



Boddingtons Power Controls

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Q1 Single Stage PFC Relay



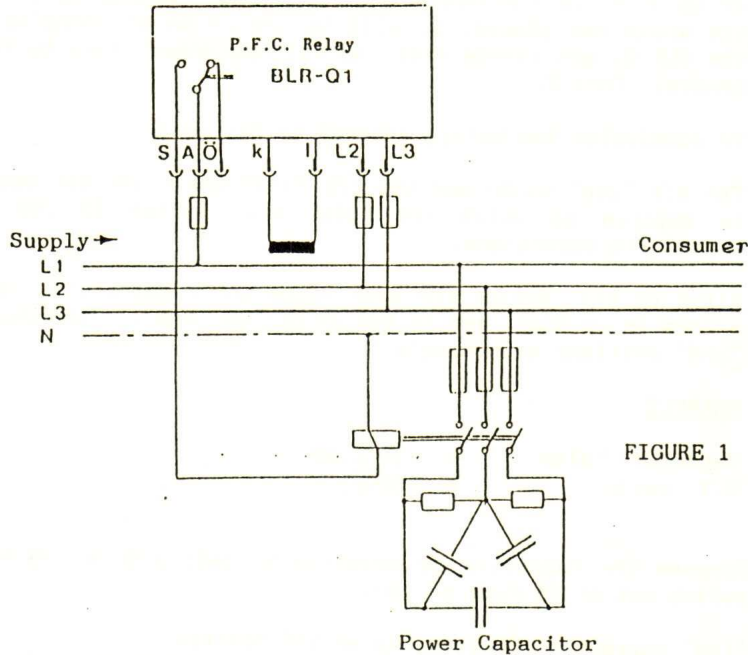
This single step relay facia size 144 x 72mm allows the user to set independent lead/lag threshold reactive currents. It has hand/auto/off control available on the relay. This controller is well suited to HV Capacitor installations on overhead lines or on any switchboard HV or LV.

COMMISSIONING INSTRUCTIONS FOR
BELUK POWER FACTOR CONTROL RELAY

BLR-Q1

- 1) Connect the Relay in accordance with Figure 1 below:-

WIRING DIAGRAM



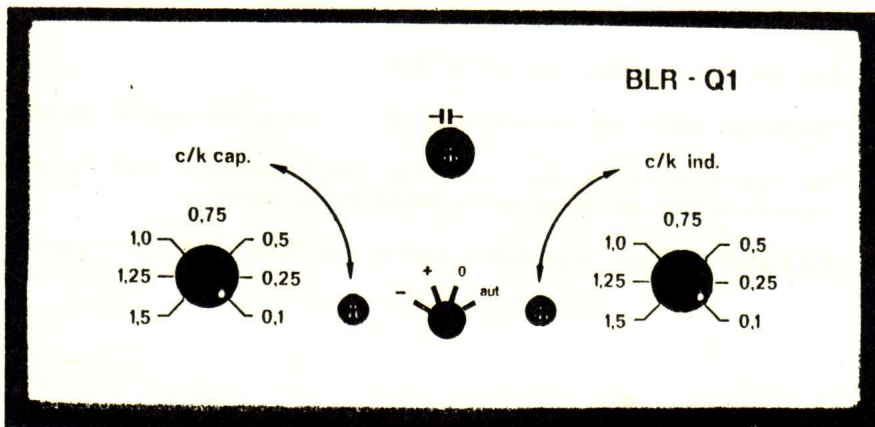
- 2.0) The Current Transformer, connected to terminals k - l must:-

- a.) Measure the total load including the P.F.C. load.
- b.) Be positioned in a different phase to the two phases used for L2 - L3.

N.B. NEVER CONNECT AN OPEN CIRCUIT LOAD CARRYING C.T. TO THE RELAY. THIS CAN GENERATE VOLTAGES WHICH WILL DAMAGE THE ELECTRONIC CIRCUIT. KEEP C.T. SHORT-CIRCUITED WHILST CONNECTING.

- 2.1) Sometimes it is not convenient to place the C.T. in L1 (Red) phase. If so, move the C.T. to another phase.

C.T. on L1 (Red) - Voltage to Relay from L2 (Yellow) - L3 (Blue)
 C.T. on L2 (Yellow) - Voltage to Relay from L1 (Red) - L3 (Blue)
 C.T. on L3 (Blue) - Voltage to Relay from L1 (Red) - L2 (Yellow)



2.2) If the C.T. is positioned and the voltage supply to the Relay is from the wrong two phases, it will be easier to de-energize the supply to the BLR Q1 and change over the voltage connections to the correct two phases. (see 2.1)

2.3) To commission the Relay, proceed as follows:-

The c/k "cap" scale and the c/k "ind" scale are the reactive currents in Amperes at which the Relay will switch in the inductive and capacitive directions.

First of all, decide the kvar value you require the capacitor bank to switch in on "ind" and to switch out on "cap". Then set the "cap" and "ind" settings accordingly.

2.4) EXAMPLE

Capacitor Value = 50 kvar
C.T. ratio = 500/5

Suppose the Capacitor is required to switch in at 25 kvar Lag and to switch out at 35 kvar of lead.

"ind" current at 25 kvar lag at 415 Volts:-

$$\frac{25 \times 1000}{415 \times \sqrt{3}} = 34.78 \text{ Amps}$$

With C.T. ratio 500/5, C.T. output = $\frac{34.78}{500/5} = 0.3478 \text{ Amps}$

Set the "ind" potentiometer to 0.35.

"cap" current at 35 kvar Lead at 415 volts 3 ph 50 Hz:-

$$\frac{35 \times 1000}{415 \times \sqrt{3}} = 48.68 \text{ Amps}$$

With C.T. ratio 500/5, C.T. output = $\frac{48.68}{500/5} = 0.4868 \text{ Amps}$

Set the "cap" potentiometer to 0.49.

The Relay would now switch in at 25 kvar Lag and out at 35 kvar lead.

The total value of the "ind" and "cap" settings must be 120% of the capacitor bank value so as to avoid Relay hunting.

This explains the principles behind the "cap" and "ind" controls.

4.0) Fault Finding

4.1) Relay does not function at all:-

Check that the correct voltage is applied to L2 - L3.

4.2) Relay switches in but does not switch out:-

Voltage L2 - L3 is taken from wrong phases.

Check that connections are as 2.1.

C.T. is incorrectly positioned and not measuring the Capacitor bank current.

4.3) Insufficient load on system at time of commissioning:-

Switch capacitor in on the hand "+" control. Change to "auto", Capacitor should switch out.

4.4) Relay does not switch correctly at "ind" and "cap" settings:-

Protection diodes on the C.T. circuit have operated due to over voltage on the C.T. path. Return the Relay for repair.

C/K TABLE FOR BLR-Q1

II	CAPACITOR RATING (kvar)												
	10	12,5	15	20	25	30	40	50	60	75	100	125	150
50/5	1,74	2,20	2,60										
100/5	0,87	1,10	1,30	1,80	2,25								
150/5	0,58	0,73	0,87	1,20	1,50	1,80	2,40						
200/5	0,43	0,54	0,65	0,87	1,10	1,30	1,70	2,20					
250/5	0,35	0,44	0,52	0,70	0,86	1,04	1,38	1,74	2,10				
300/5	0,30	0,36	0,44	0,58	0,74	0,88	1,18	1,46	1,76	2,20			
400/5	0,22	0,27	0,32	0,43	0,54	0,64	0,85	1,06	1,28	1,60	2,10		
500/5		0,22	0,26	0,35	0,44	0,52	0,70	0,86	1,04	1,30	1,74	2,20	
600/5			0,22	0,30	0,36	0,44	0,58	0,74	0,88	1,10	1,45	1,85	2,20
800/5				0,22	0,27	0,33	0,44	0,55	0,65	0,82	1,08	1,35	1,62
1000/5					0,22	0,26	0,35	0,44	0,53	0,66	0,88	1,10	1,32
1500/5							0,23	0,29	0,35	0,44	0,58	0,72	0,88
2000/5								0,22	0,26	0,33	0,44	0,55	0,65
2500/5									0,21	0,26	0,35	0,44	0,52
3000/5										0,22	0,29	0,36	0,44
4000/5											0,22	0,27	0,33

Contact BPC for any problem concerning PFC

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