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CSPF-200 Power Factor Controller (6 / 8 / 12 Steps)



AUTO/MANUAL
CONTROL OF
CAPACITOR
BANK

EFFECTIVE
PF CONTROL
UPTO 12
CAPACITOR
BANK

LAST
5 ALARM
DATA

REDUCED
ELECTRIC
UTILITY
BILLS

FIELD
ACCESSIBLE
TEST
FACILITY

Catalog

SINGLE PHASE POWER FACTOR CONTROLLER SERIES



PMD Division

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① Introduction

CSPF-200, 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.

② Features

- ◆ Suitable for 1-CT Application
- ◆ Capacitor-ratio Series editor
- ◆ Auto Capacitor kVAr detection menu
- ◆ Wide range of measuring voltage Input
- ◆ LIFO / Best Fit Intelligent control algorithm
- ◆ Alphanumeric LCD Display for user interface
- ◆ Automatic & Manual Control of Capacitor Bank
- ◆ Field accessible Test facility to check relay contact
- ◆ Indication of Active Capacitor Bank status through LEDs
- ◆ Effective PF control up-to 12 capacitor banks controllable *
- ◆ Compatible to various wiring scheme for CT or Voltage connection
- ◆ Operational / Statistical Record for Capacitor bank usage
- ◆ Capacitor KVAR (individually programmable) value based control
- ◆ Facility for CT wrong connection compensation from menu operation
- ◆ Separate Potential Free Alarm Output & Fan control Output on abnormal conditions
- ◆ Protection & Indication of Abnormal condition such as Over Volt / Over Compensation / Step Fail etc.

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 Records

- ◆ Last 5 Alarm Data
- ◆ No. of operation per capacitor stage
- ◆ Operation Time per capacitor stage

⑤ Benefits

- ◆ Saving in installation cost of conductors
- ◆ Reduced electric utility bills
- ◆ Increased system capacity
- ◆ Reduction of power losses

⑥ Functional Description

Automatic power factor controllers are used for measurement and control of power factor control panels 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-200 measures reactive power & PF 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-200 has a LCD display & several LED indications which are functionally divided into following categories:

a) Metering / Status : Following measurement values can be displayed

- 1) Voltage (Ph-N)
- 2) Current
- 3) Power Factor
- 4) Active Power (kW)
- 5) Reactive Power (kVAr)
- 6) Apparent Power (KVA)
- 7) Capacitor Steps Status
- 8) Temperature
- 9) Alarm Status
- 10) Required KVAR

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

Setting of control parameters like Target PF, CT ratio, Discharge time, Capacitor rating etc.

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-200 will control the capacitor steps automatically.

b) MANUAL mode : In this mode CSPF-200 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 ON delay time.

Press DOWN Key : Capacitor step will be disconnected after a OFF delay time.

Following are the brief description of Control Parameters:

Target PF :

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

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.

Discharge Time:

Discharge time is a blocking time, becoming active after switching off a step. As long as this time is running, this step is not available for PF correction.

Capacitor Step Type:

Capacitor step type can be configured from HMI as AUTO / FIXED ON / FIXED OFF

AUTO : Step is consider for auto PF correction

FIX ON : Step is permanently switched ON

FIX OFF : Step is permanently switched OFF

Switching Threshold:

This parameter is the switching threshold for switching-on or switching-off the capacitors in percent (%). The controller is using threshold to check, if a switching operation is necessary or if its possible. If the demand for compensation is bigger as Threshold (%) of the smallest for regulation step available, CSPF-200 will select from step database, if there are suitable steps to switch.

Control Principle:

CSPF-200 compensates Reactive power by connecting and disconnecting capacitor bank in automatic operation .Capacitor stages are automatically connected in or out in order to reach the target power factor. This happens when the required reactive power exceeds the value of the smallest capacitor stage.

CSPF-200 has 2 control mode : a) LIFO 2) BEST FIT

LIFO : It works on last in First out principle. The controller starts compensation with step 1 and switches further step by step. Switching off is done vice versa. This mode works well with equal steps (or) steps arranged in ascending order.

BEST FIT : The controller is working with the principle of Best Fit. Before a switching operation, all capacitor-sizes in step database are compared with required deviation and also counts no of switching of all capacitor steps are compared and then only the available step which gives the best results will be switched on.

Alarm Function:

CSPF-200 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-200 measures temperature with in-built sensors. After the temperature measured by the device reaches the temperature high set value, it generates over temperature alarm 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, it resets the temperature alarm.

Step Fail Alarm:

A step fail warning will be given when the steps actual power to the capacitor kVA_r value entered in the setting menu drops below the StpFailLevel and this condition remains same for retry attempts (StpFailAtmpt). The faulty step can be seen under record menu.

7 Human Machine Interface

The Man-Machine interface in CSPF-200 enables user to program the device parameters, monitor the electrical parameters & capacitor bank status and control the capacitor bank switching. The HMI consists of following :

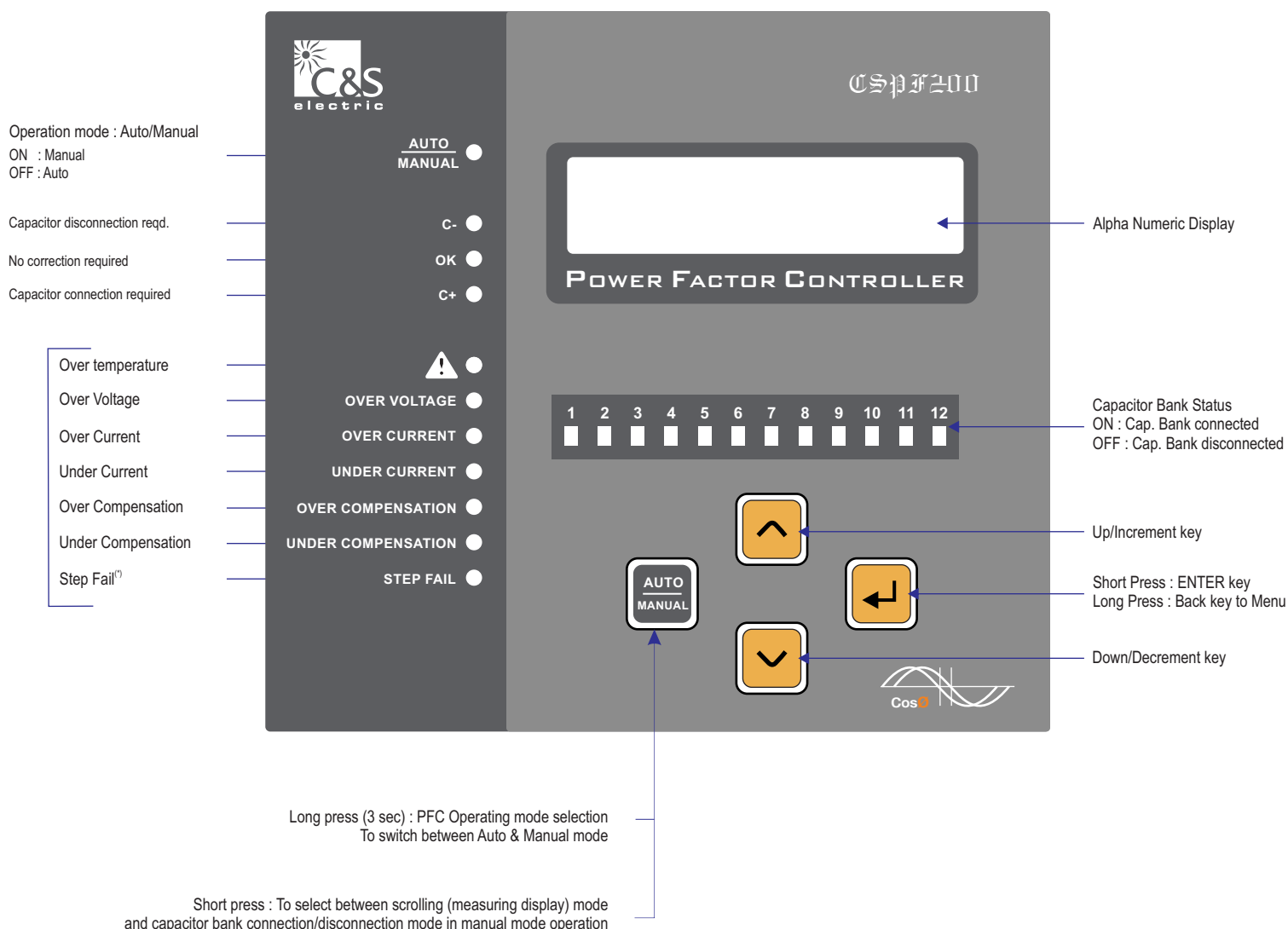
- ◆ 16 x 2 integrated LCD Display
- ◆ 12 LEDs for Capacitor Bank connection status
- ◆ 1 LED for Auto / Manual Operating mode indication
- ◆ 3 LED for Capacitor Bank control status (About to switch ON /about to switch OFF / No switching)
- ◆ 7 LEDs for Alarm / fault status.
- ◆ 4 Keys to navigate, edit, 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 Output

List of Measured Parameters : Voltage, Current, Power Factor, Active Power (P), Reactive Power (Q), Apparent Power (S), Temperature, Required KVAR to Target PF

List of Alarm : Over / Under current, Over Voltage, Step Fail ^(*), Over/Under Compensation

Record :

- No. of operation per capacitor stage
- Operation Time per Capacitor Stage
- Last 5 Alarm details
- Failed capacitor step status



* Model Dependent

8 Programmable Parameters
BASIC SETTING

(These settings can be accessed in Parameter setting from Edit/View menu)

Parameters	Display	Setting Range		Step size	Unit	Default setting
		Min	Max			
Target power factor ⁽¹⁾	TargetPF	0.80L	0.80C	0.01	-	1.0L
No. of capacitor bank used	NoOfCapBnk	01	12	1	-	12
External CT ratio	CT Ratio	0001	9999	1	-	1
Bank switch ON delay	SwOnTime	0001	9999	1	Sec	5
Measuring voltage connection ⁽¹⁾	Connection	L-L	L-N	-	-	L-L

 Note : ¹ Target PF setting 0.80L to 0.80C means 0.80 (inductive) to 0.80 (capacitive)

ADVANCE SETTING
(A) Common Setting (These settings can be accessed in Parameter setting from Edit/View menu)

Parameters	Display	Setting Range		Step size	Unit	Default setting
		Min	Max			
Rated voltage	RatedVolt	150	440	1	V	415
Phase Angle	PhaseAngle	0 / 180 (L-N), 90 / 270 (L-L)		180	deg	90
Control Principal	Control	LIFO	BEST Fit	-	-	BEST Fit
Switch Off Time	SwOffTime	0001	9999		sec	10
Switch Discharge Time	SwDchgTime	0001	9999		sec	20
Switching threshold	C_Threshold	20	100	1	%	60
Fan On Temperature	FanOnTemp	05	100	1	°C	45
Fan Off Temperature	FanOffTemp	05	90	1	°C	40

(B) (i) Capacitor Bank (STEP kVAr) setting parameters

Parameters	Display	Setting Range		Step size	Unit	Default setting
		Min	Max			
Capacitor bank 1	C-1	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 2	C-2	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 3	C-3	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 4	C-4	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 5	C-5	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 6	C-6	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 7	C-7	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 8	C-8	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 9	C-9	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 10	C-10	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 11	C-11	000.1	500.0	0.1	kVAr	1.0
Capacitor bank 12	C-12	000.1	500.0	0.1	kVAr	1.0

(B) (ii) Capacitor Bank (Step Type) setting parameters

Parameters	Display	Setting Range		Default setting
		Min	Max	
Capacitor bank 1	C-1	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 2	C-2	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 3	C-3	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 4	C-4	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 5	C-5	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 6	C-6	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 7	C-7	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 8	C-8	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 9	C-9	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 10	C-10	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 11	C-11	AUTO / FIX-ON / FIX-OFF		AUTO
Capacitor bank 12	C-12	AUTO / FIX-ON / FIX-OFF		AUTO

(C) Alarm Parameters

Parameters	Display	Setting Range		Step size	Unit	Default setting
		Min	Max			
Over voltage setting ⁽¹⁾	OverVolt	150	490	1	V	456
Over voltage alarm delay	tOvrVolt	001	999	1	Sec	5
Capacitor bank trip selection on over voltage	OvVolTrip	ON	OFF	-	-	OFF
Over current setting ⁽¹⁾	OvCurrent	50	150	1	%In	OFF
Over current alarm delay	tOvCurrnt	001	999	1	Sec	5
Capacitor bank trip selection on over current	OvCurTrip	ON	OFF	-	-	OFF
Under current setting ⁽¹⁾	UnCurrent	001	90	1	In	OFF
Under current alarm delay	tUnCurrnt	001	999	1	Sec	5
Capacitor bank trip selection on under current	UnCurTrip	ON	OFF	-	-	OFF
Temp. high set ⁽¹⁾	TempHiset	010	120	1	°C	55
Temp. low Set	TempLoset	010	120	1	°C	50
Temp. high alarm delay	tTempHi	001	999	1	Sec	10
Capacitor bank trip Selection on high temperature ⁽²⁾	TempHiTrip	ON	OFF	-	-	OFF
Over compensation ⁽¹⁾	OvrCompns	1	99	1	Sec	5
Under compensation ⁽¹⁾	UndCompns	1	99	1	Sec	5
Step fail attempt ⁽¹⁾	StpFailAtmpt	1	20	1	-	5
Cap Step fail level	StpFailLevel	30	80	1	%	40

Note : 1. This Alarm settings will have disable (OFF) option

2. In = Rated Current (5A)

* Model Dependent

9 Technical Data

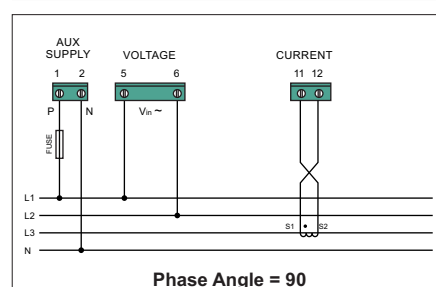
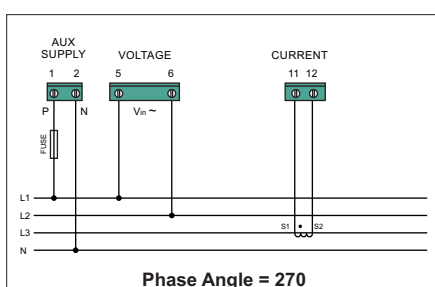
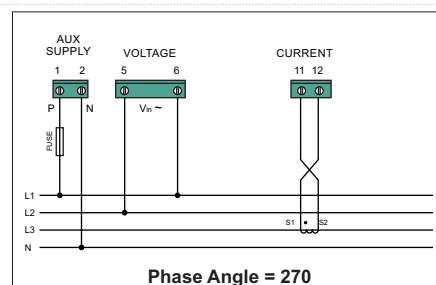
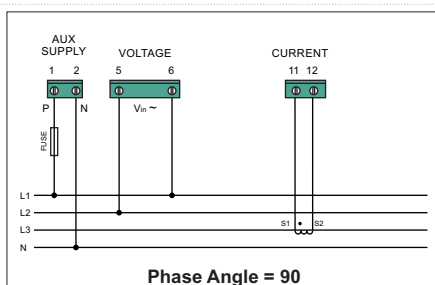
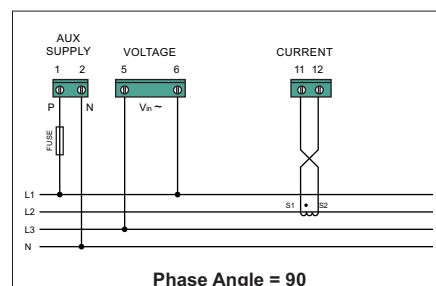
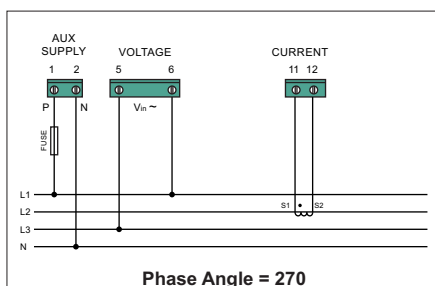
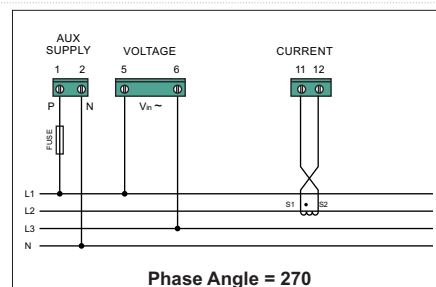
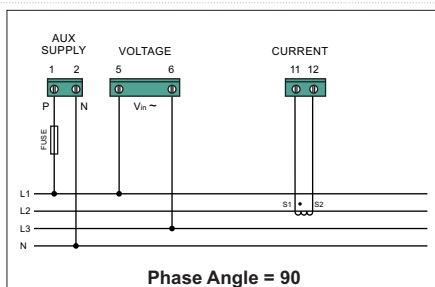
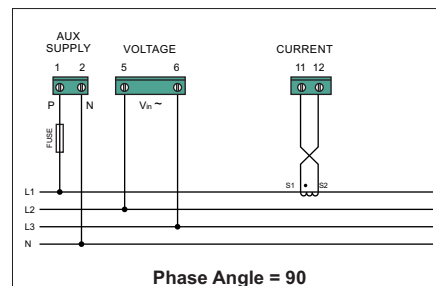
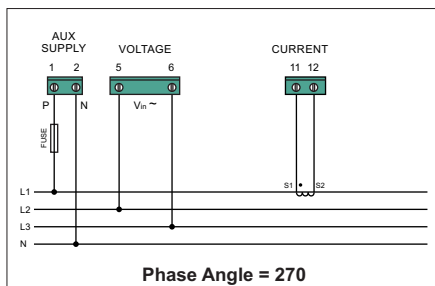
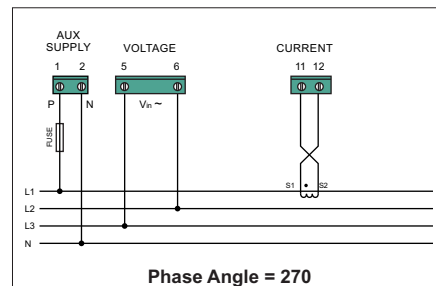
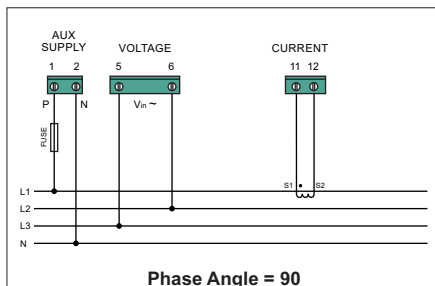
Network type	3 Phase - 3 Wire / 3 Phase - 4 Wire
Aux. supply	150 - 265V / 90 - 180V (AC / DC), 50 / 60Hz (As per ordering information)
Sensing / Measurement	True RMS
Operating voltage	Voltage Input : L-N / L-L Range : 50 to 500V AC; 50/60 Hz
Operating current	40mA - 7.5A (/5A Current Transformer), 1 CT
Relay output contact	Type : N/O, Rating : 5A @ 250V AC, 1250VA
Capacitor steps *	12 Steps (Max). please refer ordering information for available models
Power consumption	<0.2VA (Current Circuit), <5VA (Voltage Circuit)
Target PF setting	0.80 Lag - 1.00 - 0.8 Lead
CT ratio	Configurable (Max 9999)
Compliance / Standard specification	IEC 61000
Operating temperature range	0°C to +55°C
Storage temperature range	-10°C, +70°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

10 Connection Scheme (L-L)

Wiring connection for measuring voltage, current and setting of Connection & Phase Angle has to be made correct, otherwise power factor correction will not function correctly.

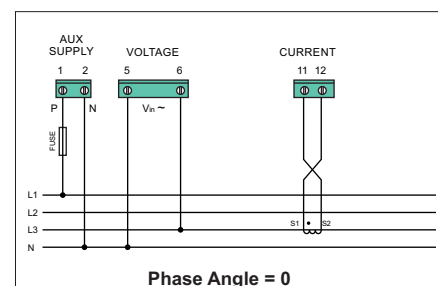
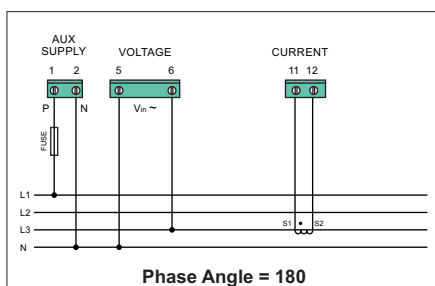
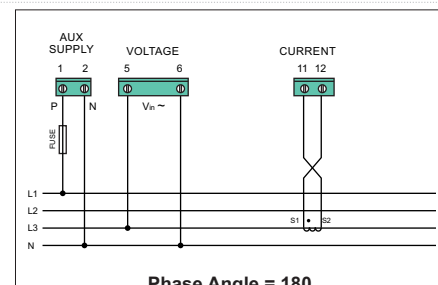
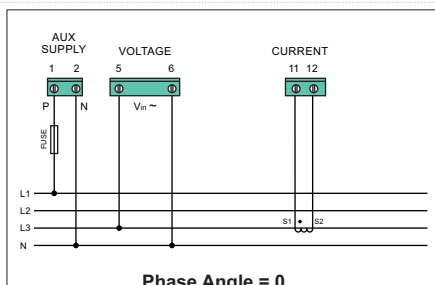
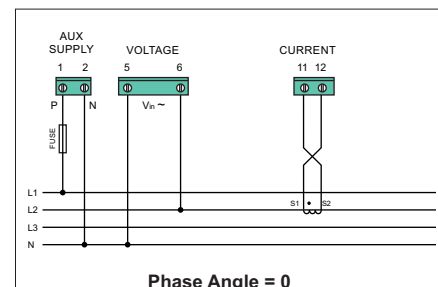
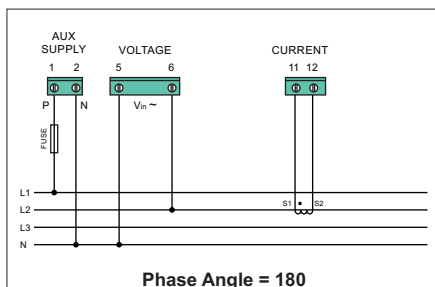
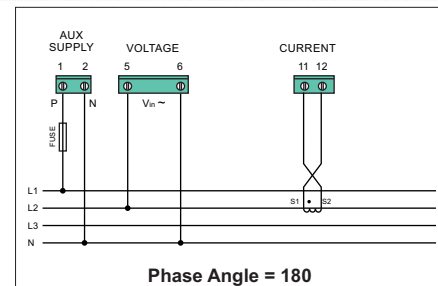
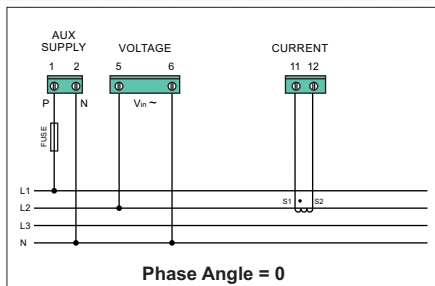
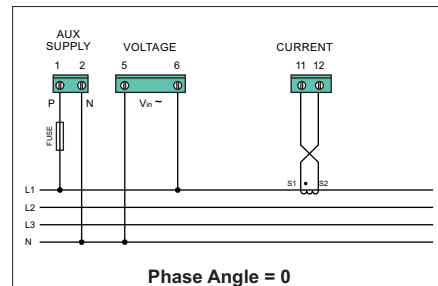
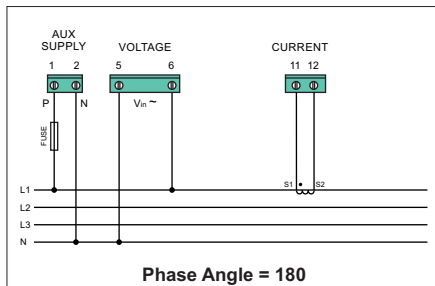
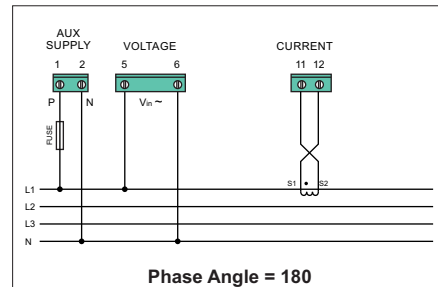
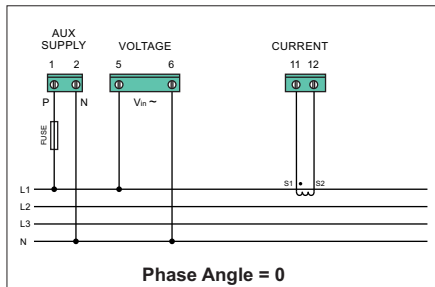
For the setting , Connection = L-L, voltage input to be connected from any two phases and current from the remaining third phase.



Voltage & Current from Different Phases

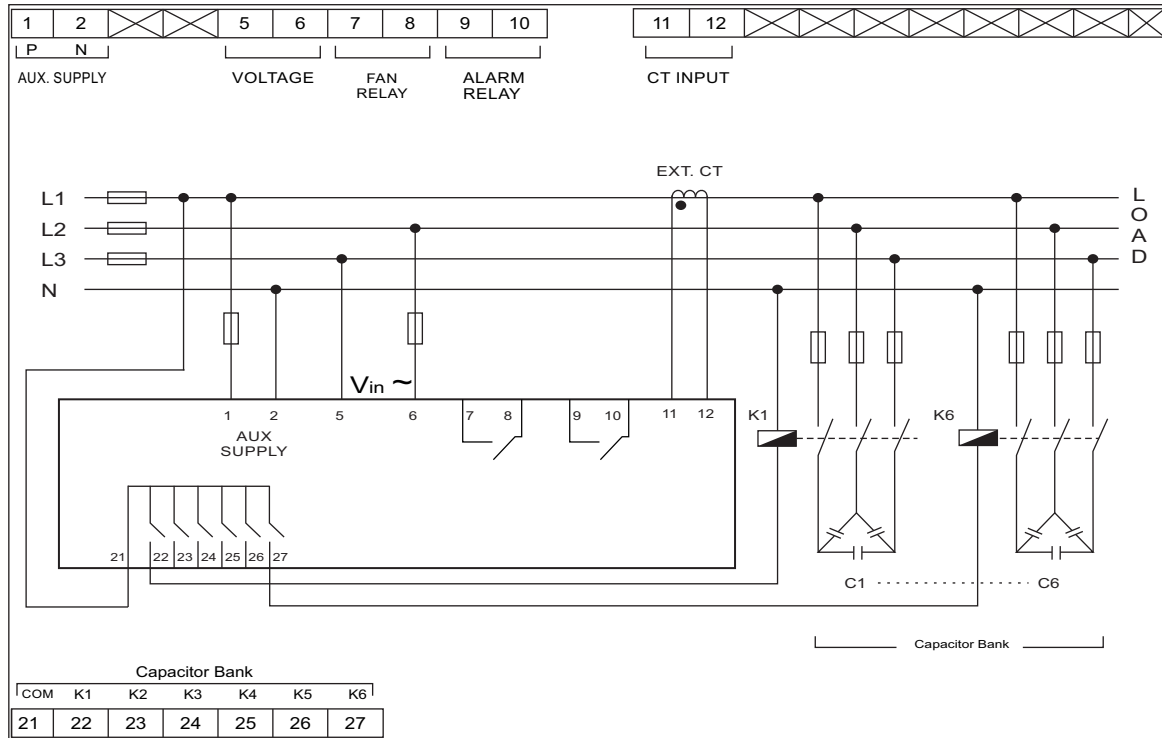
11 Connection Scheme (L-N)

For the setting, Connection = L-N, voltage and current inputs to be connected from same phase.
Following diagram shows different connection type for which the controller will work.



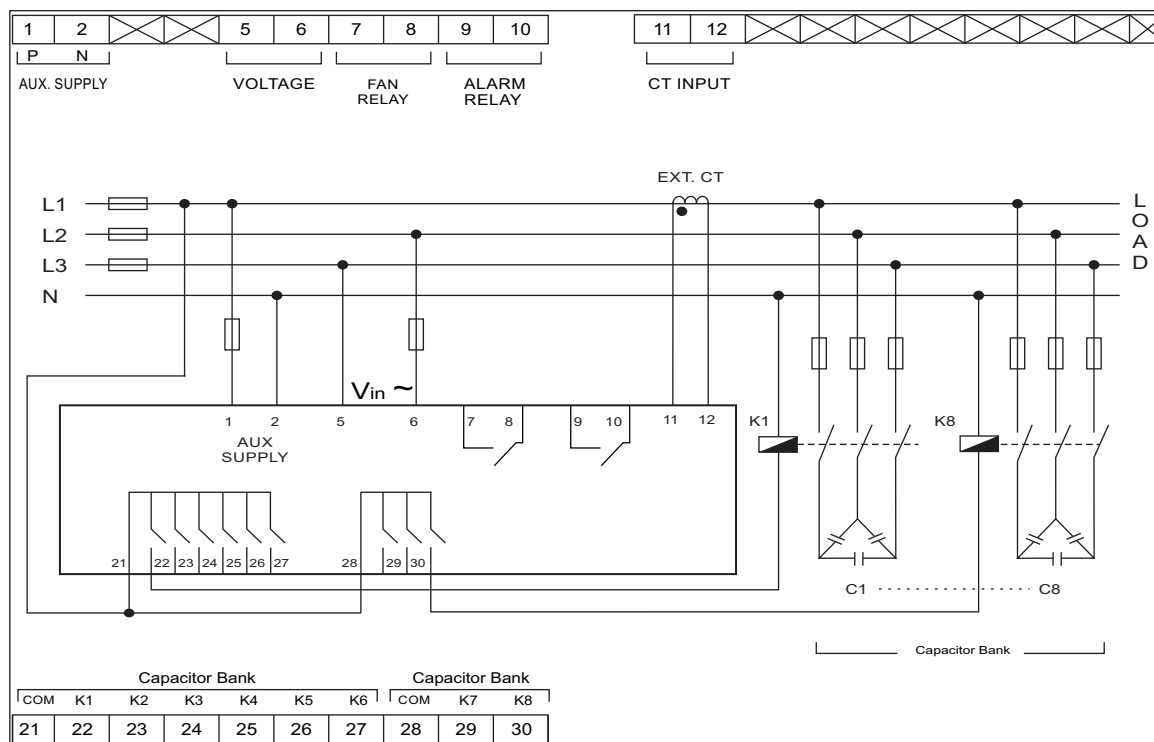
Voltage & Current from Same Phase

12 a) Connection diagram (6 cap bank)



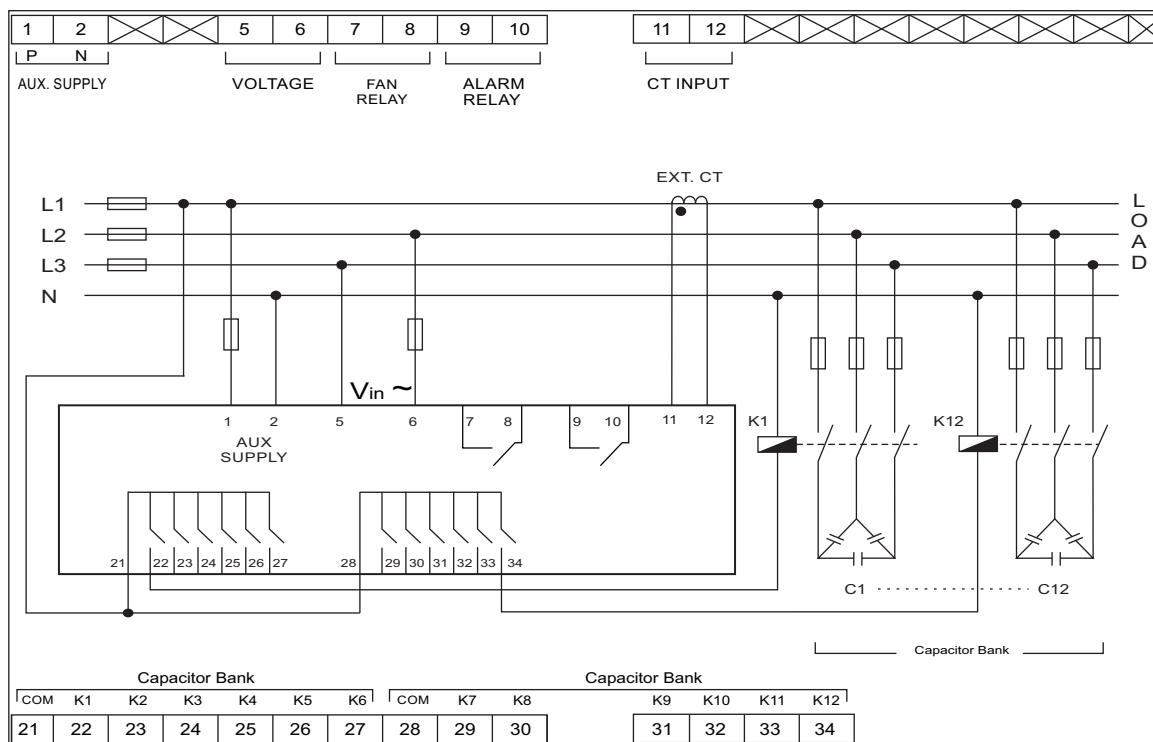
Terminal No.	Connection Name	Connection Description
1	Aux Supply (P)	Phase for control supply
2	Aux Supply (N)	Neutral for control supply
3	X	Not Connected
4	X	Not Connected
5	V _{in}	Phase Voltage (L3) or (L1)
6	V _{in}	Phase Voltage (L2) or Neutral (N)
7	FAN Output	N/O Contact for FAN Relay output
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

12 b) Connection diagram (8 cap bank)



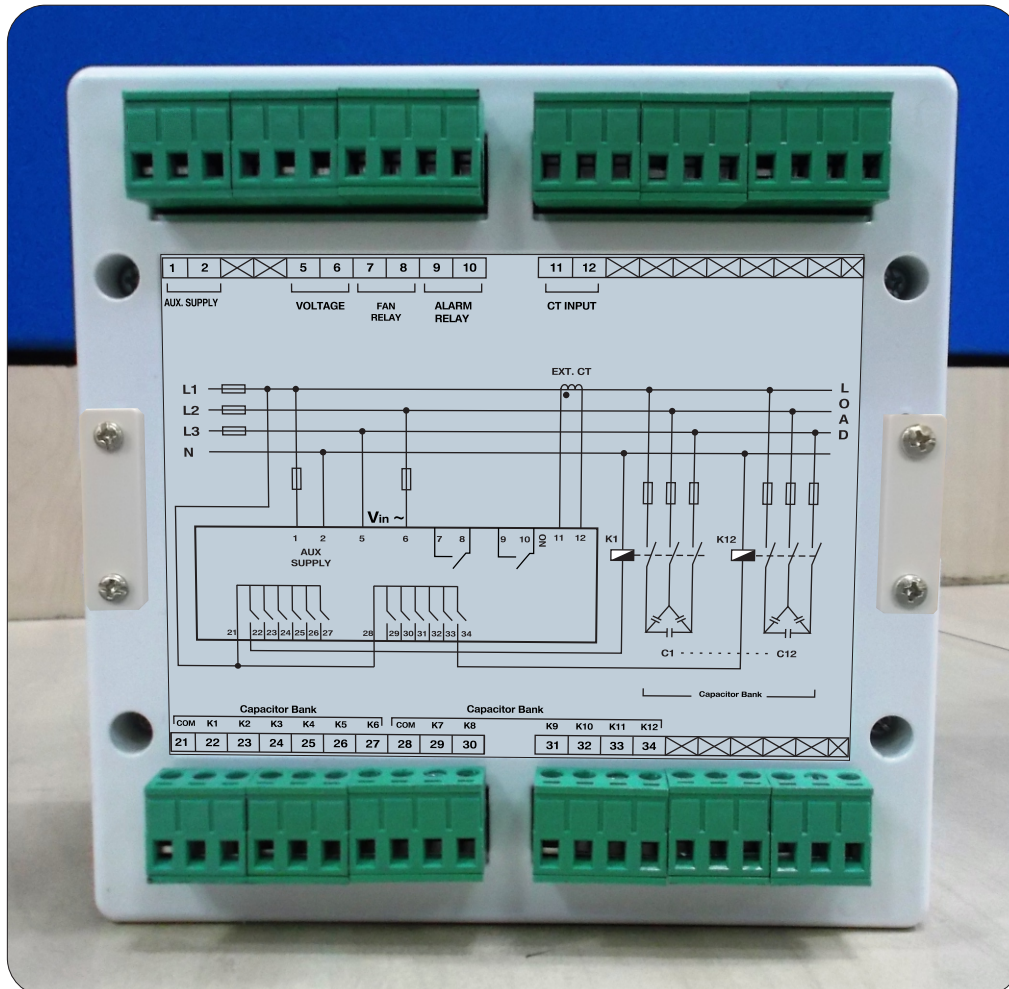
Terminal No.	Connection Name	Connection Description
1	Aux Supply (P)	Phase for control supply
2	Aux Supply (N)	Neutral for control supply
3	X	Not Connected
4	X	Not Connected
5	V _{in}	Phase Voltage (L3) or (L1)
6	V _{in}	Phase Voltage (L2) or Neutral (N)
7	FAN Output	N/O Contact for FAN Relay output
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

12 c) Connection diagram (12 cap bank)



Terminal No.	Connection Name	Connection Description
1	Aux Supply (P)	Phase for control supply
2	Aux Supply (N)	Neutral for control supply
3	X	Not Connected
4	X	Not Connected
5	V _{in}	Phase Voltage (L3) or (L1)
6	V _{in}	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

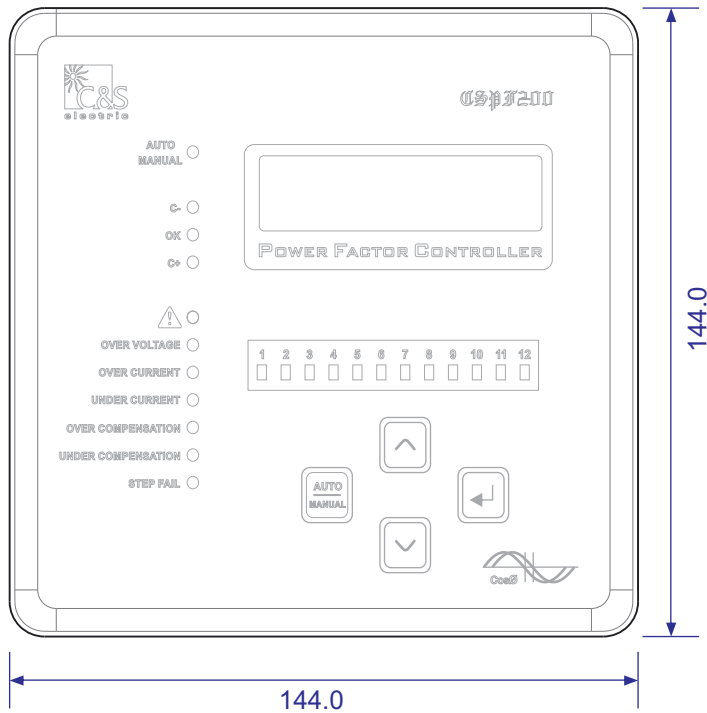
13 Back view of CSPF-200 (12 cap bank)



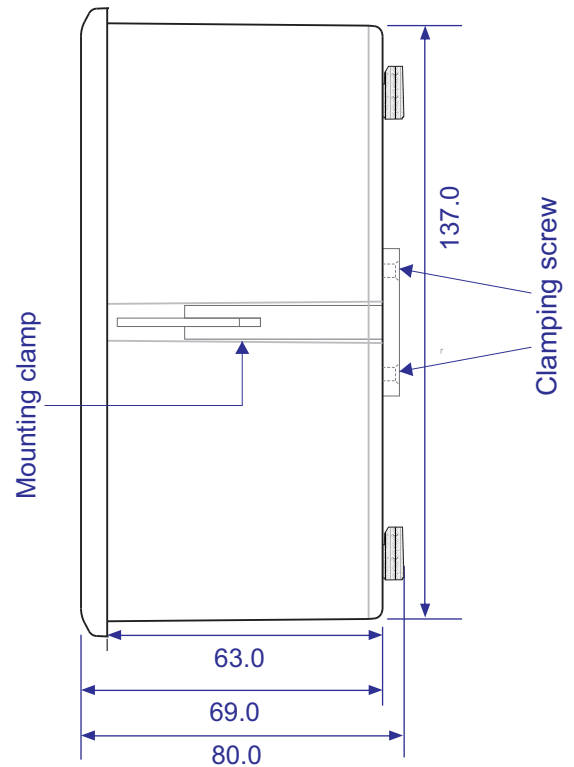
(All the dimension are in mm, Gen. Tol: $\pm 1.0\text{mm}$)

14 Dimension Details

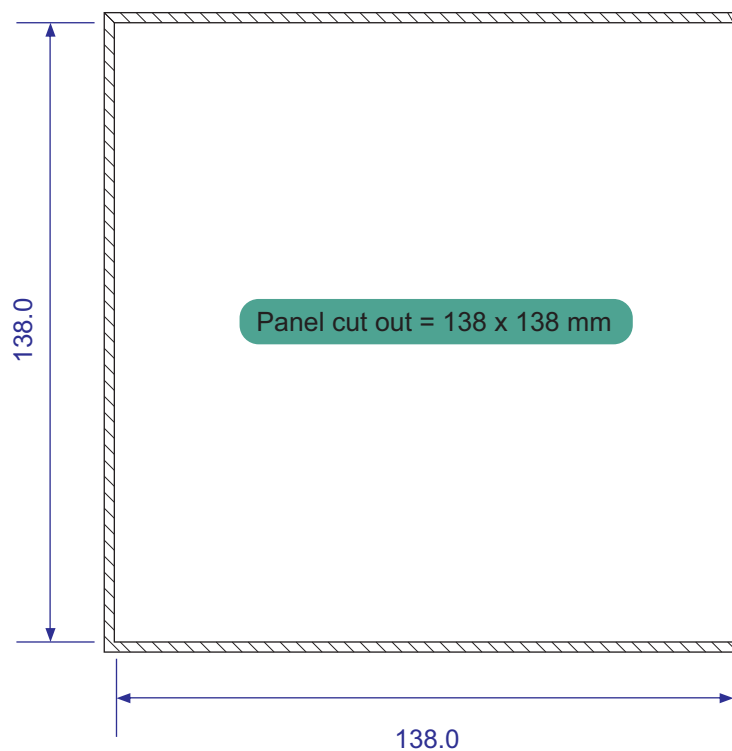
Front View



Side View



Panel Cut out dimension



15 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	0.83	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

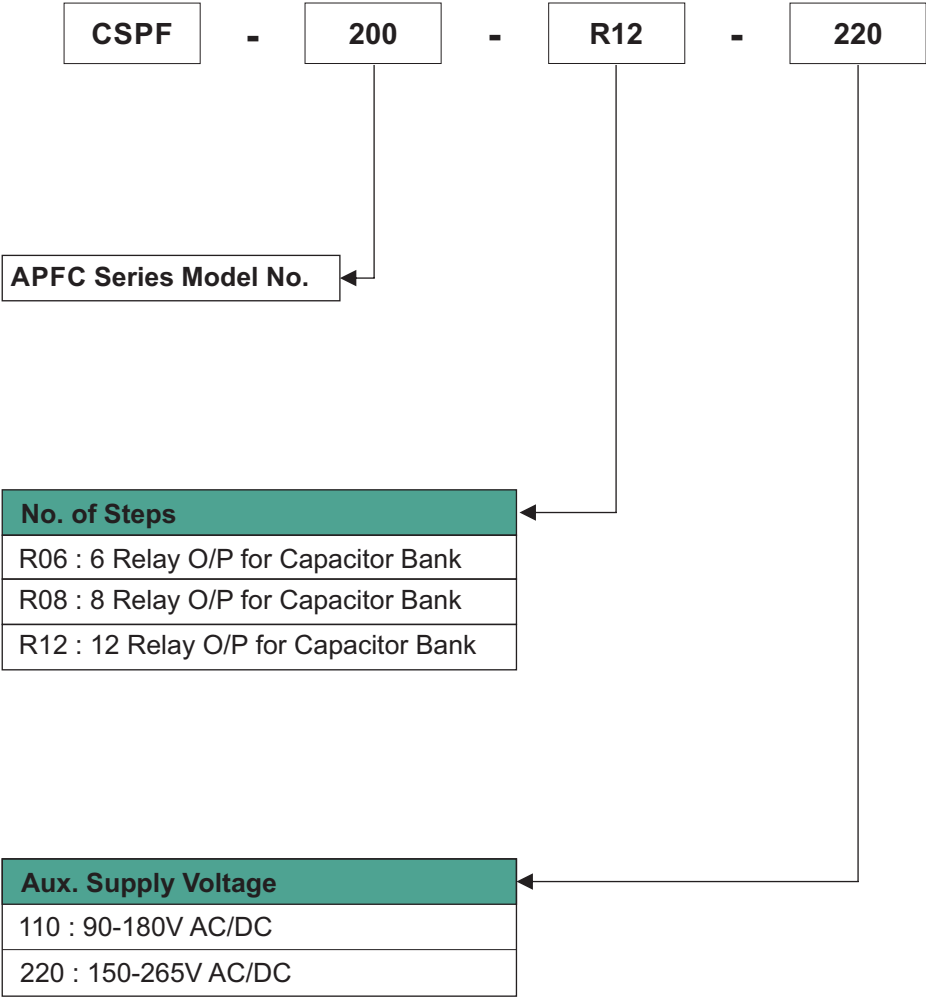
Savings by installing capacitor

Initial kVA Rating = 500 kVA

After correction = 375 kW / 0.95 = 395 kVA

Reduction in kVA = (500 - 395) kVA = 105 kVA

16 Ordering Information



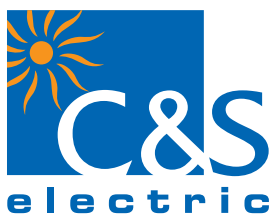
17 Revision History

[illegible]

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