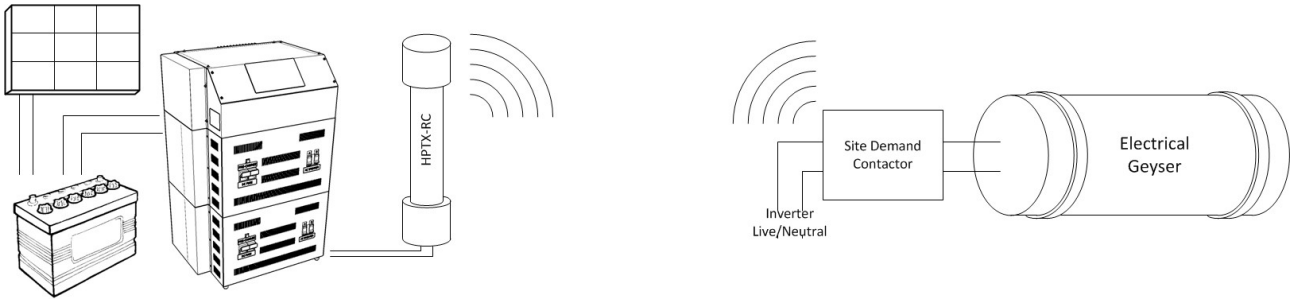
Demand Site Management (Load Shedding) using MLT PowerStar Inverters

The PowerStar has a feature, called Smart Load (discussed in the MPC-User Manual, Section 7). This is a three priority level programmable load-shedding system, allowing you to connect/disconnect certain loads based on the current state of charge of your batteries.
This allows you to, for example, turn on a water pump when your batteries are full and you have access power, or turn off your geyser/aircon when your batteries are half-full, and you want use your remaining battery power in the most economical way.
The only snag was that the Smart Load contactors had to be connected to the inverter via a control wire. But if we use wireless transmitters and receivers we can place the contactors anywhere within receiving distance and remotely shed loads.

Below is an example of a Electrical Geyser that can be remotely shed depending on the battery capacity left:



With the Solar panel charging the batteries, when the batteries, are above 2.1 volts per cell (VPC), or 90% full, then the geyser is turned on, heating the water. When the battery voltage then drops to below 1.97 VPC, the geyser will be switched off to conserve power.

Bill of Materials

For each individual Smart Load, the following is required:

1x ET Systems RX3-RC

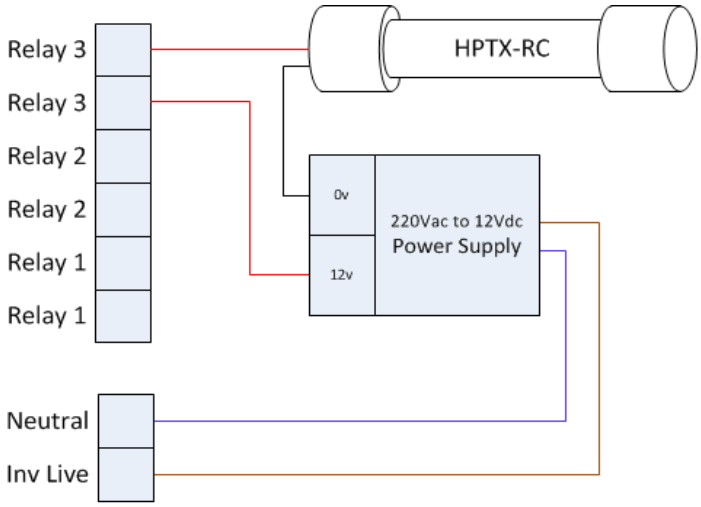
1x ET Systems HPTX-RC High Power Transmitter

2x 220Vac to 12Vdc Power Supplies (example: Meanwell RS-15-12)

1x 220Vac coil Contactor if load is more than 3A (example: ES110 25A Contactor from Electro Mechanica)

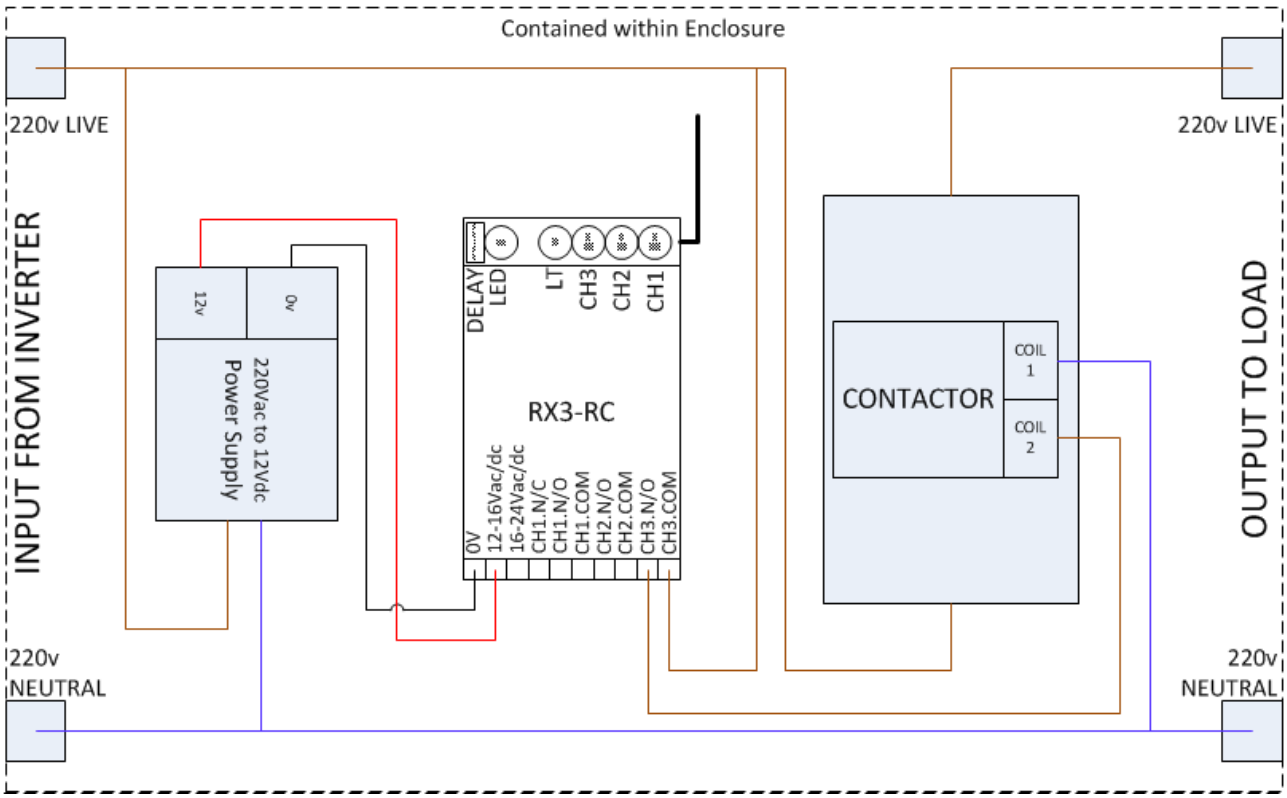
2x Enclosures for above

HPTX-RC Wiring Diagram



The HPTX-RC transmitter automatically starts transmitting when it is powered up. If we wire it via one of the PowerStar's multipurpose programmable relays, we allow the PowerStar control over the programmed RX3-3C's relay modules.
Multiple transmitter's wired to Relay 1, Relay 2 and even Relay 3 allow for up to three independent Smart Load controls.

RX3-3C Wiring Diagram



This wiring diagram above illustrates how to wire a contactor to the RX3-RC receiver to allow the PowerStar to remotely turn-on/off loads using the Smart Load feature. This should be mounted into a small housing to allow easy in-place wiring. Remember to use the correct normally open/normally closed contactor/relay combination to achieve the desired effect when the Smart Load relay opens or closes.

If more than one transmitter is connected to the PowerStar inverter, multiple contactors, each wired through one of the receiver channels can be used.

Note that if the load is less that 3A, a contactor is not needed and the load can be connected directly through the relay.

Programming the PowerStar inverter Smart Loads

Please consult the PowerStar manual, section 7, where this is discussed in detail.

Programming the RX3-RC Receiver

1. Place a jumper across the PROG pins of the HPTX transmitter.
2. While pressing the required channel button on the RX3-RC, power the HPTX transmitter. Wait for receiver LED to flash.
3. Power down the HPTX transmitter, and remove the PROG bridge. Test the RF receiver by powering up the HPTX transmitter and either listening for the relay click or by measuring with a multimeter.

Setup instructions for Geyser example

1. Wire the transmitter and receiver as per above wiring diagrams with the geyser on the output.
2. Program the receiver as per manufacturer's instructions or the above, if using the RX3-RC receiver.
3. Enter the PowerStar Smart Load setup by selecting MENU → SYSTEM CONFIG/SETUP → SYSTEM SETUP → (Enter Password) → RELAY OPTIONS.
4. Change SP140 AUX RELAY 3 FUNC to SL0. This defines that the transmitter must be turned on when the relay closes.
5. Change SP141 NO. OF SMARTLOADS to 1.
6. The Smart Load VPC settings (SP145 and SP146) can be further fine-tuned according to current systems needs, but the default values of 2.1VPC and 1.97VPC for increasing/decreasing the smart load should be sufficient for this example.
7. If you have a battery voltage above 2.1VPC, the Geyser will turn on, until 1.97VPC is reached, at which point the Geyser will turn off.

Troubleshooting

Q: My contactor opens when I want it to close and closes when I want it to open.

A: If you are using a Normally Closed (N/C) relay on the receiver, switch to using a (N/O) relay, and the reverse also applies.

Q: I know the transmitter is sending, but nothing is happening.

A: Ensure that the receiver and transmitter is paired correctly. Otherwise check that your receiver is not out of transmission range, and has a relatively clear line-of-sight.

List of Manufacturers/Suppliers

Meanwell RS-15-12
Mantech Electronics (www.mantech.co.za, Cape: +27 21 535 3150, Gauteng: +27 11 493 9307)

Contactors and Enclosures
Electromechanica (www.em.co.za, Cape: +27 21 529 7000, Gauteng: +27 11 249 5000)

ET Systems RX3-RC and ET Systems HPTX-RC High Power Transmitter
ET Systems (www.et.co.za, Cape: +27 21 448 6774, Gauteng: +27 12 657 0439)