1. DC Isolated Inverter

- Uses a transformer to provide DC isolation between PV & grid
- Power transistors most likely component to fail
- Often fail locked in the on-position

a) Boost Converter DC Isolation

\[ \text{Note: } V_b \geq V_{in} \text{ or } V_b \leq V_{in} \text{ or } V_b = -nV_{in} \]

Also, it can have multiple secondary outputs

b. AC H-Bridge Converter DC isolation

Working voltage can be low up to the transformer

Note: Controllers & sensing elements left out of the above drawings for simplicity
DOE 2003 presentation on PV Inverter needs

Data Sheets on 3 commercially available inverters
1. Aurora UNO-2.0-T and UNO-2.5-T = single phase inverters
2. Aurora ULTRA 700, 1050 and 1400 = 3-phase models “transformerless”
3. Omnik 1.5k-TL and 2.0k-TL = single phase?

Challenges with scale-up to PV commercial power plants
1. Inverter size: Fig 4.5 = 1.6MW inverter = over 20 tons
2. Inverter cooling: air or liquid cooling
   - Support infrastructures: heat exchangers, chillers, fans, ductwork/plumbing, etc.
3. Lightning protection
4. Surge protection
5. Facility security
6. Serviceability = PV arrays put out power whenever light shines on them
7. Electrically connecting large numbers (maybe 100ks) of PV modules into strings and arrays
8. Inverter sequencing
9. Inverter output waveform, purity and power factor
10. Islanding prevention

Show Fig 4.6 = Portugal 45.6MWp PV power plant
Figure 4.5 Scaling up: this 1.6 MW_inverter weighs over 20 tons (Padcon GmbH).

Figure 4.6 The Moura power plant in Portugal, rated at 45.6 MW_p, represents a big challenge for inverters as well as PV cells and modules (IEA-PVPS).