We touch your electricity everyday!

CSPF-100

Power Factor Controller

(6 / 8 / 12 Steps)

Power Factor Controller

Power Factor Controller

Power Factor Controller

Power Factor Controller

Series

Catalogue

C&S electric

PMD Division

CONTENTS

1) Introduction

CSPF-100, Power Factor Controller is designed for Automatic / Manual control of external Capacitor Banks in 3 Phase 4 Wire or 3 Phase 3 Wire LT distribution systems to allow the power factor of the installation to be stabilized to the desired value. The controller employs the state of the art micro-controller design for measurement & visualization of various system parameters with very high accuracy.

2) Features

- Effective PF control. Up to 12 capacitor banks controllable
- Seven segment display for user interface
- Auto / Manual operation
- Wide range of measuring voltage Input
- Measurement & display of line parameters like V, I, P, Q, S, CosØ & Temperature
- Indication of active capacitor bank through LEDs
- Wide range of programmable parameter including CT ratio, target CosØ value, C/K ratio, capacitor bank switching program etc.
- Suitable for various wiring scheme
- Protection & indication on abnormal condition such as over/under compensation, over voltage, over/under current etc.
- FAN control output and over temperature alarm based on a built-in temperature sensing
- Field accessible test mode for relay contact check
- Automatic C/K set-up mode
- Potential free alarm output on abnormal conditions

3) Application

- In all in-comers of an Electrical Plant
- Fixed power factor correction for individual load (e.g: Motor, Transformer etc.)
- Hi-tech Software Parks, Buildings and Shopping Malls

4) Benefits

- Saving in installation cost of conductors
- Reduced Electric Utility Bills
- Increased System Capacity
- Reduction of Power Losses

5) Functional Description

Automatic Power Factor Controllers are used for measurement and control of power factor control units for reactive power compensation. Reactive Power Compensation is achieved by measuring continuously the reactive power of the system and then compensated by switching of capacitor banks. The CSPF-100 measures Reactive Power & CosØ and compares them with target value and in order to provide necessary compensation, it switches capacitor Banks ON and OFF automatically based on the switching program sequence.

The CSPF-100 has a seven segment display & several LED indications which are functionally divided into following categories:

a) Metering Function : Voltage, Current , CosØ , Power, Temperature

b) Control Function : LED indications for Capacitor Bank & Connection/Disconnection mode of compensation.

c) Alarm Function : LED indication for Abnormal condition detected
Setting Parameters for Alarm Threshold and delay

All the parameter settings are menu driven and are kept in non-volatile memory.

There are two operating modes available to switch ON or OFF the capacitor steps.

a) AUTO Mode : This is the default mode. The CSPF-100 will control the capacitor steps automatically.

b) MANUAL Mode : In this mode CSPF-100 will control (connect /disconnect) capacitor steps depending on the user input of "UP" key or "DOWN" key.
Press "UP" Key: Capacitor step will be connected after a delay time.
Press "DOWN" Key : Capacitor step will be disconnected after a delay time.

Following are the brief description of Control Parameters:

Target Cos :

This parameter set the targeted CosØ value required when the system is under "AUTO" mode. The controller will switch the capacitors in or out based on the Target CosØ & reactive power value measured.

NoOfCapBnk :

This denotes the Max. no of Capacitor Banks can be connected to a particular model (6 / 8 /12). User can edit this parameter to set the No of capacitor bank actually connected. By doing so, it will help in unnecessary connection & disconnection of steps which are not being used.

C/K Ratio :

This setting is used to set the switching hysteresis and it is calculated based on the first and smallest size capacitor used. This value can be set manually by user depending on his/her system requirement, Capacitor kVAr value and External CT used. Or, it can be automatically calculated by the controller when user entered into a Menu driven process called auto C/k setup< >. In Auto setup, C/k value will be calculated. This setup is not recommended for unstable load. For correct calculation, user can enter into the setup without connecting any load. Only the Capacitor Bank will be available to the system. C/K value can be calculated as,

C/K = Power Of First Capacitor in kVAr (Q) / Current Transformer Ratio (CT Ratio)

C/k value for the different Capacitor & CT Ratio values are as followed: -

CT	CT Ratio	Power of 1st Capacitor Step (kVAr) (C)											
		2.5	5	10	12.5	15	20	25	30	40	50	60	100
50/5	10	0.25	0.50	1.00									
75/5	15	0.17	0.33	0.67	0.83	1.00							
100/5	20	0.13	0.25	0.50	0.63	0.75	1.00						
150/5	30	0.08	0.17	0.33	0.42	0.50	0.67	0.83	1.00				
200/5	40	0.06	0.13	0.25	0.31	0.38	0.50	0.63	0.75	1.00			
300/5	60	0.04	0.08	0.17	0.21	0.25	0.33	0.42	0.50	0.67	0.83	1.00	
400/5	80	0.03	0.06	0.13	0.16	0.19	0.25	0.31	0.38	0.50	0.63	0.75	
500/5	100		0.05	0.10	0.13	0.15	0.20	0.25	0.30	0.40	0.50	0.60	1.00
600/5	120			0.08	0.10	0.13	0.17	0.21	0.25	0.33	0.42	0.50	0.83
800/5	160			0.06	0.08	0.09	0.13	0.16	0.19	0.25	0.31	0.38	0.63
1000/5	200			0.05	0.06	0.08	0.10	0.13	0.15	0.20	0.25	0.30	0.50
1250/5	250				0.05	0.06	0.08	0.10	0.12	0.16	0.20	0.24	0.40
1500/5	300					0.05	0.07	0.08	0.10	0.13	0.17	0.20	0.33
2000/5	400						0.05	0.06	0.08	0.10	0.13	0.15	0.25
2500/5	500							0.05	0.06	0.08	0.10	0.12	0.20
3000/5	600								0.05	0.07	0.08	0.10	0.17
4000/5	800									0.05	0.06	0.08	0.13

Example : First step capacitor connected is 2.5 kVAr and external CT is 200/5.
C/k Ratio = 2.5/(200/5) = 2.5/40 = 0.062

hence C/k Ratio to be set in the CSPF-100 will be 0.06 for the above case.

SwOnTime / SwOffTime : These are the set time to provide delay between capacitor Bank On or OFF.

CT ratio : This value denotes the External CT ratio. e.g : if external CT is 200 / 5 ,then CT ratio to be set is 40.

PrgmSequnce : The CSPF-100 switches capacitor ON or OFF according to 9 different switching program modes which determines the power ratio of each capacitor step.

The power ratio selection between capacitor steps is very important for proper functioning.

Program Sequence Selection	Power Ratio
PG1	1 : 1 : 1 : 1 1
PG2	1 : 2 : 2 : 2 2
PG3	1 : 2 : 4 : 4 4
PG4	1 : 2 : 4 : 8 8
PG5	1 : 2 : 3 : 3 3

Program Sequence Selection	Power Ratio
PG6	1 : 1 : 2 : 2 2
PG7	1 : 1 : 2 : 4 4
PG8	1 : 2 : 3 : 4 4
PG9	Any combination (Linear)

Control Principle :

CSPF-100 compensates Reactive power by connecting and disconnecting capacitor bank as per following switching principle: -

a) Rotational Switching :

It is based on rotational first-in-first-out (FIFO) sequence between equal steps in the clockwise direction. PG1 to PG8 are the program modes in this category.

b) Linear Switching :

This switching program begins always from the first step to the last step in both switching on and off mode.
PG9 comes under this category.

Alarm Function

CSPF-100 also monitors and protects capacitor bank from various abnormal condition such as :

Over / Under current :

If detected current is above or below the set current, it generates alarm indication, activates the alarm relay and depending on the capacitor bank trip setting, it switches off all the capacitor bank.

Over voltage :

If detected voltage is above or below the set voltage, it generates alarm indication, activates the alarm relay and depending on the capacitor bank trip setting, it switches off all the capacitor bank.

Over Compensation :

If the system is still capacitive although all the capacitor steps are disconnected, over compensation alarm indication gets ON and alarm relay is activated.

Under Compensation :

When target power factor is not reached although all the capacitor steps have been switched ON, Insufficient compensation alarm indication gets ON and the alarm relay is activated.

Over Temperature :

CSPF-100 measures temperature with in-built sensors. After the temperature measured by the device reaches the temperature high set value (t-HI), it generates over temperature alarm (0 indicates activates the alarm relay and depending on the capacitor bank trip setting, it switches OFF all the capacitor bank. When temperature reached down to low set value (t-LO), it resets the temperature alarm.

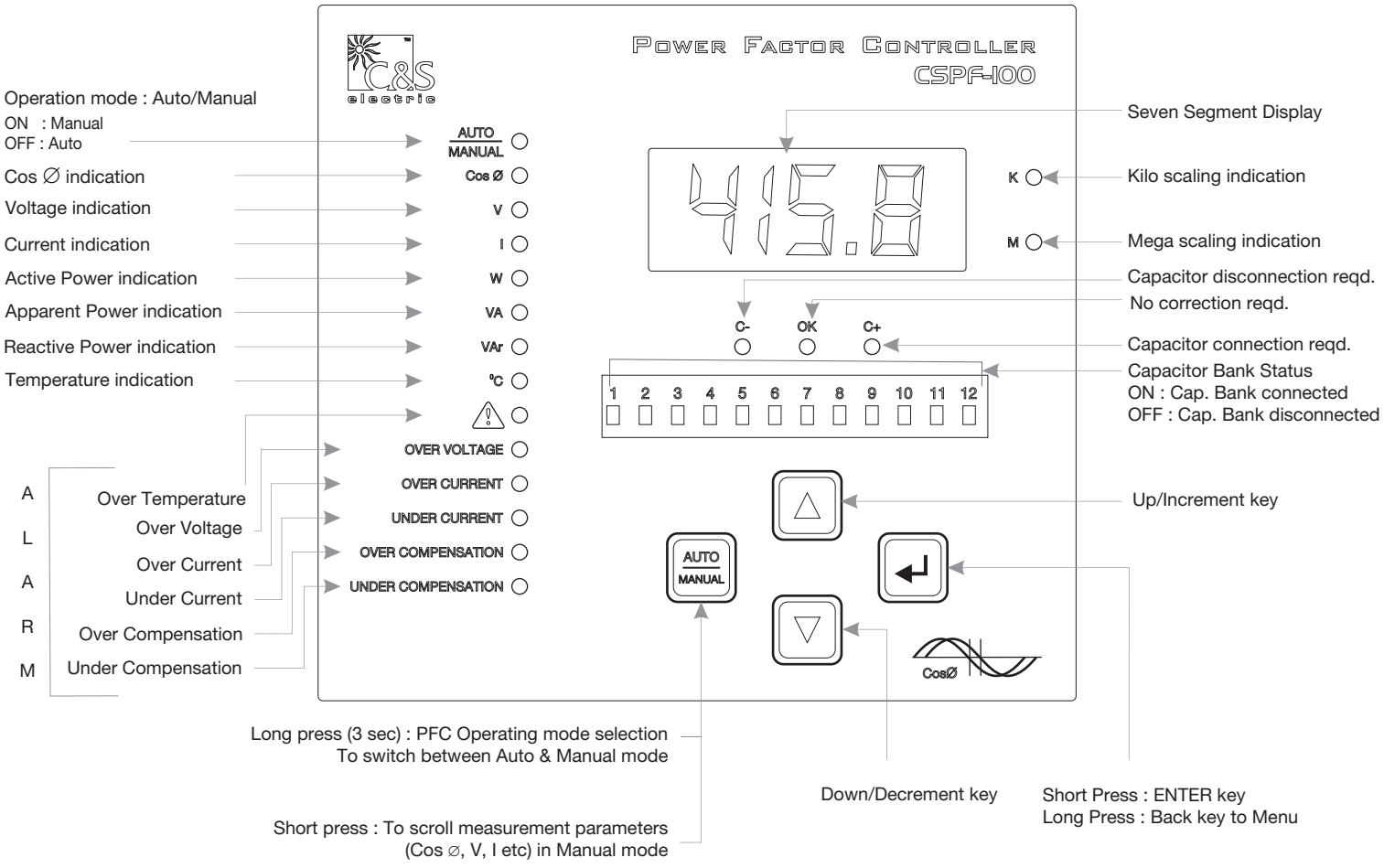
6) Human Machine Interface (HMI)

The Human-Machine interface in CSPF-100 enables user to program the device parameters, monitor the electrical parameters & capacitor bank status and control the capacitor bank switching. The MMI consists of following :

- Seven Segment Display
- 12 LEDs for Capacitor Bank connection status
- 3 LED for Capacitor Bank control status (About to switch ON /about to switch OFF / No switching)
- 1 LED for Auto / Manual Operating mode indication
- 7 LED for Measured Parameter indication
- 6 LEDs for Alarm / fault status.
- 4 Keys to navigate, edit, save setting parameters
- 12 Relay contacts to connect or disconnect capacitor banks via contactors *
- 1 Relay contact to extend ALARM status to Remote location
- 1 Relay contact to Switch ON/OFF FAN

List of Measured Parameters : Voltage, Current, Cos∅, Active Power (P), Reactive Power (Q), Apparent Power (S), Temperature

List of Alarm : Over / Under current, Over Voltage, Over Compensation, Under Compensation, Over Temperature.



* Model Dependent

(Figure-1) (HMI)

7) Programmable Parameters

BASIC SETTING

Parameters	Display	Setting Range		Step size	Unit	Default
		Min	Max			
Target Cos Ø [1]	CoS	0.80	-0.80	0.01	-	1.00
C/K Ratio	C_K	0.03	02.00	0.01	-	0.04
External CT Ratio	Ctr	1	9999	1	-	1
Bank switch ON delay	t_on	1	9999	1	Sec	5
Switching program selection [1]	PGM5	PG 1	PG 9	-	-	PG 1

Note : [1] "Target Cos Ø setting 0.80 to -0.80 means 0.80 (inductive) to 0.80 (capacitive)

Default Password for Basic Setting : **P100**

ADVANCE SETTING

(A) Common Setting

Parameters	Display	Setting Range		Step size	Unit	Default
		Min	Max			
Nominal Voltage [*]	UnoM	150	435	1	V	415
Phase Angle [1]	AnGL	0	330	30	°C	90
Bank switch OFF delay	t_oF	1	9999	1	Sec	10
No. of Capacitor Bank used	StEP	1	12	1	-	12
Fan ON Temperature	F-on	5	100	1	°C	45
Fan OFF Temperature	F-oF	5	90	1	°C	40

Note : [1] **Phase Angle** parameter will be used for different connection scheme, Please refer section 9.0 for more details.

Default Password for Advance Setting : **P200**

(B) Alarm Parameters

Parameters	Display	Setting Range		Step size	Unit	Default
		Min	Max			
Over Voltage setting [1]	oUrU	150	490	1	V	456
Over Voltage Alarm delay	dELY	1	999	1	Sec	5
Capacitor Bank Trip selection on Over voltage	CAP	OFF	On	-	-	OFF
Over current Setting [1]	oUrC	50	150	1	In [1]	OFF
Over current Alarm Delay	dELY	1	999	1	Sec	5
Capacitor Bank Trip selection on Over current	CAP	OFF	On	-	-	OFF
Under current Setting [1]	UndC	1	90	1	In [2]	OFF
Under current Alarm delay	dELY	1	999	1	Sec	5
Capacitor Bank Trip selection on Under current	CAP	OFF	On	-	-	OFF
Over compensation [1]	oCo	1	600	1	Sec	5
Under compensation [1]	uCo	1	600	1	Sec	5
Temp High Set [1]	t_HI	10	120	1	°C	55
Temp Low Set	t_Lo	10	120	1	°C	50
Temp High Alarm Delay	dELY	1	999	1	Sec	300
Capacitor Bank Trip selection on high Temperature [2]	CAP	OFF	On	-	-	OFF

Note : 1. This Alarm settings will have disable (OFF) option 2. In = Rated Current (5A) * Model Dependent

8) Technical Data

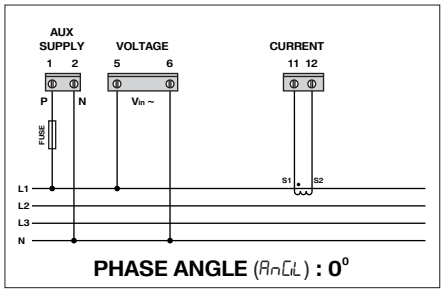
Network Type	3 Phase - 3 Wire / 3 Phase - 4 Wire
Aux-Supply	100 - 265V AC / DC, 50 / 60Hz, 12VA
Sensing / Measurement	True RMS
Operating Voltage	Voltage Input : L-N or L-L ;
	Range : 50 to 500V AC; 50/60 Hz
Operating Current	40mA - 7.5A (/5A Current Transformer)
Relay Output Contact	Type : N/O, Rating : 5A @ 250V AC, 1250VA
Capacitor Steps (*)	12 Steps (Max)
Power Consumption	<0.2VA (Current Circuit), <5VA (Voltage Circuit)
Target CosØ setting	0.80 Lag - 1.00 - 0.8 Lead
CT Ratio	Configurable (Max 9999)
Compliance / Standard Specification	IEC 61000
Operating Temperature Range	0^{o}C to +55^{o}C
Storage Temperature Range	-10^{o}C, +70^{o}C
Humidity Range	5% to 95% non condensing
Installation	Panel mounting & fitted by side screw clamp
Dimension	144 x 144 x 80 mm
Packing Weight	900 gms (Approx)

* Model Dependent

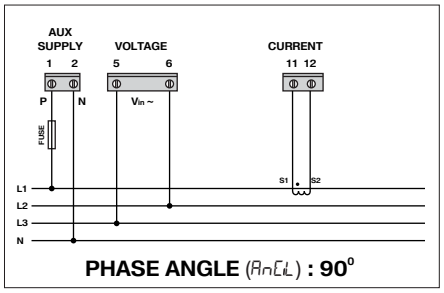
9) Variants of CSPF-100

10) Connection Scheme

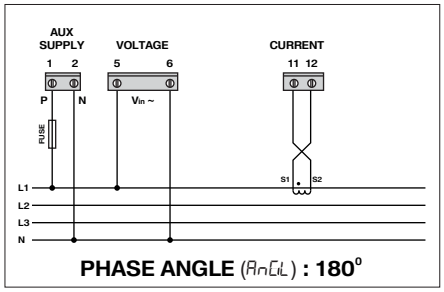
To install the CSPF-100 pfc controller in different connection configuration as shown below set the “phase angle” parameter as given with corresponding connection scheme.



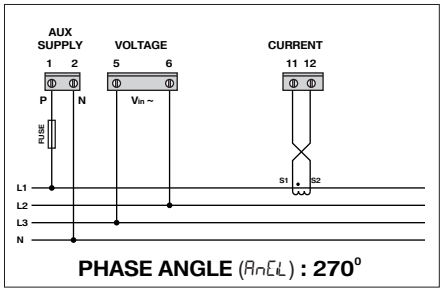
PHASE ANGLE (AnGL) : 0°



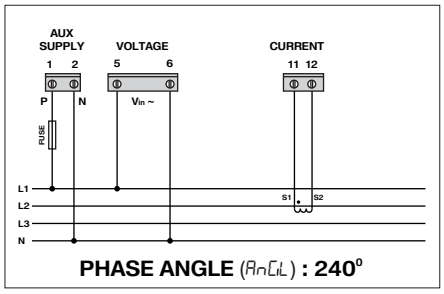
PHASE ANGLE (AnGL) : 90°



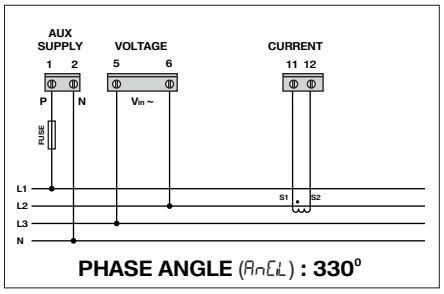
PHASE ANGLE (AnGL) : 180°



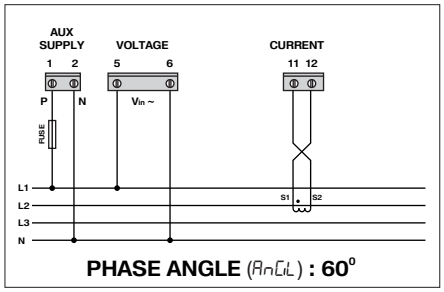
PHASE ANGLE (AnGL) : 270°



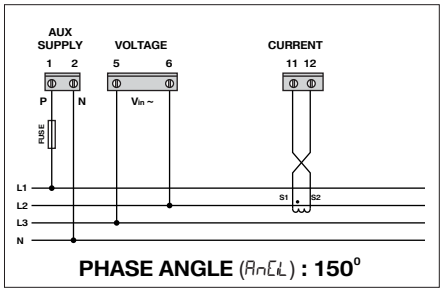
PHASE ANGLE (AnGL) : 240°



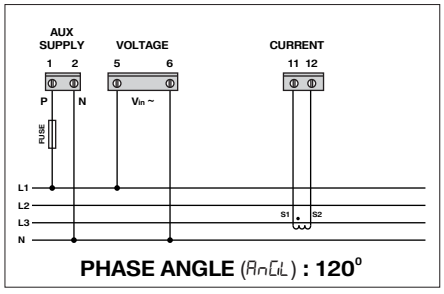
PHASE ANGLE (AnGL) : 330°



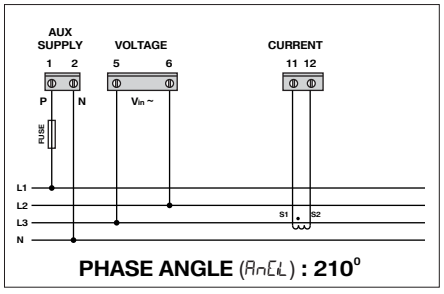
PHASE ANGLE (AnGL) : 60°



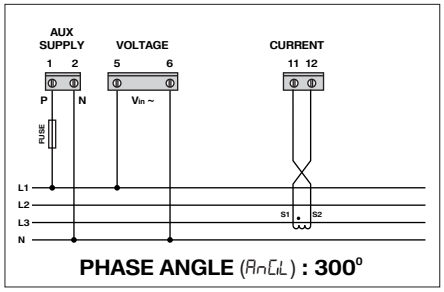
PHASE ANGLE (AnGL) : 150°



PHASE ANGLE (AnGL) : 120°

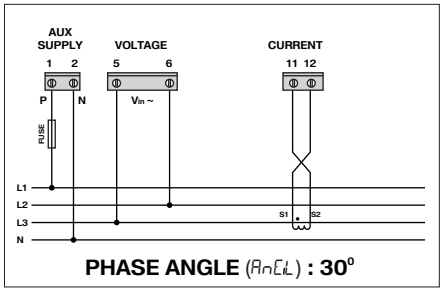


PHASE ANGLE (AnGL) : 210°



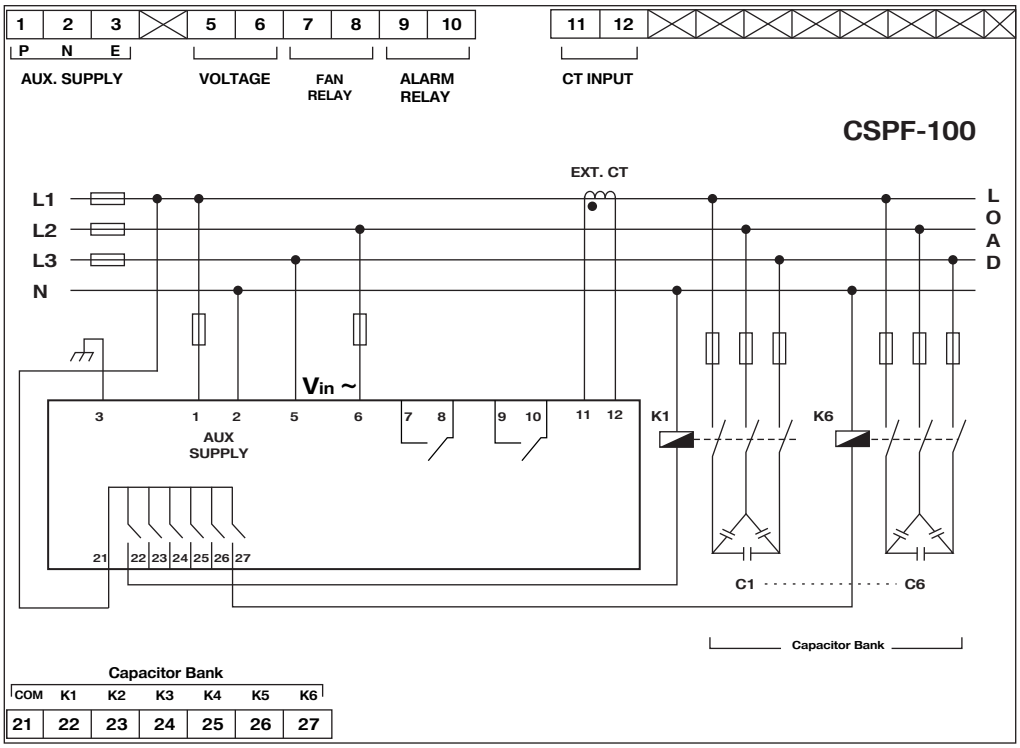
PHASE ANGLE (AnGL) : 300°

(Figure-2)



PHASE ANGLE (AnGL) : 30°

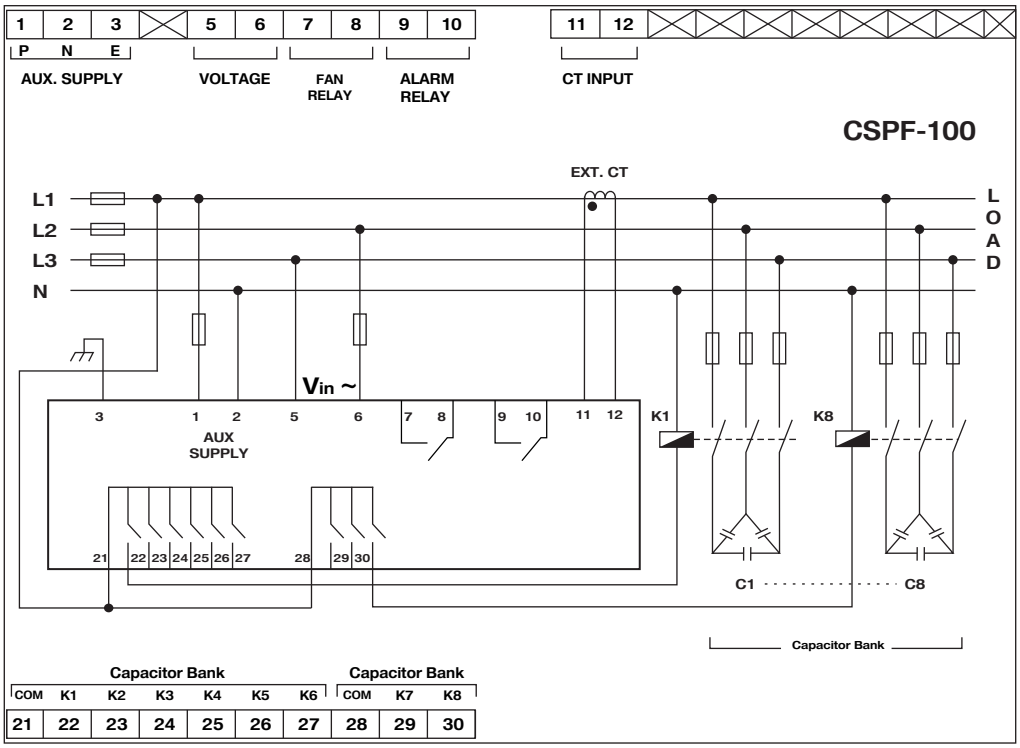
11-A) Connection Diagram (6 Cap Bank)



(Figure-3)

Terminal No.	Connection Name	Connection Description
1	Aux Supply (P)	Phase for control supply
2	Aux Supply (N)	Neutral for control supply
3	Earth	
4	X	Not Connected
5	Vin	Phase Voltage (L3) or (L1)
6	Vin	Phase Voltage (L2) or Neutral (N)
7	FAN Output	N/O Contact for FAN Relay output
8	FAN Output	COM
9	ALARM Output	N/O Contact for ALARM Relay output
10	ALARM Output	COM
11	External CT (S1)	Phase Current (In)
12	External CT (S2)	Phase Current (Out)
13	X	Not Connected
14	X	Not Connected
15	X	Not Connected
16	X	Not Connected
17	X	Not Connected
18	X	Not Connected
19	X	Not Connected
20	X	Not Connected
21	COMM	Common Terminal for Relay contact K1--K6
22	K1	N/O Contact for Cap Bank-1
23	K2	N/O Contact for Cap Bank-2
24	K3	N/O Contact for Cap Bank-3
25	K4	N/O Contact for Cap Bank-4
26	K5	N/O Contact for Cap Bank-5
27	K6	N/O Contact for Cap Bank-6

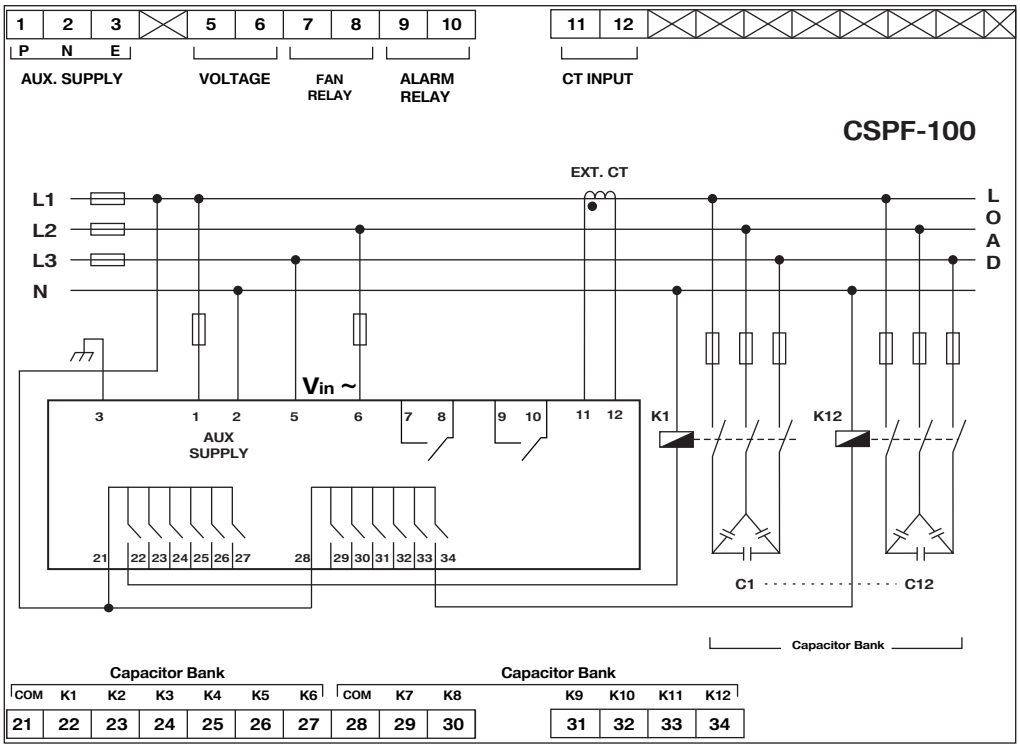
11-B) Connection Diagram (8 Cap Bank)



(Figure-3)

Terminal No.	Connection Name	Connection Description
1	Aux Supply (P)	Phase for control supply
2	Aux Supply (N)	Neutral for control supply
3	Earth	
4	X	Not Connected
5	Vin	Phase Voltage (L3) or (L1)
6	Vin	Phase Voltage (L2) or Neutral (N)
7	FAN Output	N/O Contact for FAN Relay output
8	FAN Output	COM
9	ALARM Output	N/O Contact for ALARM Relay output
10	ALARM Output	COM
11	External CT (S1)	Phase Current (In)
12	External CT (S2)	Phase Current (Out)
13	X	Not Connected
14	X	Not Connected
15	X	Not Connected
16	X	Not Connected
17	X	Not Connected
18	X	Not Connected
19	X	Not Connected
20	X	Not Connected
21	COMM	Common Terminal for Relay contact K1--K6
22	K1	N/O Contact for Cap Bank-1
23	K2	N/O Contact for Cap Bank-2
24	K3	N/O Contact for Cap Bank-3
25	K4	N/O Contact for Cap Bank-4
26	K5	N/O Contact for Cap Bank-5
27	K6	N/O Contact for Cap Bank-6
28	COMM	Common Terminal for Relay contact K7--K8
29	K7	N/O Contact for Cap Bank-7
30	K8	N/O Contact for Cap Bank-8

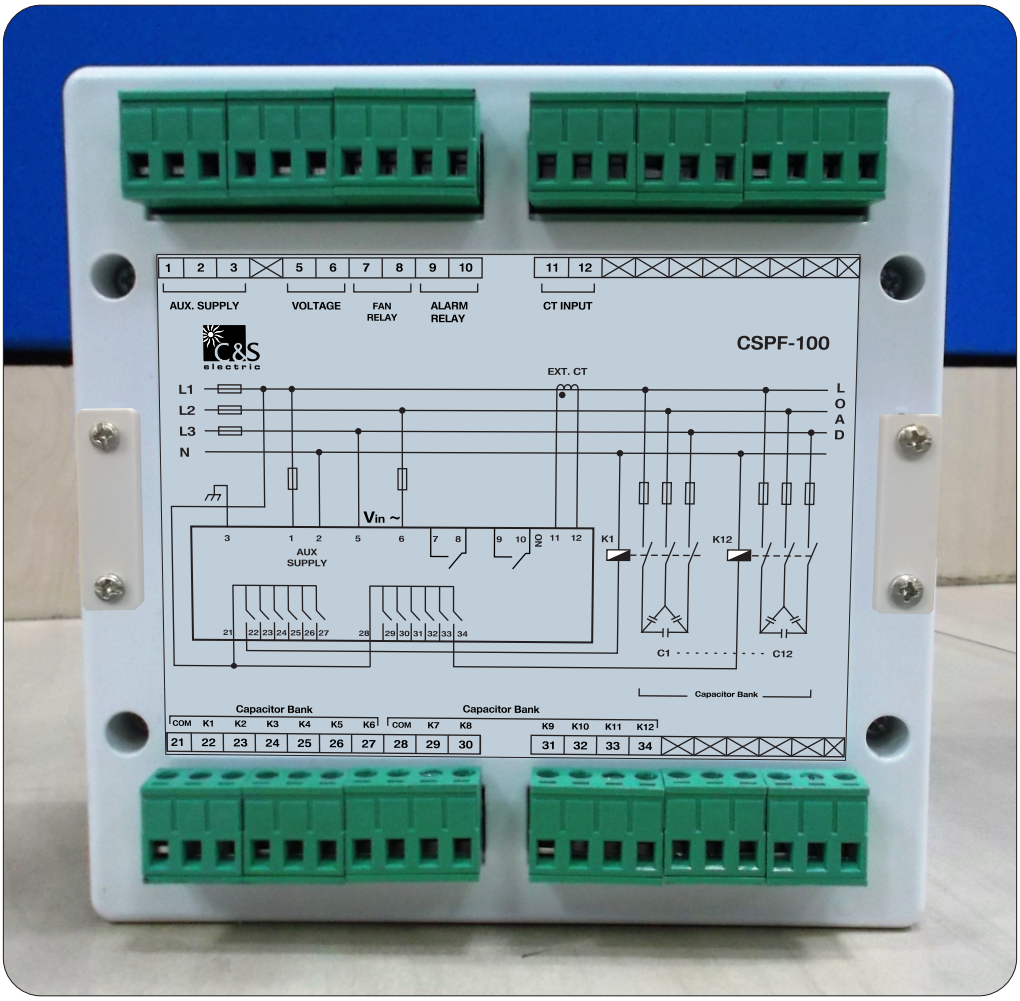
11-C) Connection Diagram (12 Cap Bank)



(Figure-3)

Terminal No.	Connection Name	Connection Description
1	Aux Supply (P)	Phase for control supply
2	Aux Supply (N)	Neutral for control supply
3	Earth	
4	X	Not Connected
5	Vin	Phase Voltage (L3) or (L1)
6	Vin	Phase Voltage (L2) or Neutral (N)
7	FAN Output	N/O Contact for FAN Relay output
8	FAN Output	COM
9	ALARM Output	N/O Contact for ALARM Relay output
10	ALARM Output	COM
11	External CT (S1)	Phase Current (In)
12	External CT (S2)	Phase Current (Out)
13	X	Not Connected
14	X	Not Connected
15	X	Not Connected
16	X	Not Connected
17	X	Not Connected
18	X	Not Connected
19	X	Not Connected
20	X	Not Connected
21	COMM	Common Terminal for Relay contact K1--K6
22	K1	N/O Contact for Cap Bank-1
23	K2	N/O Contact for Cap Bank-2
24	K3	N/O Contact for Cap Bank-3
25	K4	N/O Contact for Cap Bank-4
26	K5	N/O Contact for Cap Bank-5
27	K6	N/O Contact for Cap Bank-6
28	COMM	Common Terminal for Relay contact K7--K12
29	K7	N/O Contact for Cap Bank-7
30	K8	N/O Contact for Cap Bank-8
31	K9	N/O Contact for Cap Bank-9
32	K10	N/O Contact for Cap Bank-10
33	K11	N/O Contact for Cap Bank-11
34	K12	N/O Contact for Cap Bank-12

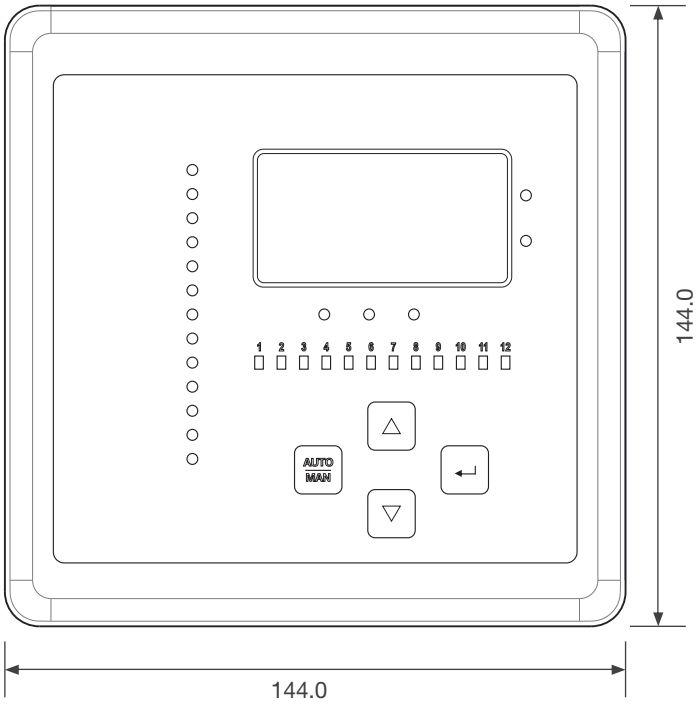
12) Back view of the Relay (12 Cap Bank)



(Figure-4)

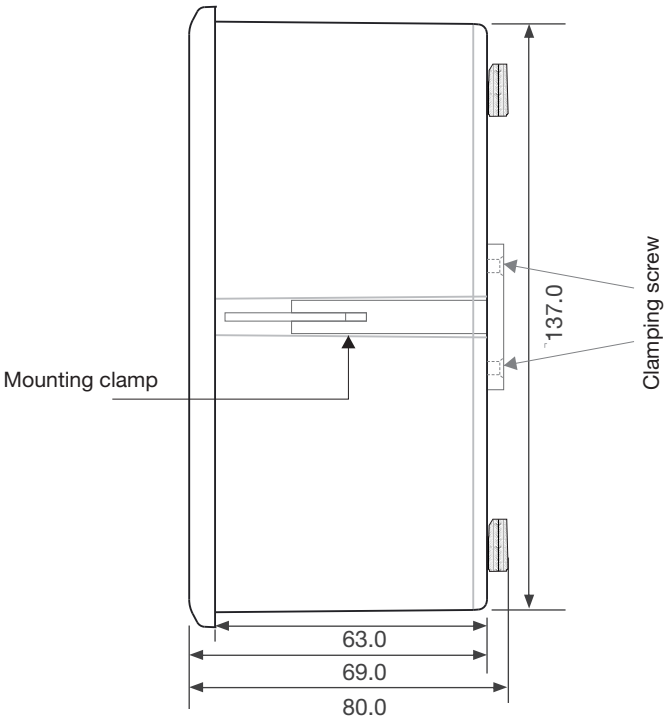
13) Dimension Details (All the dimension are in mm, Gen. Tol: ± 1.0mm)

Front View

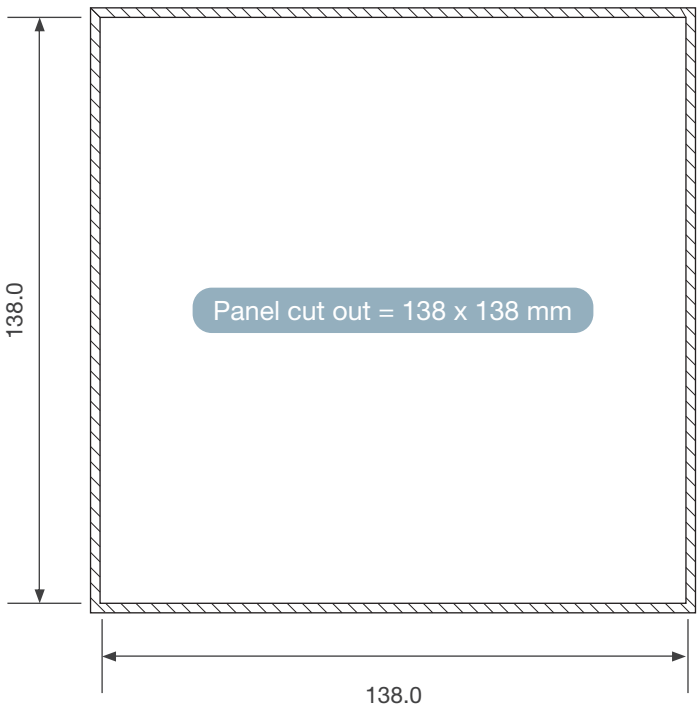


(Figure-5)

Side View



(Figure-6)



(Figure-7)

14) Recommended Capacitor Selection Table

CAPACITOR kVAr REQUIRED PER UNIT kW INPUT FOR POWER FACTOR CORRECTION																
Initial Power Factor	Power Factor Required															
	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0
0.50	1.11	1.16	1.17	1.19	1.22	1.25	1.28	1.31	1.34	1.37	1.40	1.44	1.49	1.53	1.60	1.73
0.51	1.07	1.10	1.12	1.15	1.18	1.21	1.24	1.26	1.29	1.33	1.36	1.14	1.44	1.49	1.55	1.69
0.52	1.02	1.05	1.11	1.11	1.14	1.16	1.19	1.22	1.25	1.28	1.32	1.36	1.40	1.45	1.51	1.65
0.53	0.98	1.01	1.07	1.07	1.09	1.12	1.15	1.18	1.21	1.24	1.28	1.32	1.36	1.41	1.47	1.60
0.54	0.94	0.97	1.02	1.02	1.05	1.08	1.11	1.14	1.17	1.20	1.23	1.27	1.32	1.37	1.43	1.57
0.55	0.90	0.93	1.00	0.98	1.01	1.04	1.07	1.10	1.13	1.16	1.20	1.23	1.28	1.33	1.38	1.53
0.56	0.86	0.89	0.96	0.94	0.97	1.00	1.03	1.06	1.09	1.12	1.15	1.19	1.24	1.29	1.34	1.48
0.57	0.82	0.85	0.91	0.91	0.94	0.96	0.99	1.02	1.05	1.08	1.12	1.16	1.20	1.25	1.31	1.45
0.58	0.79	0.81	0.88	0.87	0.90	0.93	0.95	0.98	1.01	1.05	1.08	1.12	1.16	1.21	1.27	1.41
0.59	0.75	0.78	0.84	0.83	0.86	0.89	0.92	0.95	0.98	1.01	1.04	1.08	1.12	1.17	1.23	1.37
0.60	0.71	0.74	0.80	0.80	0.82	0.85	0.88	0.91	0.94	0.97	1.01	1.05	1.09	1.14	1.20	1.34
0.61	0.68	0.71	0.77	0.76	0.79	0.82	0.85	0.87	0.90	0.94	0.97	1.01	1.05	1.10	1.16	1.30
0.62	0.65	0.67	0.73	0.73	0.75	0.78	0.81	0.84	0.87	0.90	0.94	0.98	1.02	1.07	1.13	1.27
0.63	0.61	0.64	0.70	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.90	0.94	0.99	1.03	1.09	1.24
0.64	0.58	0.61	0.67	0.65	0.69	0.72	0.75	0.77	0.80	0.84	0.87	0.91	0.95	1.00	1.06	1.20
0.65	0.55	0.57	0.63	0.63	0.66	0.69	0.71	0.74	0.77	0.81	0.84	0.88	0.92	0.97	1.03	1.17
0.66	0.52	0.55	0.60	0.60	0.63	0.66	0.68	0.71	0.74	0.78	0.81	0.85	0.89	0.94	1.00	1.14
0.67	0.49	0.51	0.57	0.57	0.60	0.63	0.65	0.68	0.71	0.75	0.78	0.82	0.86	0.91	0.97	1.11
0.68	0.46	0.48	0.54	0.54	0.57	0.60	0.62	0.65	0.68	0.72	0.75	0.79	083	0.88	0.94	1.08
0.69	0.43	0.46	0.51	0.51	0.54	0.57	0.60	0.62	0.65	0.69	0.72	0.76	0.80	0.85	0.91	1.05
0.70	0.40	0.43	0.48	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.70	0.73	0.78	0.83	0.88	1.03
0.71	0.37	0.40	0.46	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.67	0.70	0.75	0.80	0.85	1.00
0.72	0.34	0.37	0.43	0.43	0.45	0.48	0.51	0.54	0.57	0.60	0.64	0.68	0.72	0.77	0.83	0.97
0.73	0.32	0.34	0.37	0.40	0.43	0.45	0.48	0.51	0.54	0.57	0.61	0.65	0.69	0.74	0.80	0.94
0.74	0.29	0.32	0.34	0.37	0.40	0.43	0.45	0.48	0.51	0.55	0.58	0.62	0.66	0.71	0.77	0.91
0.75	0.26	0.29	0.32	0.34	0.37	0.40	0.43	0.45	0.49	0.52	0.55	0.59	0.64	0.68	0.74	0.89
0.76	0.23	0.26	0.29	0.32	0.34	0.37	0.40	0.43	0.45	0.49	0.53	0.57	0.61	0.66	0.72	0.86
0.77	0.21	0.23	0.26	0.29	0.32	0.34	0.37	0.40	0.43	0.47	0.50	0.54	0.58	0.63	0.69	0.83
0.78	0.18	0.21	0.23	0.26	0.29	0.32	0.35	0.38	0.41	0.44	0.48	0.51	0.55	0.60	0.66	0.80
0.79	0.15	0.18	0.21	0.23	0.26	0.29	0.32	0.35	0.38	0.41	0.45	0.49	0.53	0.58	0.64	0.78
0.80	0.13	0.15	0.18	0.21	0.24	0.27	0.29	0.32	0.35	0.39	0.42	0.46	0.50	0.55	0.61	0.75
0.81	0.10	0.13	0.16	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.40	0.44	0.48	0.53	0.59	0.73
0.82	0.08	0.10	0.13	0.16	0.19	0.22	0.24	0.27	0.30	0.34	0.37	0.41	0.45	0.50	0.56	0.70
0.83	0.05	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.28	0.31	0.35	0.38	0.43	0.48	0.53	0.68
0.84	0.03	0.05	0.08	0.11	0.14	0.16	0.19	0.22	0.25	0.28	0.32	0.36	0.40	0.45	0.51	0.65
0.85	-	0.03	0.05	0.08	0.11	0.14	0.17	0.20	0.23	0.26	0.29	0.33	0.38	0.42	0.48	0.62
0.86	-	-	0.03	0.05	0.08	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35	0.45	0.46	0.60
0.87	-	-	-	0.03	0.05	0.08	0.11	0.14	0.17	0.20	0.24	0.28	0.32	0.37	0.43	0.57
0.88	-	-	-	-	0.03	0.06	0.09	0.11	0.14	0.18	0.21	0.25	0.29	0.34	0.40	0.54
0.89	-	-	-	-	-	0.03	0.06	0.09	0.12	0.15	0.18	0.22	0.26	0.31	0.37	0.51
0.90	-	-	-	-	-	-	0.03	0.06	0.09	0.12	0.16	0.20	0.24	0.29	0.35	0.49
0.91	-	-	-	-	-	-	-	0.03	0.06	0.09	0.13	0.17	0.21	0.26	0.32	0.46
0.92	-	-	-	-	-	-	-	-	0.03	0.06	0.10	0.14	0.18	0.23	0.29	0.43
0.93	-	-	-	-	-	-	-	-	-	0.03	0.07	0.11	0.15	0.20	0.26	0.40
0.94	-	-	-	-	-	-	-	-	-	-	0.04	0.08	0.12	0.17	0.22	0.37
kVAr Selection formula : kW x Factor required = kVAr required																

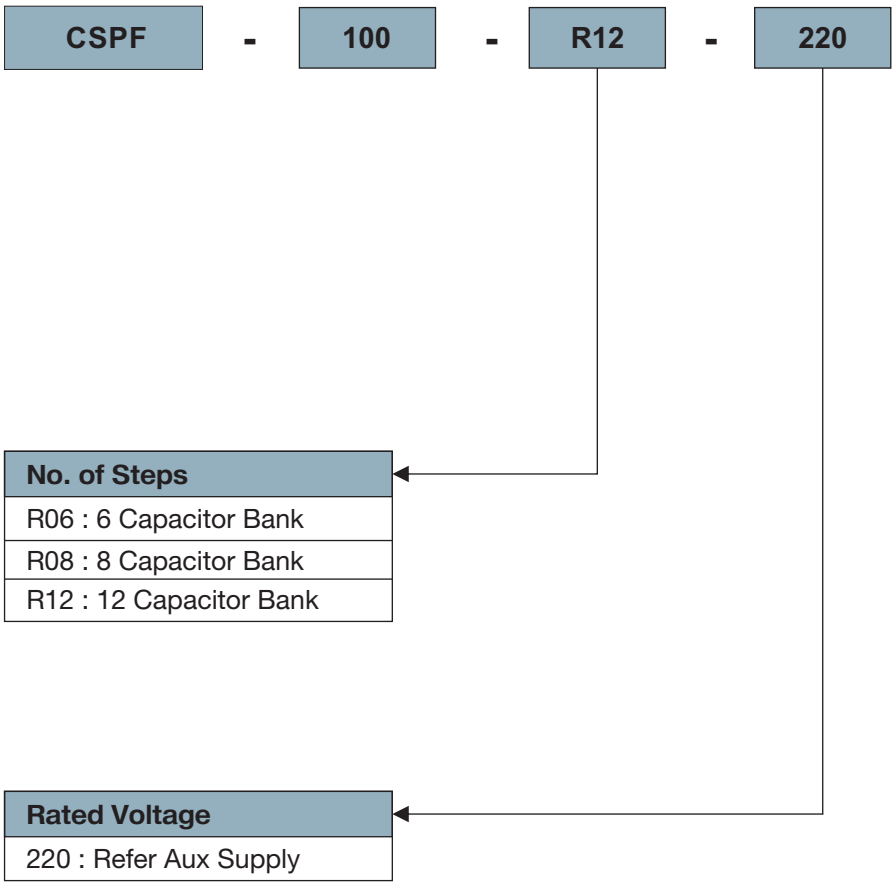
Example

Lets consider, A installed load of 500 kVA at 0.75 PF needs to be corrected to 0.95 PF.
From the above table, Factor required is 0.55 PF.
So, Active Power = kVA x PF = 500 x 0.75 = 375 kW
Therefore, Required Capacitor size = kW x Factor = 375 x 0.55 = **206 kVAr**

Savings by installing capacitor

Initial kVA Rating = 500 kVA
After correction = 375 kW / 0.95 = 395 kVA
Reduction in kVA = (500 - 395) kVA = **105 kVA**

15) Ordering Information



Note: Measuring Voltage is different from Aux Supply Voltage. Aux Supply Voltage Range 100-265V AC/DC

Revision History

S.No.	Rev.No.	Details	Date
01	01	Conn Diagram, Conn Scheme, HMI, Prog. Parameters changed and include the description of Over temp.	19.01.17
02	02	Include Control SMS format on pg-5, Conn. diagram for CSPF-100-GM on pg-12, Include Gsm modem on page-3 and change ordering information	05.06.18

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REVISE OR ELSE

Issue Date: 22.04.16

Rev. No: 01

Rev. Date: 19.01.17

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