## Hanging Baskets overview

The 7 no. "hanging basket" systems use Sealey PH250 power hoists. The original winch safety systems, approved to EU and UK lifting gear regulations, have been left intact. The approach was to replace the manual handset with a new control system, but to leave the original limit switch system unmodified.

The original rocker switch connections on the handset have been replaced by a pair of high current (25A) contactors. These are controlled by relays that have a hardwired interlock, meaning that UP and DOWN cannot be activated simultaneously.

On startup the system retracts the winches, until the stopper on the steel rope reaches the limit switch lever and cuts the power to the motor. A current detecting sensor then detects that the motor has stopped, concluding that the basket is now at its highest position. If the current detecting sensor doesn't detect the motor switching off after 17 seconds, the system switches off all motors and enters a fault mode.

From here the choreographed sequences can run, never descending for longer than 15 seconds, so that the baskets are kept out of the public's reach.

Note that the motor speed differs depending on direction, and so periodic re-homing is required to correct positional drift.

The main control box uses 24V signals to control the contactors for each winch, and the winch returns a 24V signal from the current detecting relay. The 24V signals are connected to an 8 channel opto isolation buffer board in the main control box, which then converts the signals to 3.3V for the Teensy pins.

## Maintenance

Periodically check the steel rope for signs of damage or fraying, check the ferrules and thimbles for signs of damage, check that the winch mounting bracket bolts are tight, check that the electrical cables aren't in the way of any moving parts.

Check that the limit switch lever is firmly pressing the limit switch plunger.

Checks should be carried out daily until confident there has been no change. Checks to then be carried out weekly, including a close up inspection via a scissor lift.

## Rotary switch modes

0: Run normal routine
1-7: Manual control of individual winches 1 to 7. Press button 1 on the control box PCB for UP, button 2 for DOWN.
7-15: Unused

**Things to watch out for**

Never command the winch to change direction without a minimum one second pause. If the winch reverses direction without a pause, the massive current spike will likely weld the contactor contacts together, allowing both UP and DOWN motor coils to be activated simultaneously, likely causing catastrophic failure of the motor.

Duty cycle: The winches should never be used for more than four minutes at a time. Any period of use should be followed by a similar period with the hoist at rest.

If a winch is ever replaced, be sure to check the position of the cam profile component that presses the limit switch plunger. This component is adjustable and needs checking, as it might not arrive properly calibrated from the factory. During testing there was a limit switch failure due to a poorly set cam position. All lever cam components were then inspected, adjusted, and glued in place with epoxy. It is essential that this process is carried out on any replacement winches.

Note that if a current sensor unit is ever replaced, the 230V cable must be wrapped through the sensor coil twice, so that there's enough measurable current.

**Troubleshooting**

Check serial output for diagnostic clues.

There are 16A circuit breakers in the black box connected to each winch. The winch won't move if these have tripped.

**Notable components**

Sealey PH250 winch
Finder 22.32.0.024.1320 contactor, Rapid Electronics part number 03-3524
TruComponents 656591 current monitoring relay, Rapid Electronics part number 65-6591
Schneider EZ9F66116 16A Type C circuit breaker, electricaldiscountedsupplies.com
8 channel opto isolation board, generic
Sensor cables, RS Components part number 877-1104

The large capacitor next to the contactors is from the original winch handset.

Sealey supply spare parts for the winches.

**Colours**

N/A