Soft Starter Wiring Diagram and Bypass Contactor

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Article address: https://drgmotor.com/en/blog/electric-motors/soft-starter-wiring-diagram-bypass

Technical assumptions

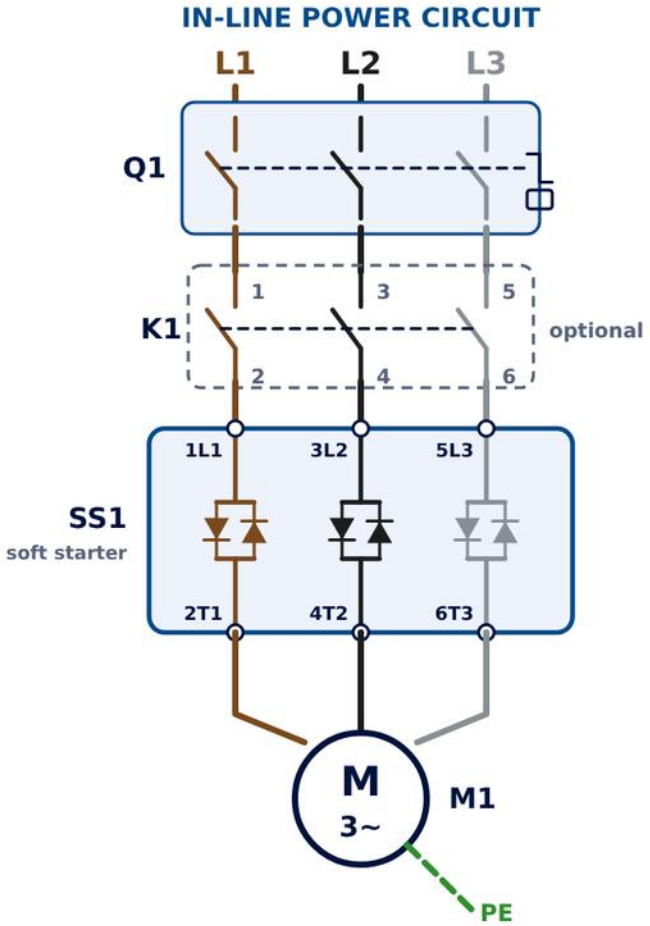
- 400 V 50 Hz three-phase supply; the 230 V AC control circuit is an example.
- Terminal names (1L1 3L2 5L3, 2T1 4T2 6T3, COM, START, R1–R3) are generic and vary by device; the device's own wiring diagram prevails.
- Ramp time, initial voltage and current limit are set on the device according to load and motor nameplate; no setting values are given here.
- Inside-delta connection is used only if the device manufacturer permits it.
- Values are examples; equipment is 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-160M-4: https://drgmotor.com/en/buy-electric-motors-online/11-kw-1500-rpm-three-phase-motor-cast-iron-drg-160m-4
- DRG-180L-4: https://drgmotor.com/en/buy-electric-motors-online/22-kw-1500-rpm-three-phase-motor-cast-iron-drg-180l-4
- DRG-200L-4: https://drgmotor.com/en/buy-electric-motors-online/30-kw-1500-rpm-three-phase-motor-cast-iron-drg-200l-4
- DRG-225M-4: https://drgmotor.com/en/buy-electric-motors-online/45-kw-1500-rpm-three-phase-motor-cast-iron-drg-225m-4
- https://drgmotor.com/en/buy-electric-motors-online



Components

Q1: short-circuit protection (motor protection breaker or the fuses specified by the device manufacturer).
K1: line contactor — isolates the motor from the supply at stop and on fault.
SS1: soft starter — input 1L1 3L2 5L3, output 2T1 4T2 6T3.
M1: three-phase motor; terminal connection (Y or Δ) according to supply voltage and nameplate.

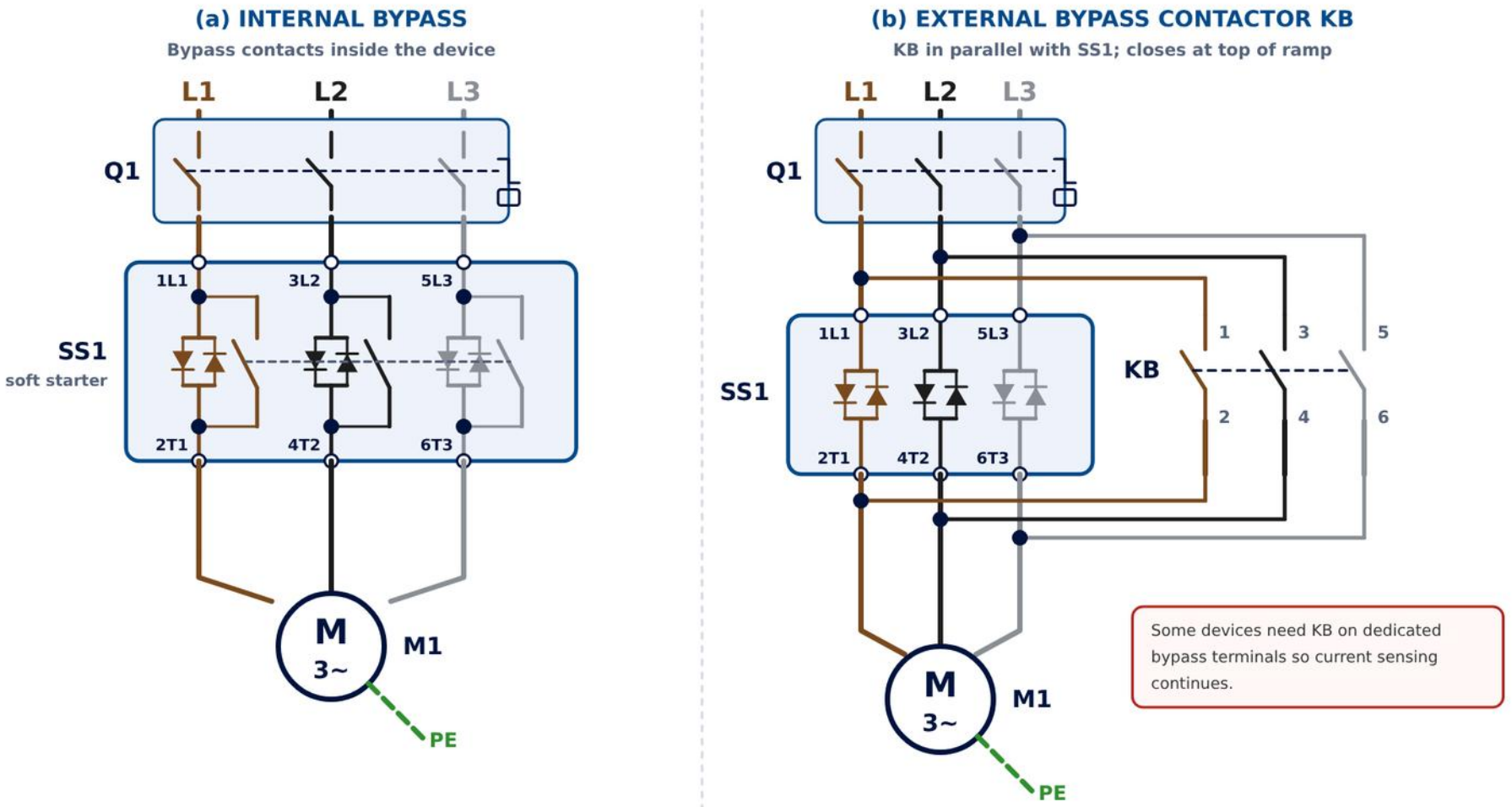
Caution

Never connect power-factor capacitors between the soft starter output and the motor.
Terminal names vary by device; the device's own wiring diagram prevails.

Soft starter in-line connection: Q1 → K1 → SS1 → M1

Anti-parallel thyristors in each phase · 400 V 50 Hz example supply

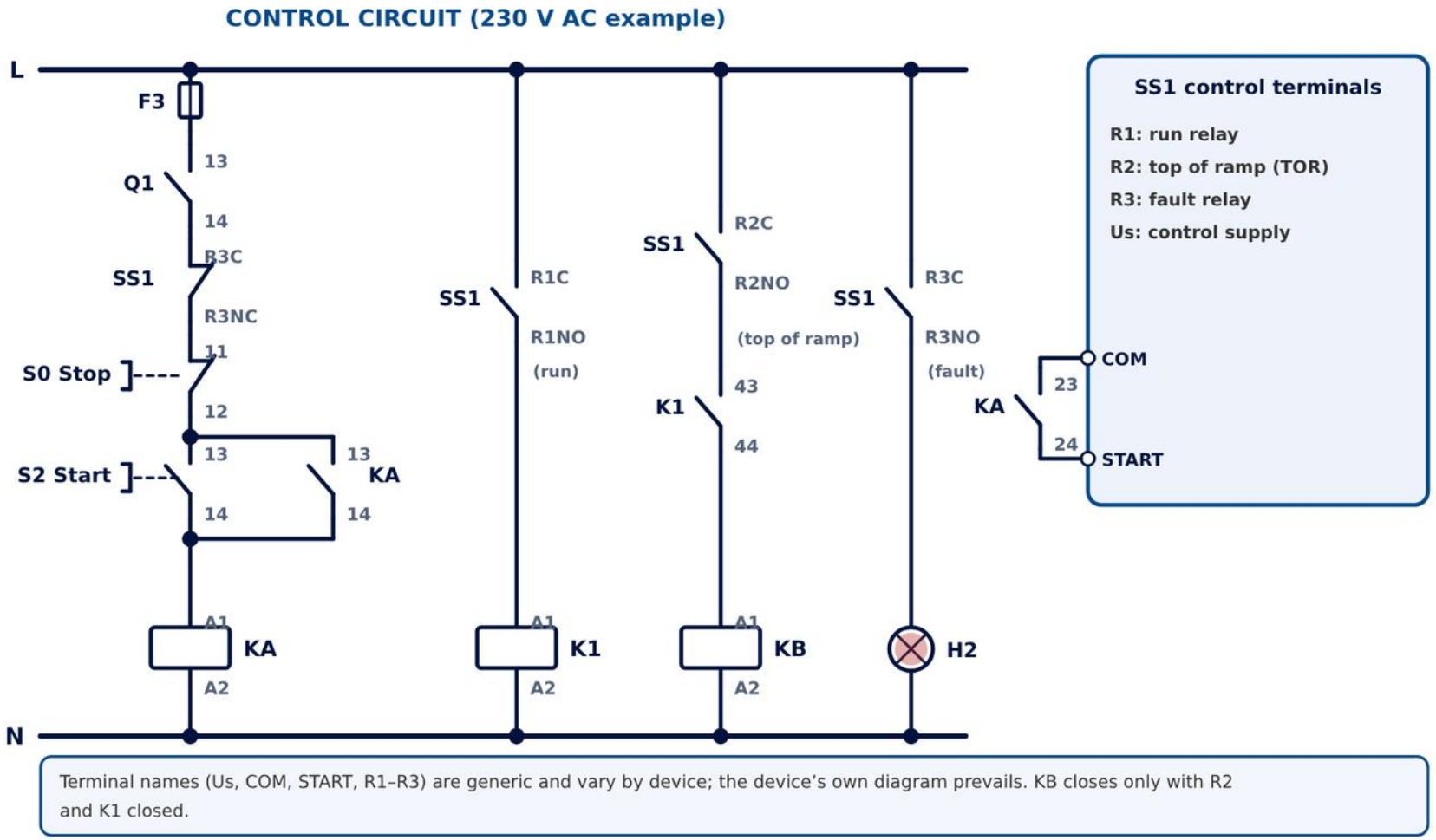
Figure 1



Internal bypass versus external bypass contactor (KB)

With bypass closed, current flows through contacts, not thyristors · less heat loss

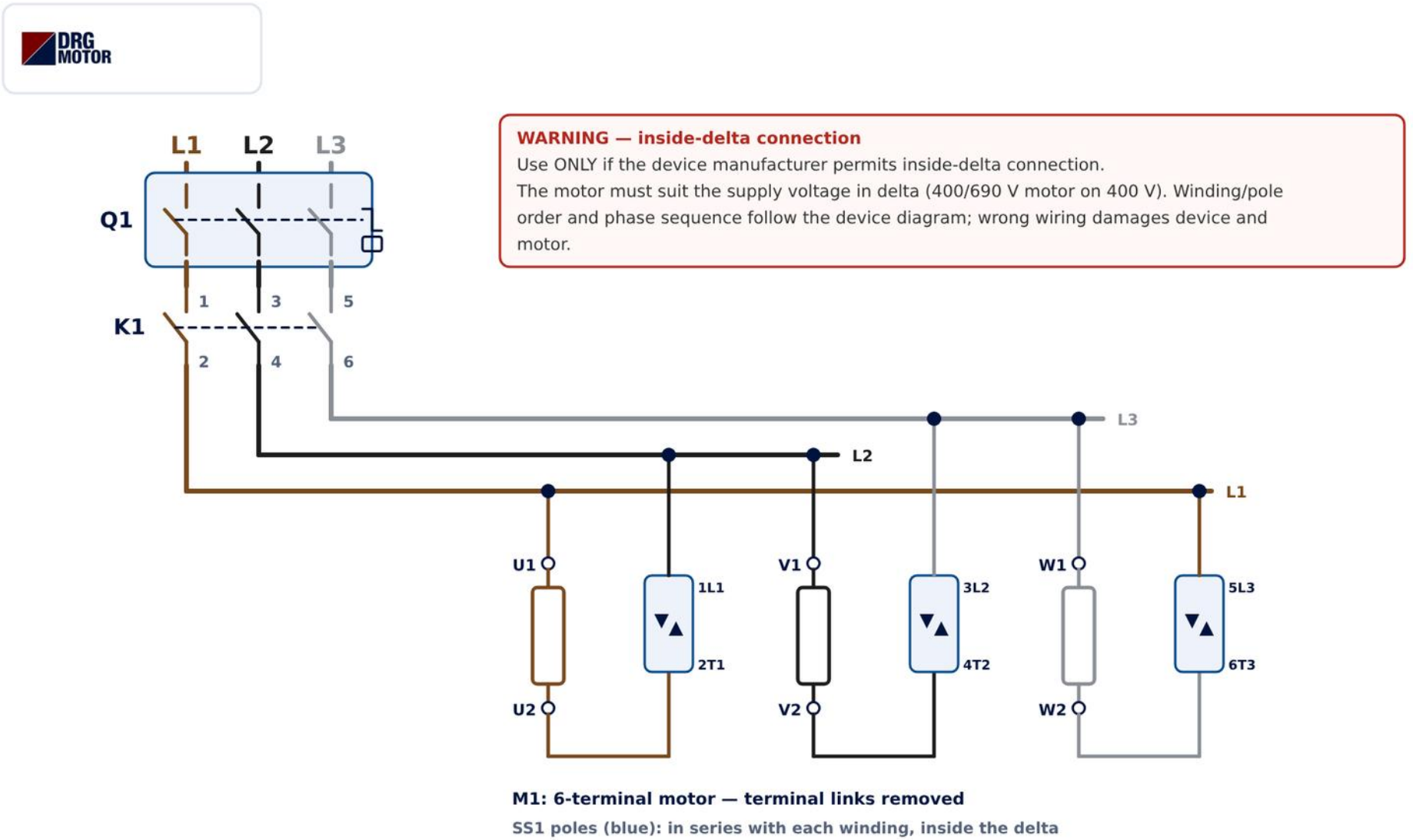
Figure 2



Soft starter control: start/stop, top of ramp → KB, fault output

KA run relay · K1 line contactor (R1) · KB bypass (R2) · H2 fault lamp (R3)

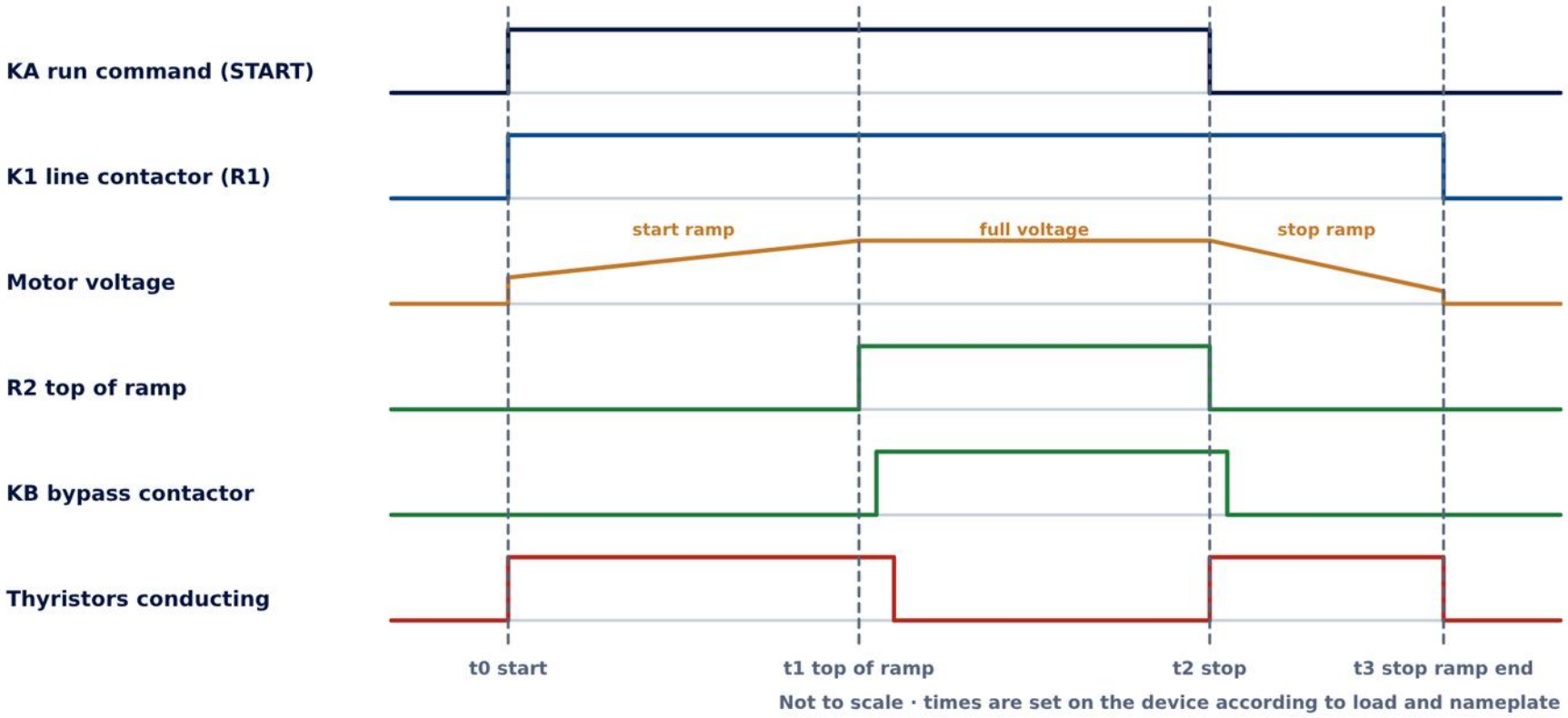
Figure 3



Inside-delta soft starter connection — 6-terminal motor

Poles carry winding current (about 1/√3 of line current) · a K1 line contactor is usually required

Figure 4



Timing diagram: start, ramp, bypass, stop ramp

At stop KB opens first and current returns to the thyristors; K1 opens after the stop ramp

Figure 5

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State	K1	Thyristors	KB	R2 top of ramp	R3 / H2 fault
Standby (supply on, no command)	open	blocked	open	open	none
Start ramp	closed	phase-angle controlled	open	open	none
Running on bypass	closed	bypassed (current in KB)	closed	closed	none
Stop ramp (if selected)	closed	conducting, voltage reduced	open	open	none
Coast stop	opens	blocked	open	open	none
Fault (trip)	opens	blocked	open	open	H2 on, KA drops

With internal bypass, the KB column refers to the device’s internal contacts. Terminal names vary by device.

Soft starter state table: K1, thyristors, KB and relay outputs

Based on outputs R1/R2/R3 of the control circuit

Figure 6