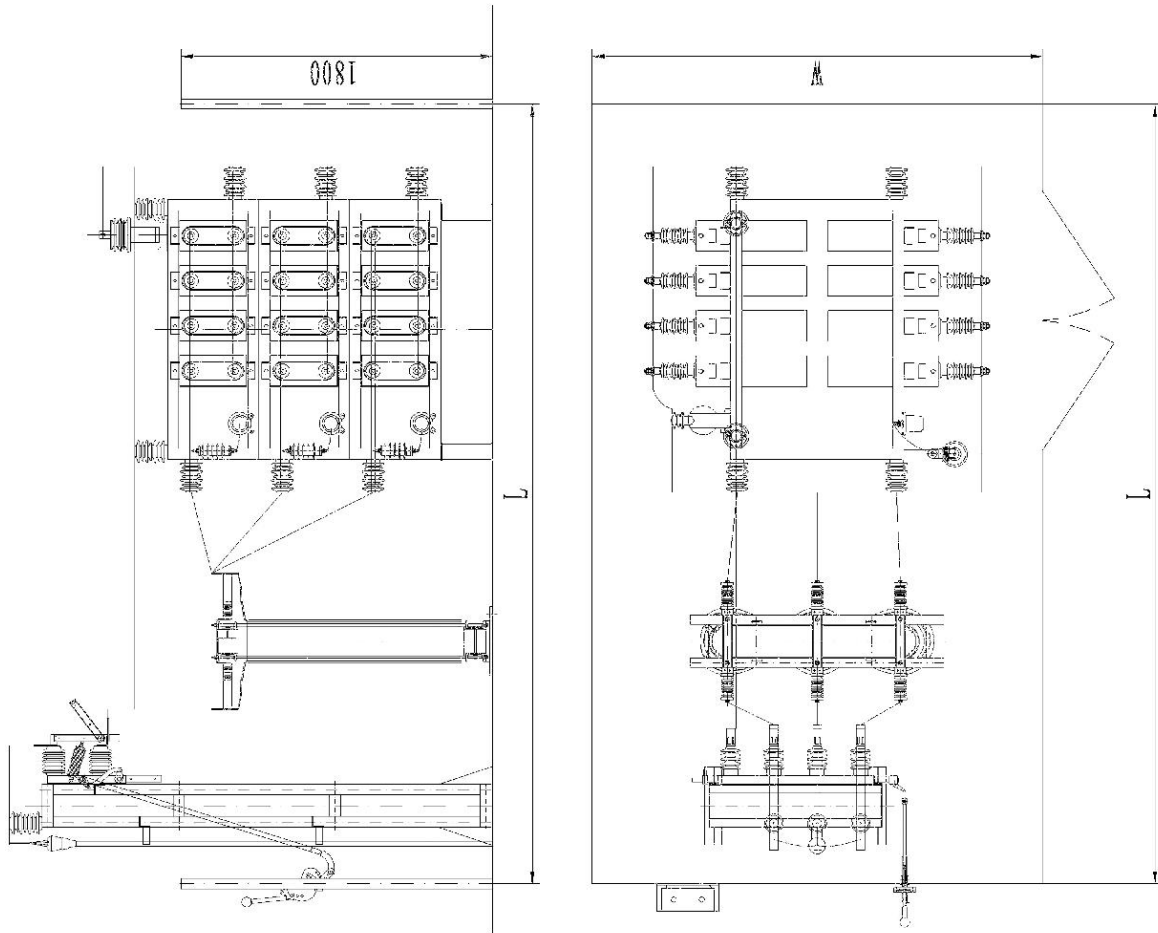
HV shunt capacitor and capacitor bank



- QS -- Isolated switch
- QG -- Earthing switch
- C -- Shunt capacitor
- L -- Series reactor
- TV -- Discharge coil
- FV -- Zinc oxide lightning arrester

Primary connect drawing

Drawing 3

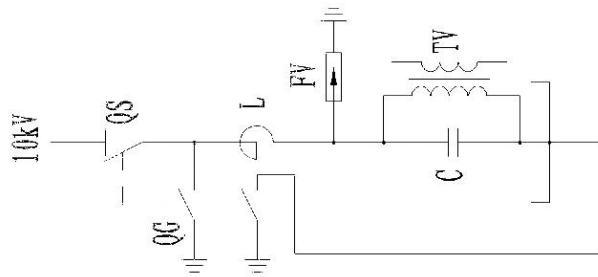
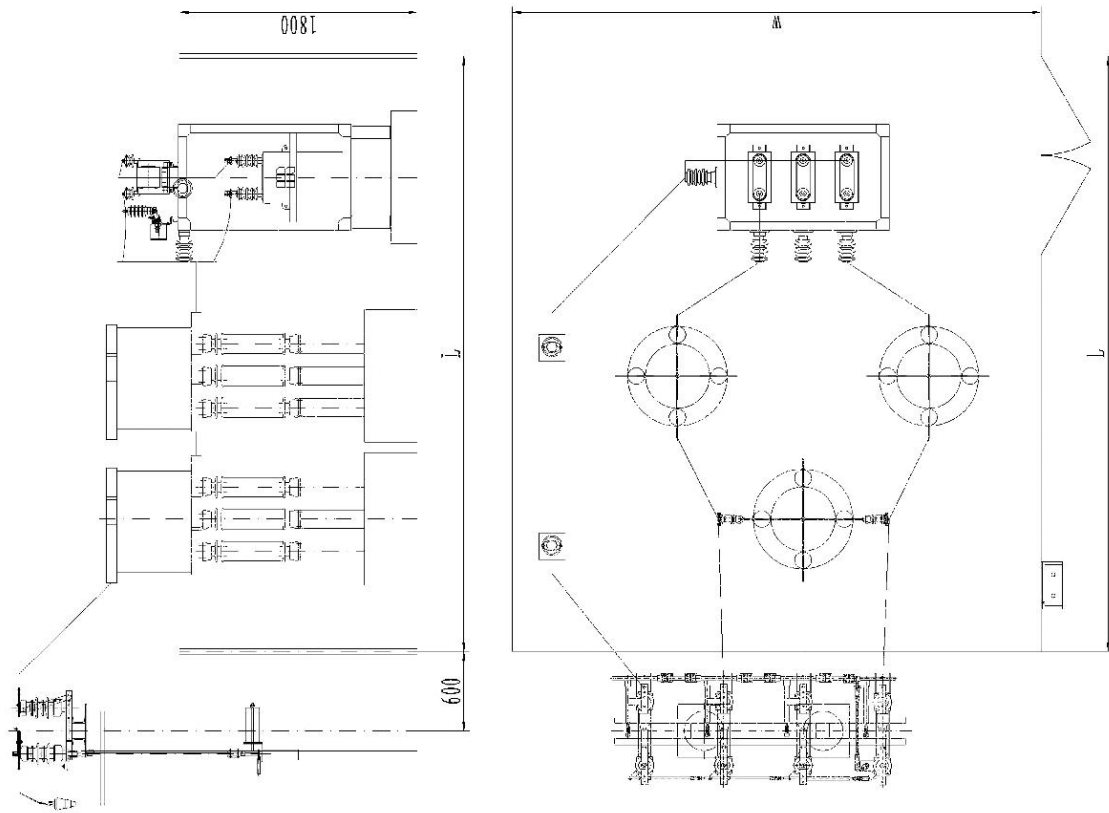


Primary connect drawing

HV shunt capacitor and capacitor bank

10kV Frame type shunt capacitor installation (outdoor) Typical configuration technology parameter table

No.	Model	Capacitor unit model	length L(mm)	width W(mm)	drawing code
1	TBB10-1002/334-AKW	BAM11/ $\sqrt{3}$ -334-1W	4500	4000	drawing5
		BAM12/ $\sqrt{3}$ -334-1W			
2	TBB10-2004/334-AKW	BAM11/ $\sqrt{3}$ -334-1W	5000	4000	drawing5
		BAM12/ $\sqrt{3}$ -334-1W			
3	TBB10-3006/334-AKW	BAM11/ $\sqrt{3}$ -334-1W	5000	4000	drawing5. drawing6
		BAM12/ $\sqrt{3}$ -334-1W			
4	TBB10-3600/200-AKW	BAM11/ $\sqrt{3}$ -200-1W	5500	4000	drawing6
		BAM12/ $\sqrt{3}$ -200-1W			
5	TBB10-4008/334-AKW	BAM11/ $\sqrt{3}$ -334-1W	5500	4000	drawing5. drawing6
		BAM12/ $\sqrt{3}$ -334-1W			
6	TBB10-5004/417-AKW	BAM11/ $\sqrt{3}$ -417-1W	5500	4000	drawing5. drawing6
		BAM12/ $\sqrt{3}$ -417-1W			
7	TBB10-4800/200-ACW	BAM11/2 $\sqrt{3}$ -200-1W	5000	4000	drawing7
		BAM12/2 $\sqrt{3}$ -200-1W			
8	TBB10-6012/334-ACW	BAM11/2 $\sqrt{3}$ -334-1W	6000	4500	drawing7
		BAM12/2 $\sqrt{3}$ -334-1W			
9	TBB10-8016/334-ACW	BAM11/2 $\sqrt{3}$ -334-1W	6500	4500	drawing7
		BAM12/2 $\sqrt{3}$ -334-1W			
10	TBB10-6012/334-BLW	BAM11/ $\sqrt{3}$ -334-1W	6000	4500	drawing8
		BAM12/ $\sqrt{3}$ -334-1W			
11	TBB10-8016/334-BLW	BAM11/ $\sqrt{3}$ -334-1W	6500	4500	drawing8
		BAM12/ $\sqrt{3}$ -334-1W			



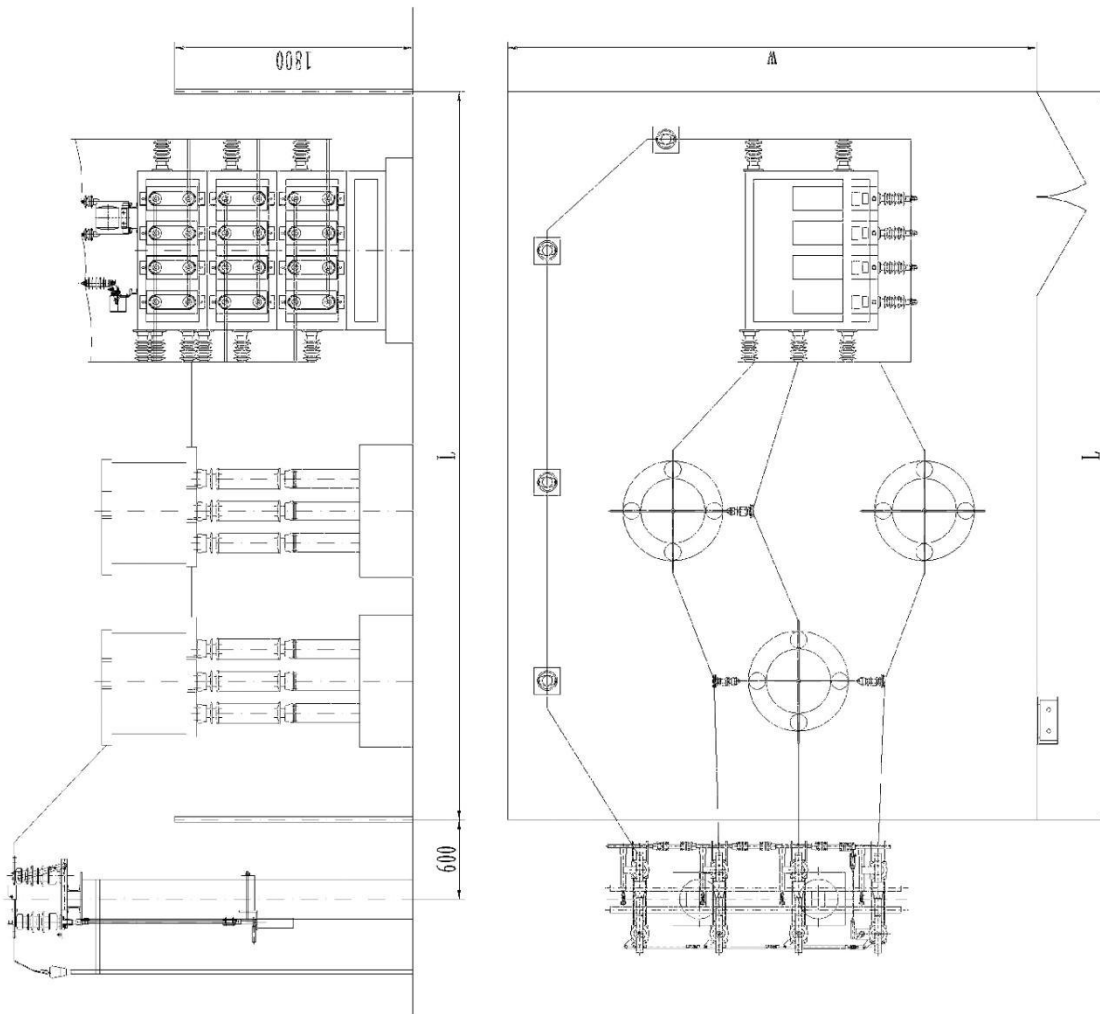
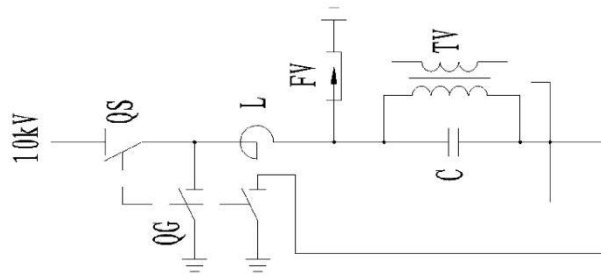
- QS -- Isolated switch
- QG -- Earthing switch
- C -- Shunt capacitor
- L -- Series reactor
- TV -- Discharge coil
- FV -- Zinc oxide lightning arrester

Primary connect drawing

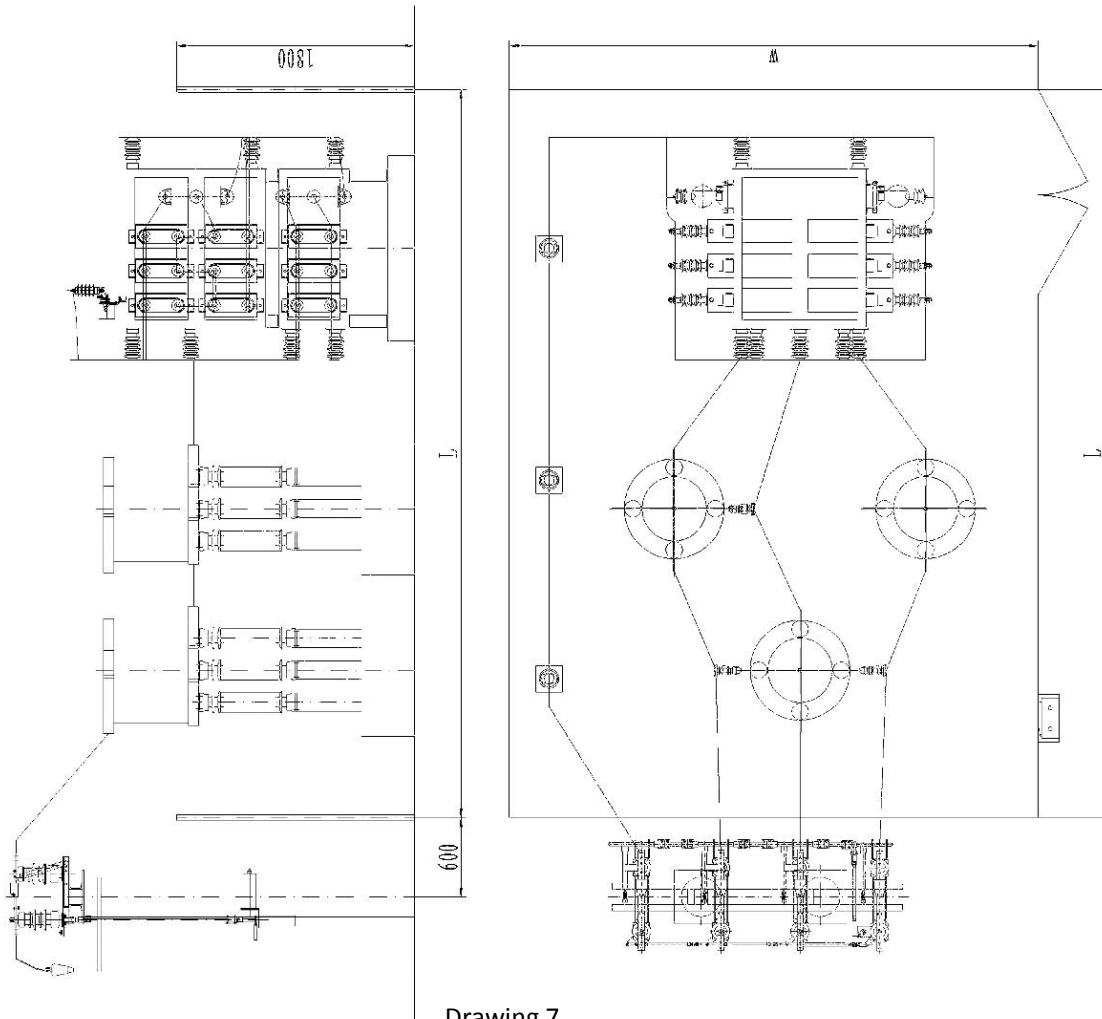
Drawing 5

HV shunt capacitor and capacitor bank

- QS -- Isolated switch
- QG -- Earthing switch
- C -- Shunt capacitor
- L -- Series reactor
- TV -- Discharge coil
- FV -- Zinc oxide lightning arrester



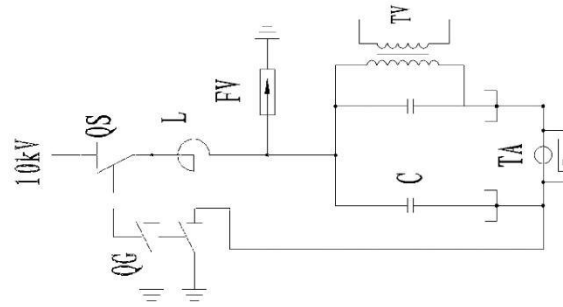
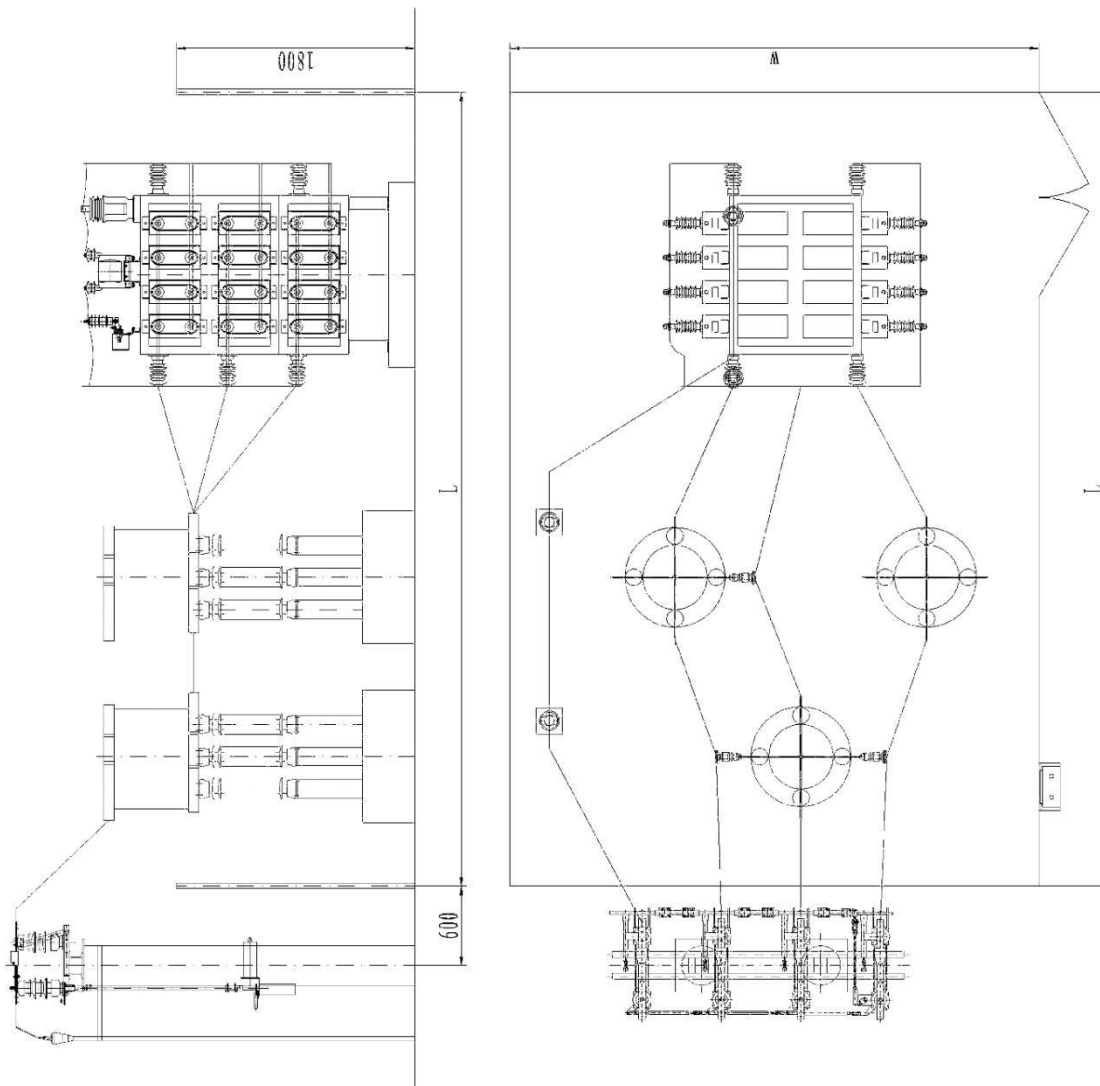
Drawing 6



- QS — Isolated switch
- QG — Earthing switch
- C — Shunt capacitor
- L — Series reactor
- TV — Discharge coil
- FV — Zinc oxide lightning arrester

Primary connect drawing

Drawing 7



Primary connect drawing

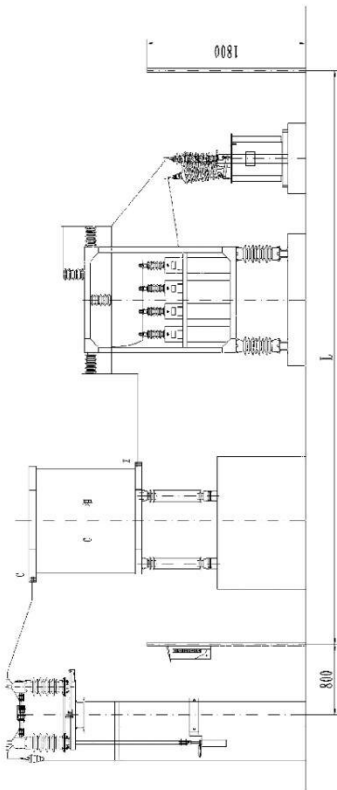
- QS --- Isolated switch
- QG --- Earthing switch
- C --- Shunt capacitor
- L --- Series reactor
- TV --- Discharge coil
- FV --- Zinc oxide lightning arrester
- TA --- CT

Drawing 8

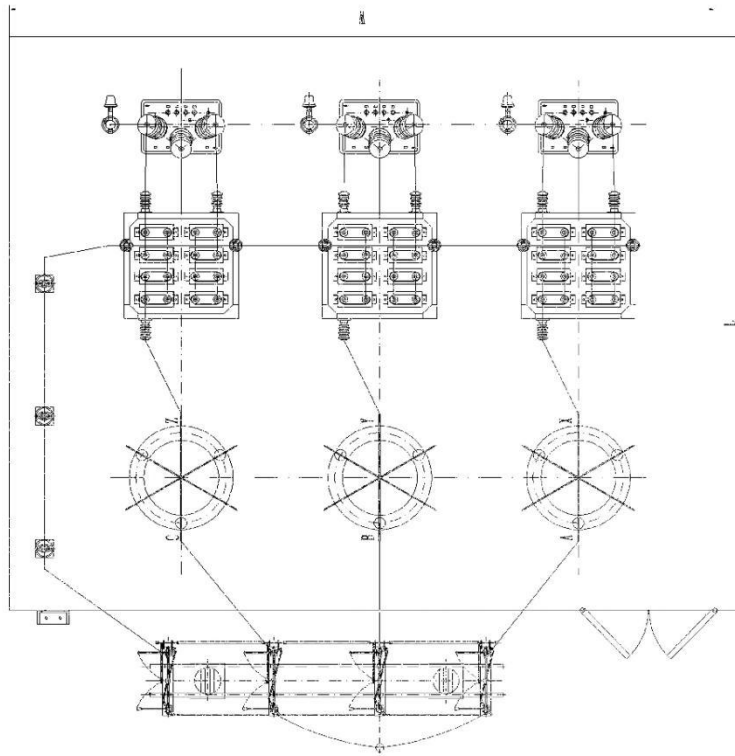
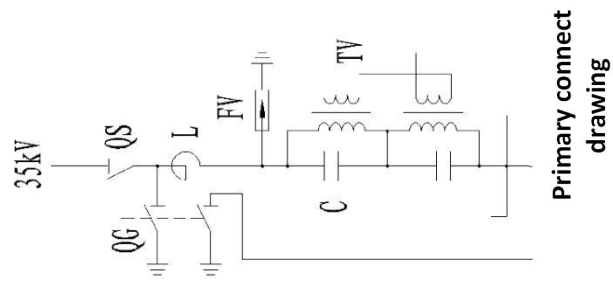
Table of typical configuration parameters of 35kV frame type shunt capacitor device

No.	Model	Capacitor unit model	length L(mm)	width W(mm)	drawing code
1	TBB35-10000/417-ACW	BAM11/2-417-1W	6500	8000	drawing9
		BAM12/2-417-1W			
2	TBB35-20000/417-ACW	BAM11/2-417-1W	6500	8000	drawing9
		BAM12/2-417-1W			
3	TBB35-30000/500-ACW	BAM11/2-500-1W	6500	8000	drawing9
		BAM12/2-500-1W			
4	TBB35-40000/417-AQW	BAM11/2-417-1W	4500	10000	drawing10
		BAM12/2-417-1W			
5	TBB35-60000/500-AQW	BAM11/2-500-1W	5000	10000	drawing10
		BAM12/2-500-1W			

HV capacitor and capacitor bank

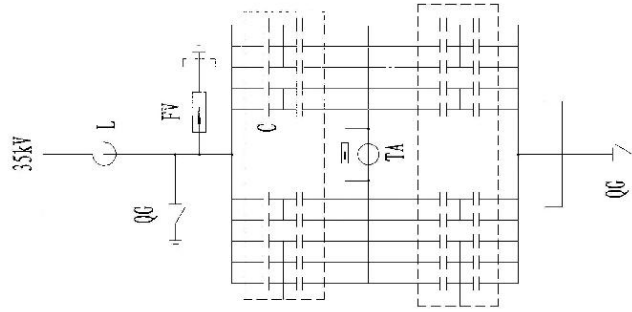


- Isolated switch -- QS
- Earthing switch -- QG
- Shunt capacitor -- C
- Series reactor -- L
- Discharge coil -- TV
- Zinc oxide lightning arrester -- FV

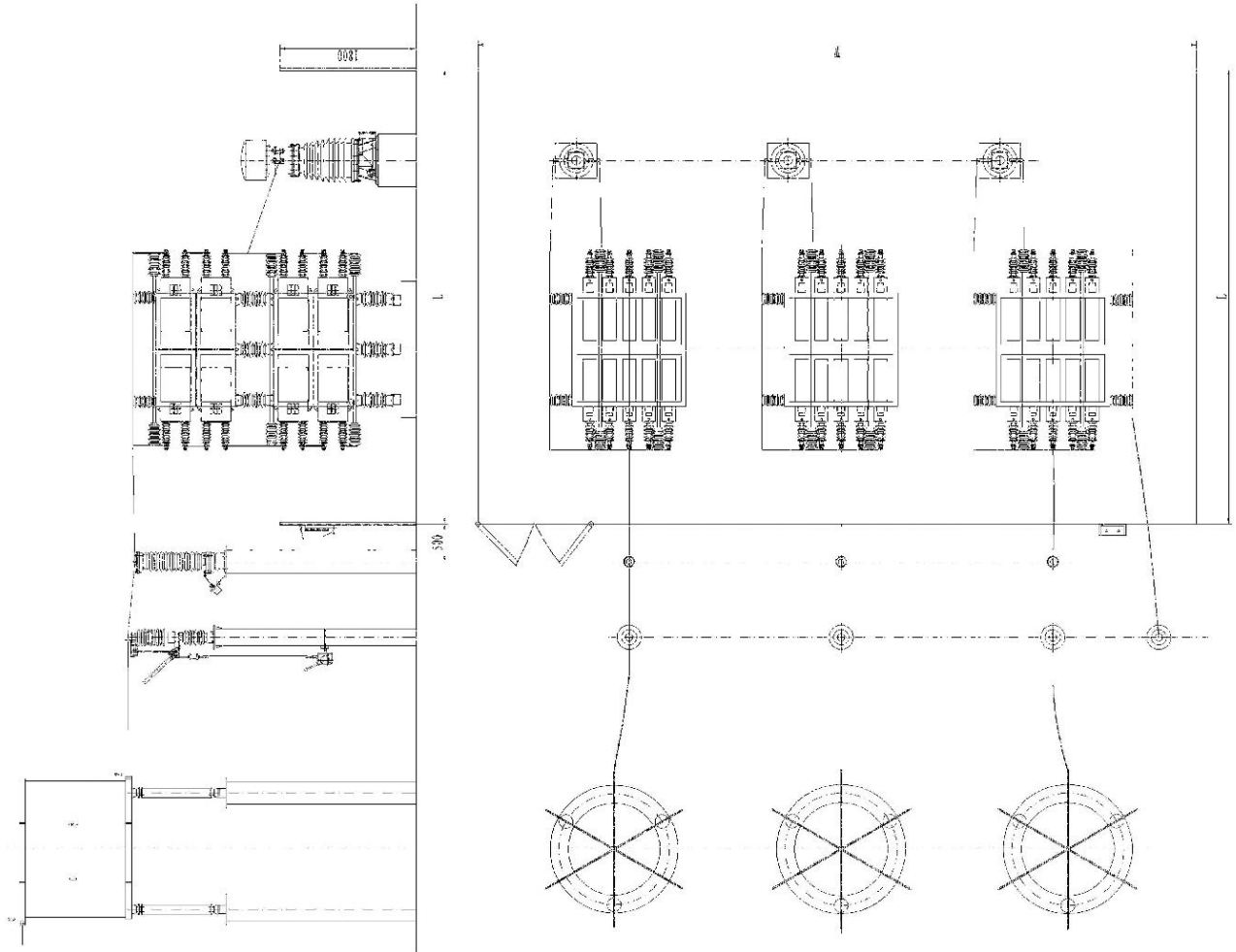


Drawing 9

- QC --- Earthing switch
- C --- Shunt capacitor
- L --- Series reactor
- FV --- Zinc oxide lightning arrester
- TA --- CT



Primary connect drawing



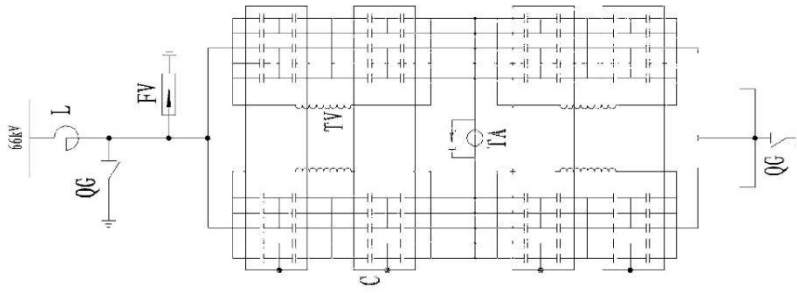
HV capacitor and capacitor bank model manual

66kV Frame type shunt capacitor device Typical configuration technology parameter table

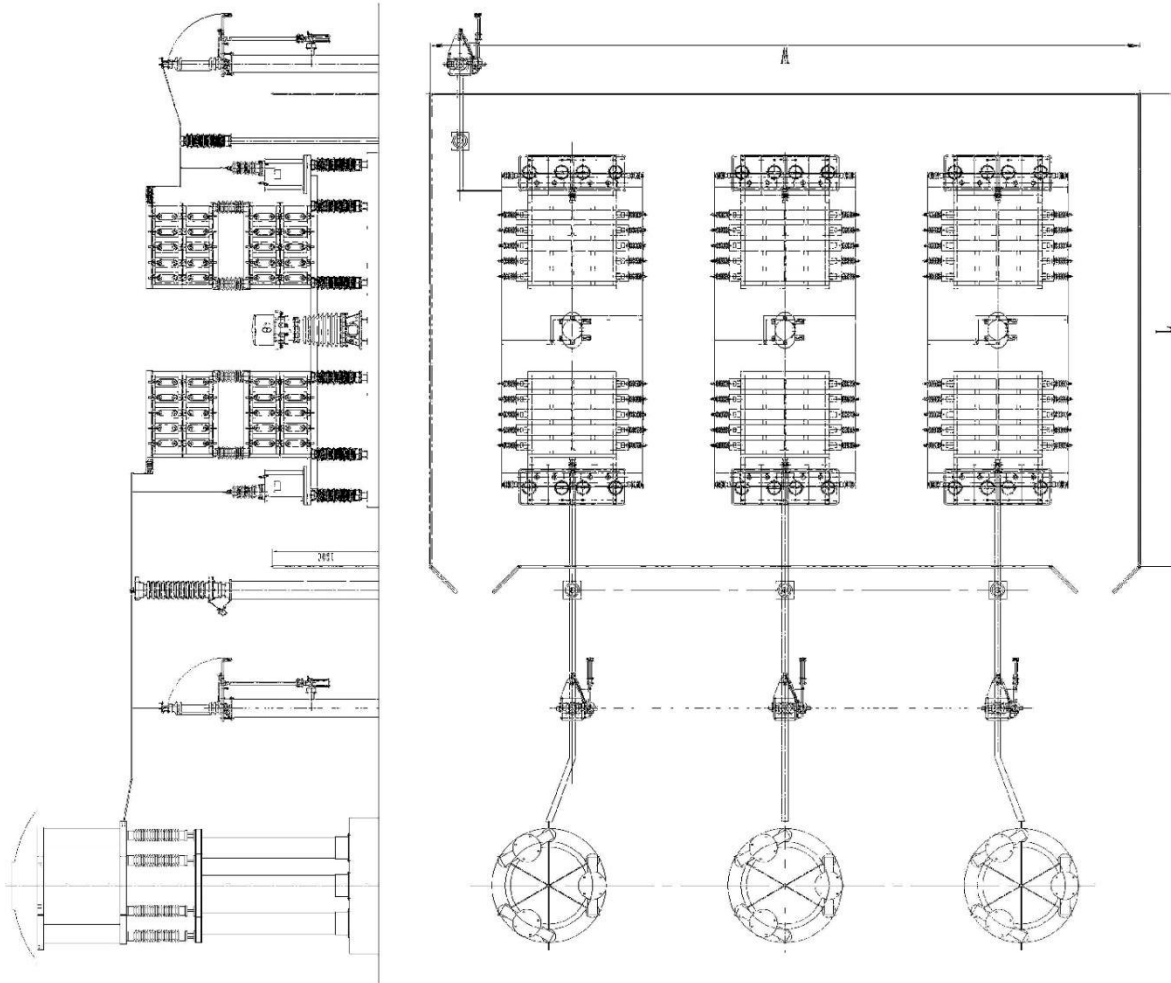
No.	Model	Capacitor unit model	length L(mm)	width W(mm)	drawing code
1	TBB66-10000/417-AQW	BAM21/2-417-1W	4500	6500	drawing11
		BAM23/2-417-1W			
2	TBB66-20000/417-AQW	BAM21/2-417-1W	5000	7000	drawing11
		BAM23/2-417-1W			
3	TBB66-25000/417-AQW	BAM21/2-417-1W	6000	7500	drawing11
		BAM23/2-417-1W			
4	TBB66-40000/417-AQW	BAM21/2-417-1W	5000	9500	drawing11
		BAM23/2-417-1W			
5	TBB66-60000/500-AQW	BAM21/2-500-1W	6000	9500	drawing11
		BAM23/2-500-1W			
6	TBB66-120000/500-AQW	BAM21/2-500-1W	8000	12000	drawing12
		BAM23/2-500-1W			

HV capacitor and capacitor bank model

- ⊗ Shunt capacitor
- () Series reactor
- | Zinc Oxide lightning arrester
- ⊕ CT
- ⊖ Discharge coil



Primary connect drawing



Drawing 12

Assembling shunt capacitor bank



1. Summary

Assembling shunt capacitor device contains the main components are: Assembling shunt capacitor, Series reactor, discharge coil, Zinc Oxide arrester, isolation and grounding switch, discharge coil bracket, bus, connecting line, post insulator, fence, etc.

Collection type shunt capacitor installation is installed directly on the ground, mainly used for 110kV and above substation.

2. main features

- Capacitor with internal fuse.
- Anti explosion, fire prevention, safe and reliable.
- Installation is simple.
- Easy maintenance.
- Small floor area.
- The high rate of operation.

3. technical parameter

- rated voltage : 10. 35. 66kV.
- Rated single set capacity: 1000~20000 kvar etc..
- The ratio of the maximum and minimum capacitance of the three-phase capacitor is not greater than that of the 1.01.

- The capacitor device can be operated under $1.1U_n$ for a long time..
- The capacitor unit can be operated at a time when the current is not more than 1.3 times the rated current..

4. demonstration of the model

for example: TBB35-20000/6667-ACW

T: capacitor install

BB: Shunt capacitor device

35: nominal voltage of a system 35kV

20000: rated capacity 20000kvar

6667: Capacity of single capacitor 6667kvar

A: Single star connection(B: Double star connection)

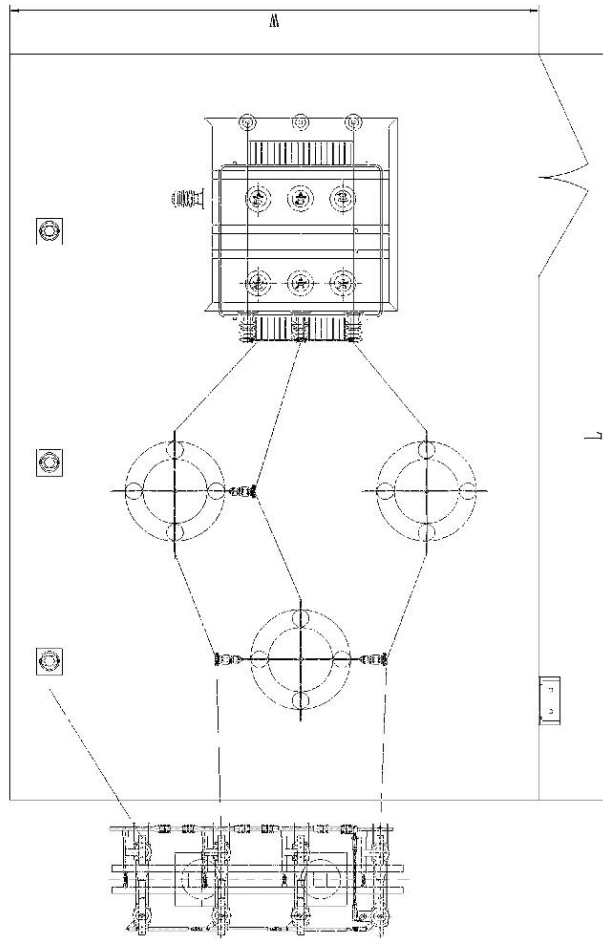
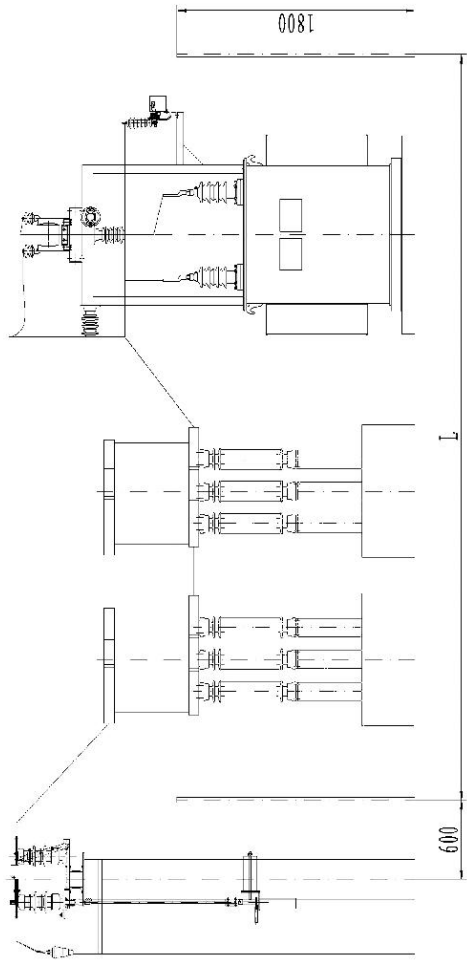
C: Phase voltage differential protection(K: Open delta voltage protection; L: Neutral point unbalance current protection; Q: Bridge type differential current protection)

W: outdoor use(Do not write the indoor use)

5. Assembling shunt capacitor device typical configuration technical parameter table

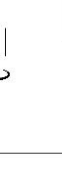
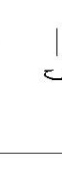
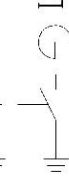
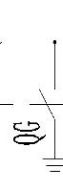
Technical parameter table of typical configuration of 10kV Assembling shunt capacitor device

No.	model	capacitor model	length L(mm)	width W(mm)	Drawing code
1	TBB10-1000-AKW	BAMH11/ $\sqrt{3}$ -1000-3W	5000	4000	Drawing 13
		BAMH12/ $\sqrt{3}$ -1000-3W			
2	TBB10-3600-AKW	BAMH11/ $\sqrt{3}$ -3600-3W	5500	4000	Drawing 13
		BAMH12/ $\sqrt{3}$ -3600-3W			
3	TBB10-4800-AKW	BAMH11/ $\sqrt{3}$ -4800-3W	5500	4000	Drawing 13
		BAMH12/ $\sqrt{3}$ -4800-3W			



10kV

QS



QS — Isolated switch

QG — Earthing switch

C — Shunt capacitor

L — Series reactor

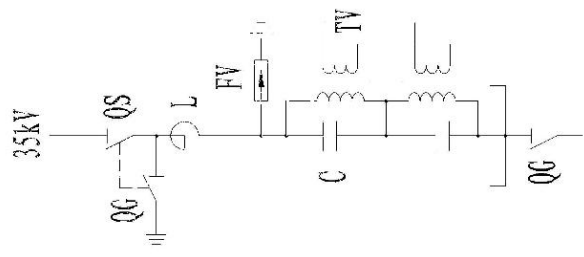
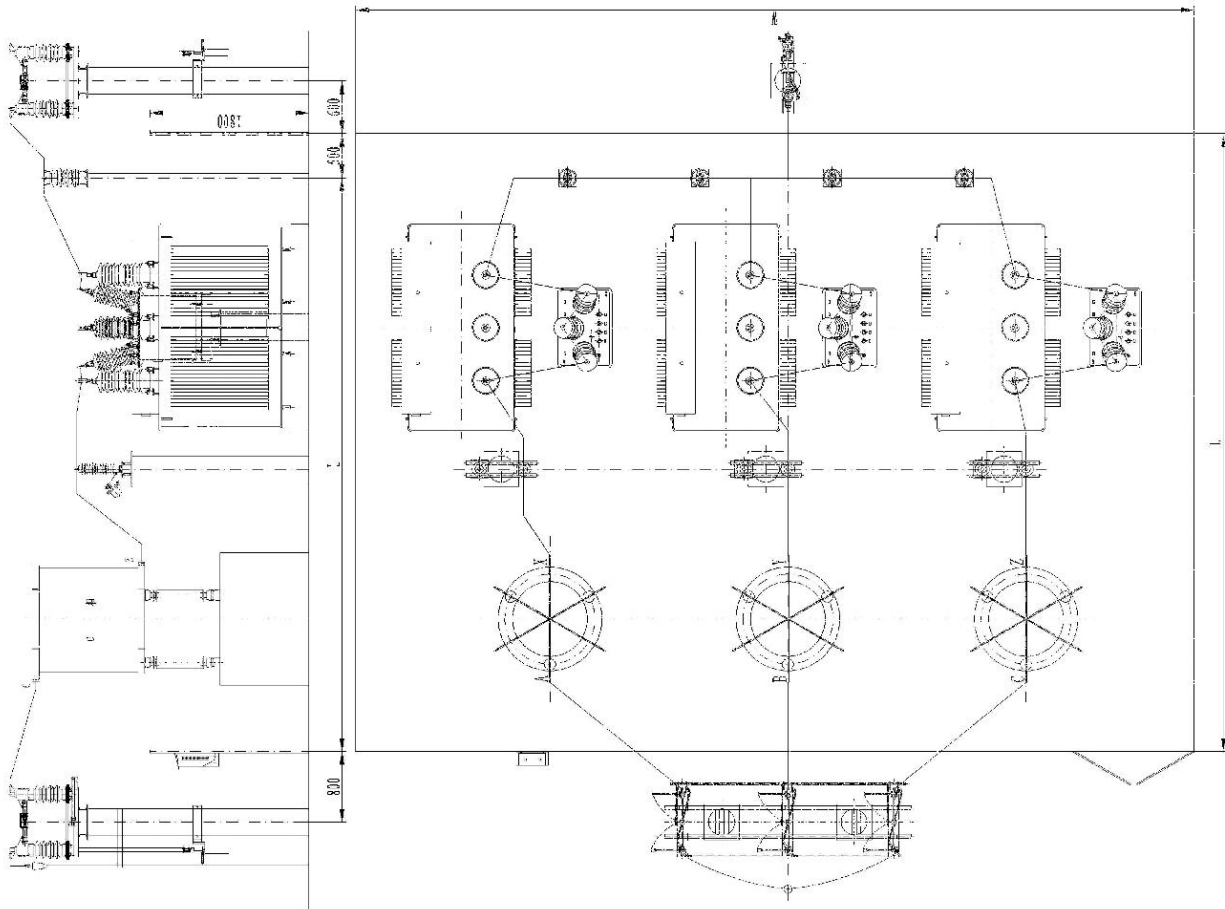
TV — Discharge coil

FV — Zinc oxide lightning arrester

Primary connect drawing

Technical parameter table of typical configuration of 35kV assembly shunt capacitor device

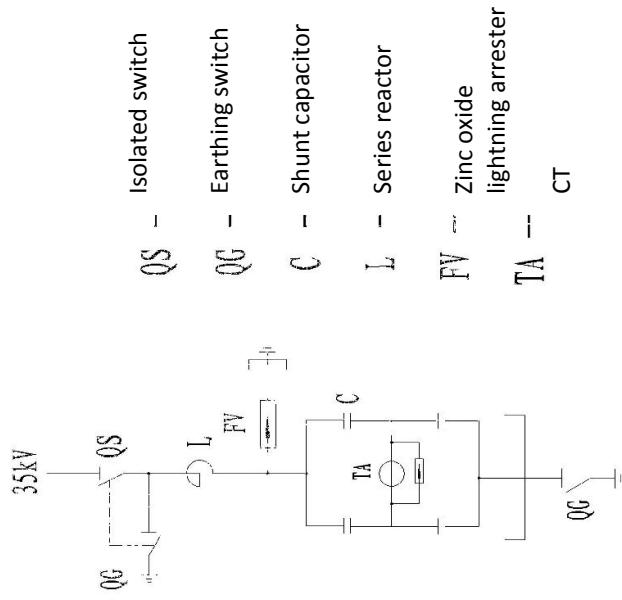
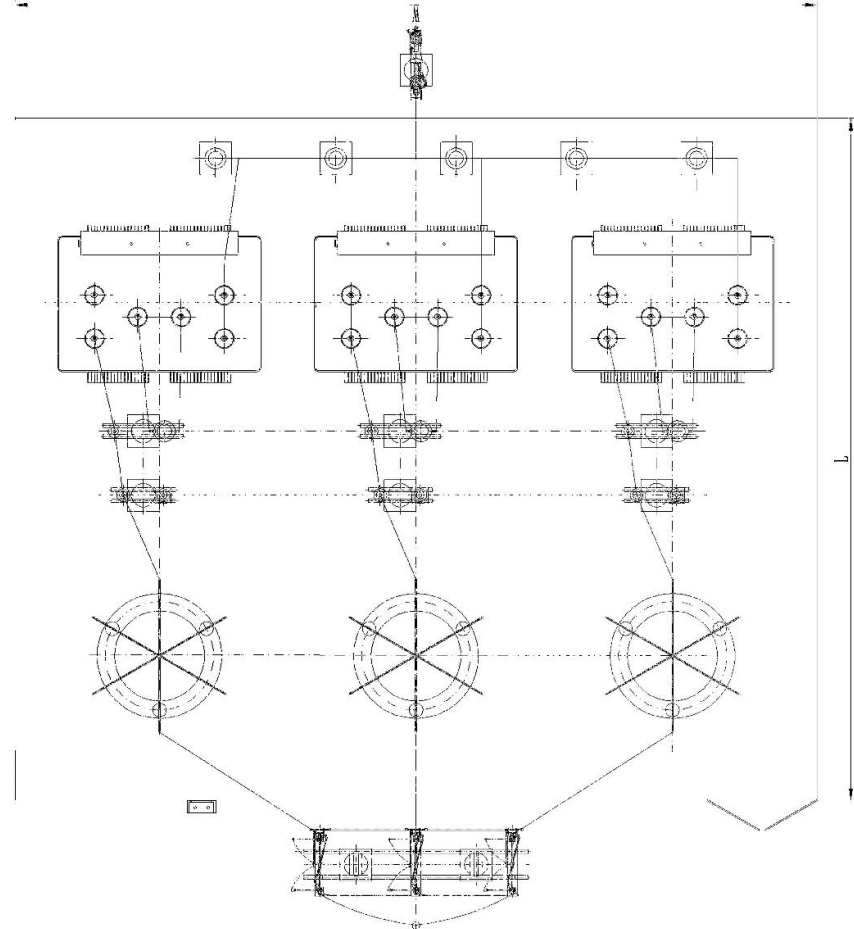
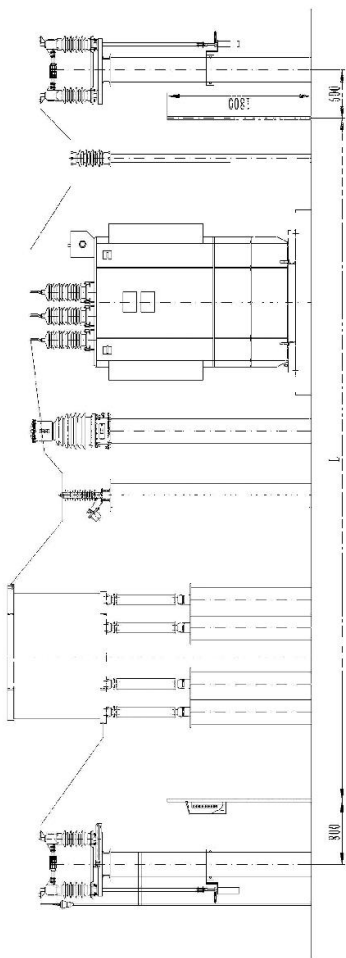
No.	model	capacitor model	length L(mm)	width W(mm)	Drawing code
1	TBB35-20000/6667-ACW	BAMH38.5/ $\sqrt{3}$ -6667-1W	7000	9500	drawing14
		BAMH42/ $\sqrt{3}$ -6667-1W			
2	TBB35-30000/10000-ACW	BAMH38.5/ $\sqrt{3}$ -10000-1W	7500	11000	drawing14
		BAMH42/ $\sqrt{3}$ -10000-1W			
3	TBB35-60000/20000-AQW	BAMH38.5/ $\sqrt{3}$ -20000-1W	8500	10000	drawing15
		BAMH42/ $\sqrt{3}$ -20000-1W			



- QS --- Isolated switch
- QG --- Earthing switch
- C --- Shunt capacitor
- L --- Series reactor
- TV --- Discharge coil
- FV --- Zinc oxide lightning arrester

Primary connect drawing

HV shunt capacitor and capacitor bank

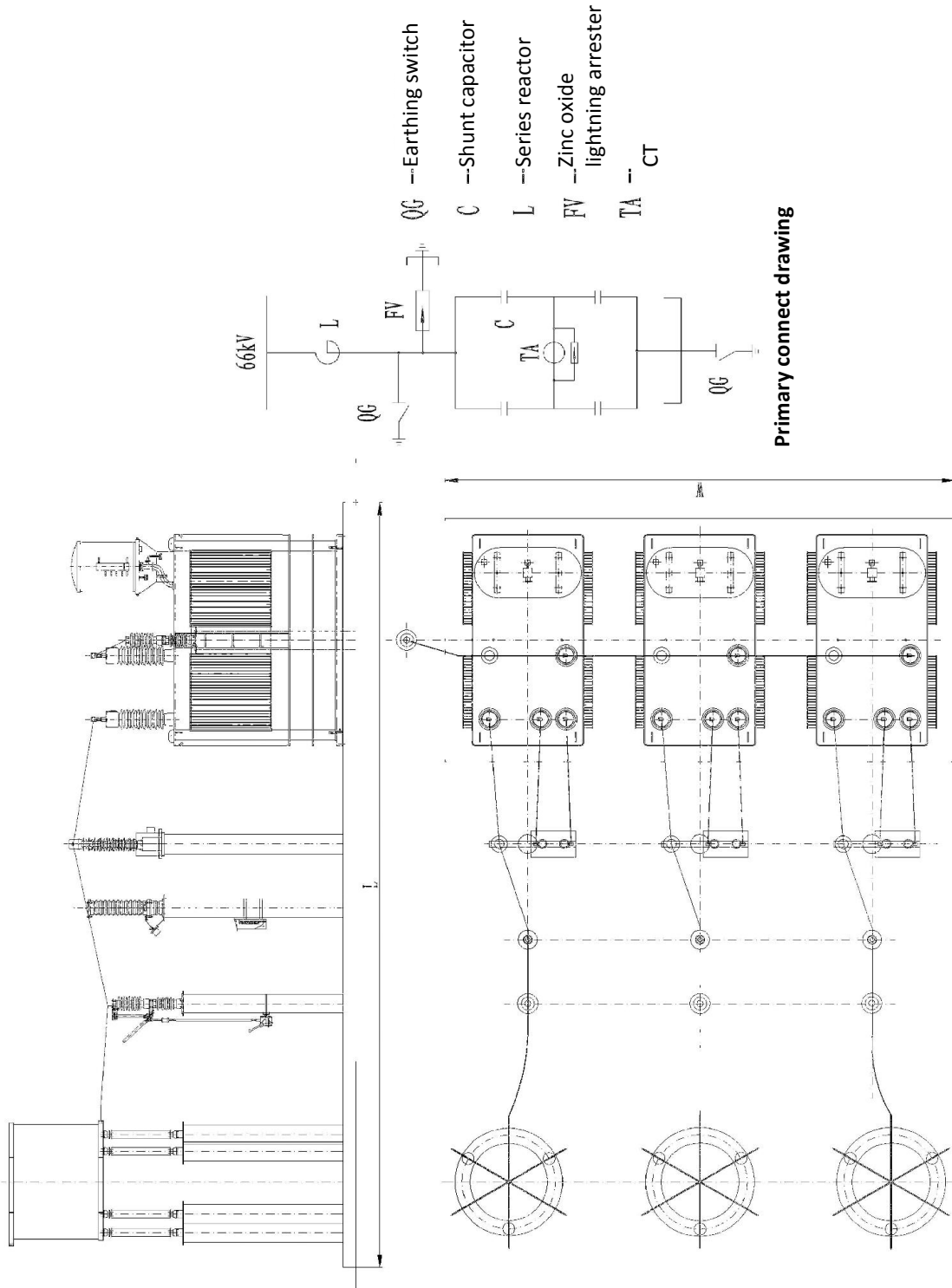


- QS - Isolated switch
- QG - Earthing switch
- C - Shunt capacitor
- L - Series reactor
- FV - Zinc oxide lightning arrester
- TA - CT

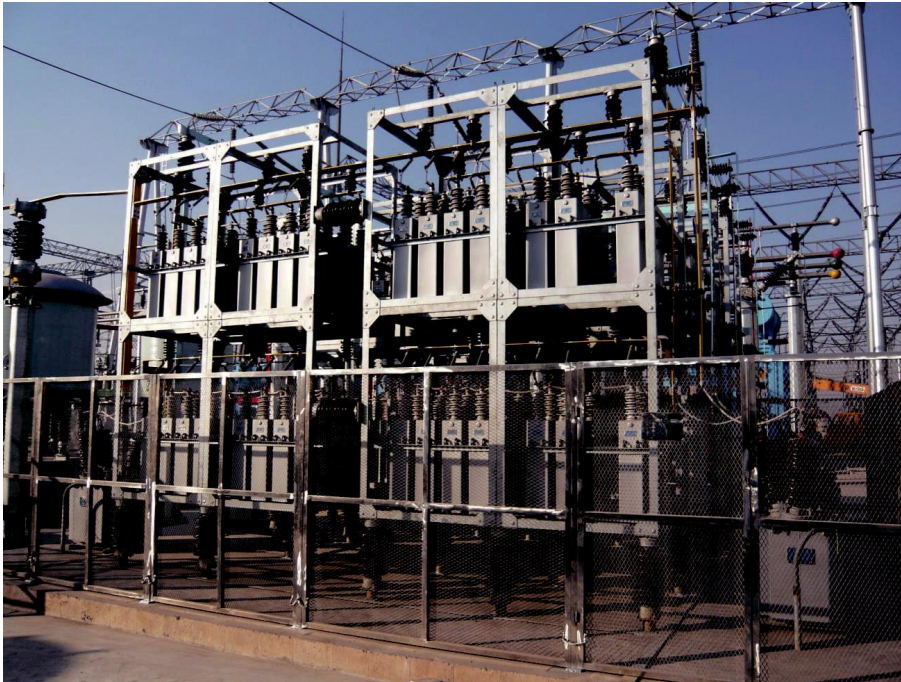
Primary connect drawing

Technical parameter table of typical configuration of 66kV assembling shunt capacitor device

No.	model	capacitor model	length L(mm)	width W(mm)	Drawing code
1	TBB66-60000/20000-AQW	BAMH73/ $\sqrt{3}$ -20000-1W BAMH79/ $\sqrt{3}$ -20000-1W	12000	8000	Drawing 16



AC filter shunt capacitor bank



1. Summary

High voltage AC filter is applied to AC power system with frequency 50Hz and system voltage of 6 ~ 35kV. To reduce the harmonic content of the system, and to improve the power factor

In an ideal power system, Electric energy is transported to the user under a single fixed frequency (50Hz or 60Hz), sine wave voltage and current. But if there is a non-linear load or impact load, Such as rectifier equipment, Frequency conversion equipment, electric arc furnace, electric railway and other s which access into system, will produce a large number of high harmonic currents to make system voltage and current waveform distortion, and power system harmonic pollution, it is harm to electrical equipment and power equipment. When the voltage distortion rate exceeds the standard requirements, then filtering measures must be adopted to control the harmonics. High voltage AC filter is an economical and practical solution.

The high voltage AC filtering device mainly comprises the following devices:High voltage filter capacitors. Filter reactors. Damping resistors. Discharge coils. Zinc Oxide surge arrester. Isolated grounding switches. Frame. Connecting wires. Post insulators. Buses. Fences, etc.

High voltage AC filter device can be based on test data, to design single tuned circuit for characteristic harmonics and high pass filter circuit for high order harmonics.

The high voltage AC filter can be used as a reactive power compensation device based on effect of different configuration.

High voltage filter capacitor. Filter reactor. Damping resistance is the main component of the filter device, the composition of the harmonic of the low impedance channel.

2. main features

- High performance capacitors are used to ensure the stability of the device..
- To verify each harmonic, to ensure that there is no resonance and harmonic amplification.
- Taking into account reactive power compensation, improve the power factor.
- Optimize the quality factor of the circuit, so that the device to avoid the loss of harmonic state.

3. technical data

- System rated voltage:6, 10, 35kV.
- Selection of rated voltage of capacitor: (4.2,4.4,4.6,4.8,5.0,5.2,5.4). (7.0,7.4,7.8,8.2,8.6,9.0). (12.0,12.6,13.2,13.8,14.4,15,15.6)kV, According to the user and design requirements
- Selection of rated capacity of single capacitor:100,200,334,417kvar, According to the user and design requirements.
- Rated frequency:50Hz.
- Rated capacity:1000~10000kvar, Special specifications can be negotiated.
- Characteristic harmonic frequency:3, 5, 7, 11, 13. According to the user and design requirements

4. demonstration of the type

for example: TAL35-10000/417/5-ACW

T: capacitor install

AL: AC filter

35: nominal voltage of a system 35kV

10000: rated capacity 10000kvar

417: Capacity of single capacitor 417kvar

5: Characteristic harmonics order 5

A: Single star connection (B: double star connection)

C: Phase voltage differential protection (K: open delta voltage protection; L: neutral point unbalance current protection)

W: Outdoor use (indoor use not to write)

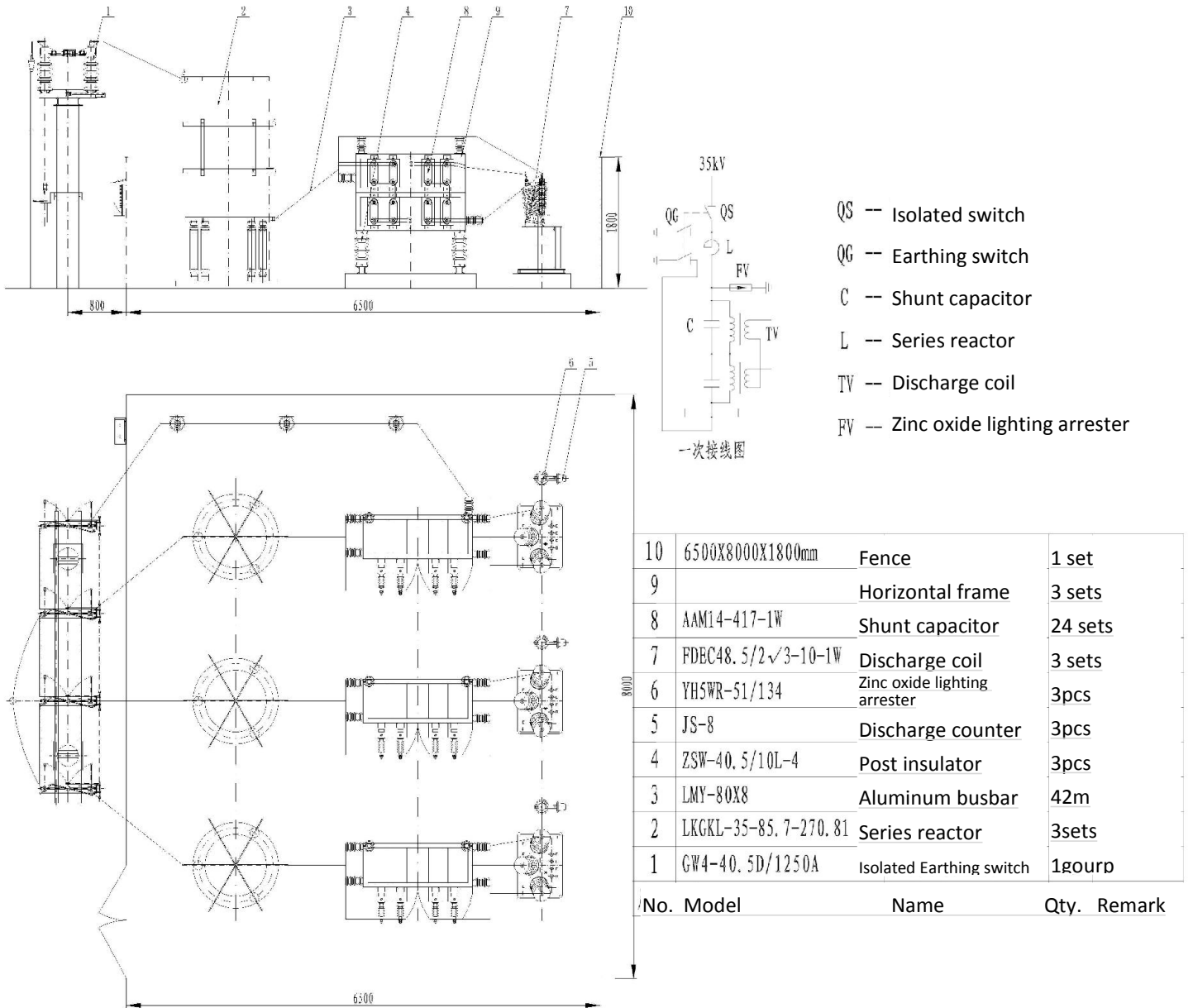
5. Order notice

When ordering, please pay attention to the following:

- Put forward specific requirements: the room size of the device to install. The method of incoming cable, with matching with the switch, etc..
- Parameters of power network in the original state, Background harmonic (Harmonic voltage and harmonic current values under no-load condition), can be carried out by our company to measure the operation parameters of the power grid, harmonic and so on.
- System wiring diagram.
- Load characteristics and size.

6. Drawing

TAL35-10000/417/5-ACW layout, see drawing 17.



Drawing17

Voltage and capacitance regulation shunt capacitor bank



1. summary

Voltage and capacitance regulate shunt capacitor bank is new type reactive power automatic compensate device which lead the industry new technology, the device breaks the traditional reactive power compensation method which use circuit breaker and contactor to switch the capacitor bank, but use the principle of output of capacitive reactive power during compensation and square of terminal voltage become direct ratio , By controlling the output voltage of the voltage regulator to change the terminal voltage of the fixed capacitor group, To achieve the purpose of fine compensation for reactive power. The controller of the device adopts advanced control technology, The parameters such as voltage, current, power factor, reactive power and so on can be monitored and displayed in real time, The control and protection parameters can be adjusted. Controller based on voltage and reactive power control mode, According to the changes of voltage and reactive power, Automatically adjusting the position of the load tap changer to change the output voltage of the self coupling voltage regulator. The capacitor is connected with the output end of the voltage regulator, The input end of the voltage regulator is connected with the bus bar or the line. Therefore, the reactive power compensation capacity of the capacitor group to the power system will be changed accordingly with the change of the voltage. The device has a wide application range, can be used in electric power enterprises, coal industry, metallurgical industry, oil industry, cement industry, railway industry and wind power plants, etc., to realize 6kV, 10kV, 35kV voltage level of large capacity reactive power automatic compensation.

2. Technical characteristics

- Device using fixed capacity input, no shift, through output voltage of the regulator is regulated by the load tap changer, To change the terminal voltage of the compensation capacitor, and then change the output reactive power of the device. Can achieve 9 steps output, Regulating precision is high, the adjustment range is big, the voltage regulation range is $(100-60)\%U_n$, the capacity adjustment range is $(100-36)\%Q_n$.

- In the process of switching device, voltage regulator of the differential is smaller, In addition, the access of the transition resistance of the load tap changer and the leakage reactance of the voltage regulator, Almost no inrush flow, Greatly reducing the impact on the system, To ensure the safe operation of the system, improve the service life of the equipment.

- The capacitor is operated under the rated voltage for a long time, and no switching problem of over voltage and inrush current, which prolongs the service life of the capacitor..
- The capacitor bank no need divided into groups, save the switching equipment area, save the cost of infrastructure investment
- Due to the use of self coupling voltage regulation, can effectively reduce the auxiliary loss, the maximum value is only 2/1000 of the capacitor capacity, 1/5 for the SVC.
- The device has high automation degree, and has perfect protection function, digital communication and remote maintenance function, which can satisfy the requirement of unattended operation and maintenance free.
- High cost efficiency, in the same capacity, the cost is only SVC (20-30)%.

3. main parameter

- rated voltage : 6kV, 10kV, 35kV.
- Rated capacity: when 6kV, capacity \leq 4000kvar;
When 10kV, capacity \leq 6000kvar; when
35kV, capacity \leq 20000kvar.
- Phase number: three phase.
- Rated frequency: 50Hz.
- Reactive power adjustment range: (36%-100%)Rated capacity.
- Voltage regulation range: (60%-100%)Rated voltage of busbar.
- Step No.: 9 steps.

4. demonstration of the model

for example: TYBZ10-4008/334-AKW

TYBZ: Voltage and capacitance regulation shunt capacitor bank

10: Nominal system voltage 10kV

4008: rated capacity 4008kvar

334: Capacity of single capacitor 334kvar

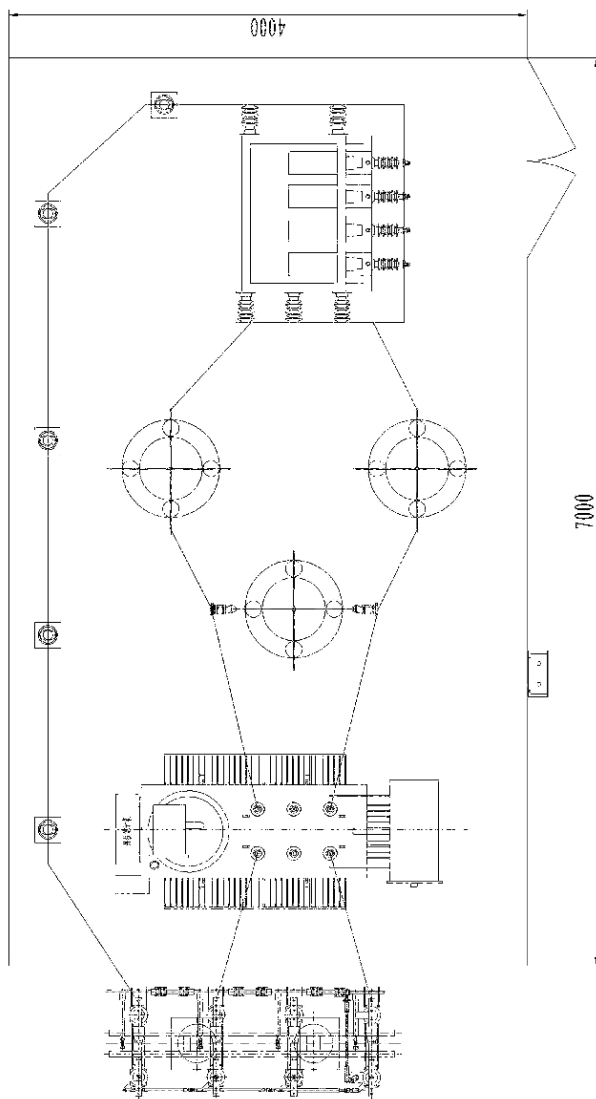
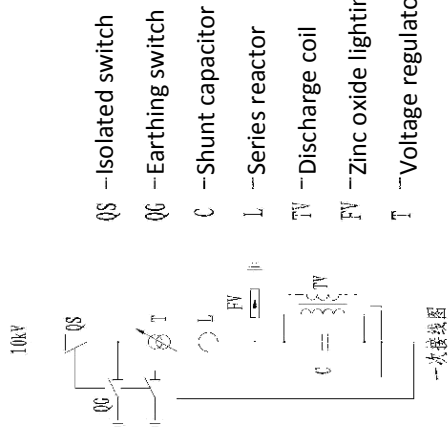
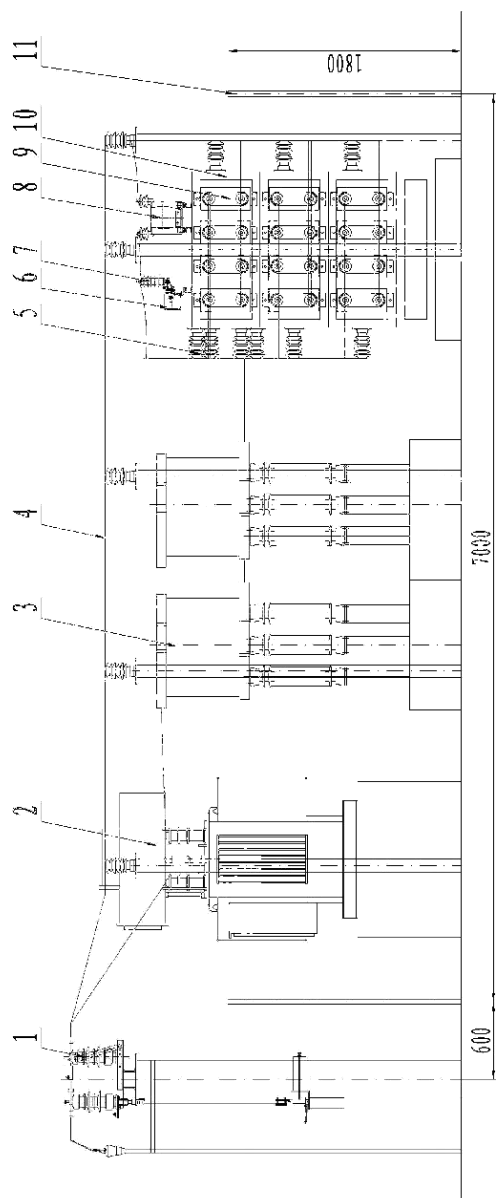
A: Single star connection(B: Double star connection)

K: Open delta voltage protection (C: voltage differential protection L: neutral point unbalance current protection)

W: Outdoor (indoor use not written)

5.drawing

TYBZ10-4008/334-AKW layout, See drawing 18



11	7000X4000X1800mm	Fence
10		Horizontal frame
9	BAM11/√3-334-1W	Shunt capacitor
8	FDGE11/√3-3, 4-1W	Discharge coil
7	YH5WR-17/46 (2ms, 600A)	Zinc oxide lightning arrester
6	JS-8	Discharge counter
5	ZSW-10/4	Post insulator
4	LM1-60X6	Aluminum busbar
3	CKGL 66.8/10-5	Series reactor
2	OSZ-4000/10.5	Voltage regulator
1	GW4-12D/1250A	Isolated Earthing switch
No.	Model	Name Qty. Remark

Multiple group auto switch in/out reactive power compensate device



1. overview

Multiple sets of automatic switching of reactive power compensation device is based on conventional high voltage shunt capacitor device then plus capacitor switching vacuum circuit breaker and automatic switching controller to realize packet capacitor reactive power automatic switching, achieve load capacity regulating purposes.

2. Usage

Device is mainly used for 6 ~ 10kV power system, through the automatic regulating transformer OLTC and automatic switching capacitors on the bus to achieve the comprehensive control of substation voltage and reactive power. To improve the power factor of the system, reduce the loss of the transformer and line, improve the quality of power supply.

Device is mainly for business users, widely used in chemical, petroleum, metallurgy, coal system. Considering the harmonic problem of enterprise users, can design the series reactance rate of 5% or above reactor, to make the harmonic enterprise users get some control.

Secondly, a large substation device can be used for rural power, considered rural substation load characteristics of diurnal variation and seasonal variation, to get maximum reactive power compensation to the system.

Third, the device can be applied to the city network unattended substation, with "four remote" function.

Fourth, the device can be used as an improvement for old substation capacitor installation, to improve the operation level of the substation.

3. Technical characteristics

- Vacuum switch special for capacitor, passed the capacitor capacitive switching back to back test, suitable for frequent switching.
- Automatic compensation is divided into five to two way, High compensation precision, Small impact, The maximum reactive power compensation effect can be obtained.

- The controller uses intell6 bit single chip microcomputer, Large screen Chinese character display menu, Have a friendly man-machine interface, Real time display operation parameters and fault information ; With RS-485 communication interface, Achieve four remote functions, Integrated with substation automation interface, To achieve local, backstage and scheduling three aspects of control and management.
- The controller adopts the principle of "nine domain area", auto recognize various operating modes of transformer and capacitor in Substation, To prevent the switch shock.
- Each capacitor is equipped with over current protection and internal fault protection, Can effectively isolate the fault capacitor in time., And a voice alarm function, Ensure the overall safe and reliable operation.

4. main parameter

- Installation method : indoor product use cabinet type structure, Outdoor products using box variable structure or frame structure.
- Control way: 2 ~ 5 ways, More than 5 road can be selected in the form of two groups.
- Input physical quantity: Bus exit current (5A) , Voltage (100V) .
- Control physical quantity: 2 ~ 5 circuits vacuum switch, transformer has load capacity adjust tap
- Protection: over current, over voltage, voltage loss, internal fuse + open delta voltage protection
- display: Current, voltage, power factor, running state of each capacitor
- Operation mode: Automatic, manual optional.
- rated voltage : 6, 10kV.
- rated capacity : 600~5000kvar.
- Single step maximum capacity: Not more than 2000kvar
- Series reactance rate: 1%, 5%, 12%

5. demonstration of the model

for example: TBBZ10-1000×3-AK

T: capacitor bank

BB: Parallel compensation

Z: Automatic steps choose

10: Nominal system voltage 10kV

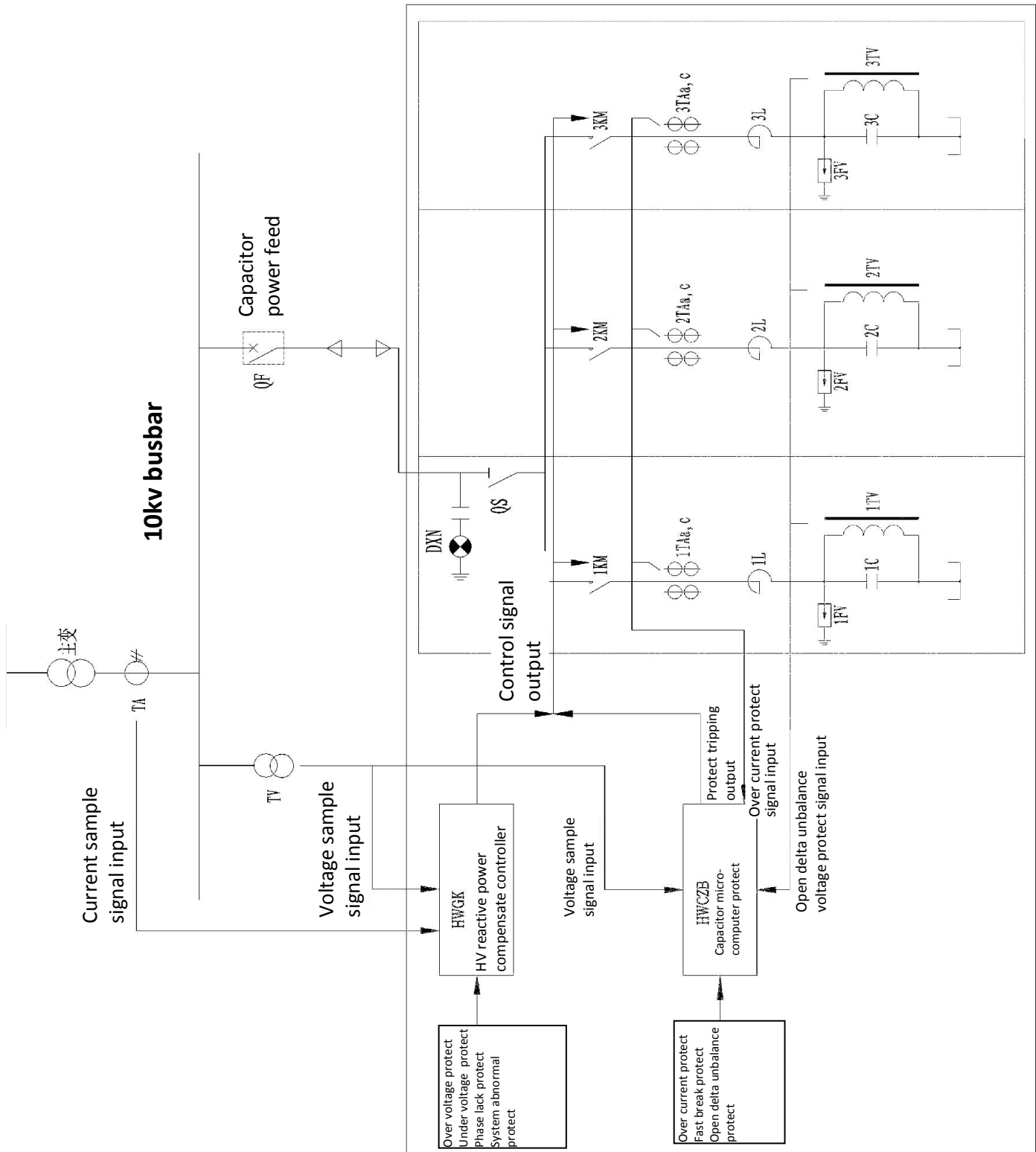
1000×3: rated capacity 3000kvar, Divided into 3, Capacity per groups is 1000kvar

A: Single star connection

K : Open delta voltage protection

6. drawing

TBBZ10-1000×3-AK Schematic wiring diagram, See drawing 19, Basic layout plan, see drawing 20.



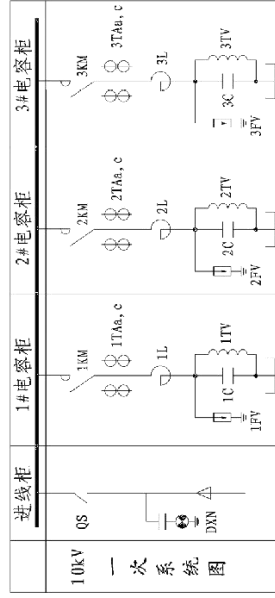
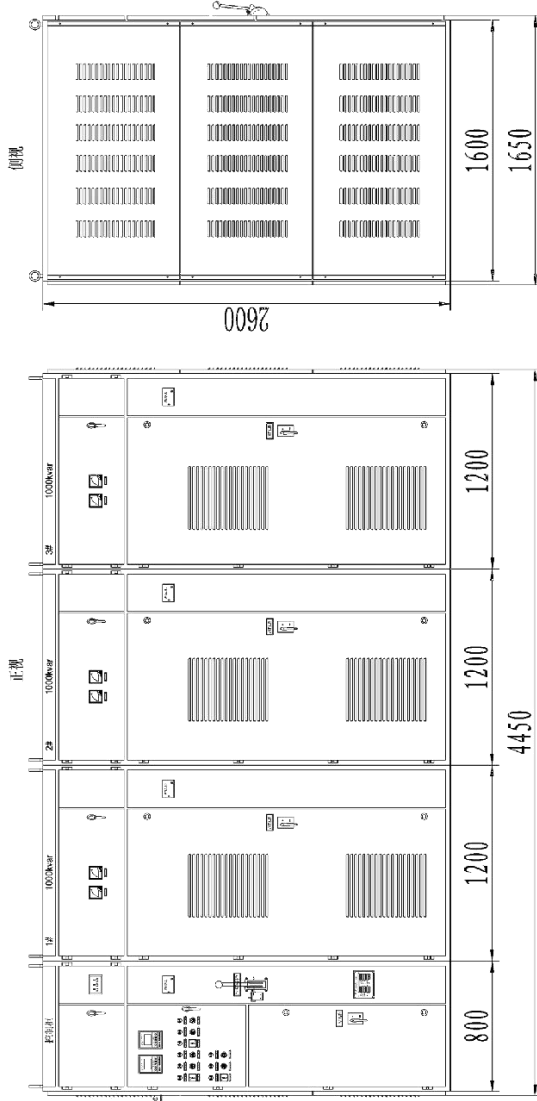


图 20

12	HWCX	控制柜	1套	
11	HWCZB	微机综保	1套	
10	LFS-100, 100/5	围栏	1套	
9		柜体	1套	
8	BAM11/√3-334-1W	并联电容器	9台	
7	FDGE11/√3-3.4-1W	放电线圈	6台	
6	YH5WR-17/46 (2ms, 600A)	氧化锌避雷器	6支	
5	DXN-Q5, AC220V	带电显示器	1个	
4	LMY-60X6	铝母线	42米	
3	CKSC-50/10-5	串联电抗器	3台	
2	JCZ5-12D/D630	高压接触器	3台	
1	GN24-12D/630A	隔离带接地开关	1组	
序号	型号	名称	数量	备注

Reactive power compensation device for electrified railway



1. Summary

The electric railway has the advantages of fast speed, strong transportation ability, long power supply distance, energy saving and cost saving, so it has broad prospects for development, it is the world as well as the direction of China's railway development. As the current stage of China's railway transport speed up, Increased traffic density and weight, it increase the traction load, Traction network voltage fluctuations are too large, Reactive power compensation measures are not perfect, The power supply system of the existing electrified railway has been difficult to meet the needs of high-speed development. To improve this situation, the demand for reactive power compensation device is more intense. Because of the market situation, our company a special high-voltage reactive power compensation device for railway is developed.. The device is mainly composed of shunt capacitor, series reactor, discharge coil and so on.

2. Usage

Suitable for rated voltage of 27.5kV Electric railway traction substation, connected in parallel with 50Hz AC traction power supply system , To improve the power factor of the power grid, reduce the loss, improve voltage quality, harmonic absorption.

3. Main features

- The structure is simple, the function is perfect, the area is small..
- The whole structure is easy to be disassembled, and the transportation is convenient..

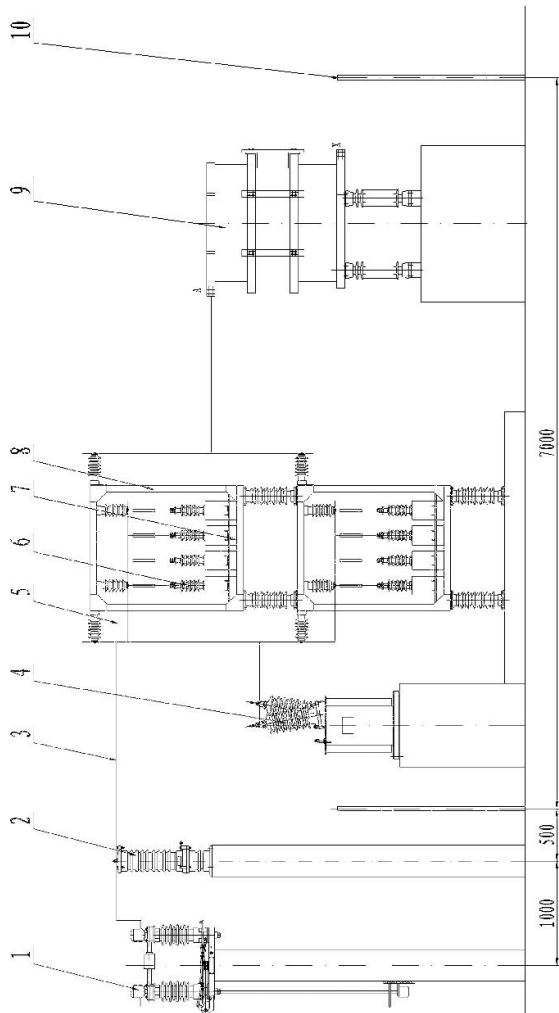
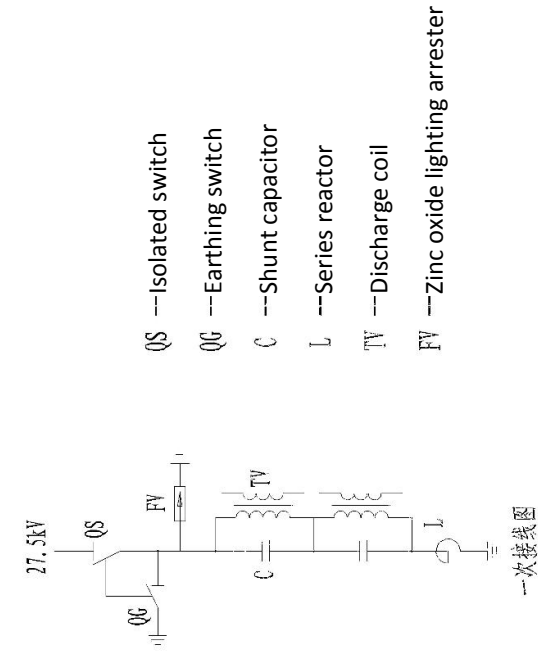
4. Technical parameter

- rated voltage : 27.5kV.
- rated capacity : 1000~6000kvar.
- rated frequency : 50Hz.
- Loss Tan: Not more than0.0003.
- Capacitance Deviation: 0~+5%.
- The device can be continuously operated under 1.36UN.
- The device can run at a time of not more than 1.35 times the current rating of the device.
- Connection mode: single star connection.
- Internal fault protection: internal fuse (external fuse) + open delta voltage protection (phase voltage differential protection).

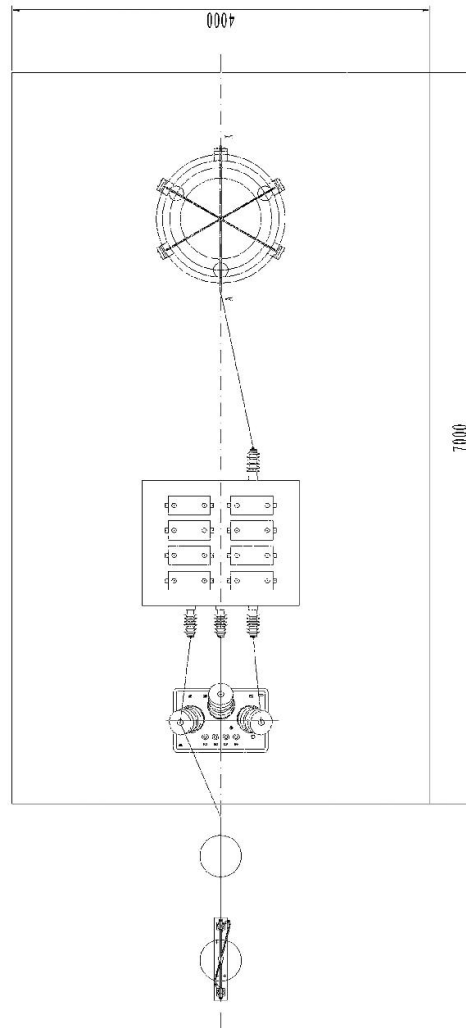
5. Drawing

TBB27.5-1600/100 Plan layout, please see drawing 21.

HV capacitor and capacitor bank



序号	型号	号	名称	数量	备注
10	7000X4000X1800mm		围栏	1套	
9	CKKT-208/27.5-13		串联电抗器	1组	
8			框架	1套	
7	BAM8.1-100-1W		并联电容器	16台	
6	BRW-12/18		外熔断器	16支	
5			支柱绝缘子	12支	
4	FDEC(16.8+16.8)-3.4-1W		放电线圈	3台	
3	LMY-60X6		铝排	18米	
2	Y5WR-51/134		氧化锌避雷器	1支	
1	GW4-40.5D/1250A		隔离接地开关	1组	



Drawing 21



GWBH Pole mounted reactive power auto compensation device



1. Product usage and features

GWBH series Pole mounted HV reactive power automatic compensation device Suitable for 10kV and 6kV lines, Mounted on overhead lines, As to improve the power factor, reduce the line loss, save energy, improve the quality of voltage, Can also be used for small terminal substation 10kV bus reactive power compensation, Local reactive power compensation of high voltage motor.

The device is composed of drop fuse. Large capacity voltage transformer. Capacitor special high-voltage vacuum contactor (high voltage vacuum circuit breaker). Current transformer. Zinc Oxide arrester. High voltage shunt capacitor. The automatic control and protection device for high voltage capacitor. The wireless digital outdoor open type current transformer (or outdoor open type current transformer device) and a box; Please refer to the principle diagram of Figure 22

The device configuration is integrated. Compact structure. Simple installation and easy maintenance. The quality is stable. The service life is long. At the same time according to user needs, the capacitor plug-in external installation mode and single pole capacitor built-in double rod installation.

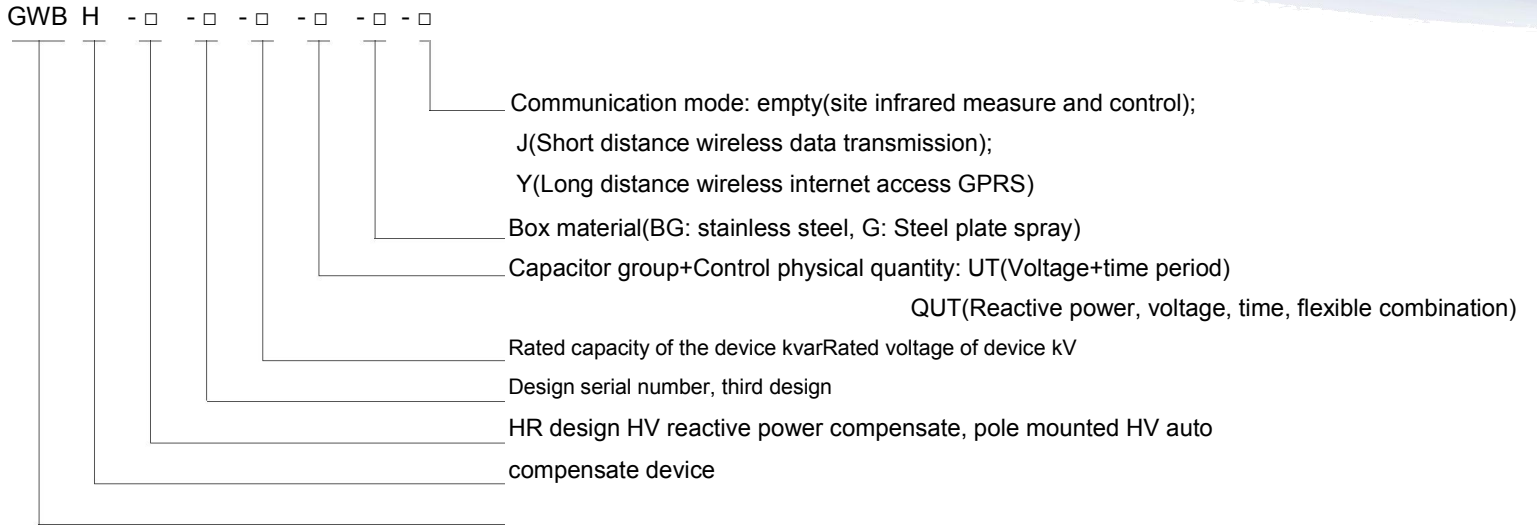
Device parameters are set by the user, Microcomputer to judge. Analysis device operation, According to the actual need, the automatic switching of the high voltage shunt capacitor group is realized.. At the same time, the device also has a perfect protection function, Delay over current protection and over voltage protection. Under voltage protection, phase failure protection and non-trip protection. Fault blocking and other functions, At the same time can be achieved in a variety of ways of four remote (remote control. Remote telemetry. Remote communication) communication function.

2. System operating conditions

- rated voltage : 6kV. 10kV;
- Maximum long-term operating voltage: 6.6kV. 11kV;
- rated frequency : 50Hz;
- Neutral point connection mode: non effective grounding or neutral point insulation.

3. Model definition and product function description

3.1 Model meaning



3.2 GWBH Table of function list of pole mounted high voltage reactive power automatic compensation device

No	Model	Control physical quantity: voltage Time: voltage+time	Control physical quantity: Reactive power. Voltage. Time. Flexible combine	Site infrared measure and control	Near distance four remote data transmission module	Long distance four GPRS Internet access	Protection: over voltage, under voltage, short circuit, over current, lack of phase, fault locking, etc.	CT
1	GWBH-II-□-□- nUT-□	yes		yes			yes	common
2	GWBH-II-□-□- nQUT-□	yes	yes	yes			yes	common
3	GWBH-II-□-□- nQUT-□-J	yes	yes	yes	yes		yes	common
4	GWBH-II-□-□- nQUT-□-Y	yes	yes	yes		yes	yes	common
5	GWBH-III-□-□- nUT-□	yes		yes			yes	wireless
6	GWBH-III-□-□- nQUT-□	yes	yes	yes			yes	wireless
7	GWBH-III-□-□- nQUT-□-J	yes	yes	yes	yes		yes	wireless
8	GWBH-III-□-□- nQUT-□-Y	yes	yes	yes		yes	yes	wireless

4. 6kV-10kV Selection of optimal compensation capacity and compensation position of distribution line

How to select and install GWBH high voltage reactive power automatic compensation device of 6kV-10kV power distribution line, to make the distribution line loss is minimum, also minimum investment, and the best compensation benefit is obtained, is a very important issue worthy of analysis. Because of exist reactive power automatic compensation device for distribution line, usually like the primary switch in/out method, not use reactor, and multi pole switch in/out must use reactor in each group. Therefore, usually the line install one or two sets of reactive power automatic compensation device, In order to obtain the best compensation effect and the least economic investment, Selection of capacitor capacity, Installation location is very important.

If a line is only to install a set of compensation capacitors, The reactive power compensation rate is "2/3". Installed in the "2/3" line of the so-called double 2/3 principles, Its cost and compensation effects are better. Reactive power compensation ratio means ratio between the installed capacity of the capacitor and the actual lack capacity of the whole line, Reactive power compensation should be less than 1, Otherwise there will be over compensation.

Optimal installation of capacitors in different installation group

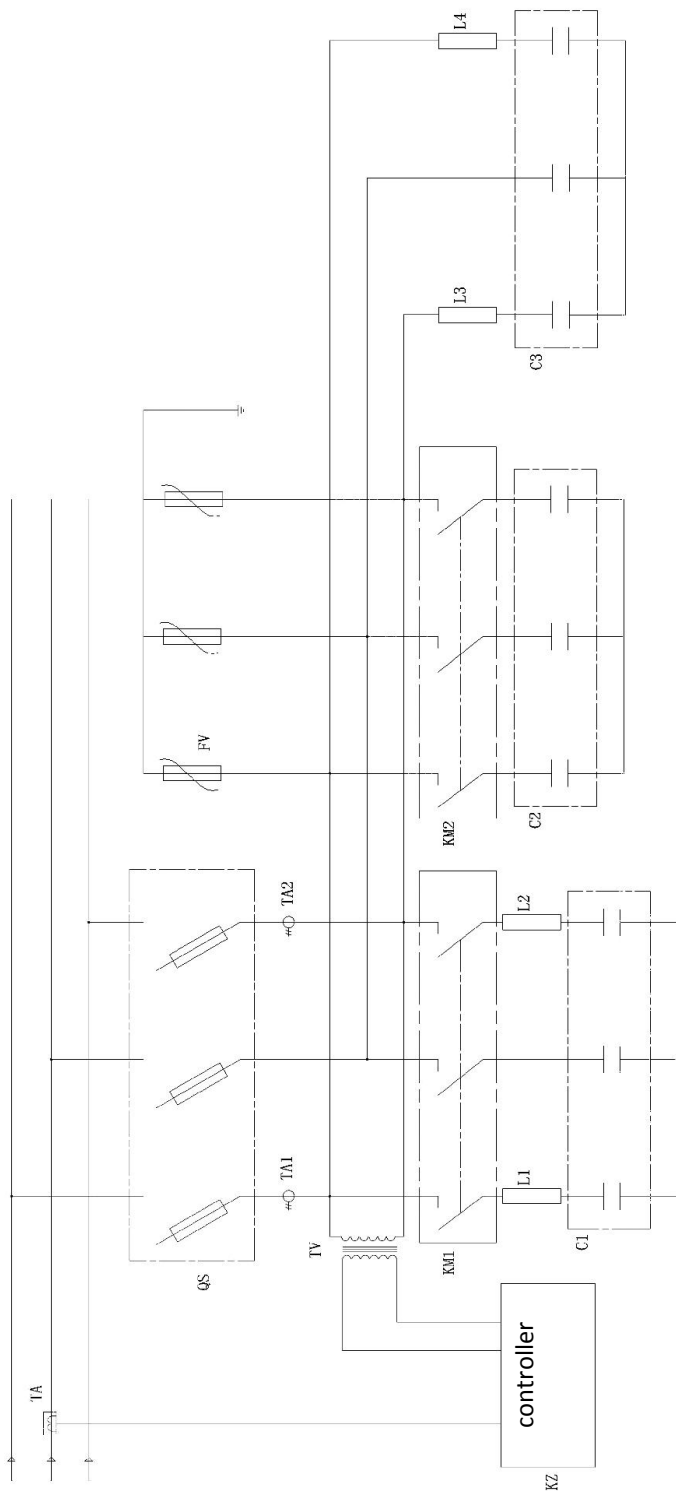
Capacitor group number	Capacitor installation location			Optimal compensation degree	Percentage loss reduction(%)
	First group	Second group	Third group		
1	2/3	-	-	2/3	88.9
2	4/5	2/5	-	2*2/5	96.0
3	6/7	4/7	2/7	3*2/7	98.0

Note: 1. Here the "reduce loss" refers to the line system loss, not cable loss;

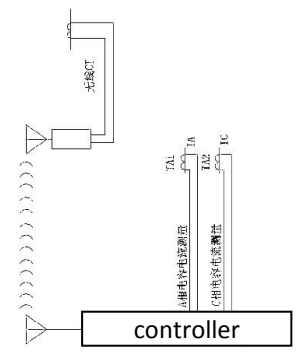
2. "Installation location" means the ratio between whole line length and substation to install site, but it based on the line load is distributed evenly, if not, then need to install on the centralized load;

3. "compensation degree" means ratio between compensate capacity with full line lacked reactive power

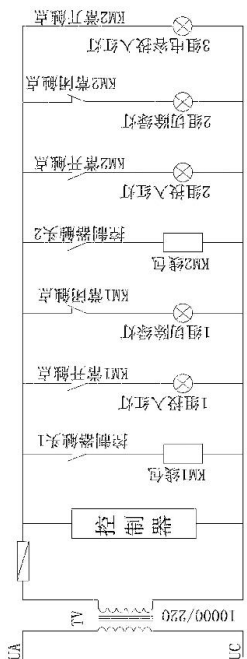
Drawing: auto compensate principle drawing, install drawing 22 and 23



Drawing 22

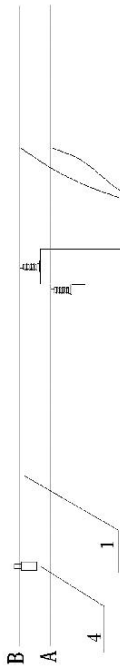


Primary line drawing

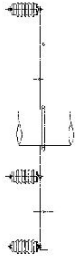


Second line drawing

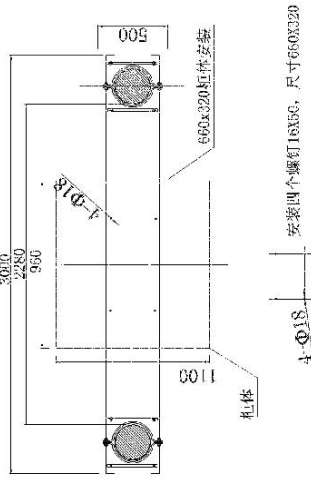
序号	代号	名称	型号规格	数量	备注
11	KZ	无功补偿控制器	VZMR-III	1	
10	C3	并联电容器	BAMR11-50-3W	1	
9	C2	并联电容器	BAMR11-50-3W	1	
8	C1	并联电容器	BAMR11-50-3W	1	
7	L1, 2, 3, 4	限流器	CSXB	4	
6	FV	氧化锌避雷器	YD5WZ-17/45	3	
5	KM	投切电容器专用开关	JZC5-C5G4-12	2	
4	TV	电压互感器	JDY-10-100(200)	1	
3	TA	开启式无线电流互感器	LZBD10-200/5	1	
2	TA1, TA2	电流互感器	TXCP-204	2	套管式CT
1	QS	跌落式熔断器	RW7-10/200	3	



高压跌落熔断器安装图



避雷器安装图



序号	代号	名称	数量	备注
16		10m 水泥电杆	2根	用户自备
15		标准件16X40MM	4套	
14		标准件12X30MM	6套	
13		避雷器	1组	供应商提供
12		3米台架拉力螺杆M16X350	4套	
11		对分包箍230	1套	
10		对分包箍250	2套	
9		接地铁板4X40X6000	2条	
8		3米台架	1套	
7		1.75米金具	2套	
6		U型包箍230 (含16螺母)	2套	
5		10KV绝缘线	20米	
4		连接件	1	供应商提供
3		开启式无线电流互感器	1	供应商提供
2		高压自动补偿控制柜	3	供应商提供
1		跌落式熔断器	3	供应商提供
		10KV母线		用户自备

Drawing 23

Intelligent substation use integrated shunt capacitor device



Structure 1

structure 2

1. Summary

- Device contains: Shunt capacitors - shunt reactors - Isolation and earthing switches - discharge coils - Zinc Oxide surge arrester - capacitor on line monitoring devices and control panel. Primary, second wiring, etc..

- Shunt capacitor with a digital temperature display and temperature control device. Large capacity temperature control switch capable of freely setting in the whole range range. Composite sensing technology, the control signal can be sent to a few hundred meters outside the room, through the XMT digital display synchronous display oil temperature in capacitor, also can pass digital display instrument, Converting the PT100 platinum resistance signal into standard signal of networking with the computer.

- Pressure release valve with electrical alarm device, which is normally open..

- The on-line monitoring device of the capacitor is installed on the control panel, real time data processing and analysis of capacitor group, total recording capacity, Monitor capacitance change, Provide raw data for failure analysis. To make the capacitor group outage maintenance targeted, Improve the operation reliability and maintenance efficiency of the device.

2. technical parameter

- Rated voltage: 10kV.
- Installed capacity : 3000kvar. 5000kvar. 8000kvar etc..
- Rated frequency : 50Hz.
- Rated reactance rate: 5% or 12%.
- Connection mode: single star or double star.
- Protection mode: open delta voltage protection or neutral point unbalance current protection.

3. Product structure and main features

structure1

- Half closed structure for shunt capacitor installation: Modular design, The whole device is divided into three modules, Isolation switch. Series reactor. Place in box for the first module, A shunt capacitor. arrester, discharge coil is put in the box for second modules.. The screen body of the capacitor on line monitoring device is third modules..

- Overall size of the capacitor bank:

- a) 3000,5000kvar: (4500X2200mm). b) 8000kvar: (5000X2500mm).

main features:

- First and second are put on same stage, position is fixed, produced in factory, save the producing period. On line monitoring device of capacitor screen placed in the main control room to facilitate user observation.

- The inner part of the first module is provided with a heat radiating fan, the smoke alarm is added to facilitate the monitoring of the reactor. Outside the second module is surrounded by stainless steel enclosure, The capacitor can provide temperature. pressure release signal, The signal is introduced into the main control room through the cable leading to the terminal box, provide technical parameters for the operator to provide background monitoring. Third module capacitor on line monitoring device can realize the monitoring of three-phase voltage, current and capacitance value of the capacitor group, record the waveform and related data, convenient access.

- The whole device is integrated transported, not more than 3 modules

Structure 2:

- The shunt capacitor device adopts fully enclosed structure: Modular design, whole bank is single module, an isolation switch, the discharge coil, the arrester is placed outside the box shell, Shunt capacitor. The series reactor is put in the box shell for the first module. The screen of capacitor on line monitoring device is second modules.

- Capacitor bank size:

- 3000, 5000kvar: (2600X2400mm).

main features:

- The device adopts fully sealed and compact structure, which covers an area of only 1/3 and a set of complete sets of equipment, saving land resources..

- Isolation switches - counter - terminal box mounting method and direction can be adjusted to facilitate user control and observation records.

- Capacitor bank all finished in factory and whole set transport, save transport time.

- Capital construction is simple, wiring is simple, save the site construction cycle, the operation and maintenance of small.

- Full insulation direct ground install, anti vibration, after site location, then operation on-grid

4. drawing

TBB10-5000-AKW layout, see drawing 24 and 25

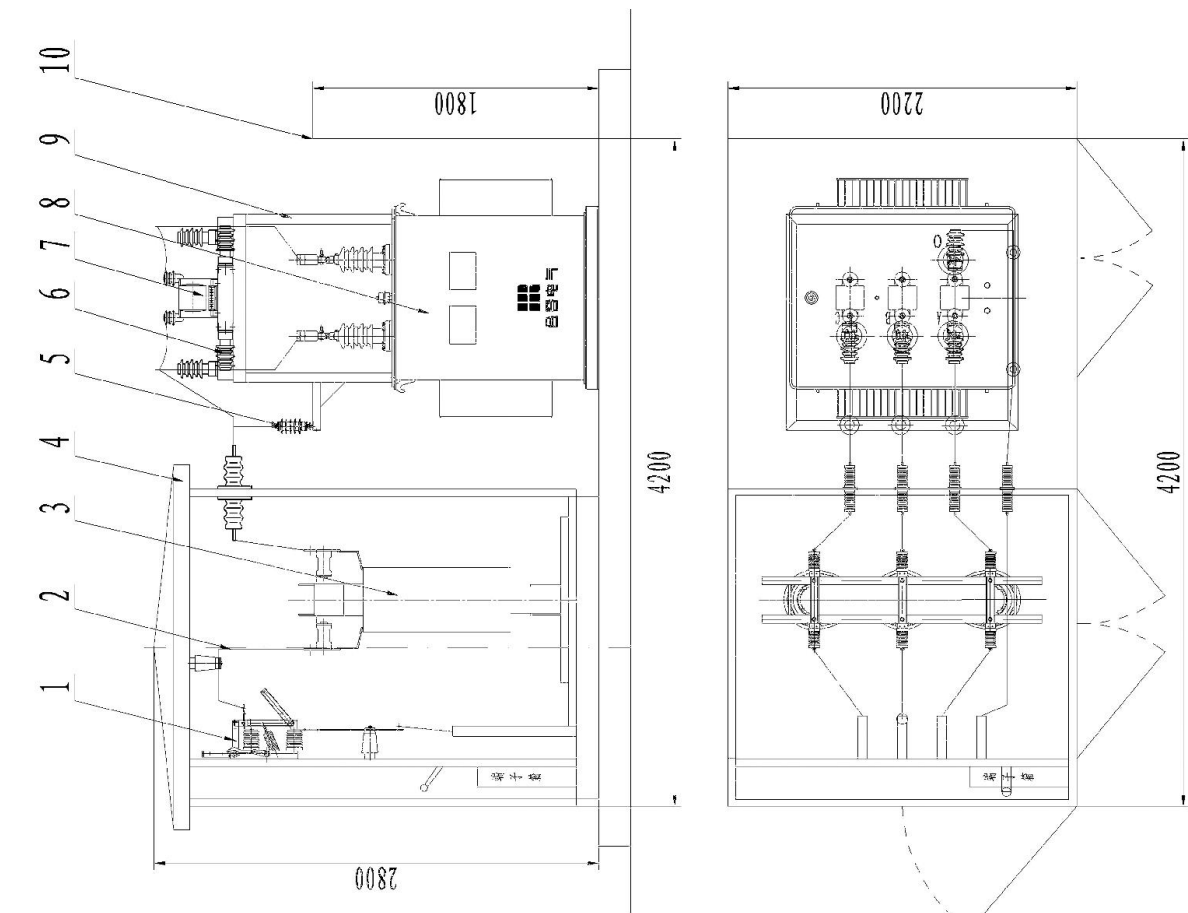
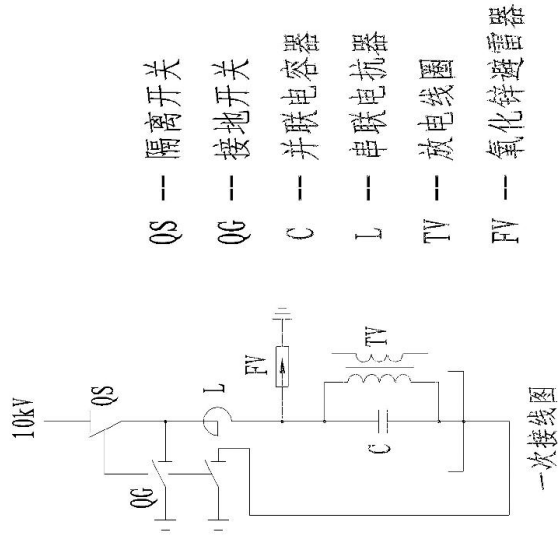
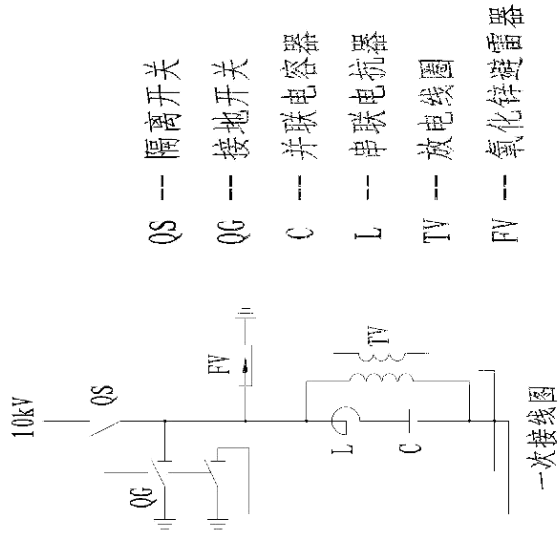


图 24

序号	型号	名称	数量	备注
10		围栏	1套	
9	QK	放电线圈支架	1套	
8	BAMH12/√3-5000-3W	并联电容器	1台	
7	FDGE12/√3-3-4-1W	放电线圈	3台	
6	ZSW-10/4	支柱绝缘子	6支	
5	YH5WR-17/46 (600A)	氧化锌避雷器	3支	
4	ZBW-10	箱体	1套	
3	CKSC-600/10-12	串联电抗器	1组	
2	LWY-60x6	铝排	10米	
1	GN24-12D/1250A	隔离接地开关	1组	



QS -- 隔离开关

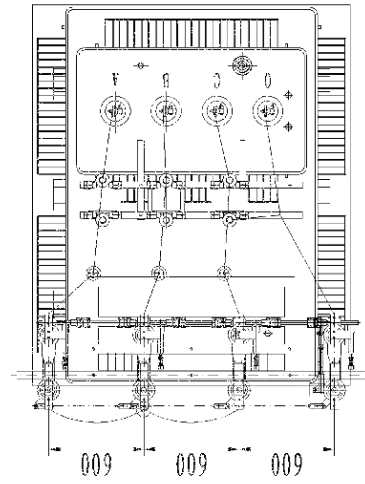
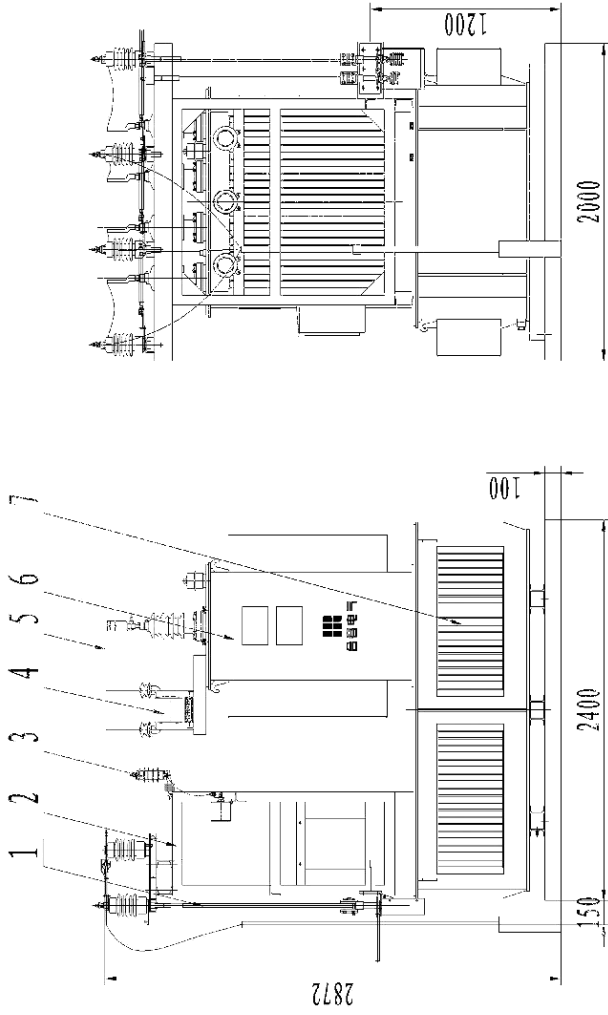
QG -- 接地开关

C -- 并联电容器

L -- 串联电抗器

TV -- 放电线圈

FV -- 氧化锌避雷器



序号	型号	名称	数量	备注
7		并联电容器	1台	
6		串联电抗器	1组	
5	LMY-60x6	铝排	10米	
4	FDGE12/√3-3.4-1W	放电线圈	3台	
3	YUSWR-17/46(600A)	氧化锌避雷器	3支	
2		隔离开关支架	1套	
1	GW4-12D/1250A	隔离接地开关	1组	

Tower type shunt capacitor bank



1. Main use

Mainly used frequency 50Hz. rated voltage 35kV and above power frequency electric power system to reactive power compensation. Improve the transmission capacity of power grid, reduce power loss, reduce power loss and improve the voltage quality and improve the utilization rate of equipment.

2. technical parameter

2.1 main parameter

2.1.1 rated frequency : 50Hz.

2.1.2 Loss tan: $\tan\delta$ not more than 0.0002.

2.1.3 Phase no.: single phase.

2.1.4 Capacitance Deviation: The deviation between the measured capacitance and its nominal value is not more than 0 to +5%, The ratio of the maximum and minimum values of the three phase capacitance is not greater than 1.02.

2.2 The capacitor can be operated at 1.1 times the rated voltage..

2.3 The capacitor can run continuously at 1.3 times the current of its rated current..

2.4 Outlet bushing creepage distance: $\geq 31\text{mm/kV}$.

2.5 Bushing pollution level: IV.

2.6 Maximum stacking layer: 7 layers

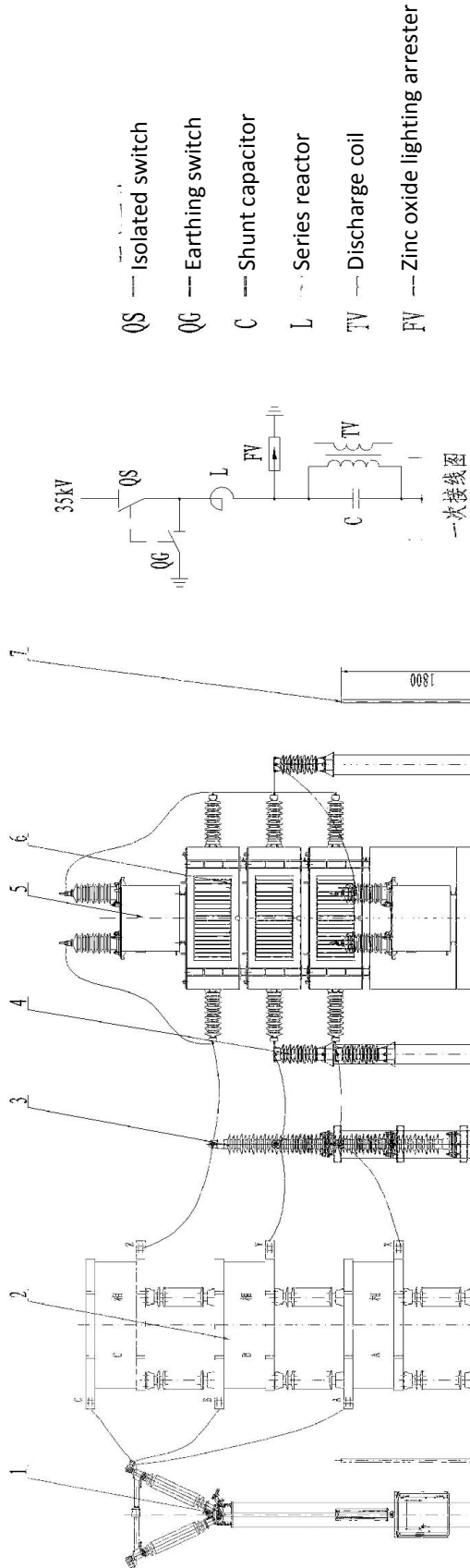
3. Structure characteristics

- 3.1 Fully sealed structure, medium for the whole film benzyl toluene.
- 3.2 The capacitor is mainly composed of the main core. Shell. Heat sink. The bushing and other parts. The core is composed of a number of large components connect in parallel, without fuse, no small iron shell
- 3.3 The internal use of large components without the iron, parallel composition of small core, After a series become small core branch, the whole capacitor is composed of a plurality of branches in parallel.
- 3.4 The capacitor bushing is provided with a side lead, which is beneficial to the accumulation and combination of the capacitor.
- 3.5 No fuse, low loss of product.
- 3.6 Between insulation it adopts the special electrical industrial insulation paper plate structure, oil gap is big, easy for heat radiation, reliable electrical connection, powerful current withstand.,
- 3.7 Insulated cooling oil is full of the shell(benzyl toluene), The main core insulating oil in the vertical and horizontal oil channel, the heat load to the heat sink out.

4. drawing

TBB35-10000/3334-AKW layout see drawing 26

HV shunt capacitor and capacitor bank



序号	型号	名称	数量	备注
7	8400X4700X1800mm	围栏	1套	
6	BAM42/√3-3334-1W	并联电容器	3台	
5	FDE42/√3-10-1W	放电线圈	3台	
4	ZSW-35	支柱绝缘子	5个	
3	YH5WR-51/134	氧化锌避雷器	3支	
2	CXGKL-400/35-12	串联电抗器	3台	
1	GW5-40.5D/1250A	隔离带接地开关	1组	
		名称	数量	备注



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