Float Switch Control of a Three-Phase Pump

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Article address: https://drgmotor.com/en/blog/electric-motors/float-switch-three-phase-pump-control

Technical assumptions

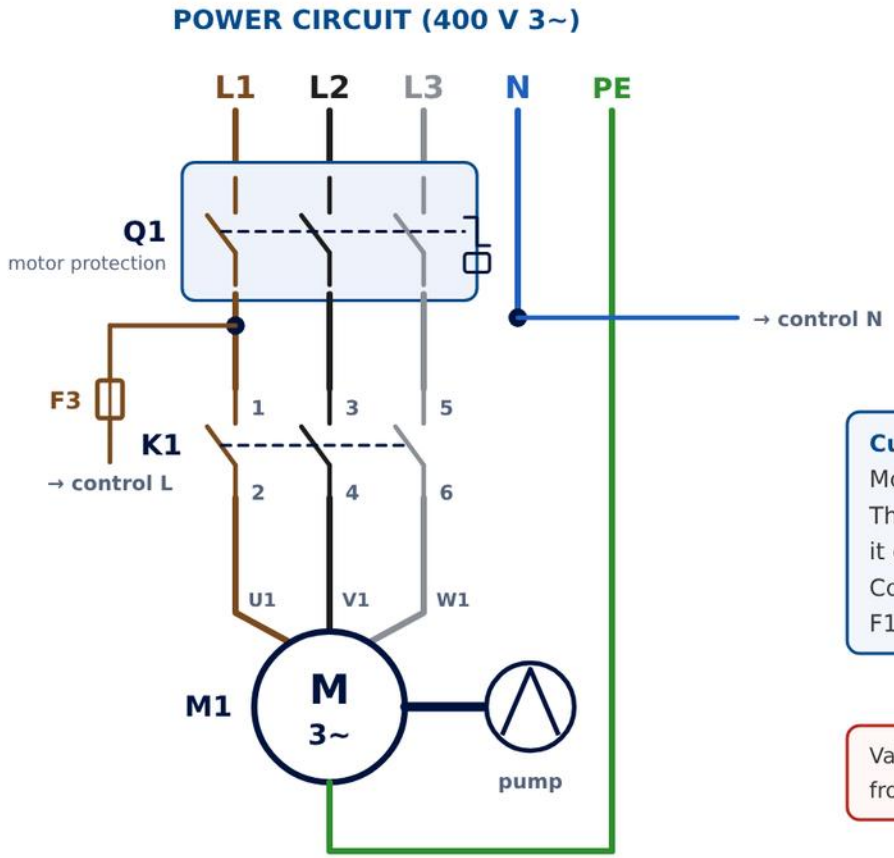
- 400 V 50 Hz three-phase supply; control voltage 230 V AC (L1-N) protected by fuse F3.
- The float switch does not carry motor current; it only switches the K1 contactor coil. Check the contact rating on the device label.
- Filling uses the C-NC pair (closed with the float down), emptying uses the C-NO pair (closed with the float up). Core colours and terminal names vary by device; the device diagram prevails.
- The S2 MAN-0-AUTO selector is optional; in MAN there is no level protection.
- Values are examples; protection and contactors are selected from the rated current on the motor nameplate.

Safety notice

- This content is for technical information only. Wiring, measurement and commissioning must be carried out by qualified electrical personnel, following lock-out and verification of de-energised state, and in line with the motor and device manufacturer's documentation.

Suitable DRG motors and store

- DRG-90L-2 (2,2 kW, 3000 rpm): https://drgmotor.com/en/buy-electric-motors-online/2-2-kw-3000-rpm-three-phase-motor-aluminium-drg-90l-2
- DRG-100L-2 (3 kW, 3000 rpm): https://drgmotor.com/en/buy-electric-motors-online/3-kw-3000-rpm-three-phase-motor-aluminium-drg-100l-2
- DRG-112M-2 (4 kW, 3000 rpm): https://drgmotor.com/en/buy-electric-motors-online/4-kw-3000-rpm-three-phase-motor-aluminium-drg-112m-2
- DRG-132S1-2 (5,5 kW, 3000 rpm): https://drgmotor.com/en/buy-electric-motors-online/5-5-kw-3000-rpm-three-phase-motor-aluminium-drg-132s1-2
- https://drgmotor.com/en/buy-electric-motors-online



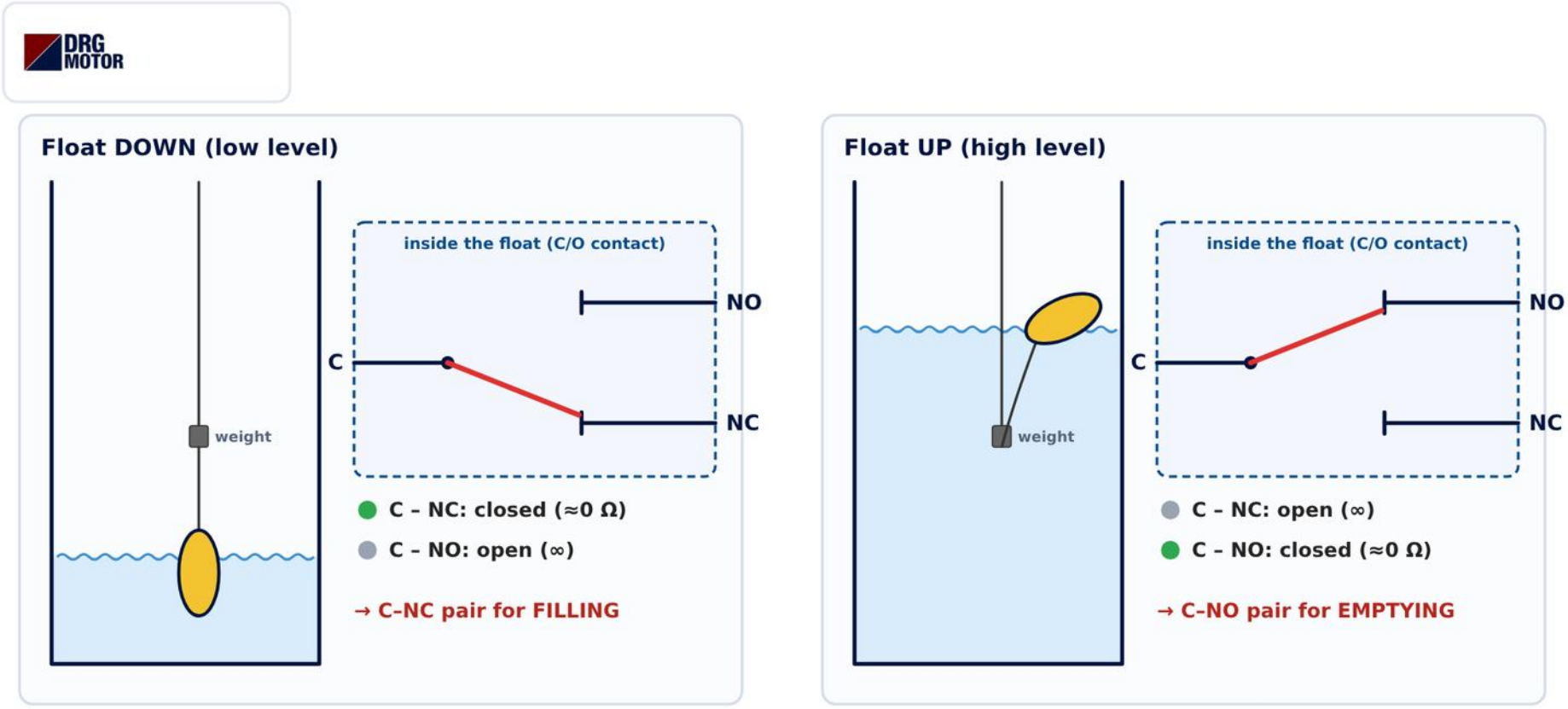
Current paths
Motor current: Q1 → K1 1-2 / 3-4 / 5-6 → M1
The float switch is NOT in this circuit:
it only switches the K1 coil current
Control 230 V AC: L1 – F3 and N
F1 fuses + F2 overload relay also possible

Values are examples; select devices
from the motor nameplate current

Float-controlled pump: power circuit

Q1 motor protection breaker · K1 contactor · M1 3~ pump motor · control supply L1–N via F3

Figure 1

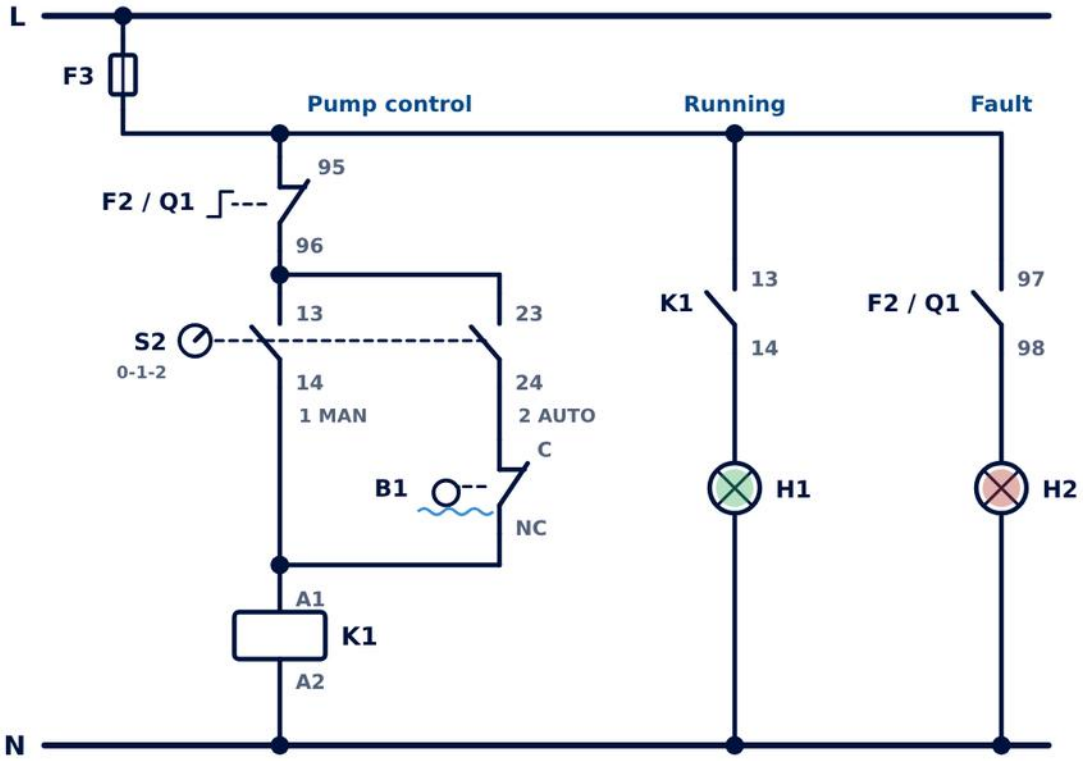


Core colours (e.g. brown / black / blue) and the NO-NC naming vary by device. Find the common (C) core and the pair that closes in each position with an ohmmeter while lifting and lowering the float by hand. The device diagram prevails. The unused core is landed on a terminal and insulated, never left loose.

Float switch contact type: C/O (common, NO, NC)

Down: C–NC closed · up: C–NO closed · the contact carries only the coil current

Figure 2



Components
F3: control fuse
F2 / Q1 95-96 (NC): overload
S2: MAN-0-AUTO selector
B1 C–NC: closed with float DOWN → pump starts when the level falls (filling)
K1 A1-A2: contactor coil
H1 running · H2 fault

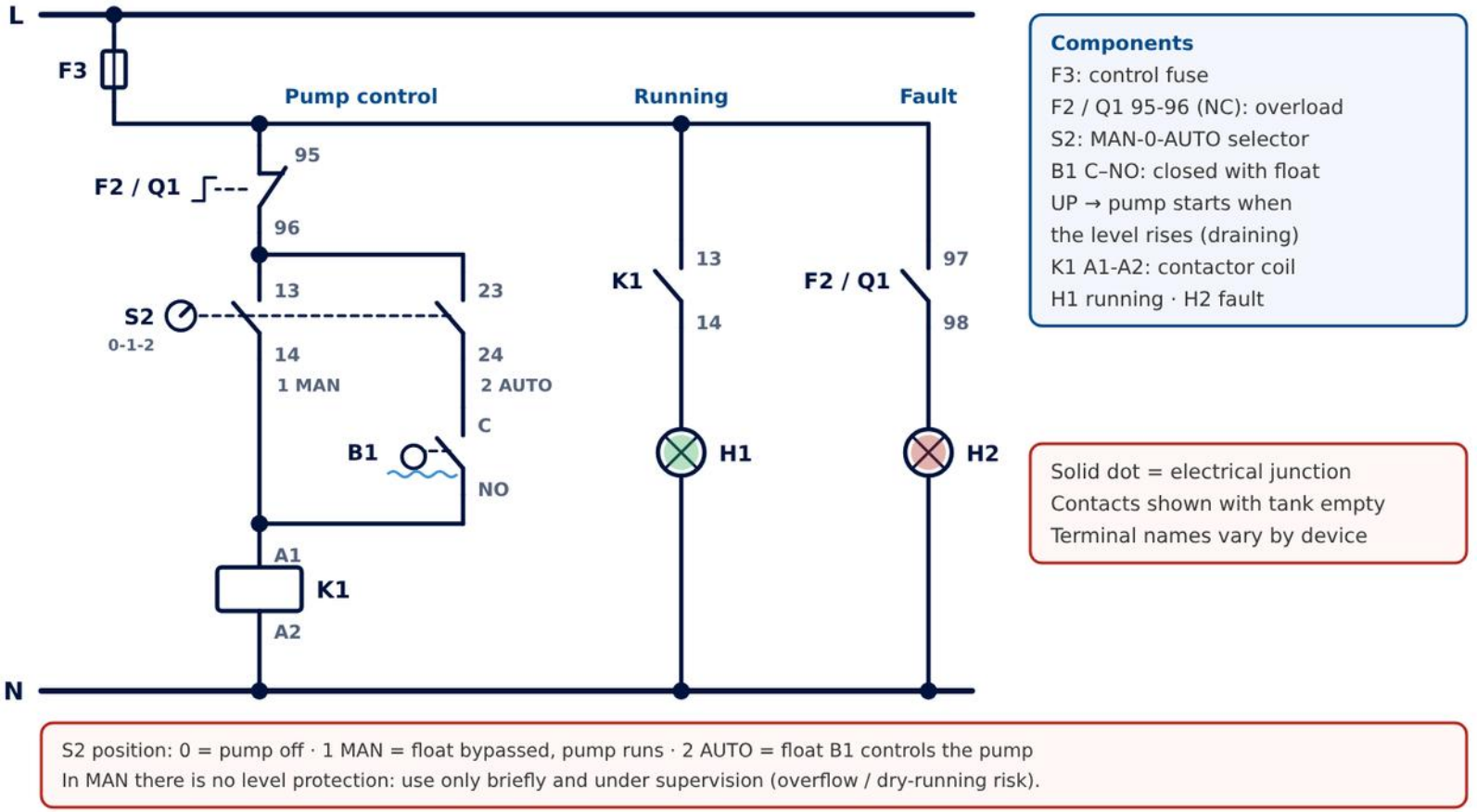
Solid dot = electrical junction
Contacts shown with tank empty
Terminal names vary by device

S2 position: 0 = pump off · 1 MAN = float bypassed, pump runs · 2 AUTO = float B1 controls the pump
In MAN there is no level protection: use only briefly and under supervision (overflow / dry-running risk).

A) Tank FILLING control circuit (float C–NC)

L – F3 – F2/Q1 95-96 – S2 (MAN ‖ AUTO + B1 C–NC) – K1 A1-A2 – N · pump runs when the level falls

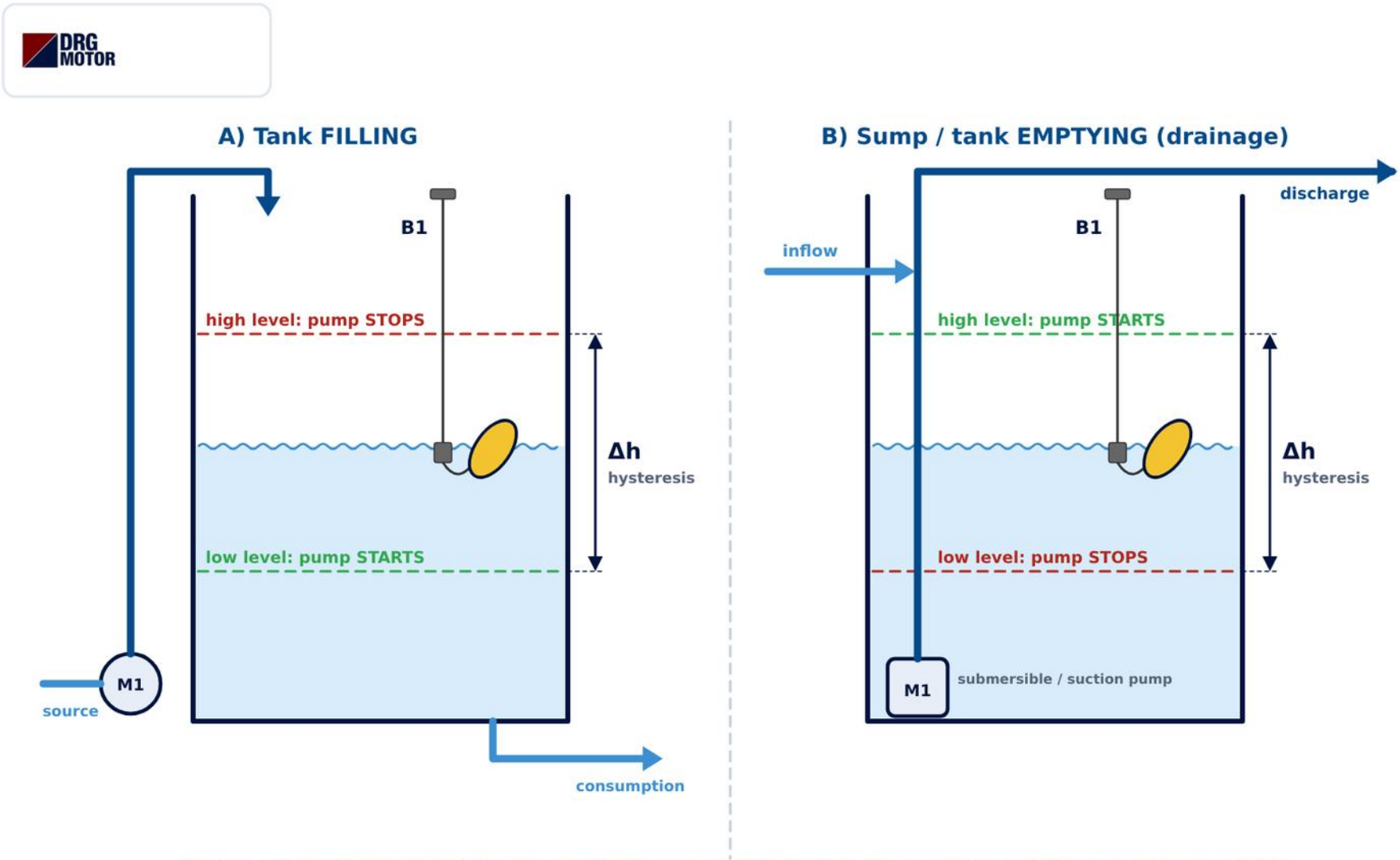
Figure 3



B) Sump / tank EMPTYING control circuit (float C–NO)

L – F3 – F2/Q1 95-96 – S2 (MAN ‖ AUTO + B1 C–NO) – K1 A1-A2 – N · pump runs when the level rises

Figure 4



Δh: on a cable float it is set by the cable length between weight and float · the low level must stay above the pump inlet

Tank section: filling and emptying levels

A) pump runs when the level falls · B) pump runs when the level rises · the gap Δh = hysteresis

Figure 5

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		A) Filling (C-NC)		B) Emptying (C-NO)	
Level condition	**Float**	**Contact**	**Pump**	**Contact**	**Pump**
1 Empty (below low level)	down	closed	runs	open	stopped
2 Level rising (in between)	down	closed	runs	open	stopped *
3 High level reached	up	open	stopped	closed	runs
4 Level falling (in between)	up	open	stopped	closed	runs *
5 Low level reached	down	closed	runs	open	stopped
6 S2 = 0 or overload trip	—	—	stopped	—	stopped

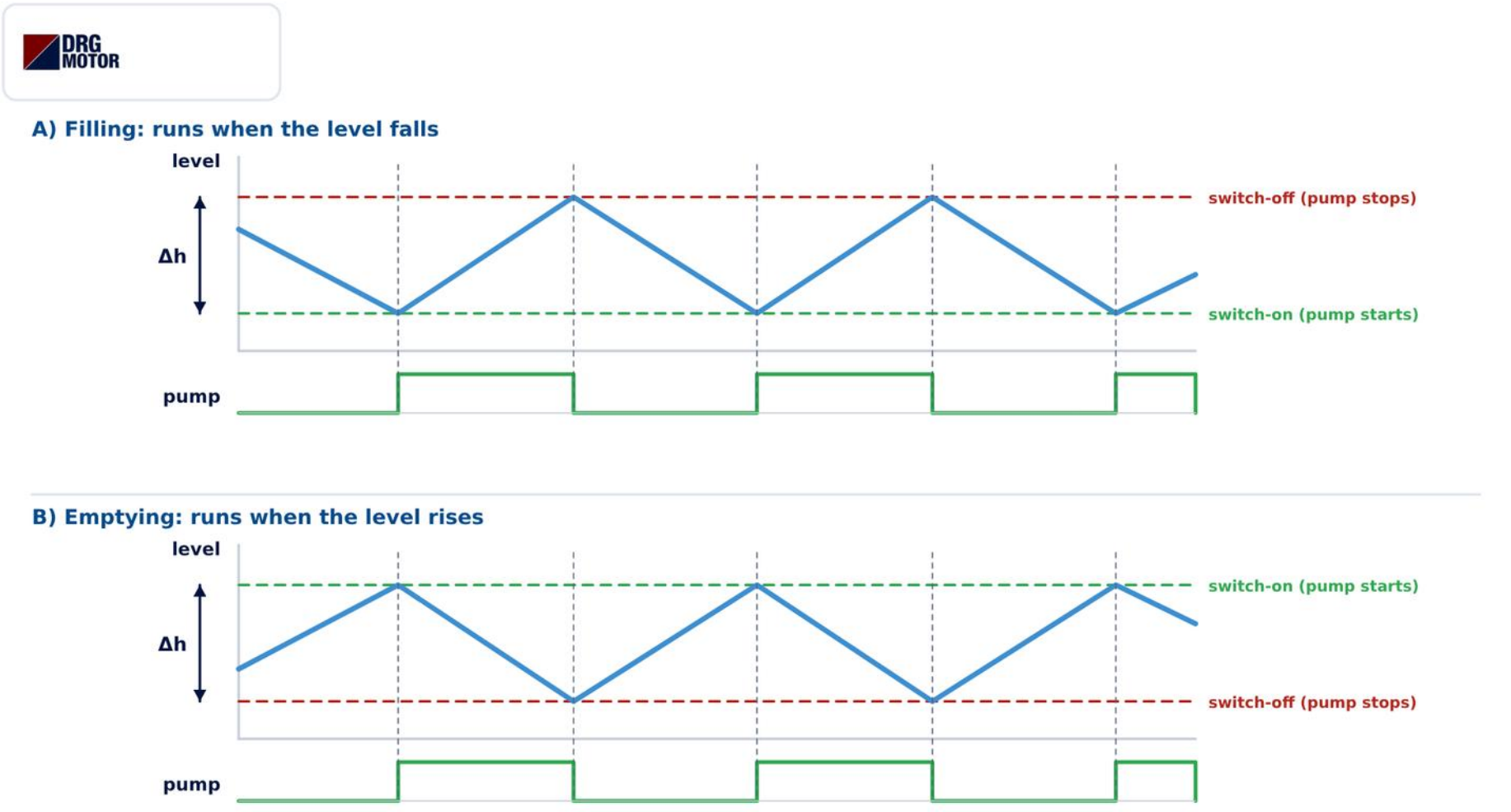
*** Rows 2 and 4: level between the two limits; the float keeps its position and the pump keeps its state (hysteresis).**

With S2 = 1 (MAN) the pump runs regardless of the float; there is no level protection.

Level – float – pump state table

Contact and pump state for each level condition with S2 = 2 (AUTO) · filling and emptying side by side

Figure 6



A small Δh makes the pump cycle often (frequent starts stress motor and contactor); a large Δh leaves part of the tank unused.

Hysteresis: the gap between switch-on and switch-off levels

Level curve and pump state over time · between the two limits the pump keeps its previous state

Figure 7