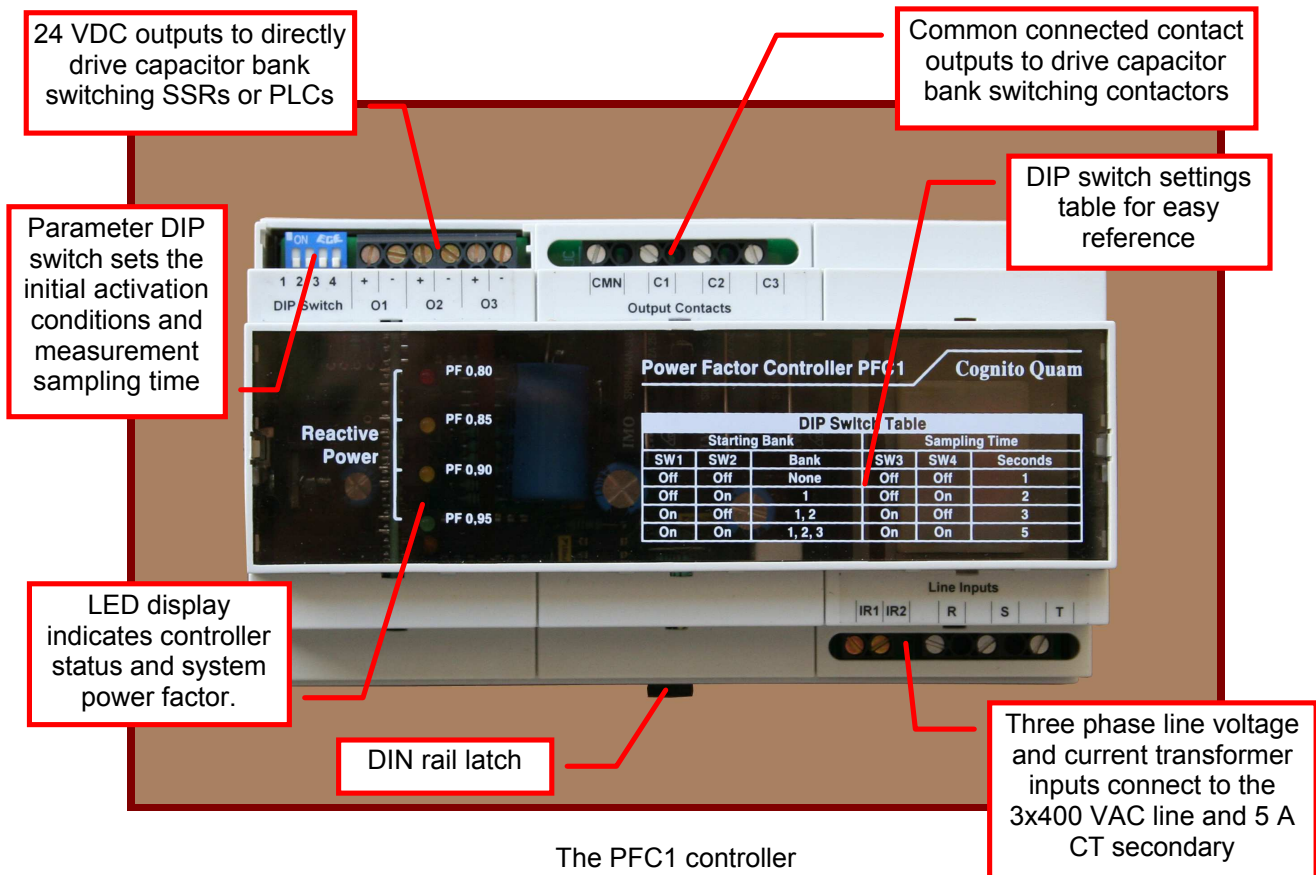


## PFC1 Fast Power Factor Controller

The PFC1 controller measures the phase angle between the voltage and current vectors in a three phase 3x400 VAC system and activates its three-step output to switch in and out of the line compensating capacitor banks. The current is detected with a standard current transformer (CT) in one of the line phases and measurement duration is selectable from 1 to 5 seconds.

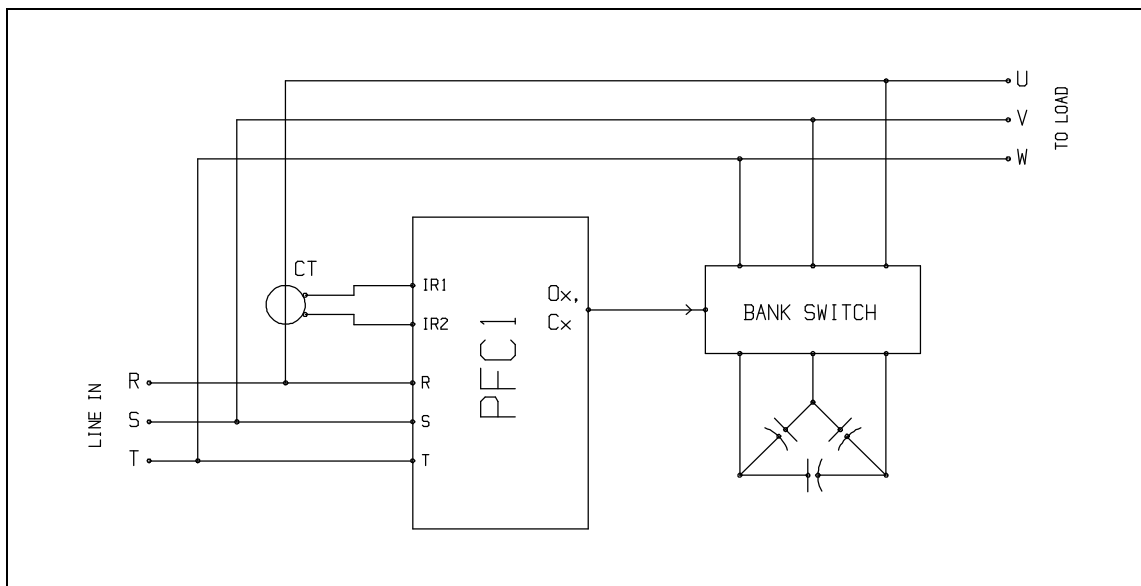
The PFC1's fast response makes it particularly suitable for very fast dynamic compensation of frequently-started, low-duty or variable loads such as lifts, conveyors, pumps and fans.



The PFC1 controller

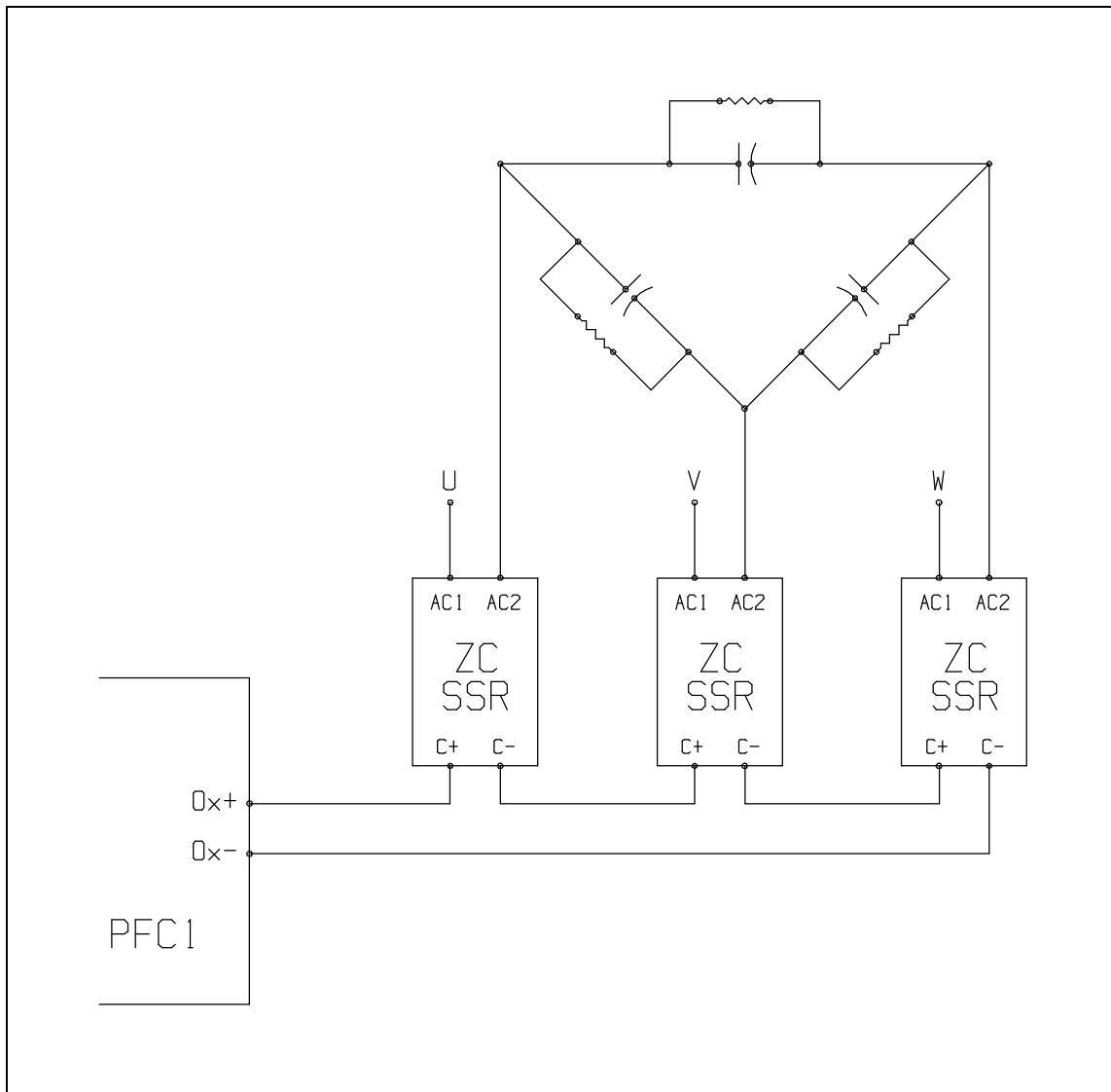
The controller is active while the CT secondary current is above 0.5 A (10 % of range). On activation the outputs are initialized as selected at the DIP switch until the first measurement is completed. If the measured power factor is above 0.95 the outputs remain unchanged until the next measurement is completed. The outputs are incremented (the next step output is activated) for inductive power factors below 0.95 and the activated output protection time-out has elapsed. Correspondingly, the outputs are decremented (the highest step output is deactivated) for capacitive power factors below 0.95.

<b>PFC1 Feature Summary</b>	
<b>Line connection</b>	To the three phases only (no neutral connection) of the 3x400 VAC line
<b>Current detection</b>	By standard 5 A secondary current transformer (CT)
<b>Controller activation limit</b>	0.5 A in the CT secondary (10 % of CT range) ensures reliable, robust and noise-free controller operation
<b>Three-step output system</b>	Switches the compensating capacitor banks progressively in and out of the line at every measured sample
<b>Dual type galvanically isolated outputs</b>	Directly drive solid state relays (SSR) and/or higher voltage loads such as contactors. The SSRs can be driven directly by the 24 VDC outputs while contactors are controlled via the PFC1 isolated contact outputs
<b>Measurement time</b>	DIP switch selectable averaging/sampling time of 1, 2, 3 and 5 seconds
<b>Initial output state</b>	DIP switch selectable at controller activation until the first measurement is ready to immediately compensate known loads
<b>DIP switch changes</b>	Immediately effective at the next controller activation
<b>Four LED display</b>	Simple and intuitive display indicates the measured power factor and controller status
<b>Comprehensive error handling</b>	Handles reverse current transformer connection, out-of-range line frequency (valid range is 45 - 66 Hz) and line faults. Outputs are deactivated during a fault and the error clears after its cause is removed.
<b>CT phase error compensation</b>	The phase error introduced by the current transformer is compensated by a programmable amount.
<b>Capacitor bank time-out protection</b>	Time-out after deactivation allows proper capacitor discharging before next switch-in.
<b>Protection</b>	Line inputs are protected against line overvoltages and faults. 24 VDC outputs are protected against over-voltages and are current-limited.
<b>Enclosure</b>	DIN rail mountable plastic enclosure, 157x90x58 mm.



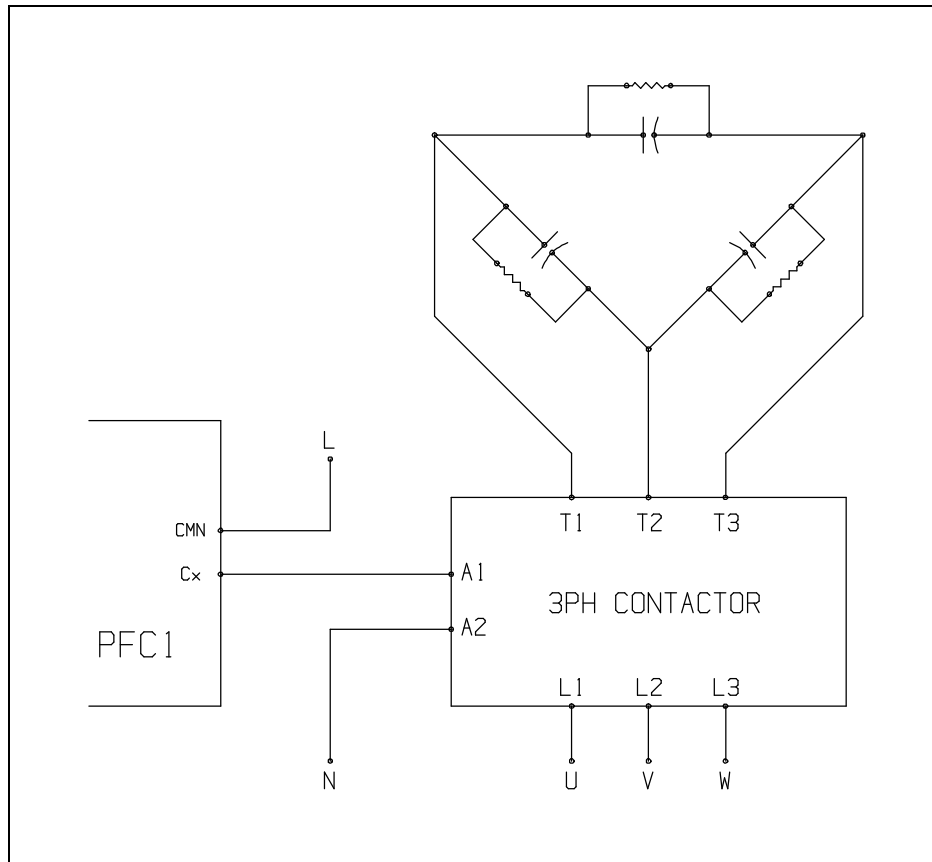
Typical power factor correction PFC1 system. Only one capacitor bank is shown for clarity. The bank switch can either be a set of three solid state switches or a relay contactor.

Each PFC1 24 VDC output is current-limited by 210 Ohms of resistance and protected against overvoltages and reverse inductive current. It can typically drive three SSRs (one at each phase) connected in series with 20 mA control current.



Typical solid state relay bank switch connection. Each SSR is driven with 8 VDC and must be of the zero-crossing (or line synchronized) type. This ensures that the capacitors are switched in when the line voltage equals the capacitor voltage thus eliminating capacitor inrush current and extending capacitor service life. The capacitor discharging resistors are for safety only and can be any suitable value giving minimum heat dissipation while connected to the line.

The PFC1 contact outputs are common-connected, normally-open, potential-free types and can switch up to 4 A loads at 240 VAC.



Typical contactor bank switch connection. The control voltage live (typically 230 VAC) is switched to activate the contactor coil. The contactor must be of special two stage design limiting capacitor inrush current at bank switch in. The capacitor discharge resistors can be sized to optimally bring down the capacitor voltage before a possible bank switch-in (within the DIP selectable capacitor protection time-out) minimizing average capacitor inrush current.

Ordering Information	
Model	Description
PFC1	Fast Power Factor Controller

Supplied by