

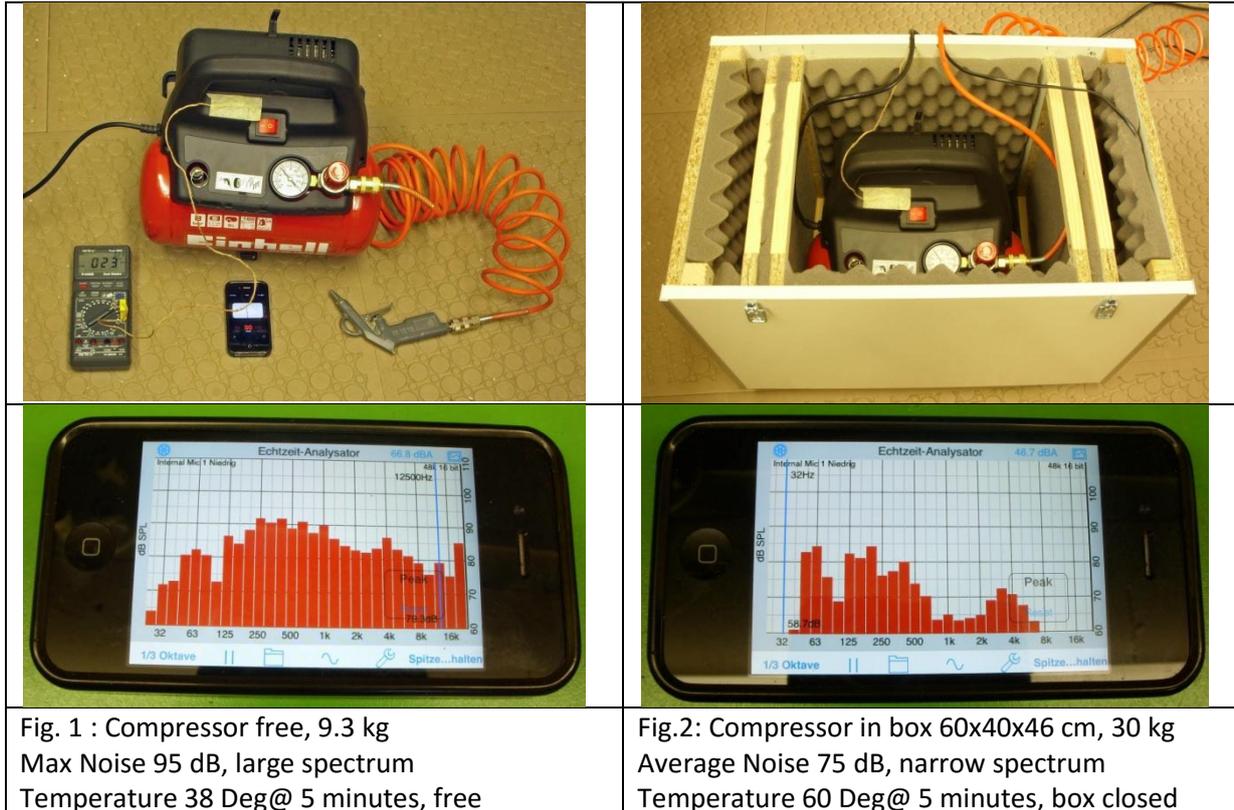
PAN, March 28th, 2016

### 1. Introduction

An Air Compressor is useful for many application, e.g. for a SMD solder dispenser.

However, small low-cost compressors are very noisy and will incommode the inhabitance.

We have here the compressor Einhell TH-AC 190/6 OF, generating a horrible noise of 95 dB over a broad spectrum, see Fig.1. A box of chipboard, lined with pinched foam rubber and mineral wood plates reduces the noise down to an acceptable level, see Fig. 2.



- The average noise could be reduced by about 15 dB, especially at 500 Hz < f < 3 kHz
- There is a minor noise amplification at 50-60 Hz; a Helmholtz Resonator effect?
- Acoustic experiments with noise attenuator material requires a spectrum analysis, e.g. by a RTA app. A peak dB meter does not show the improvements. The subjective heard noise should be assessed by the inhabitants (people and pets); the final noise can be compared to a Mercedes car.
- URGENTLY required is a ventilator of at least 10 W power. The present Einhell compressor has a built-in ventilator for the motor, but without additional ventilation the temperature will increase to 82 deg C (Celsius) within 6 minutes in a closed box, even with large air holes!
- For fail save operation the silencer is equipped with two thermostats, see chapter 5.

### 2. Silencer Material

- Pinched foam rubber is a good first approach to reduce the noise, mineral wood type 3 is better; however, the material is fibrous and litters fibers if not protected. A good compromise is to cover the top plate with mineral wood, protected by foam rubber and to cover the bottom plate with mineral wood, protected by a shock absorber plate.

### 3. Silencer with air flow principle

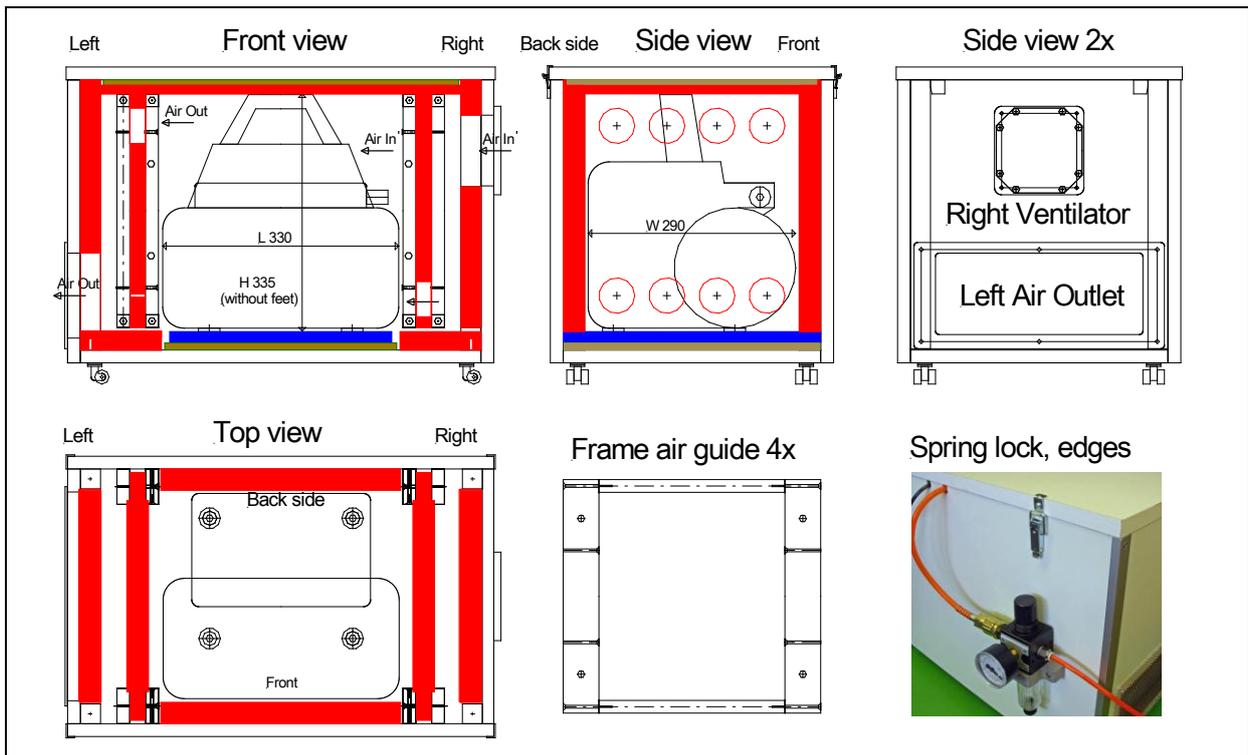


Fig. 3: Silencer overview with air flow

Silencer Materials: Red: pinched foam rubber, Blue: vibration damper, Green: mineral wood

The top plate overlaps at all four sides the box by 2 mm and the edges of the box are protected by Alu-L-profiles. The spring lock hook was bent at the top for better force distribution at the top plate.

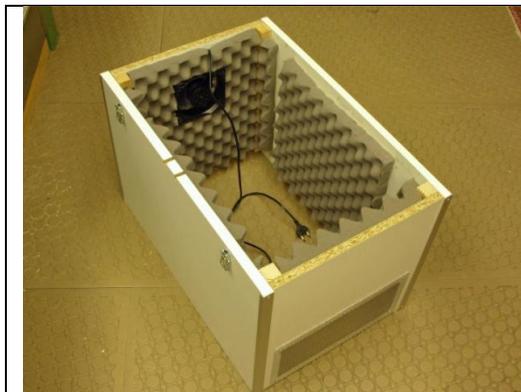


Fig.4 : Box with ventilator, air guide not mounted yet



Fig. 5: Air guide frames, with pinched foam rubber and holes of 50 mm diameter

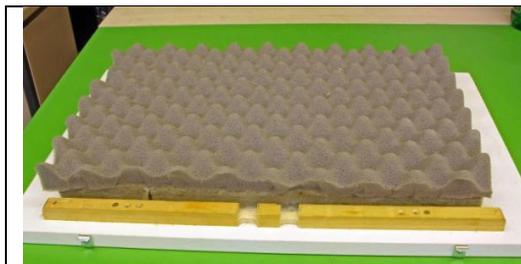


Fig. 6: Top plate with mineral wood and pinched foam rubber as protection



Fig. 7: Bottom plate with mineral wood and shock absorber plate above

#### 4. Drawing and bill of material to be ordered by a DIY store

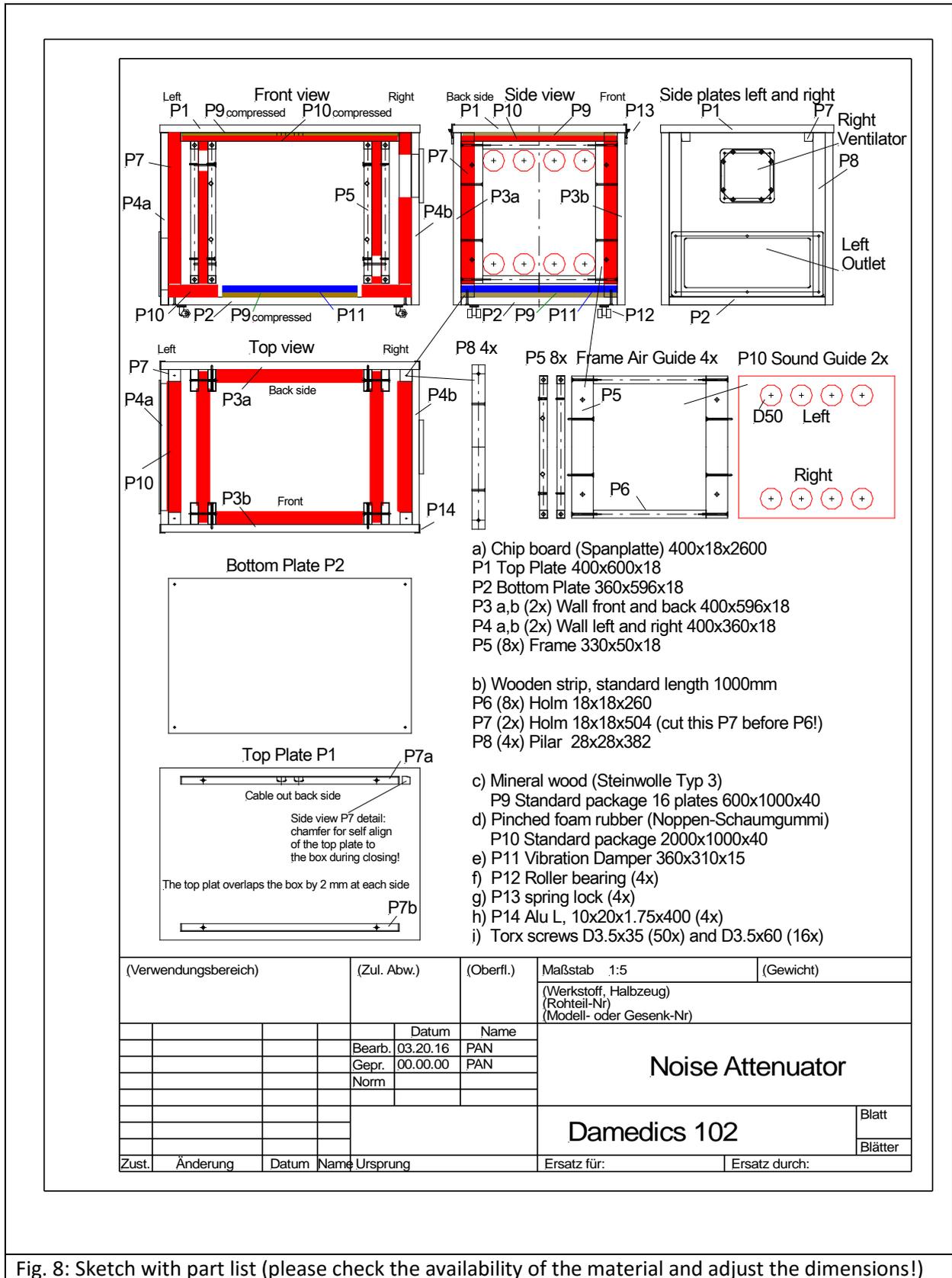


Fig. 8: Sketch with part list (please check the availability of the material and adjust the dimensions!)

Advice: After screwing on item together with another item, indicate these two items by a successive numbers (see Fig. 5). Assembly after a temporary demounting will be much easier!

## 5. Temperature control by thermostats

The allowable max temperature of the Einhell TH-AC 190/6 OF is specified to 120 °C.

A standard multiple pin strip was equipped with two Elmwood thermostats:

2455R-100-78 for Ventilator on/off at 50/35 °C and 2455R-100-75 for compressor off/on at 80/65 °C



Fig. 9: Test of the temperature stability of the multiple pin strip at boiling water (100 °C) : ok (A test with a PVC case failed, as expected!)



Fig. 10: Pneumatic tube assembly and leakage test by soap water. Teflon tape on threads. A small leakage was detected by soap water!

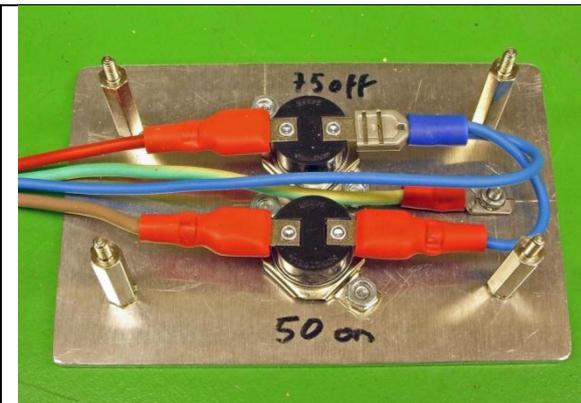


Fig. 11: Thermostats on Aluminum plate  
IMPORTANT: Earth cable on Alu plate!

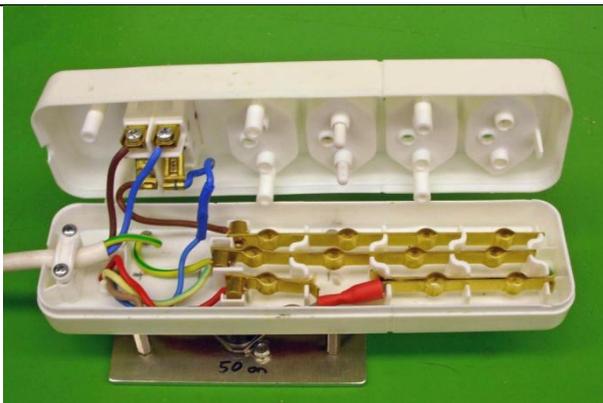


Fig. 12: Modified wiring of the pin strip.  
Left Pin: 80°C off, NC, 2x right pins 50 °C on

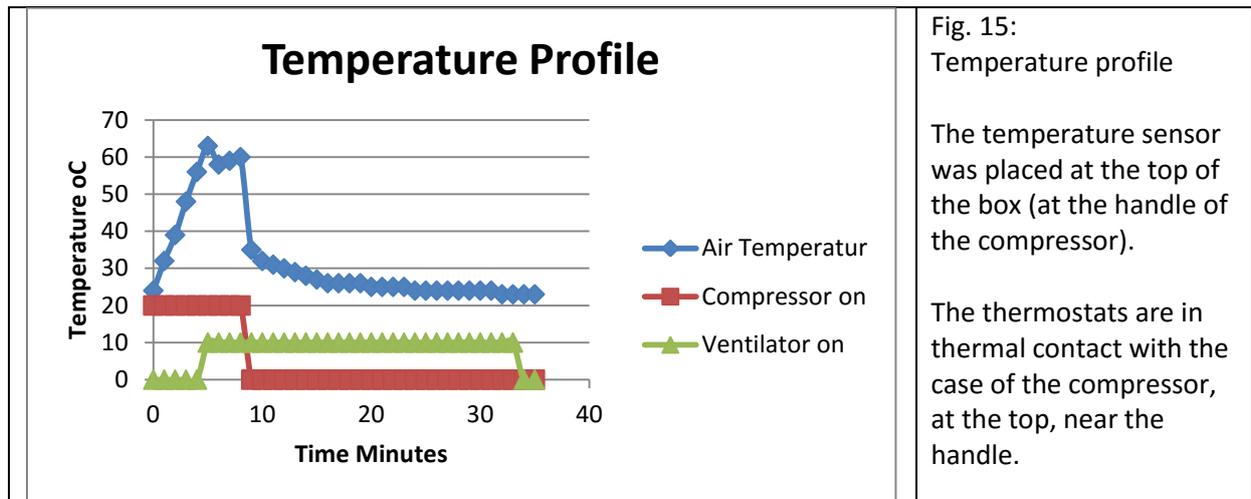


Fig. 13: Modified pin strip



Fig. 14: Installed pin strip with flat 230V plugs

## 6. Final Test and comments



### Conclusions

- The air temperature inside the box increases to 65 °C within 5 minutes without ventilation during permanent compressor run.
  - The case temperature of the compressor increases to 50 °C within 5 minutes.
  - With ventilation the ambient temperature drops to 29 °C and remains constant during running.
  - The recovery to 35 °C case temperature needs about 25 minutes after compressor stop.
  - The emergency compressor stop at case temperature 80 °C was not tested in practice. However, the thermostat was testate for its own and it turns off at 85 °C
- A minor mechanical problem is the screws for disassembling the pin strip: some modern pin strips are equipped with special screws, impossible to un-screw!  
Be patient; modify an old screw driver for this difficult operation!