JouKo Thermal Management with long lifecycle applications

The JouKo devices have three Hongfa power relays with a specified contact resistance of 50 milliohms .

During our laboratory tests the contact resistance was of the order 10 milliohms and the temperature rise inside the enclosure was +15 C at 75% of the maximum specified AC output power.

When the relays are new the temperature rise inside the enclosure is then not a problem. We had 2 * 24 pieces of 3.5 mm ventilation holes at the upper half of the enclosure.

If You switch e.g. 30 times a year, the relays should keep their low contact resistance characteristics until the end of the lifetime of the device.

However, if the OFF-ON switching events achieve 750 during the lifetime, a blower must be added to JouKo to keep the internal temperature low enough. The contact resistances of the power relays would increase when they age. The high temperature following from this would decrease the MTBF of the device.

The blower (fan) should conveniently be of a 12 V DC type and be connected to the +12V line, across the 10000 uF electrolytic capacitor.

The fan should be controlled (on/off) e.g. by a bimetal thermal switch that is normally open. When the switch achieves +60 C, it closes and the fan gets power.

A good fan candidate is the CFM-8025V-132-330 from CUI Inc. It uses 12 V DC and consumes 1.5 W.

The size of this fan is 80 * 80 * 25 mm. It can be attached to the outside of the JouKo enclosure, with the air flow axis pointing to the middle power relay. The fan costs 3 Euros in quantities of 100. An added plastics net should prevent touching the moving parts.

The fan can be controlled by a bimetal temperature switch. One candidate is the ELECAPITAL KSD9700 , version +60 C. The switch is normally open. When the temperature of the switch achieves +60 C the switch closes and the fan gets 12 V supply voltage. The price of this switch is 0.45 Euros a piece in small quantities. The source of the switches is e.g. aliexpress.com.

The temperature switching (and fan on) event is then probable only after the power relays have themselves switched over 750 times during their lifetime.