PowerGuard CPM-3PC Mk 2 - INSTALLATION

The PowerGuard CPM-3PC Mk 2 is a maximum demand controller designed to control loads where either not enough power is available or where kVA needs to be reduced in order to save on electricity bills. Design criteria called for ease of installation and high build integrity. This is a certified South African designed and manufactured product.

This single enclosure houses power supplies, communication modem, display, control selection as well as all the required external connector terminals.

INPUT

Load information is accessed from standard current transformer outputs covering the point of entry serving the area to be controlled.

CONTROL

Current or kVA based control can be selected to regulate demand. For customers with insufficient supply, current based phase selective sheds ensure that only the transgressing overloaded phase responds to shed signals. The number of shed signals per half hour are recorded to assist with fine tuning shed levels while line current graphs aid with phase balancing.

PROGRAMMING

All the variables associated with creating a shed instruction can be set up either on rotary numerical switches or slide selector switches. This enables all shed criteria to be viewed without the need for laptops or specialised software.

DISPLAY

An on-board LCD display shows the real time line currents and total kVA. LEDs indicate processor heartbeat, phase conscious shed requests, line quality of shed signals and total shed demand.

SPECIFICATIONS

- Current transformer ratio adjustable from 1- to 9 999 Amps. Secondary output is 1 Amp into 1 Ohm burden for full scale
- Supply from standard 3-phase 230 Volt AC, <20 Watts
- Shed level is adjustable from 1 to 9 999 Amps or kVA
- Two closing contact inputs are available to reduce ''time of use'' sensitive accounts from 1 to 99% of selected shed level
- Single contact closure for total progressive shed/restoration of all loads, eg. air conditioners after hours
- Shed interval delay adjustable from 4 to 99 seconds
- Switch selectable shed criteria for Amps or kVA
- Two user specific selections for custom software
- 1 to 31 kVA backlash adjustment
- Screwdriver adjustable current simulation with phase selection for testing
- Remote control via cellular networks
- Clear cover to observe load, total kVA, shed activity and shed criteria
- Housing dimensions are 380H x 280W x 135H mm, Weight is 3,8 Kg
- On board GPRS modem for remote internet-based monitoring of phase currents, kVA, shed request profile, shed active report and average phase voltage

INSTALLATION

Attach the four fixing brackets to the rear of the enclosure with the screws provided and attach the unit to a wall or sturdy structure before wiring. Drill or punch holes for glands as well as a hole for the aerial in the bottom of the enclosure. Route the aerial through the hole and secure to modem in the top right hand corner of the enclosure. Wet the suction cup on the aerial and fix vertically as high as possible on a smooth surface.

WIRING

Refer to the attached diagram and identify the terminal block at the bottom of the page.

1 & 2: A timer with potential-free contacts can be employed to, for example, switch off all air conditioners when premises are not occupied. Power off as well as power on for these loads will be progressive in order to avoid spikes to the supply.

3, 4 &5: These terminals feed the communication loop that controls all receivers. The balanced signal means that the S1 and S2 connections are not polarity conscious.

6, 7, 8, 9, & 10: Connect a secure 3 – phase 230 V ac line to these terminals observing the earth, neutral and line orientation on the diagram. Use an earth leakage free supply, protected by a 5 Amp 3 – phase circuit breaker.

11, 12, 13, 14, 15 & 16: Connect current transformers individually to these terminals, observing the relevant phase relationship on the diagram. Do not ‘’star’’ or earth any of these connections and secure outputs with isolator and 5 Amp fuses or circuit breakers.

17, 18 & 19, 20: Timers with potential-free contacts can be used to modify shed levels for time of use customers. Again, activation will ensure progressive changes in load to avoid spikes.

PROGRAMMING

Refer to the attached diagram and identify the following control switches and potentiometers.

CT RATIO: Set this value to display the ratio number for the 1 Amp output current of the current transformers to be used. Verify correct display on the L.C.D. screen at the top of the unit by comparing clamp meter readings. Variations in these readings can be calibrated as explained in the next section.

SHED LEVEL: The required shed level in either Amps (for customers with marginalised supply) or kVA, for customer with sufficient supply that require demand reductions, can be set with the four rotary switches from 1 to 9999. Selecting demand or current is selected on the 8-way dip-switch below.

% T.O.U. REDUCTION, ZONE 1 / ZONE 2: These switches can be set to reduce the shed level by 1 to 99% of the level as set above during closure of contacts on terminal block 17/18 and 19/20. Customers with time of use (TOU) sensitive accounts can optimise shed profiles by employing this feature.

NO SHED INTERVAL: The minimum time between shed instructions of 4 seconds (00) to 99 seconds can be programmed with these switches. This period depends on the number of loads, typically air conditioners, odds, shed period and lock-out period set on the receivers. Optimal setting improves the concentration of sheds across the shed cycle.

8-WAY DIP SWITCH: 1 = Shed selection based on current in Amps per phase or total kVA. Installations with insufficient power will normally use Amps or current mode as shed instructions will be generated according to the transgressing phase. Receivers can then be set to respond phase consciously to shed instructions. General demand reduction where the customer has sufficient power can benefit from the kVA setting as this produces better random shedding patterns. 2 & 3 = these two switches are reserved for clients that require specialised algorithms for a specialised environment. 4 to 8 = Backlash adjustment according to the average load in kVA to be shed. Optimising this value results in more efficient load restoration following shed instructions.

CALIBRATION

SET V: Measure the three phase voltages, add them and divide by three in order to obtain the average voltage. Compare this value to the displayed Vav: value in the bottom right hand corner of the L.C.D. display and optimise by turning the multi turn trimming potentiometer as required. This value is transmitted via the modem to aid in remote identification of supply voltage transgressions as well as loss of phase.

R, W & B: These potentiometers can be adjusted to correct discrepancies in current transformers by comparing the readings on the top row of the L.C.D. display to clamp-meter measurements.

TEST AND SIMULATION

After setting the CT ratio as well as required shed levels, phase specific current can be simulated by selecting only one phase at a time on the P4 / TEST. Rotating P4 will then simulate and display current as well as extrapolated kVA on the L.C.D. screen and generate shed instructions as required. NB! Remember to de-select this function with the shorting link to the left hand side before normal operation is required.

DISPLAYS

L.E.D. DISPLAYS

HB led. = "Heart Beat" indicates a healthy processor if a 1 second duty cycle is observed.

RED, YELLOW & BLUE led. = shed requests for a specific phase.

SHED led. = Orange colour (red and green together) indicates a healthy balanced shed signal generated.

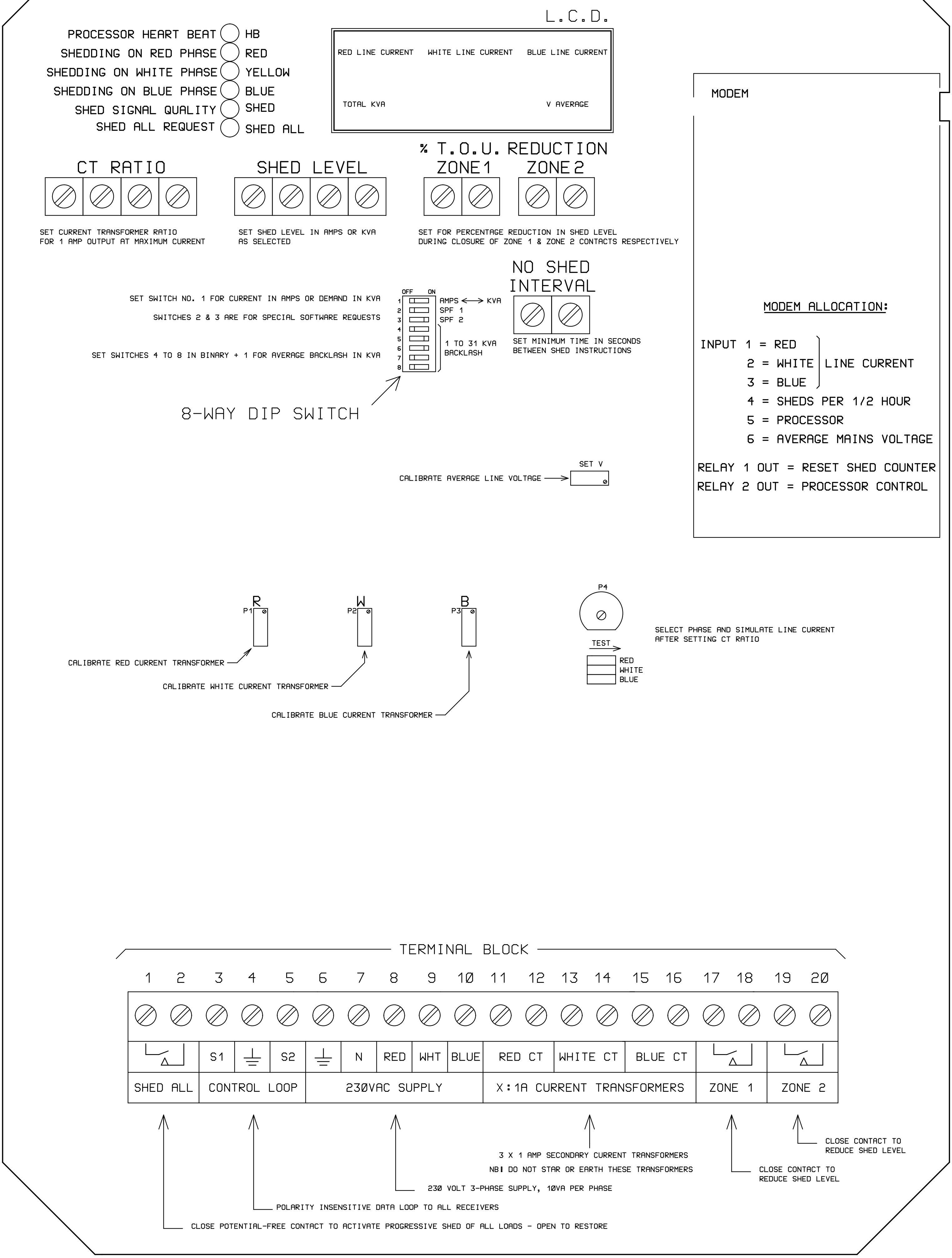
SHED ALL led. = Shed All request by shorting terminals 1 & 2 on the terminal block.

Modem = Red led. Flashing at a rate of approximately 3 seconds indicates a healthy modem with access to a network. Permanently on or rapid flashing indicates problem with connection. SMS #7050T to the modem in order to receive signal strength value and #7050V for air time report.

LCD DISPLAY

The top row shows the red, white and blue current values in Amps. Bottom left indicates total kVA. Bottom right shows average phase voltage. A flashing Vav: indicates power restoration during the preceding 35 minutes. This information is also transmitted via modem to indicate power interruptions.

PowerGuard CPM-3PCMK2



PowerGuard CPM30-1W

INSTALLATION

Remove the lid of the unit and securely fit upright against a panel or wall with Fischer or normal 4mM screws. The 4,5mM mounting holes are accessible through the rectangular apertures on the four corners of the enclosure. Drill or punch 20mM holes at the bottom of the enclosure to accommodate glands as required for wiring.

SET UP INSTRUCTIONS

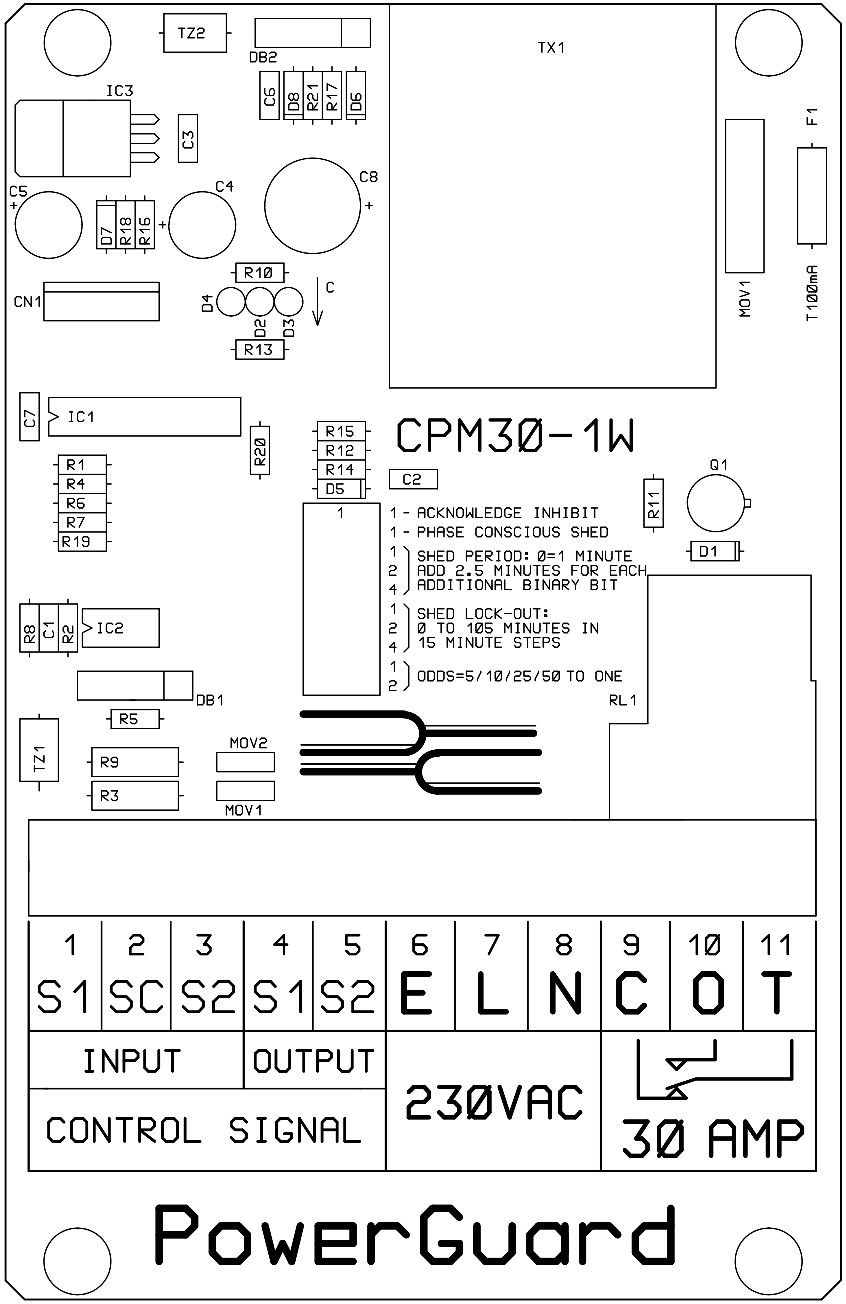
After powering up the system, **SW1** active will inhibit its load when overall demand falls within the backlash range selected on the shed controller. This feature falls away when the backlash transgression restores and only activates again after a power interruption. This feature is essential for customers with a compromised electrical supply.

SW2 active responds to phase conscious shed requests, again essential for customers with a compromised supply. Customers with adequate supply will realise an improved random shed pattern with **SW2** off.

SW3, 4 & 5 set the minimum shed period following a shed request. With these switches off, the period is 1 minute and increases by 2,5 minutes for each additional binary bit added. Total shed period is as follows: SW3=3,5; SW4=6; SW3+4=8,5; SW5=11; SW3+5=13,5; SW4+5=16 and SW3+4+5=18,5 minutes.

SW6, 7 & 8 control the minimum time between accepting shed requests. These switches together with switches 3,4&5 are essential for air conditioner control to ensure that the occupant's comfort levels are not compromised. With SW6,7&8 off, there is no lock-out interval. SW6=15; SW7=30; SW6+7=45; SW8=60; SW6+8=75; SW7+8= 90 and SW6+7+8=105 minutes.

SW9 & 10 decide on how many CPM30-1W receivers, on average, should respond to a shed request. For example, if 100 receivers are installed, all set to odds = 50, then approximately 2 units will shed for each shed request. With a total of 10 units, all set to odds = 10, approximately 1 unit will shed for each shed request. Odds are manipulated such that a recently shed unit will revert to maximum odds to allow other units to shed before it responds to the next shed request. With both SW9&10 off, odds= 5; SW9= 10; SW10= 25 and SW9&10= 50. Odds can be decreased within a control grid to favour higher priority loads or can be increased to protect lower priority loads.



TERMINAL ASSIGNMENT

1 = S1
2 = SCREEN
3 = S2

INCOMING CONTROL SIGNAL

Connect S1 & S2 to the control signal cable from the Demand Controller with the screen to terminal 2. This terminal is internally connected to earth. S1 & S2 are not polarity conscious

4 = S1
5 = S2

OUTGOING CONTROL SIGNAL

Terminals 4 & 5 connect to the outgoing control cable. These connections are not polarity conscious

6 = EARTH
7 = LINE
8 = NEUTRAL

POWER

Connect EARTH to pin 6, 230 Volt LINE to 7 and NEUTRAL to pin 8. Use the same line phase as that of the load to be controlled

9 = CLOSED
10 = OPEN
11 = COMMON

RELAY

The relay is ENERGISED to OPERATE the load. Normally CLOSED contacts on terminals 9 & 11, Normally OPEN contacts on terminals 10 & 11,