

UNIT TYPE CAPACITOR EQUIPMENT



General

Capacitor equipment's for power-factor improvement are generally used in combination with independent accessory equipment's such as series reactor, discharge coil and switch.

Nissin Electric has standardized this combination into a compact package consisting of capacitor unit, series reactor and discharge coil, vacuum contactor(option), power fuse(option) with safety-cover for all live parts.

Features

● Small space and easy installation

Neither ample area nor complicated connection wiring is required, since a capacitor unit, series reactor, discharge coil(and vacuum contactor are packed into enclosed

● Safe operation and maintenance

Wiring among component equipment is not exposed, so safe operation and maintenance are assured.

● Excellent electric performance

Capacitor and series reactor are oil immersed type, so maintenance can be minimized.

● No disturbance

Equipment is protected from disturbance of higher harmonics and inrush currents by series reactor.

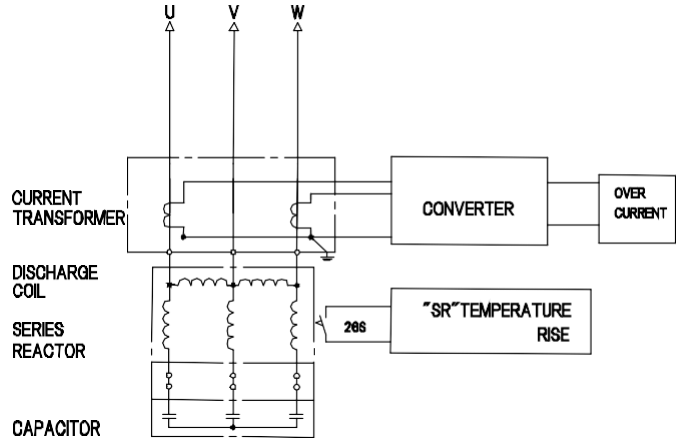
● Fault detecting device

This capacitor equipment has protection device (fault detecting device) for detecting internal failure. Therefore, please connect to the trip circuit of circuit breaker.

UNIT TYPE CAPACITOR EQUIPMENT



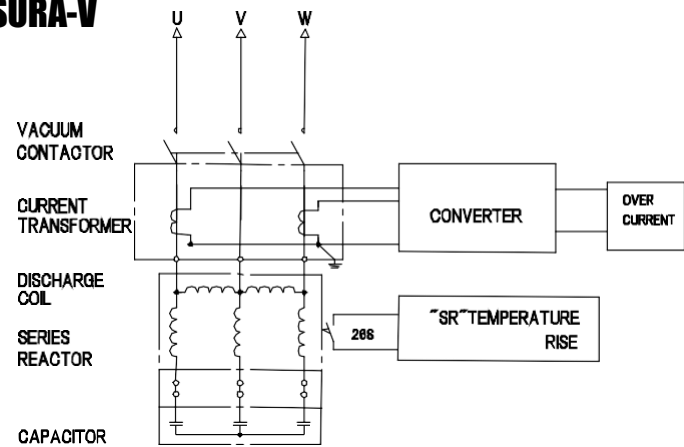
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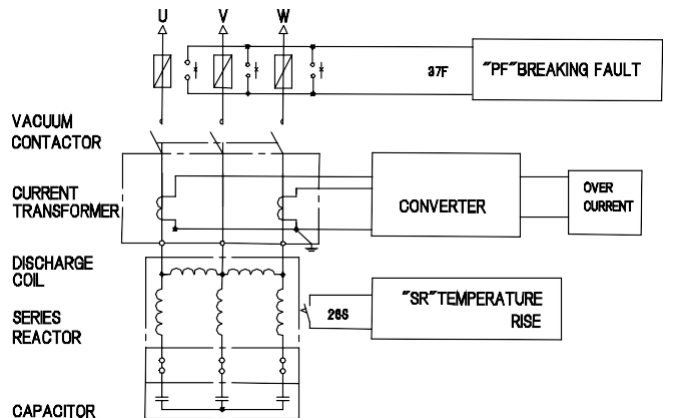
UNIT TYPE CAPACITOR EQUIPMENT (with Vacuum Contactor)



SURA-V



SURA-VF



Usual Service Condition

- Ambient temperature : -20 ~ +40 °C
- Altitude : Below 1000 meters
- Location : Indoor or Outdoor use

Standard

- Capacitor : JISC4902-1:2010
Series reactor : JIS C 4902-2:2010
Discharge coil : JIS C 4902-3:2010
Vacuum contactor : JEM-1167:2007

Standard Ratings

	UNIT TYPE CAPACITOR EQUIPMENT (Without Vacuum Contactor)	UNIT TYPE CAPACITOR EQUIPMENT (With Vacuum Contactor)
Rated voltage	3.3kV or 6.6kV	
Number of phase	Three	
Frequency	50Hz or 60Hz	
Rated capacity	100kvar, 150kvar, 200kvar, 250kvar, 300kvar, 400kvar, 500kvar, 600kvar, 750kvar, 1000kvar, 1500kvar, 2000kvar	100kvar, 150kvar, 200kvar, 250kvar, 300kvar, 400kvar, 500kvar, 600kvar, 750kvar, ※1) 1000kvar, 1500kvar, 2000kvar
Reactance of series reactor	6% of capacitor reactance 13% of capacitor reactance	
Allowable Current Category	I Not more than 120% of rated current (5 th harmonic : not more than 35%)	

※1)2000kvar: Only for 6.6kV

Performance Characteristics

a) Capacitor Unit (JISC4902-1 :2010)

Capacity tolerance	0% ~ +10%
Withstand voltage(AC 1 minute) ● Between line terminals ● Between the terminals connected together and the container	2 times rated voltage 16kV for 3.3kV rating 22kV for 6.6kV rating
Insulation resistance	Over 500 MΩ
Capacitor loss	Not more than 0.05%(at20°C)
Maximum working voltage	110% of rated : 12 hours or during 24 hours 115% of rated : 30 min or during 24 hours 120% of rated : 5 min 130% of rated : 1 min
Maximum working current	Capacitor units will be suitable for continuous operation at 130% of rated current.

b) Series Reactor with Discharge Coil (JISC4902-2, 4902-3:2010)

Capacity tolerance	-5% ~ +10%
Temperature rise (at 125% current)	Winding : Under 55°C (measured by resistance method) Oil : Under 55°C (measured by thermometer)
Maximum working current	Not more than 120% rated current (5th harmonic : Not more than 35%)
Maximum instantaneous allowable current	25 Times of rated current, 2 sec.
Withstand voltage (AC 1 minute)	Winding -Earth AC 16kV, 1 minute 3.3kV rating AC 22kV, 1 minute 6.6kV rating
Insulation resistance	Over 500 MΩ
Induced insulation strength (only for discharge coil)	120Hz, twice of rated voltage 50 sec 50Hz rating 60sec 60Hz rating
Discharge characteristics	Reduced the residual voltage to 50V or less within 5 sec after disconnecting from the source of supply.

c) Vacuum Contactor (JEM 1167:2007)

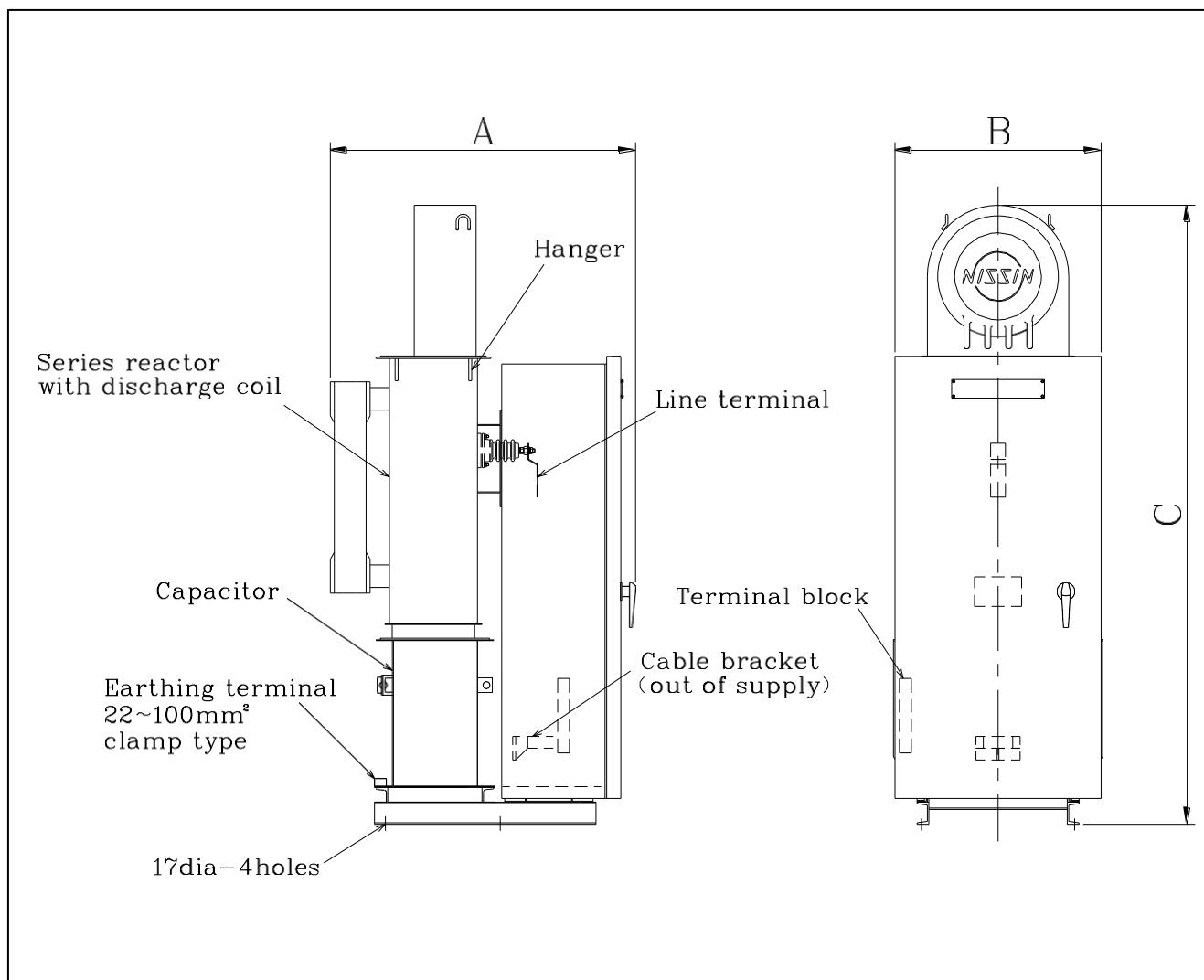
Operation method	Electro-magnetic closing, normal exciting and no-voltage tripping type
Withstand voltage (AC 1 minute) <ul style="list-style-type: none">● Between line parts and case● Between poles at switching Position of open contacts	16kV For 3.3kV 22kV For 6.6kV

Others

- Operation voltage of vacuum contactor : DC100/110V
(alternative : AC100/110V)
- Painting (Final coat) : Munsell No.5Y7/1 or required

Dimensions and Weight

■ 3.3kV or 6.6kV (without Vacuum Contactor)



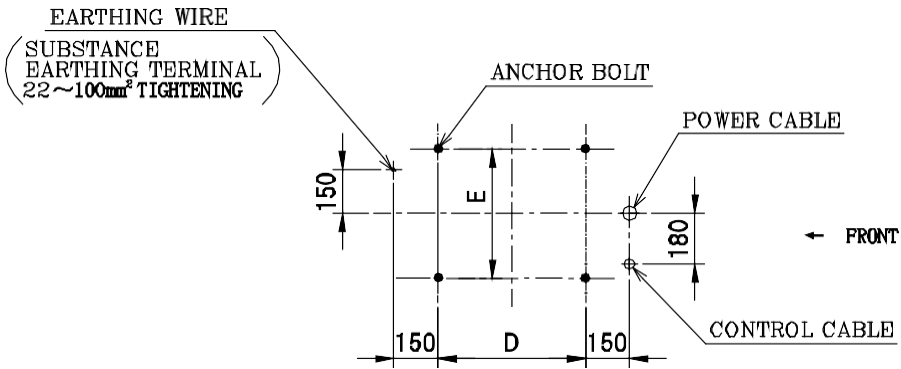
L=6 (Allowable current category : I)

Frequency (Hz)	Capacity (kvar)	Dimensions (mm)			Wight (kg)	Oil quantity (L)			
		A	B	C					
50	100	885	700	1995	470	110			
	150				500	100			
	200				895	2095	550	120	
	250				905		600	130	
	300				990		650	150	
	400				1035		700	800	190
	500				1080		850	200	
	600	1120	2195	950	220				
	750	1210	710	2300	1300	300			
	1000	1255					2400	1500	350
	1500	1195							
	2000	1195	1190	2400	1500	350			
	60	100	885	700	1995	470	110		
		150				490	110		
200		500				130			
250		895				2095	550	120	
300		990					550	130	
400		1035					600	150	
500		1080					650	150	
600		1120	750	190					
750		1210	800	200					
1000		1255	710	2195	900	220			
1500		1195					2200	1200	300
2000		1195							

L=13 (Allowable current category : I)

Frequency (Hz)	Capacity (kvar)	Dimensions (mm)			Wight (kg)	Oil quantity (L)	
		A	B	C			
50	100	990	700	2095	550	130	
	150				600	120	
	200				1080	650	140
	250				1120	750	180
	300				1165	800	170
	400				1255	850	180
	500				1035	1090	950
	600	1195	1180	1000	230		
	750	1195	1190	1200	280		
	1000	1285	1370	2300	1400	300	
	1500	1330	1610	2650	2200	650	
	2000	1420	1910	2775	2700	750	
	60	100	990	700	2095	550	140
		150				650	150
200		1080				700	190
250		1120				750	180
300		1165				800	180
400		1255				850	210
500		1035				1090	850
600		1195	1180	950	220		
750		1195	1190	1100	280		
1000		1285	1370	1300	300		
1500		1330	1610	2600	2100	650	
2000		1420	1910	2675	2500	750	

FOUNDATION DRAWING

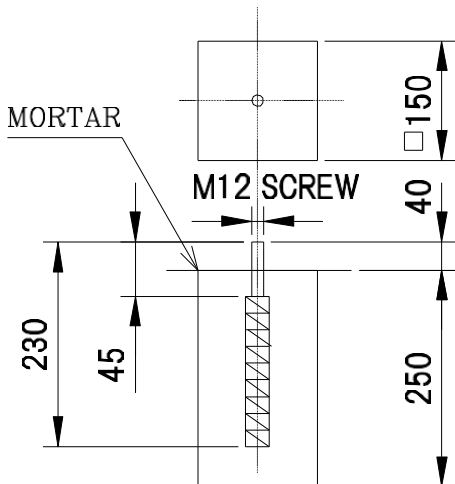


3.3/6.6kV 50/60Hz				
L=6%				
FREQUENCY (Hz)	RATING CAPACITY (kvar)	ANCHOR BOLT EMBEDDING FIGURE	EACH PART SIZE (mm)	
			D	E
50	100	[A]	390	520
	150			
	200			
	250		400	
	300			
	400		430	
	500			
	600			
	750			
	1000			
	1500			
2000				
60	100	[A]	390	520
	150			
	200			
	250		400	
	300			
	400		400	
	500			
	600			
	750			
	1000			
	1500			
2000				
			700	810

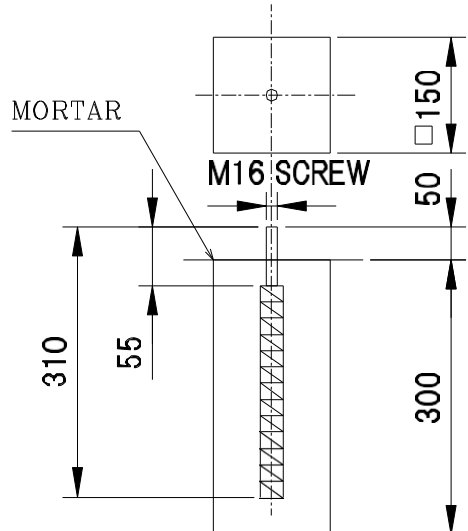
3.3/6.6kV 50/60Hz				
L=13%				
FREQUENCY (Hz)	RATING CAPACITY (kvar)	ANCHOR BOLT EMBEDDING FIGURE	EACH PART SIZE (mm)	
			D	E
50	100	[A]	400	520
	150			
	200			
	250		390	
	300			
	400		430	
	500			
	600			
	750			
	1000			
	1500			
2000				
		[B]	700	810
60	100	[A]	400	520
	150			
	200			
	250		390	
	300			
	400		430	
	500			
	600			
	750			
	1000			
	1500			
2000				
		[B]	700	810

ANCHOR BOLT EMBEDDING FIGURE

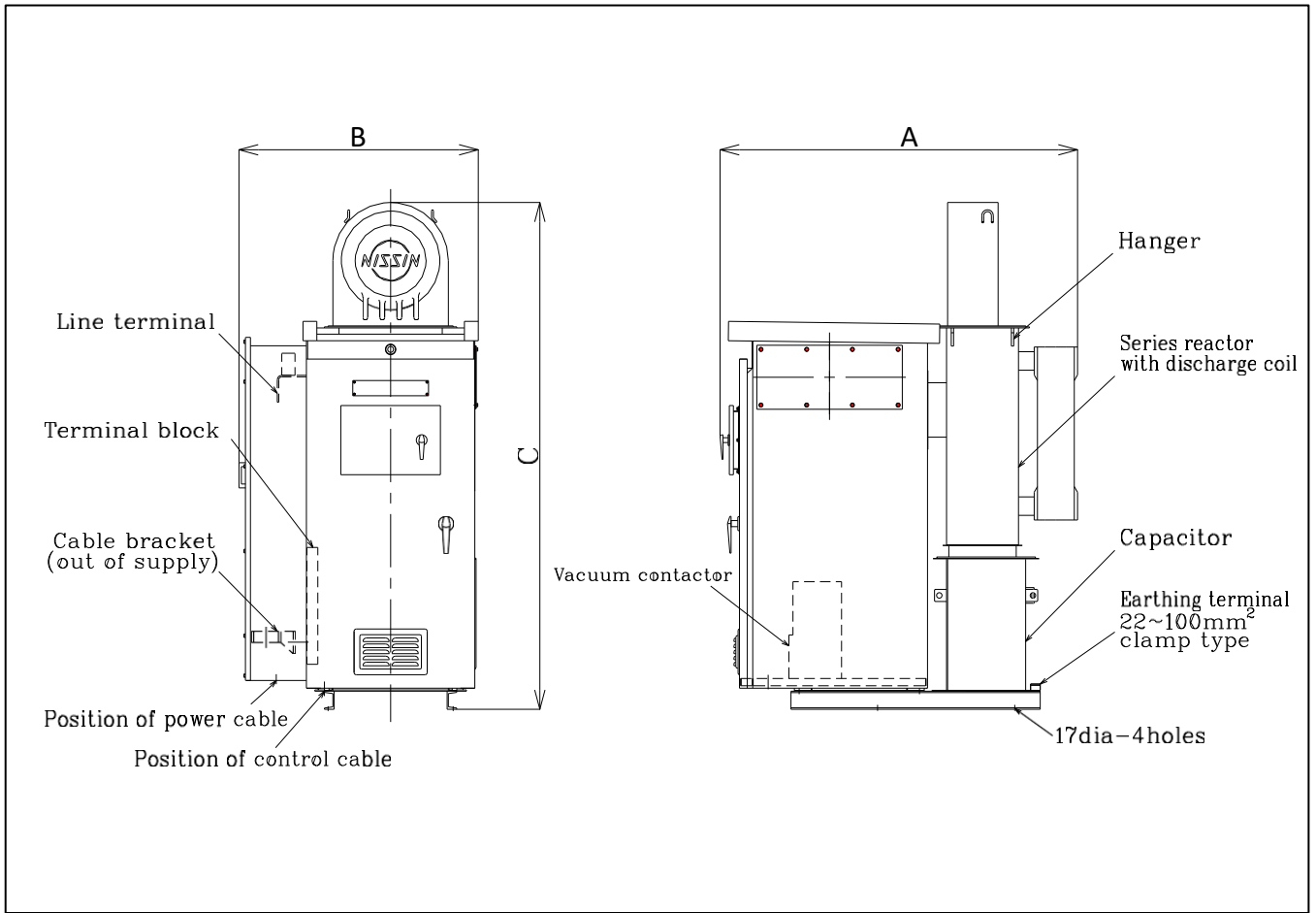
[A]



[B]



Dimensions and Weight

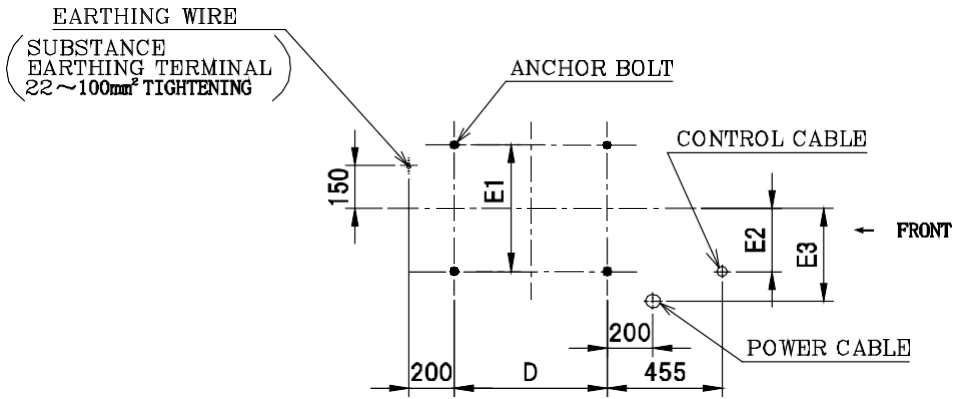


Frequency (Hz)	Capacity (kvar)	Dimensions (mm)			Wight (kg)	Oil quantity (L)
		A	B	C		
50	100	1290	995	1995	600	110
	150				650	100
	200				700	120
	250	1300		2095	130	
	300	1395			800	150
	400	1440			900	190
	500	1485	1000	200		
	600	1525	2195	1100	220	
	750	1615		1500	300	
	1000	1660		1700	350	
	1500	1650	1235	2300	1500	300
	※1 2000		1280	2400	1700	350
	60	100	1290	995	1995	600
150		650				130
200		700				120
250		1300	2095		130	
300		1395			750	150
400		1440			800	190
500		1485	850	200		
600		1525	950	220		
750		1615	2195	1000	220	
1000		1660		1400	300	
1500		1650		1235	2200	1400
※1 2000			1280	2300	1600	350

Frequency (Hz)	Capacity (kvar)	Dimensions (mm)			Wight (kg)	Oil quantity (L)
		A	B	C		
50	100	1395	995	2095	650	130
	150				700	120
	200				750	140
	250	1485		2295	180	
	300	1570			170	
	400	1660			180	
	500	1440	1175	1000	180	
	600		1220	1100	220	
	750		1225	1200	230	
	1000	1690	1370	2300	1500	300
	1500	1785	1610	2650	2400	650
	※1 2000	1875	1910	2775	2900	750
	60	100	1395	995	2095	650
150		700				130
200		750				150
250		1485	2295		190	
300		1570			180	
400		1660			180	
500		1440	1175	2195	1000	210
600			1220	1100	220	
750			1225	1300	280	
1000		1690	1370	2295	1400	300
1500		1785	1610	2600	2200	650
※1 2000		1875	1910	2675	2700	750

Note : ※2000kvar banks will be only available 6.6kV.

FOUNDATION DRAWING



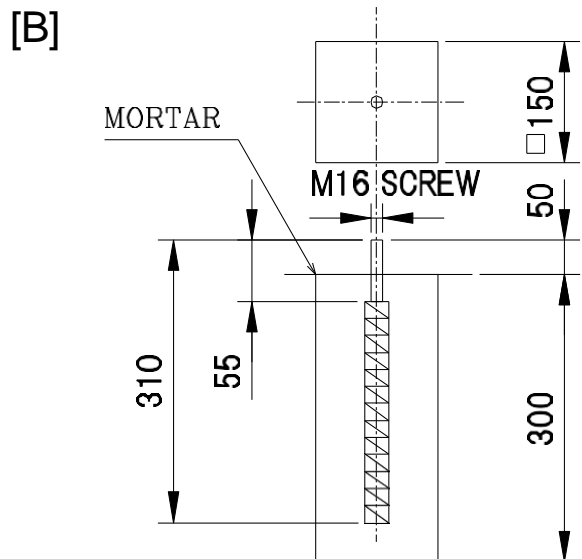
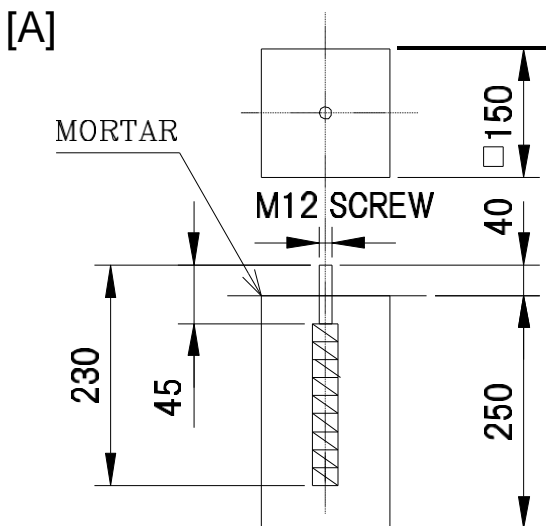
3.3/6.6kV 50/60Hz					
L=6%					
RATING CAPACITY (kvar)	ANCHOR BOLT	EACH PART SIZE (mm)			
	EMBEDDING FIGURE	D	E 1	E 2	E 3
100	[A]	570	520	275	475
150					
200					
250					
300					
400		690	520	275	475
500					
*1 600		570	810	330	530
750		690			
1000		795			
1500	825				
*2 2000	[B]	825	810	330	530

*1 UPPER 50Hz THE LOWER 60Hz
*2 PRODUCTION ONLY 6.6kV

3.3/6.6kV 50/60Hz					
L=13%					
RATING CAPACITY (kvar)	ANCHOR BOLT	EACH PART SIZE (mm)			
	EMBEDDING FIGURE	D	E 1	E 2	E 3
100	[A]	570	520	275	475
150					
200					
250					
300					
400		605	520	275	475
500					
600		725	810	330	530
750		725			
1000		825			
1500	825				
*1 2000	[B]	825	810	330	530

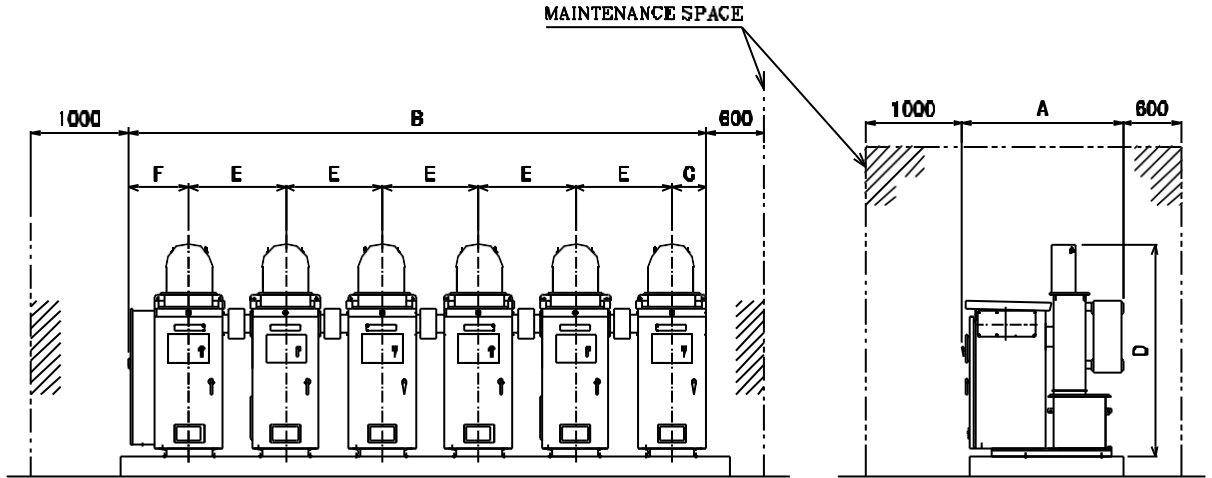
*1 PRODUCTION ONLY 6.6kV

ANCHOR BOLT EMBEDDING FIGURE



DUCT CONNECTING EQUIPMENT SIZE

■ SURA- V / SURA- VF (With Vacuum Contactor)
L=6%(CATEGORY : I)



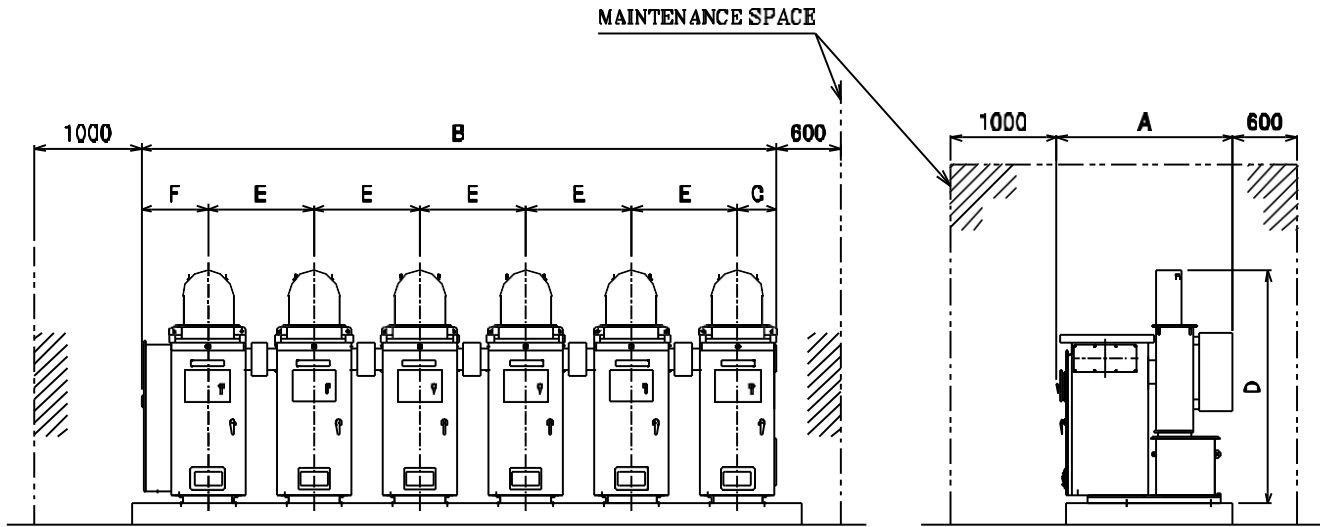
(3.3kV)											
FREQUENCY (Hz)	SINGLE UNIT CAPACITY (kvar)	EACH PART SIZE (mm)									
		A	B					C	D	E	F
			TWO	THREE	FOUR	FIVE	SIX				
50	100	1290	1995	2995	3995	4995	5995	365	1995	1000	630
	150										
	200	50Hz 1300 60Hz 1290									
	250	1300									
	300	1395									
	400	1440									
	500	1485									
	600	1525									
60	750	1615							2195		
	1000	1660									
	1500	1650						550	50Hz 2300 60Hz 2200		685

(NOTE) If you are employed , or special cable ducts if and to draw two or more circuits , separately installed cable duct requires a power cable in excess of 325 mm² .

(6.6kV)											
FREQUENCY (Hz)	SINGLE UNIT CAPACITY (kvar)	EACH PART SIZE (mm)									
		A	B					C	D	E	F
			TWO	THREE	FOUR	FIVE	SIX				
50	100	1290	1995	2995	3995	4995	5995	365	1995	1000	630
	150										
	200	50Hz 1300 60Hz 1290									
	250	1300									
	300	1395									
	400	1440									
	500	1485									
	600	1525									
60	750	1615							2195		
	1000	1660									
	1500	1650	2635	4035				550	50Hz 2300 60Hz 2200	1400	685
	2000		2680				595	50Hz 2400 60Hz 2300			

(NOTE) If you are employed , or special cable ducts if and to draw two or more circuits , separately installed cable duct requires a power cable in excess of 325 mm² .

■ SURA- V / SURA- VF (With Vacuum Contactor)
L=13%(CATEGORY : I)



(3.3kV)		EACH PART SIZE (mm)									
FREQUENCY (Hz)	SINGLE UNIT CAPACITY (kvar)	A	B					C	D	E	F
			TWO	THREE	FOUR	FIVE	SIX				
50	100	1395	1995	2995	3995	4995	5995	365	2095	1000	630
	150										
	200										
	250										
	300										
	400										
60	500	1440	2575	3975	5375	6775	—	545	50Hz 2295 60Hz 2195	1400	685
	600	1600	2620	4020	5420	—	—	590	2295		
	750		2625	4025	—	—	—	595			
	1000	1690	2970	—	—	—	—	685	50Hz 2300 60Hz 2295	1600	
	1500	1785	—	—	—	—	—	805	50Hz 2650 60Hz 2600	—	

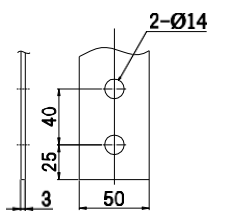
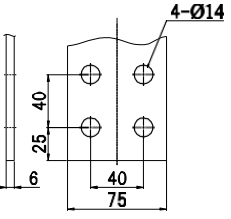
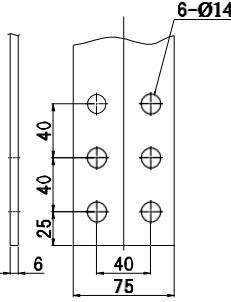
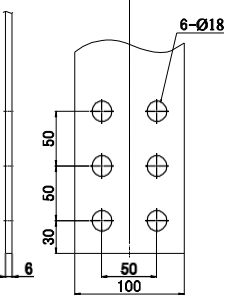
(NOTE) If you are employed, or special cable ducts if and to draw two or more circuits , separately installed cable duct requires a power cable in excess of 325 mm² .

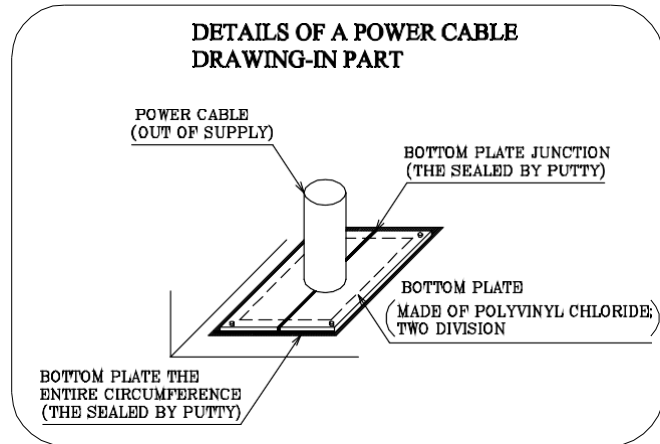
(6.6kV)		EACH PART SIZE (mm)										
FREQUENCY (Hz)	SINGLE UNIT CAPACITY (kvar)	A	B					C	D	E	F	
			TWO	THREE	FOUR	FIVE	SIX					
50	100	1395	1995	2995	3995	4995	5995	365	2095	1000	630	
	150											
	200											
	250											
	300											
	400											
60	500	1440	2575	3975	5375	6775	8175	545	50Hz 2295 60Hz 2195	1400	685	
	600	1600	2620	4020	5420	6820	8220	590	2295			
	750		2625	4025	5425	6825	8225	595				
	1000	1690	2970	4570	6170	7770	—	685	50Hz 2300 60Hz 2295	1600		
	1500	1785	3610	5610	—	—	—	805	50Hz 2650 60Hz 2600	2000		805
	2000	1875	4010	—	—	—	—	955	50Hz 2775 60Hz 2675	2100		955

(NOTE) If you are employed, or special cable ducts if and to draw two or more circuits , separately installed cable duct requires a power cable in excess of 325 mm² .

WHEN CAPACITOR DEVICE APPLICATION

MAIN CIRCUIT TERMINAL DETAILS

POWER CABLE SIZE LESS THAN 250mm ²	
POWER CABLE SIZE 325, 400, 500mm ²	
POWER CABLE SIZE 600mm ²	
POWER CABLE SIZE 800mm ²	



RECOMMENDATION

CAPACITOR GROUP CAPACITY(kvar)	CABLE SIZE (CVT)	
	3.3kV RATED	6.6kV RATED
150	8mm ²	8mm ²
200	14mm ²	
250		
300	22mm ²	14mm ²
400	38mm ²	
500	60mm ²	
600		
750	100mm ²	38mm ²
1000	150mm ²	60mm ²
1500	250mm ²	100mm ²
2000		
2500	325mm ²	150mm ²
3000	500mm ²	200mm ²
4000	* 600 mm ²	325mm ²
5000	* 800 mm ²	

*CV SINGLE CORE CABLES

NOTE: Culvert in laying , reduction rate 0.90.

FOR POWER CABLE SIZE

Generous amount of current to flow than the rated current due to rising influx of bus voltage , device fabrication tolerance , of harmonic current .

The power cable size to be used , there is a need for you to select the one that allows about 140% of rated current in consideration of these for this.

Remarks

Selection of Capacitor Switching Device

If the circuit breaker doesn't have capability of capacitive current switching, it may occur restriking on opening operations and make puncture the capacitor unit by applying the excessive overvoltage. Therefore, it should be taken to select the circuit breaker that is confirmable to capacitive current switching.

Restriking of switches

High overvoltage transients may be encountered when capacitors are disconnected by switching devices which may be either the capacitor switch or more remote switch(es) which allow restriking. Care should be taken to select switching devices which operate without causing excessive overvoltage.

If, nevertheless, restriking cannot be prevented, it may be necessary to use capacitors having a higher insulation level and a higher rated voltage.

Restrike-free breakers

Circuit breakers suitable for capacitor switching should be used. For example, the device should be such that restriking during breaking operations, which may result in excessive overvoltages, cannot occur.

It is recommended that before deciding upon the type of switching device to be used with any capacitor installation, the capacitor manufacturer and the switchgear manufacturer should be consulted.



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