Liquid Level Relay and Pump Motor Wiring

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Article address: https://drgmotor.com/en/blog/electric-motors/liquid-level-relay-pump-wiring

Technical assumptions

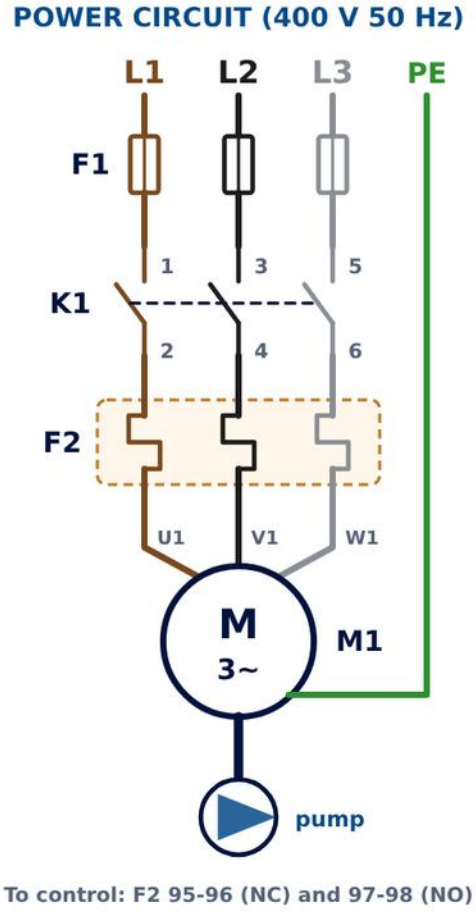
- 400 V 50 Hz three-phase supply, 230 V AC control
- Electrode (conductivity) type level relay; for conductive liquids
- Terminal names (A1-A2, E1-E2-E3, 11-12-14) are generic; the device wiring diagram prevails
- Values are examples; overload relay and contactor are selected from the motor nameplate

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



Components
F1: power circuit short-circuit protection
K1: pump contactor, main contacts 1-2 / 3-4 / 5-6
F2: overload relay, set from the motor nameplate
M1: three-phase induction pump motor + PE
Alternative: Q1 motor protection breaker instead of F1+F2; then use a Q1 auxiliary in the control

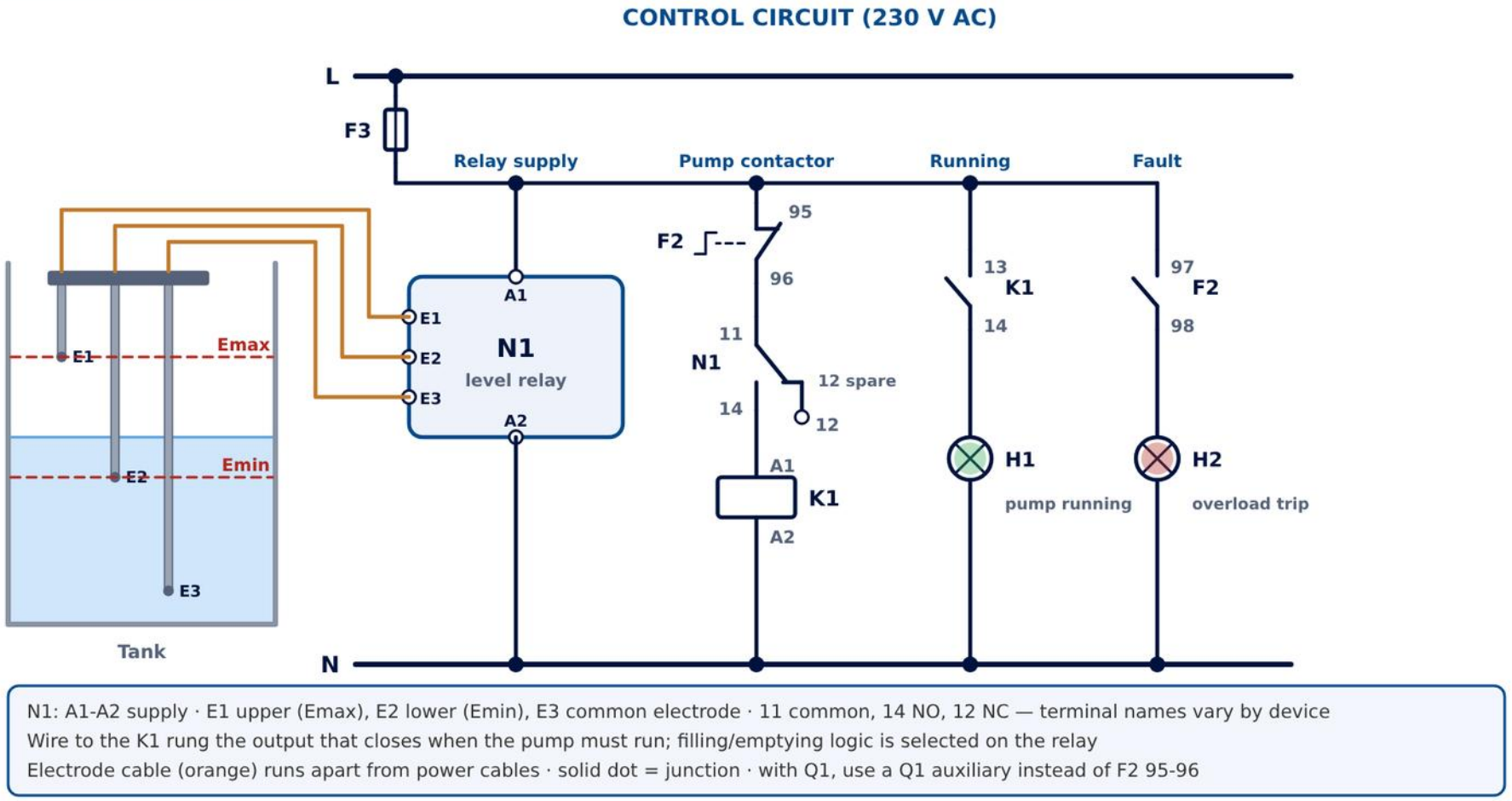
Signal path
1 Electrodes become wet or dry
2 N1 level relay switches its output contact
3 N1 11-14 closes and the K1 coil is energised
4 K1 main contacts start the pump motor

The level relay contact does not carry motor current; it only drives the K1 coil. Values are examples.

Pump with level relay: power circuit

L1-L2-L3 · F1 fuses · K1 contactor · F2 overload relay · M1 pump motor · PE

Figure 1

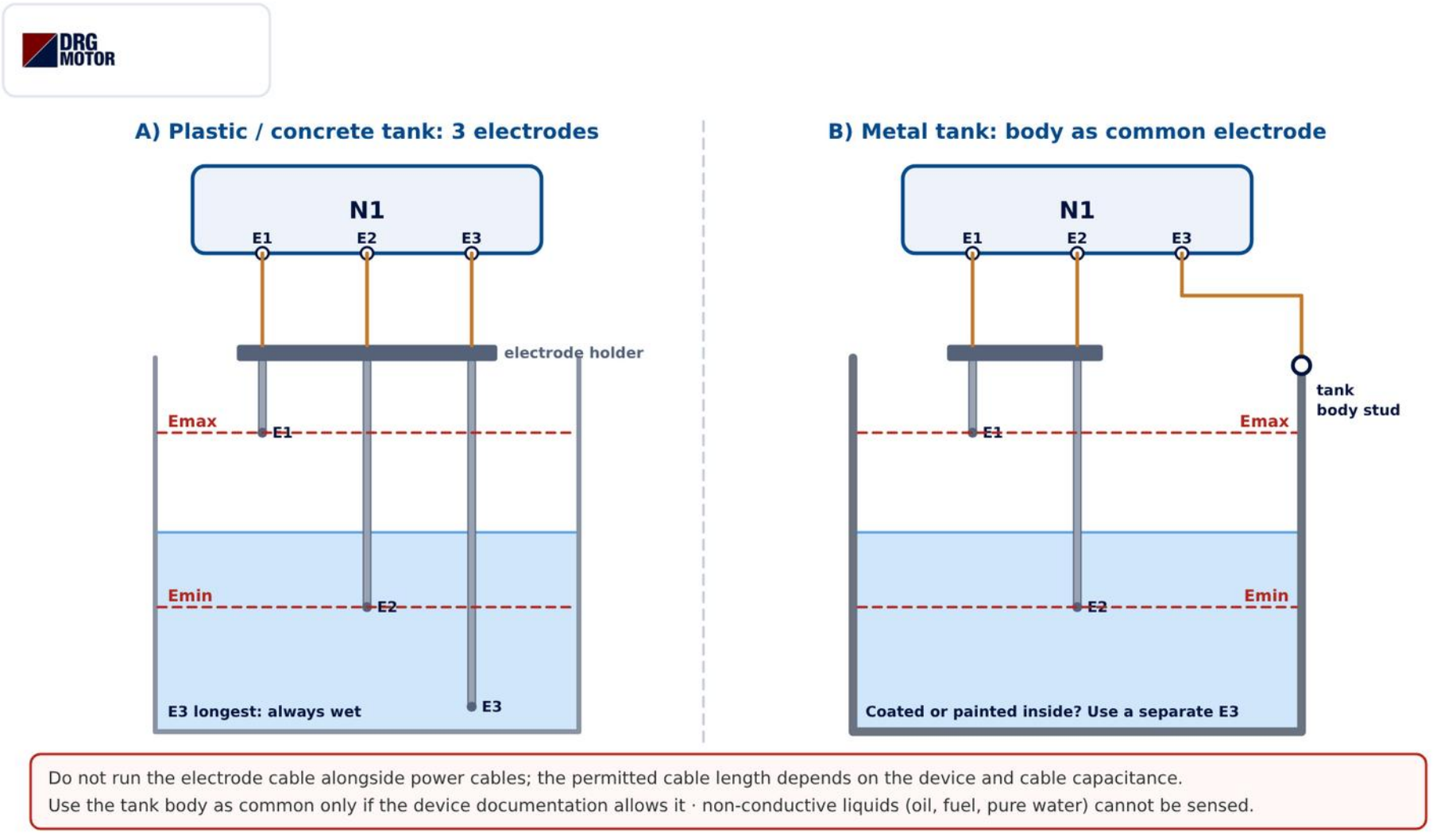


N1: A1-A2 supply · E1 upper (Emax), E2 lower (Emin), E3 common electrode · 11 common, 14 NO, 12 NC — terminal names vary by device
Wire to the K1 rung the output that closes when the pump must run; filling/emptying logic is selected on the relay
Electrode cable (orange) runs apart from power cables · solid dot = junction · with Q1, use a Q1 auxiliary instead of F2 95-96

Pump control circuit with level relay

L – F3 – F2 95-96 – N1 11-14 – K1 A1-A2 – N · N1 supply A1-A2 on its own rung

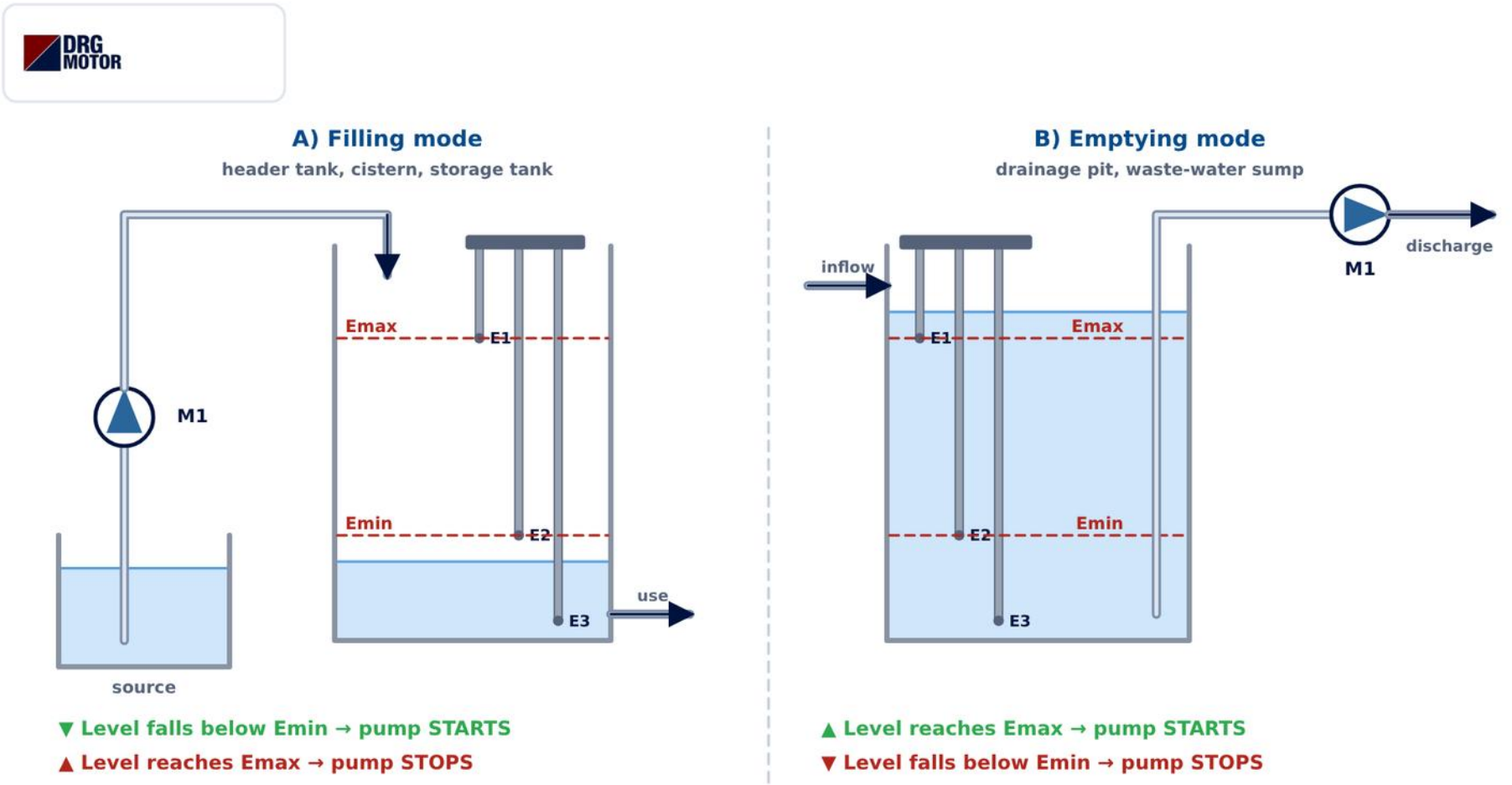
Figure 2



Electrode layout and N1 connection

E1 upper level (Emax) · E2 lower level (Emin) · E3 common (reference) · electrode cable in orange

Figure 3



Filling and emptying mode: when does the pump run?

Same electrode layout, opposite output logic · selected on the relay

Figure 4

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Level relay state table

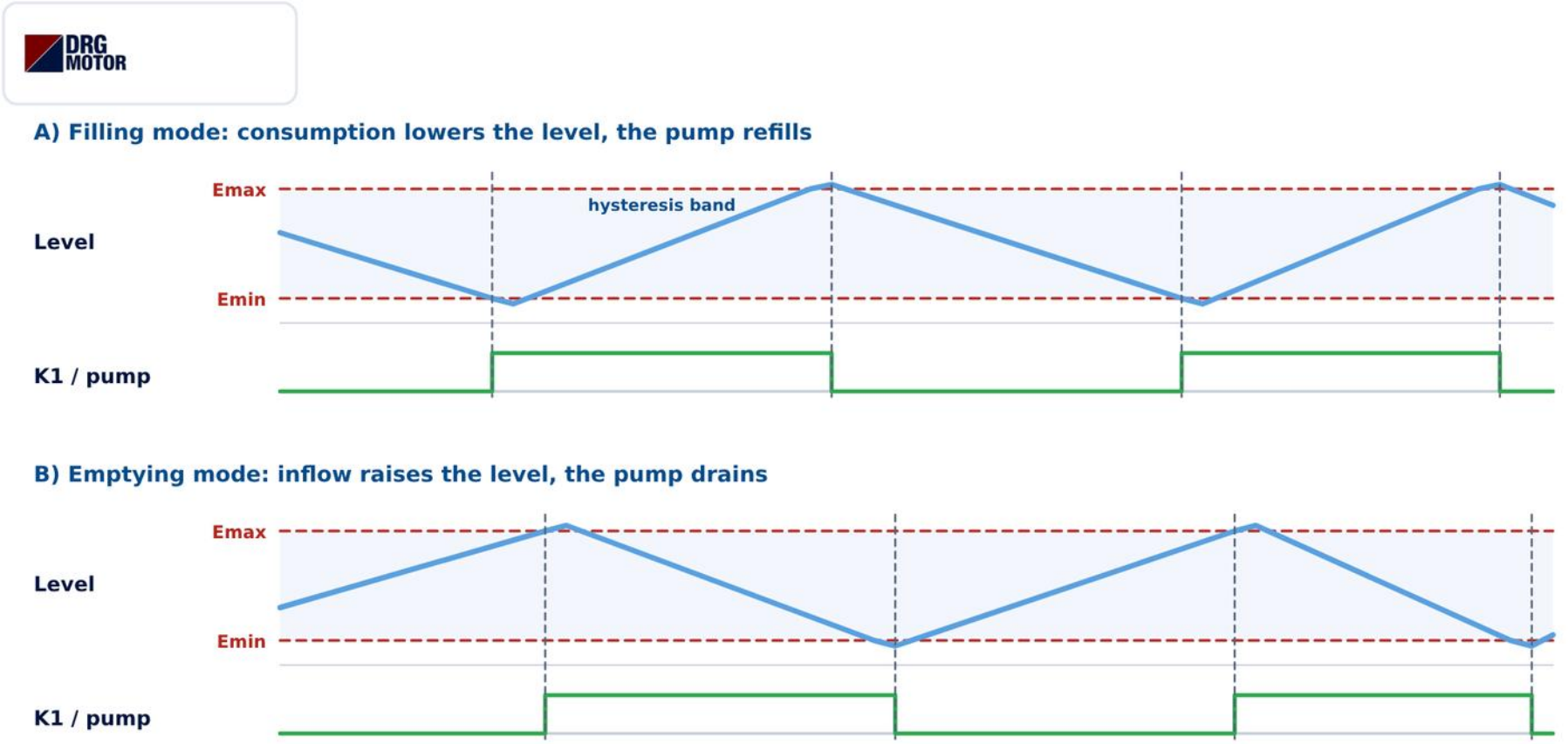
Electrode state and pump behaviour in both modes · E3 always submerged

Level situation	E2 (Emin)	E1 (Emax)	Filling: pump	Emptying: pump
1 Level below Emin	dry	dry	runs	stopped
2 Rising, between Emin and Emax	wet	dry	runs (holds)	stopped (holds)
3 Level reaches Emax	wet	wet	stopped	runs
4 Falling, between Emin and Emax	wet	dry	stopped (holds)	runs (holds)
5 Level below Emin again	dry	dry	runs	stopped
6 E1 wire broken	wet	dry	never stops!	never starts!

Rows 2 and 4 show the same electrode state; the output depends on the direction the level came from (hysteresis).

Row 6: a broken E1 never sees Emax. Critical tanks need separate overflow and dry-running protection.

Figure 5



High level = K1 coil energised, pump running. The output changes only when the level drops below Emin or reaches Emax.
Some devices add a short response delay against ripples on the surface; whether it exists and its length vary by device.

Level relay timing diagram

Liquid level and K1 contactor over time, in both modes

Figure 6