

Arguments against / for dual pole connectors

Contra:

- Reduced freedom for positioning of the connectors



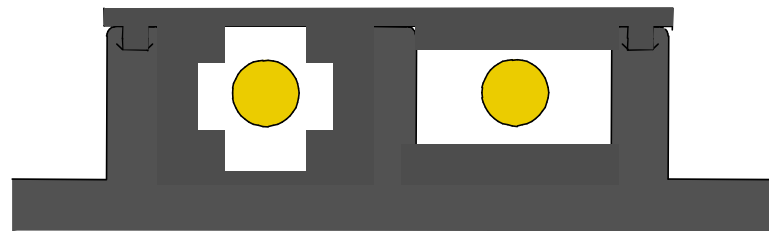
Pro:

- Smaller cost than two single poles, esp. if considering latches
- Faster connection / disconnection on vehicle assembly
- Much better safety, because of avoiding of a „hot“ free cable end after connecting first cable
- If a third contact for sensing the correct position of the contacts and/or for shut-off during connection process is to be used, this would also need a fourth contact with two single poles
- Is much better distinguished from conventional 12V batteries

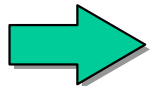
Which functions could we wish from battery terminals ?

- 1. Provide low impedance current path
- 2. Avoid crocodile clamp connection and other wrong connections
- 3. Latch connector
- 4. Avoid arcing
- 5. Provide information about installed battery:
 - coding for nominal capacity
 - coding for battery technology
- 6. Provide base information helpful for battery monitoring (battery temperature, voltage free of contact resistance, ...)
- 7. Provide information helpful for battery diagnosis

Proposal for terminal coding with lateral round pins



Plus-symbol taller than minus-symbol
Minus-symbol wider than plus-symbol



- **Polarity is easily recognized by + and - symbols**
- **Battery type (lead/acid, lithium,...) can be coded by length/width (proportions) of symbols**

What can be done with a third pole ?

1. If third pole only closes when connector is in the final position:
 - Can be used for assuring correct latching of the connector; i.e. current will only be switched on if connection is correct.
 - Can be used to switch off all loads before disconnecting (avoiding arcs)
2. A third pole could provide a current proportional to battery temperature, using state-of-the art temperature sensors
3. A third pole could provide an impedance or voltage coding for nominal capacity
4. If voltage at third pole would be proportional to a voltage at some internal cell connector, this could be used together with external battery voltage measurement to monitor cell behaviour, i.e. if a single cell becomes weak, this can be measured comparing the relation between the third pole voltage and main pole voltage

36V Battery Terminals

Proposal for third pole usage

1. Third contact closes last, opens first
2. First switch is open, no current: measure open circuit voltage at inter-cell connector; deduct nominal capacity from value
3. Switch closed: measure temperature
4. Switch open: measure inter-cell voltage for diagnosis

(may be a feature of only some batteries; others may just connect third pole to minus pole or omit the third pole completely)

