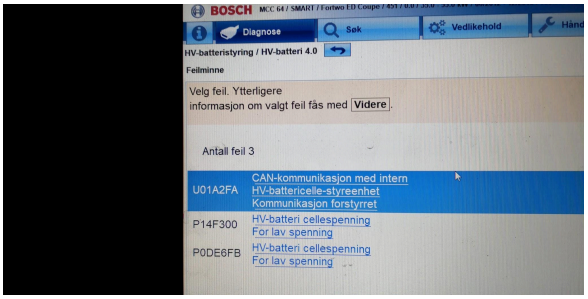
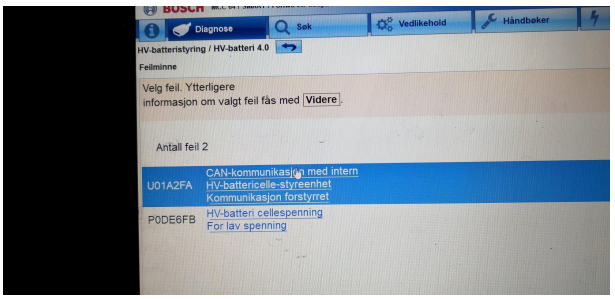
This is a description of how I got my battery working again after deep discharging my Smart 451 ED. See https://www.openvehicles.com/node/2498 for more details.

3 errorcodes was set. Only one could be deleted. U01A2FA and P0DE6FB became permanent. I did a code read out just before starting remove of HV-battery to ensure no P18051C was set right before 12V battery was disconnected just before HV-battery removal. At that point the lowest cell has fallen to 2,438V.




Battery is slightly smaller than the inner sides of rear wheels. Therefore the lifting stand must be adjusted wider than front wheels, (or use a two column lift.)

Removing the battery from the car is plain self-explaining mechanical work. But pay attention to the  BMS-controller connector. It has a locking knob on upside that must be depressed before the handle is pushed upwards.


Releasing the vent hose is done by pushing it inwards while the release-ring is pulled out before the hose and ring both are pulled out.


Battery weighs 176kg, so I placed it on pallets in a trailer before releasing the last screws in 4 corners. Then lifted car up, releasing battery and with the battery in the trailer I could move it around in the workshop.

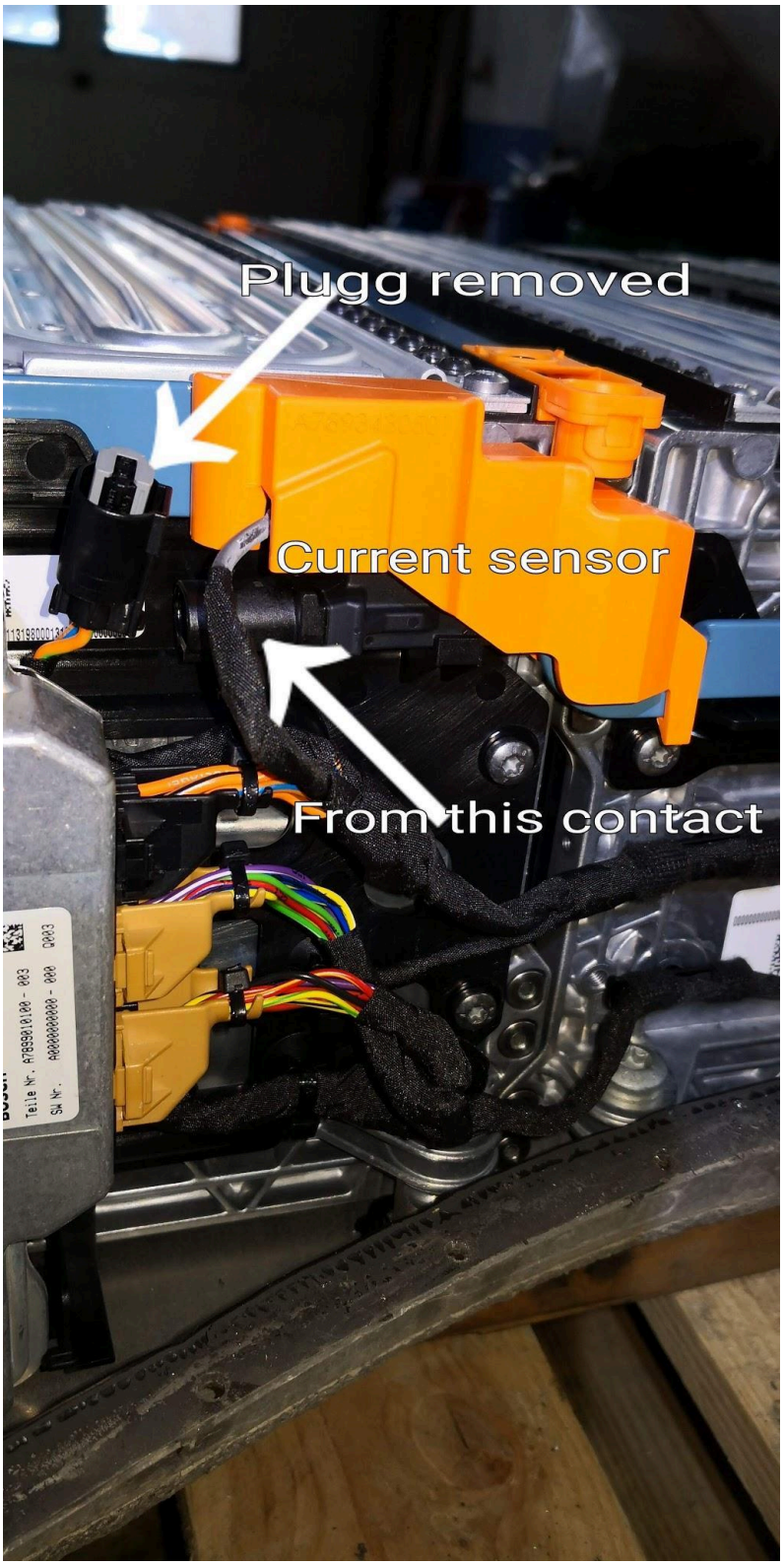
Removed all nuts under edge and drilled out rivets. Removed torx around connectors. PS! The vent hose connector must be removed by a unbrako key (at the right on this picture).

Cover is glued tight. I used a tiny chisel and a hammer all the way around. BUT PAY ATTENTION. BATTERY CELLS ARE CLOSE BEHIND, **SO DO NOT GO DEEP** !!!!

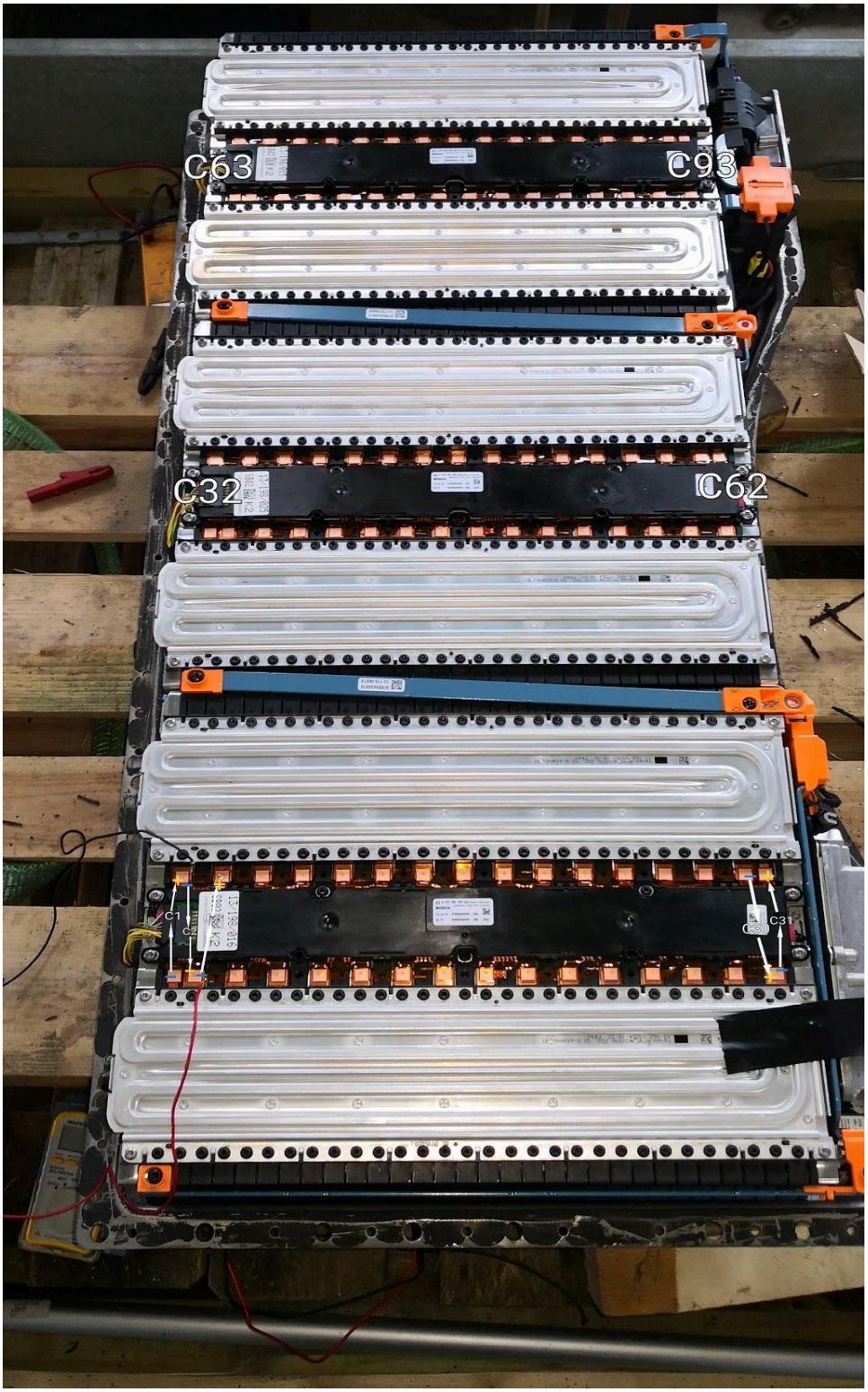

!!! **ATTENTION** !!!  UNDERNEATH THIS COVER THERE IS ABOVE 300V DC. THAT COULD **KILL YOU,** SO KEEP FINGERS AWAY FROM LEADING PARTS!!

AND DO NOT IN ANY CIRCUMSTANCES BRING METAL OBJECT OVER CELLS THAT CAN FALL DOWN SHORTEN THEM AND CAUSE MAJOR DAMAGE!!!

Before doing anything (charging cells/banks, removing BMS etc), the current sensor **must** be disconnected to prevent damaging it.

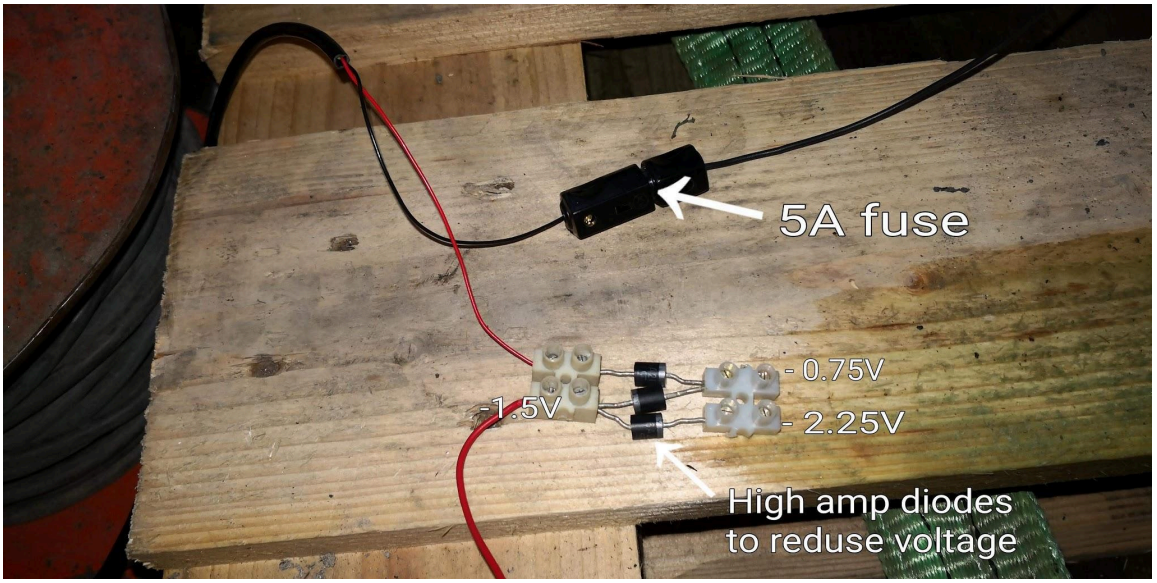


There is 3 banks of 31 cells, 93 in total. This picture shows their order, starting with C1 down left, and C93 top right. Notice how each cell is connected in ziczac between connection points. On the picture I’m charging cell 2:

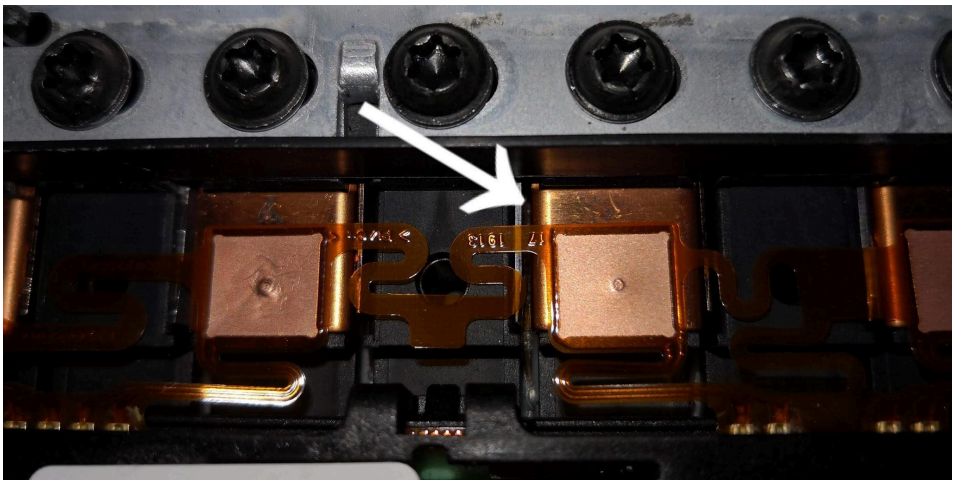


To charge one cell at a time, I simply used a 45W USB-C PD that also have a 5V USB connector capable of 2.4 Amps:

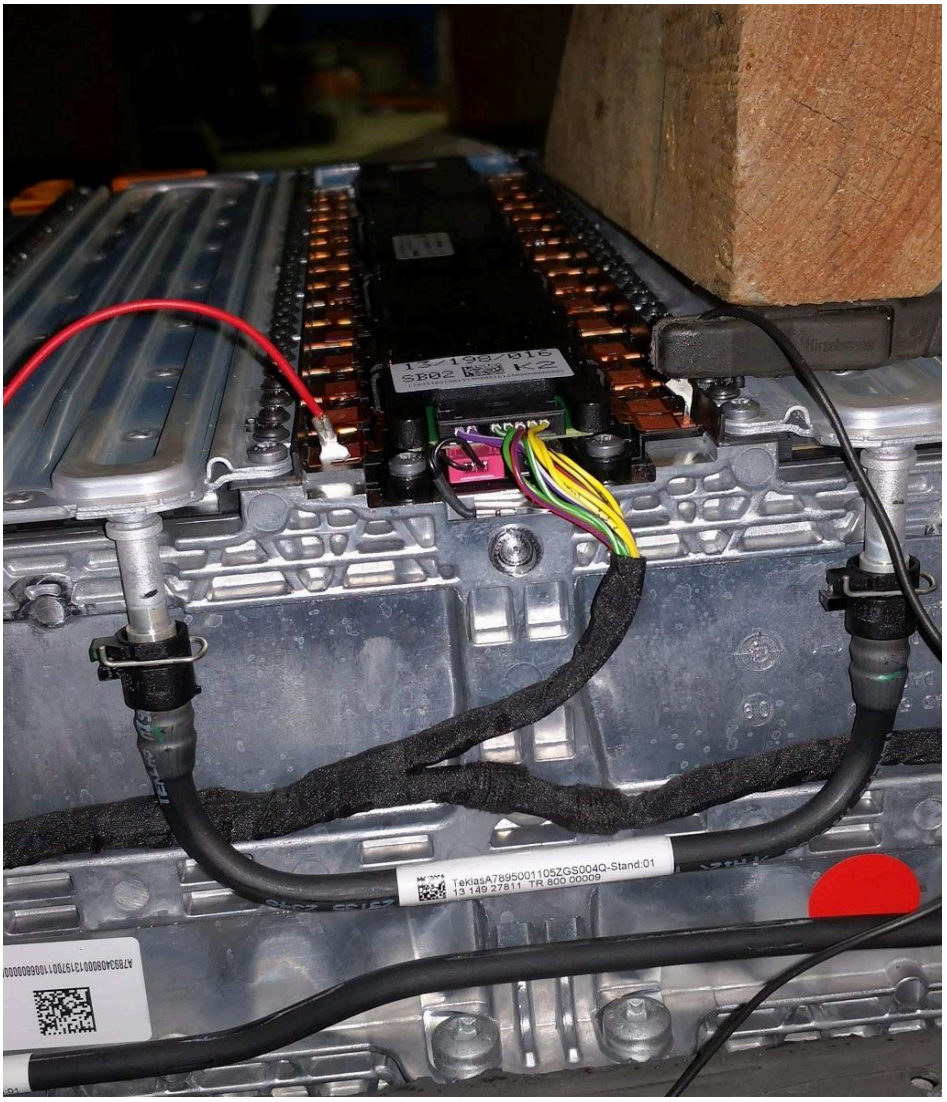

To reduce voltage from 5V down close to actual cell voltage, I put some high-amp diodes in series. By using 1,2 or 3 diodes the voltage can be adjusted as the cell voltage rises during charge. For safety I added a 5A fuse on the negative lead. Each cell took 1-2 hours to charge up to 3.3v. I was measuring amps, and when dropped below 2A, I removed one diode, to increase charging current again. Here the positive lead is connected with 2 diodes (5V-1,5V=3,5V):



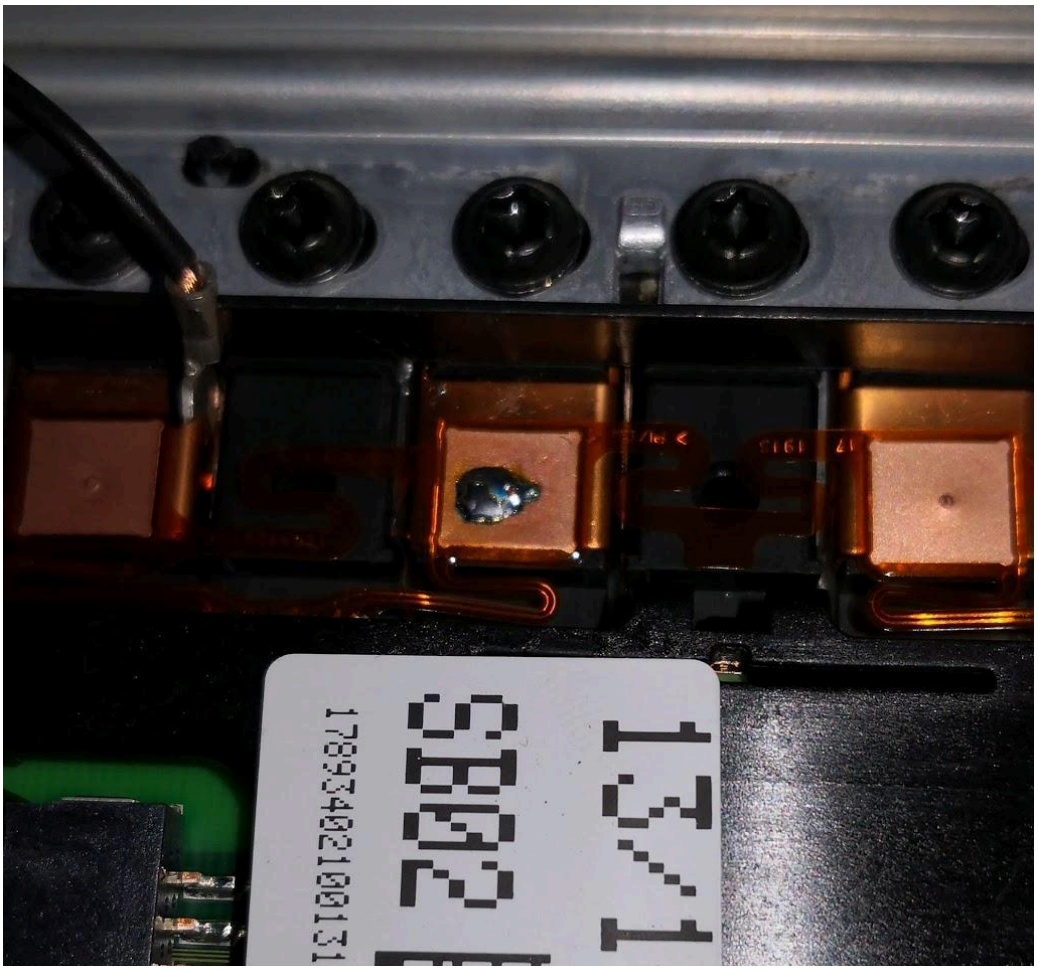
On the side of each connection point, there is a small gap where it is possible to press a suitable small connector into.



But on the outer cells, there is no gap, so I ended up with a clip with pressure from a piece of wood (Remember NO METAL OBJECTS….). (If I had more time I would have made something more elegant than this quick fix..)



Be aware of extremely fragile point weldings of the cell monitoring connectors. One of mine came loose, so I had to repair the connection by soldering it.



After all low cells were charged up to approx 3.35v and stayed above 3.3V for some hours, everything was put together and fitted to the car. And the two errorcodes went away by themselves so standard charging from 220V AC mains could be started directly afterwards.

NOTE: If you do not know how to use a multimeter, the difference between amps and volts, ohm's law, etc., then this is not a job for you. You need not only mechanical skills but also electric know-how. As you are going to charge cell by cell, the charger needs to be floating and no common ground connection at all.

AT LAST: Special thanks to GoSmart service in Ukraine. They answered my questions on WhatsApp right away through the whole weekend. Without their help I have been stuck in the process. Really good service :-)