Duty/Standby and Alternating Two-Pump Circuit

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Article address: https://drgmotor.com/en/blog/electric-motors/duty-standby-alternating-pump-circuit

Technical assumptions

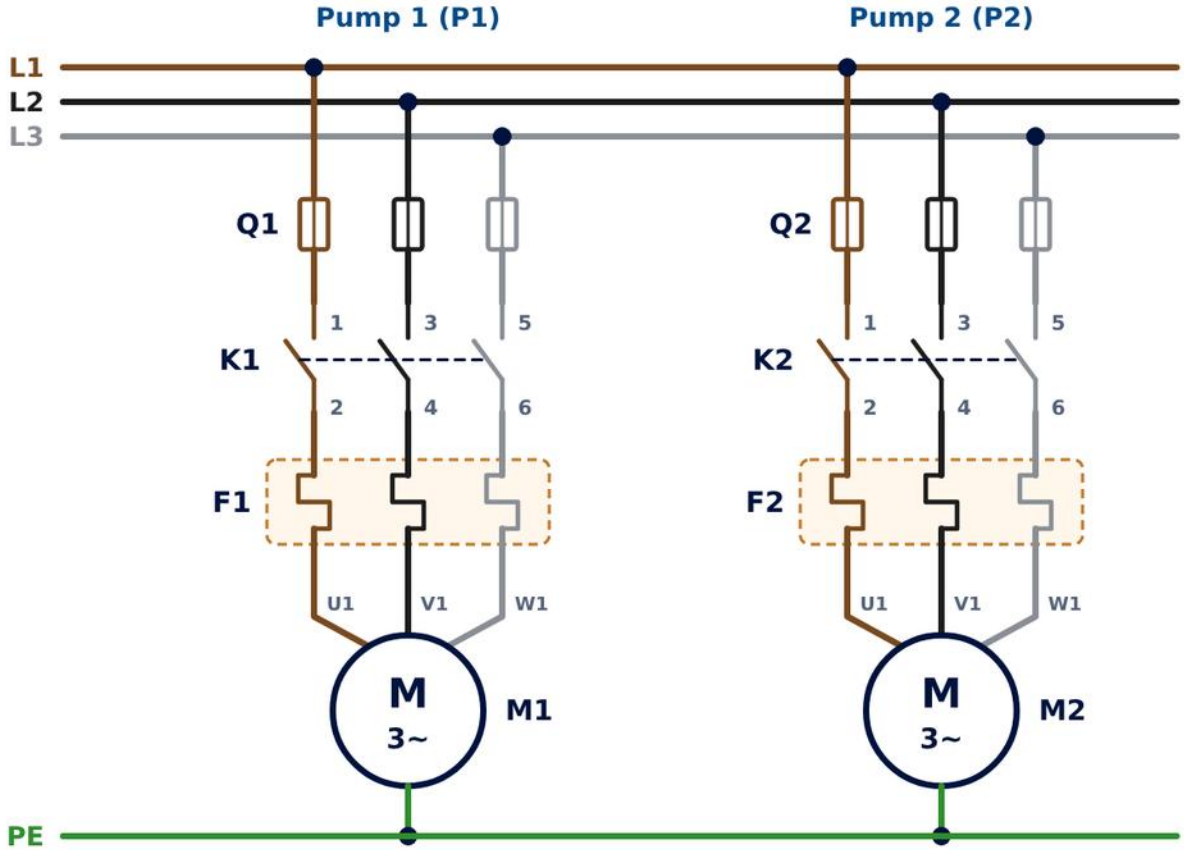
- 400 V 50 Hz three-phase supply; control voltage 230 V AC (phase-neutral) protected by fuse F0.
- Each pump has its own short-circuit protection (Q1, Q2), contactor (K1, K2) and overload relay (F1, F2).
- B1 is the first-stage demand contact, B2 the second-stage (high demand) contact (pressure or level switch, NO).
- Terminal names of alternating relay KA and on-delay timer KT are examples; the device's own wiring diagram prevails. Time and pressure settings depend on the installation.
- Values are examples; protection and contactors are selected from the rated current on the motor nameplate. Any emergency stop is designed separately according to the risk assessment.

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-90S-2 (1,5 kW, 3000 rpm): https://drgmotor.com/en/buy-electric-motors-online/1-5-kw-3000-rpm-three-phase-motor-aluminium-drg-90s-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-132S2-2 (7,5 kW, 3000 rpm): https://drgmotor.com/en/buy-electric-motors-online/7-5-kw-3000-rpm-three-phase-motor-aluminium-drg-132s2-2
- https://drgmotor.com/en/buy-electric-motors-online



Components
Each pump has its own:
Q1/Q2 short-circuit protection (fuse switch or breaker)
K1/K2 contactor
F1/F2 overload relay

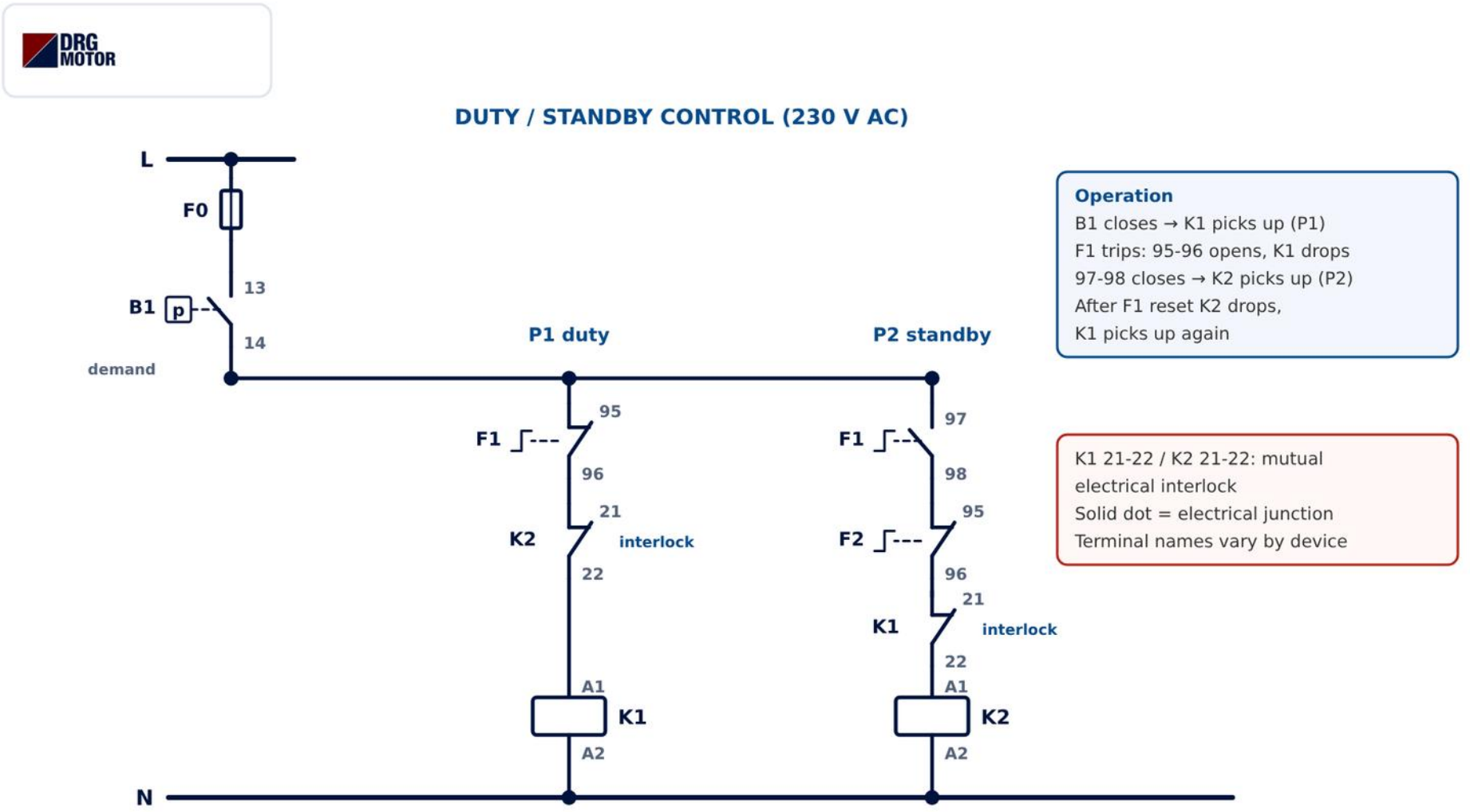
F1/F2 95-96 (NC) → own contactor drops out
F1/F2 97-98 (NO) → starts the other pump
One pump can stay in service while the other is faulty

Values are examples; select from the motor nameplate
Terminal names vary by device

Two-pump power circuit: separate Q, K and F per motor

400 V 50 Hz · two separate outgoing feeders from L1-L2-L3 · M1 and M2 3~ · common PE

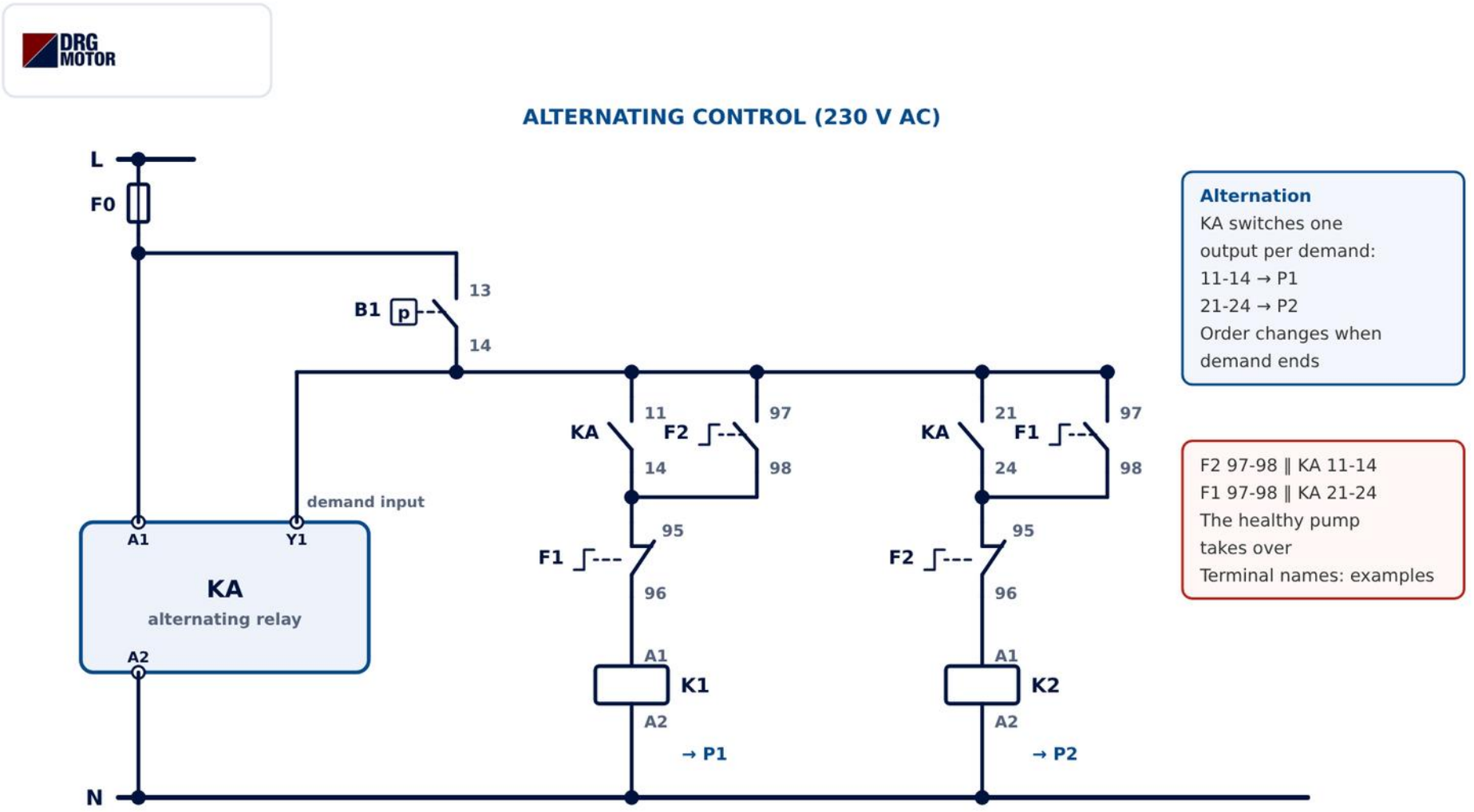
Figure 1



Duty / standby pump control circuit

When the duty pump overload trips, F1 97-98 energises the standby contactor

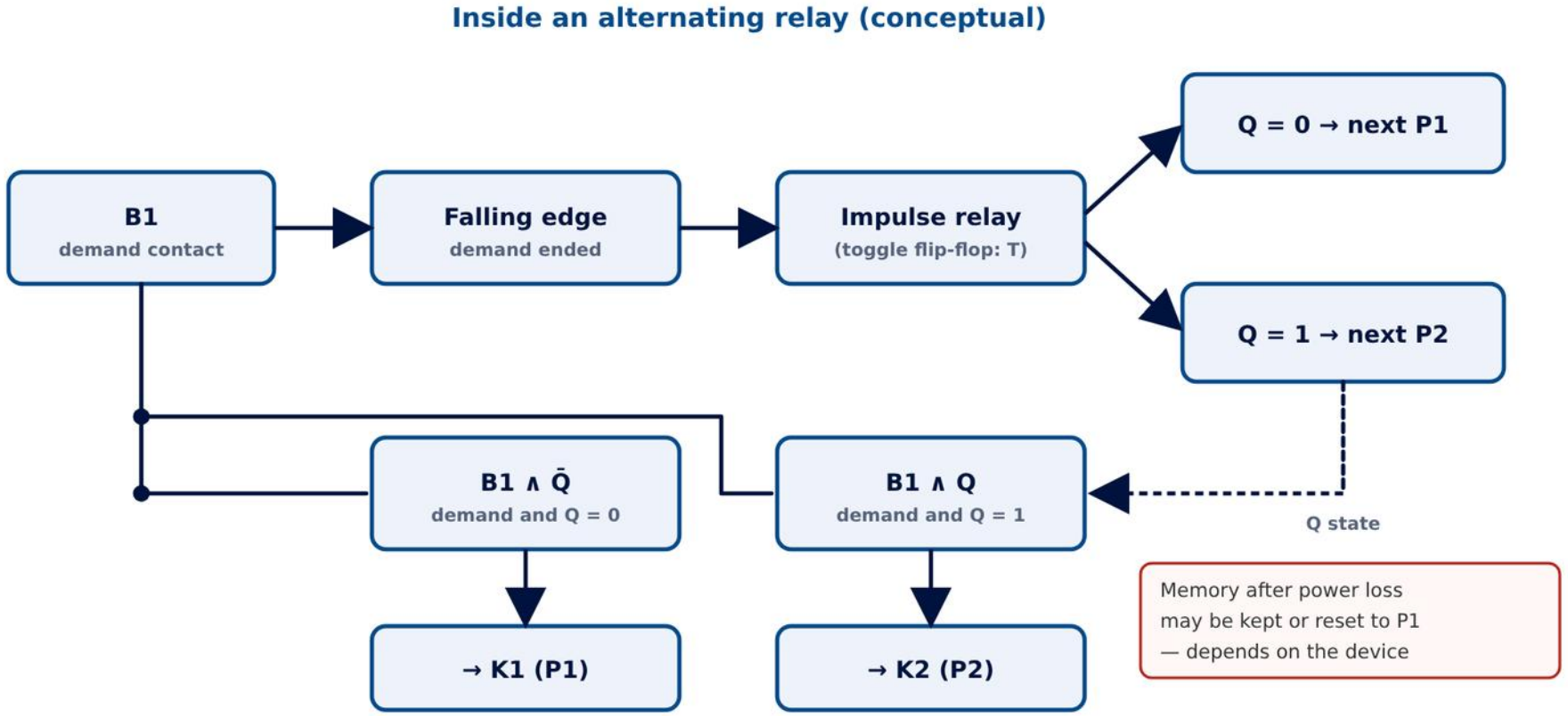
Figure 2



Alternating relay control: the next pump on each demand

KA permanently supplied (A1-A2), B1 demand feeds input Y1 and the KA output commons · with overload backup

Figure 3

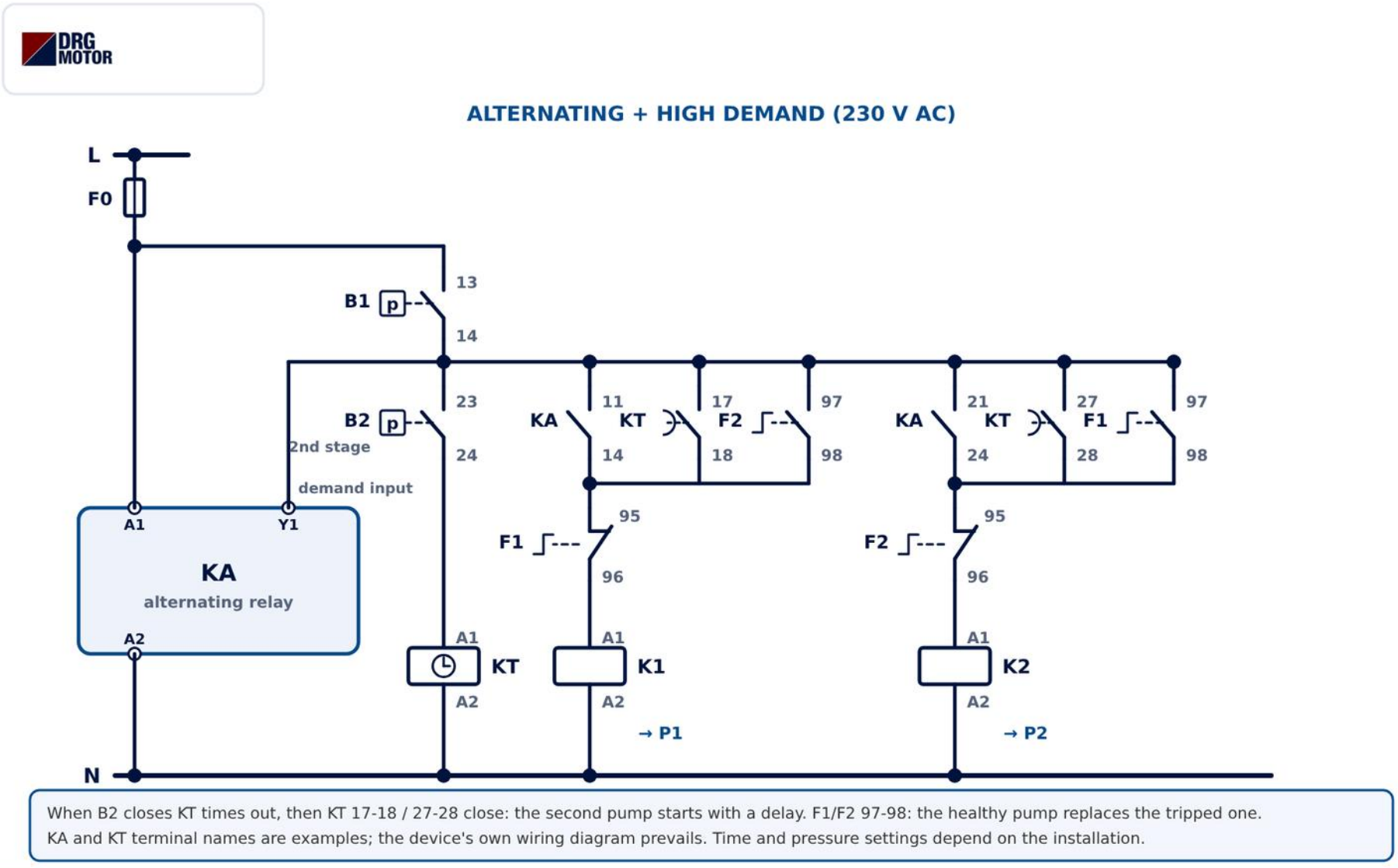


The order changes when demand ends, not while a pump is running, so the running pump stays the same for the whole demand.

Alternation logic: impulse relay / flip-flop concept

Q toggles at the end of each demand and selects which contactor picks up next time

Figure 4



Alternating operation + both pumps on high demand (staggered)

B1 1st-stage demand · B2 2nd stage (high demand) · KT on-delay: the two contactors never start together

Figure 5

DRG MOTOR

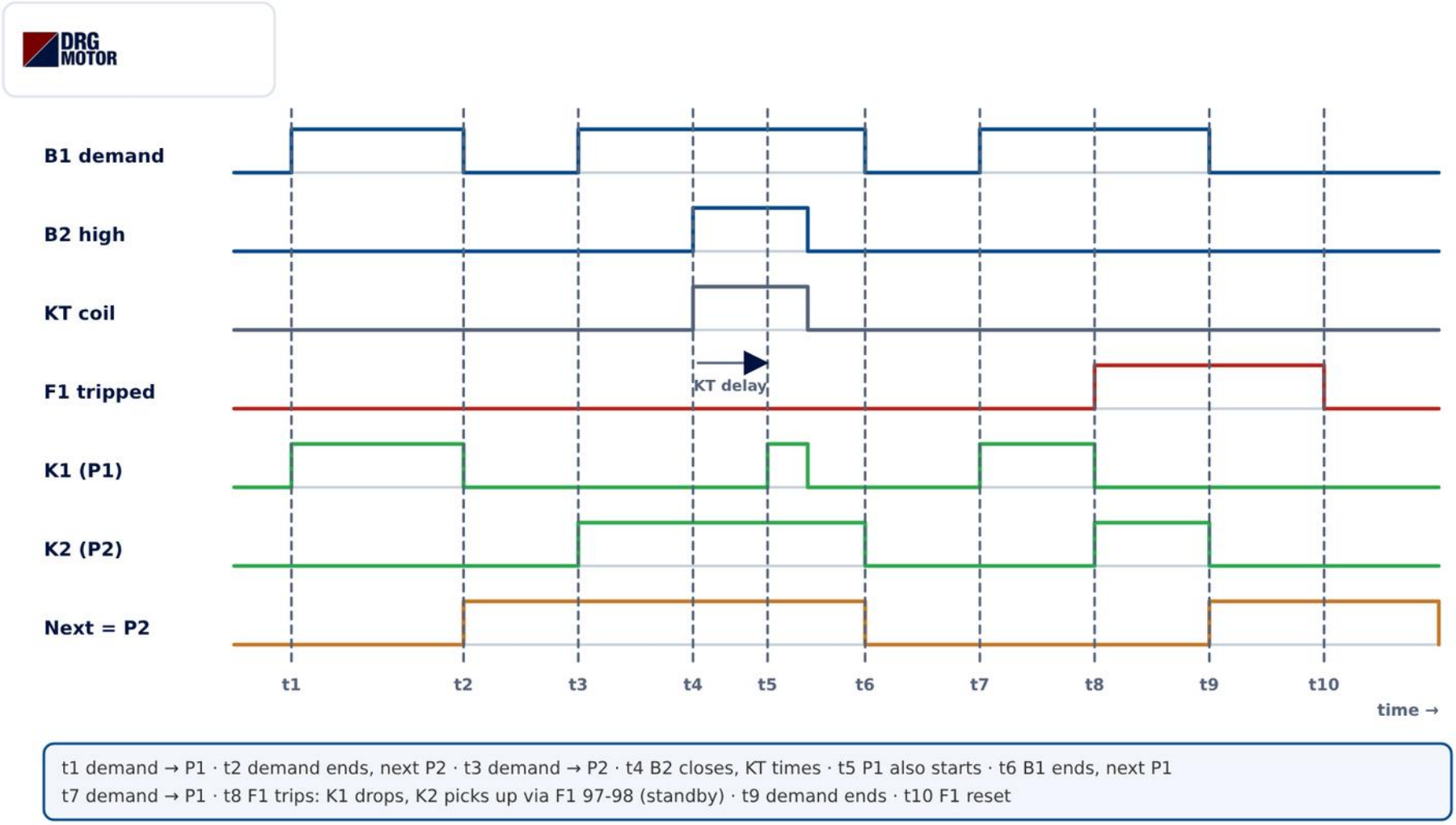
Step	B1	B2	F1	P1 (K1)	P2 (K2)	Next
1 No demand	open	open	normal	stopped	stopped	P1
2 Demand (B1 closed)	closed	open	normal	runs	stopped	P1
3 Demand ended	open	open	normal	stopped	stopped	P2
4 New demand	closed	open	normal	stopped	runs	P2
5 High demand (B2)	closed	closed	normal	delayed	runs	P2
6 B2 opened	closed	open	normal	stopped	runs	P2
7 Demand ended	open	open	normal	stopped	stopped	P1
8 Demand, F1 tripped	closed	open	tripped	stopped	standby	P1

Step 5: the second pump starts after the KT delay (staggered start). Step 8: P1 is faulty, P2 runs as standby via F1 97-98.

State table: demand, P1, P2 and order

Each row is one moment; "Next" is the pump that will run on the next demand

Figure 6



t1 demand → P1 · t2 demand ends, next P2 · t3 demand → P2 · t4 B2 closes, KT times · t5 P1 also starts · t6 B1 ends, next P1
t7 demand → P1 · t8 F1 trips: K1 drops, K2 picks up via F1 97-98 (standby) · t9 demand ends · t10 F1 reset

Alternating two-pump timing diagram

Alternation, staggered second pump on high demand and changeover on overload trip

Figure 7