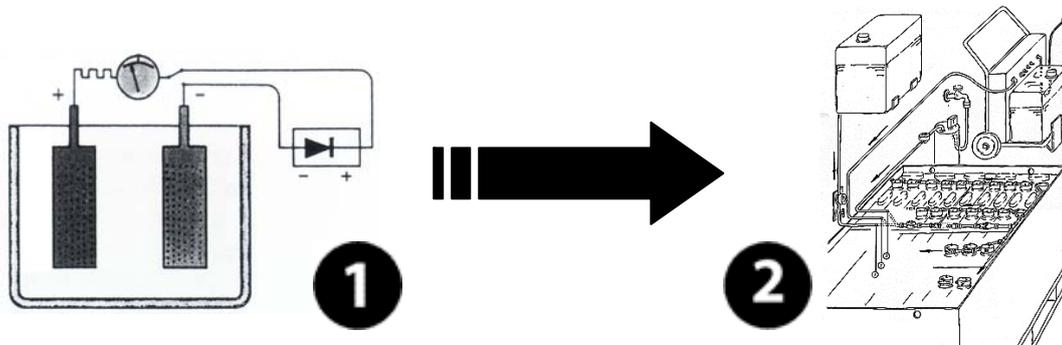
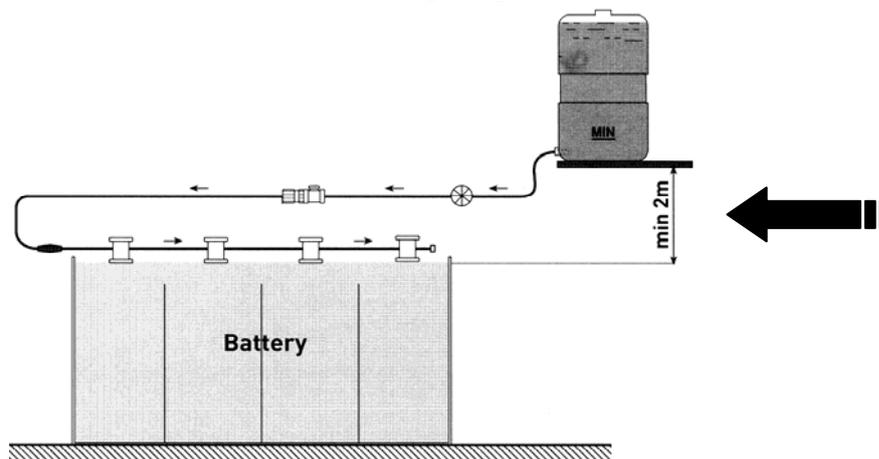


Potential causes and their errors using Single Point Watering Systems

- ◆ It is recommended to water the batteries toward the end of the charging time. **Never** fill distilled water in a battery **before** it has been charged.

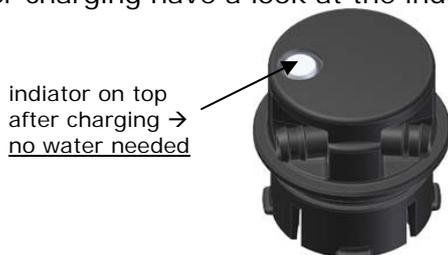


- ◆ **Water tank** is placed too low → effective filling height min. 2m (80") = 200 mbar(3.0psi)



- ◆ **Filling** → → → → As often as necessary, as less as possible!!!

After charging have a look at the indicator on the plug!!!



Attention!! Don't fill water before charging, basically!

Note:

- ◆ Filling in very short intervals with a **comparatively high pressure** (2 bis 4 bar, 30 to 60 psi), no pressure release in the hoses is possible → valve inside the plug has not yet opened → **cell remains dry**
- ◆ Filling in very short intervals with a **comparatively low pressure** (0,2 bis 0,8 bar, 3.0 to 12 psi) an overfilling of the cells can happen, because of a well-defined leakage inside the plug the hoses get empty between the filling phases, that means more water than needed runs into the cells. → **creeping overfill**

Possible causes for trouble while using battery filling systems

1. Basis

- battery dimension 12cells, 24 cells, 40 cells, etc.
- cell opening push-in, bayonet, threaded
- kind of piping parallel, in line
- watering gravity/ tap/ pump water
- water pressure mbar / psi
- stability of the battery trough → cells are moving, they are pumping air
- battery surface dry, wet, hot
- area very hot, very cold
- floor condition of the forklift track
 - are there gradients or downhill grades (inclines)
 - big unevenness, chain marks, etc.

2. troubles resulting from inside the battery

- moss shield is loose or moving up and touches the float
- moss shield has disturbing noses or ribs
- oily stuff on the electrolyte surface
- plastics and other particles inside the cell

3. dirt resulting from the field

- dust sucked into the plug disturbs the function of the valve
- degassing opening is closed or nearly closed by dirt

4. float

- correct float size (too long or too short?)
- float is partly filled with acid
- float is not correctly clipped → has fallen down

5. installation on top of the battery

- dirty surface (muddy, moist, wet)
- plugs are loose (not well pushed or screwed in)
- sealing is defect or missing (O-ring, gasket)
- plugs are damaged by water pipe or e-cable or someone was walking on it
- broken t-pieces (different reasons)

6. pipng

- if more than 6 plugs are connected in line, the very last plug in this line gets a very low water pressure and therefore the filling time is longer for this cell
- no distribution hose NW10 is installed → filling pressure in hose NW6 is going down extremely
- quality of the hose is insufficient, no bfs-hose is installed
- no hose clamps NW6 / NW10 are installed → leakage
- hoses are warmed up extremely before fitting, therefore they are permanently damaged
→ leakage
- olives of the T-pieces are damaged (knife, tong) → leakage
- piping is partly too much bent
- end piece is not well pushed on the olive → leakage

7. filling procedure

- is a bfs water filter installed?
- filter is blocked?
- clean water?
algae in the water tank? (use a coloured tank), different particles in the water or into the tank?
- is a dust cap on the male connector installed?
- is a flow indicator installed?
- water line is not disconnected immediately after the filling process has ended

8. faults sources by application or users mistakes

- the topping up of batteries with water has to be done strictly after charging
- water tank is placed too low → the effective filling height should be more than
 $2\text{m} = 200\text{ mbar} / 80'' = 3.0\text{psi}$
- the topping up is done with a relatively high pressure in a very short interval
(there is no pressure release in the hoses possible → valve inside the plug does not open for filling, cell is drying up)
- the topping up is done with a relatively low pressure in a very short interval
(Over filling of the cells is possible. Because of the leakage rate of the valve system the hoses are flowing empty and too much water remains in the cells than needed.)
- venting hole of the cell is blocked → the electrolyte will be pressed out of the degassing hole of the plug