External Start-Stop and Direction Command on a Drive

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Article address: https://drgmotor.com/en/blog/electric-motors/drive-external-start-stop-direction

Technical assumptions

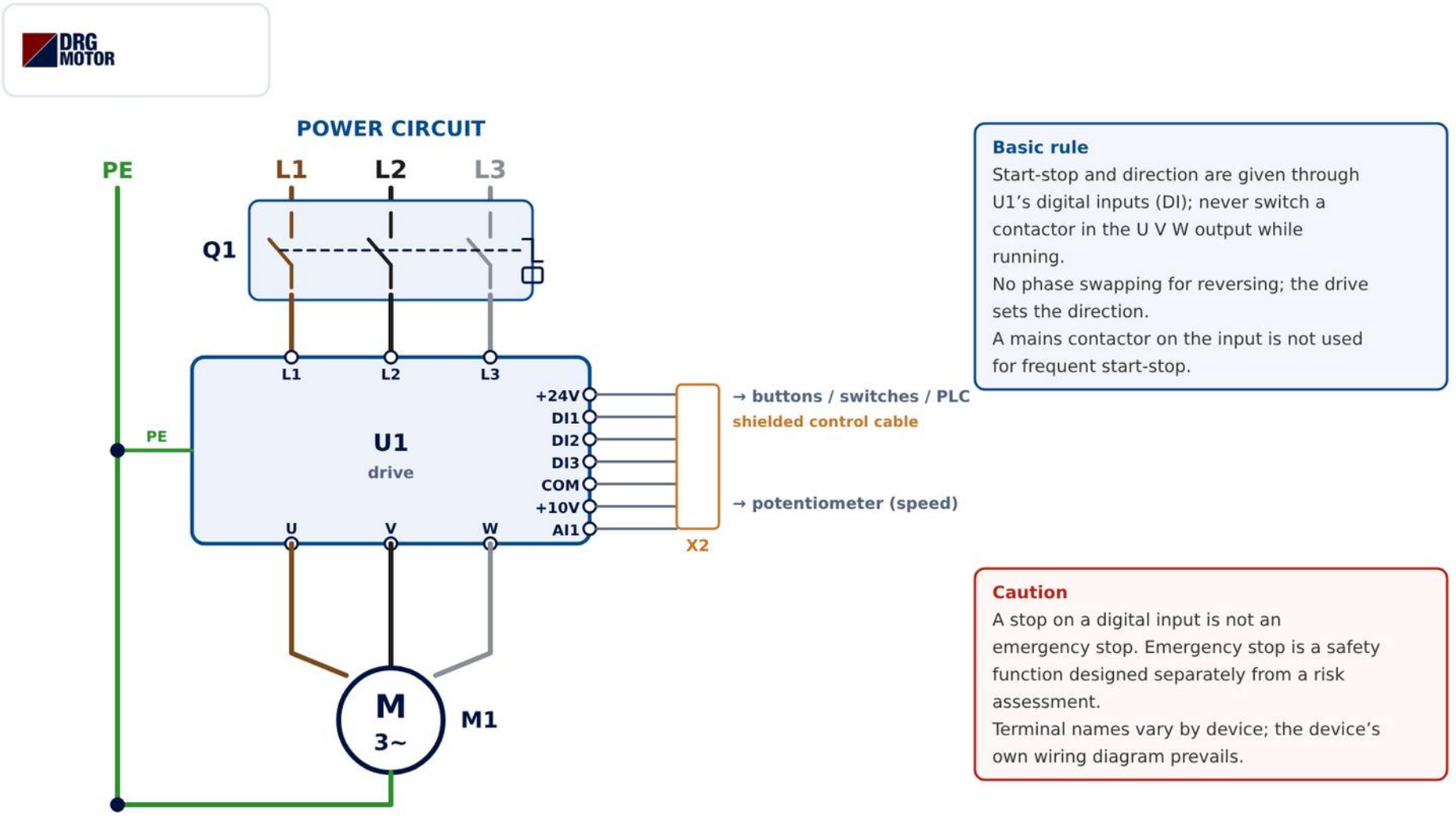
- 400 V 50 Hz three-phase supply; control inputs are shown with the drive’s internal 24 V DC supply.
- Terminal names (L1 L2 L3, U V W, PE, +24V, DI1–DI3, COM, +10V, AI1) are generic and vary by device; the device’s own wiring diagram prevails.
- Two-wire / three-wire mode, input functions, stop mode, ramp times and auto-restart are selected in the drive settings; no setting values are given here.
- A stop on a digital input is not an emergency stop; emergency stop is designed separately from a risk assessment.
- 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-90L-4: https://drgmotor.com/en/buy-electric-motors-online/1-5-kw-1500-rpm-three-phase-motor-aluminium-drg-90l-4
- DRG-100L2-4: https://drgmotor.com/en/buy-electric-motors-online/3-kw-1500-rpm-three-phase-motor-aluminium-drg-100l2-4
- DRG-112M-4: https://drgmotor.com/en/buy-electric-motors-online/4-kw-1500-rpm-three-phase-motor-aluminium-drg-112m-4
- DRG-132M-4: https://drgmotor.com/en/buy-electric-motors-online/7-5-kw-1500-rpm-three-phase-motor-aluminium-drg-132m-4
- https://drgmotor.com/en/buy-electric-motors-online



Basic rule

Start-stop and direction are given through U1's digital inputs (DI); never switch a contactor in the U V W output while running.

No phase swapping for reversing; the drive sets the direction.

A mains contactor on the input is not used for frequent start-stop.

Caution

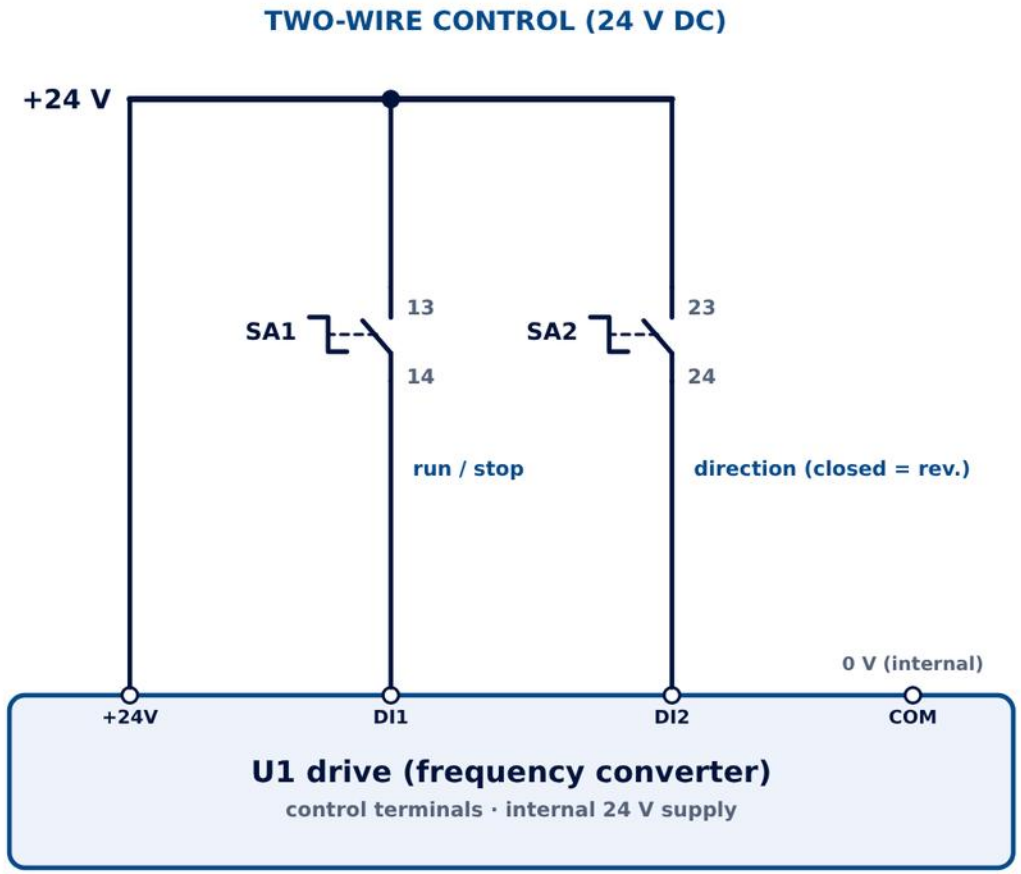
A stop on a digital input is not an emergency stop. Emergency stop is a safety function designed separately from a risk assessment.

Terminal names vary by device; the device's own wiring diagram prevails.

Drive power circuit and control terminals

L1 L2 L3 → Q1 → U1 → U V W → M1 3~ · control: +24V, DI1–DI3, COM, +10V, AI1 (generic names)

Figure 1



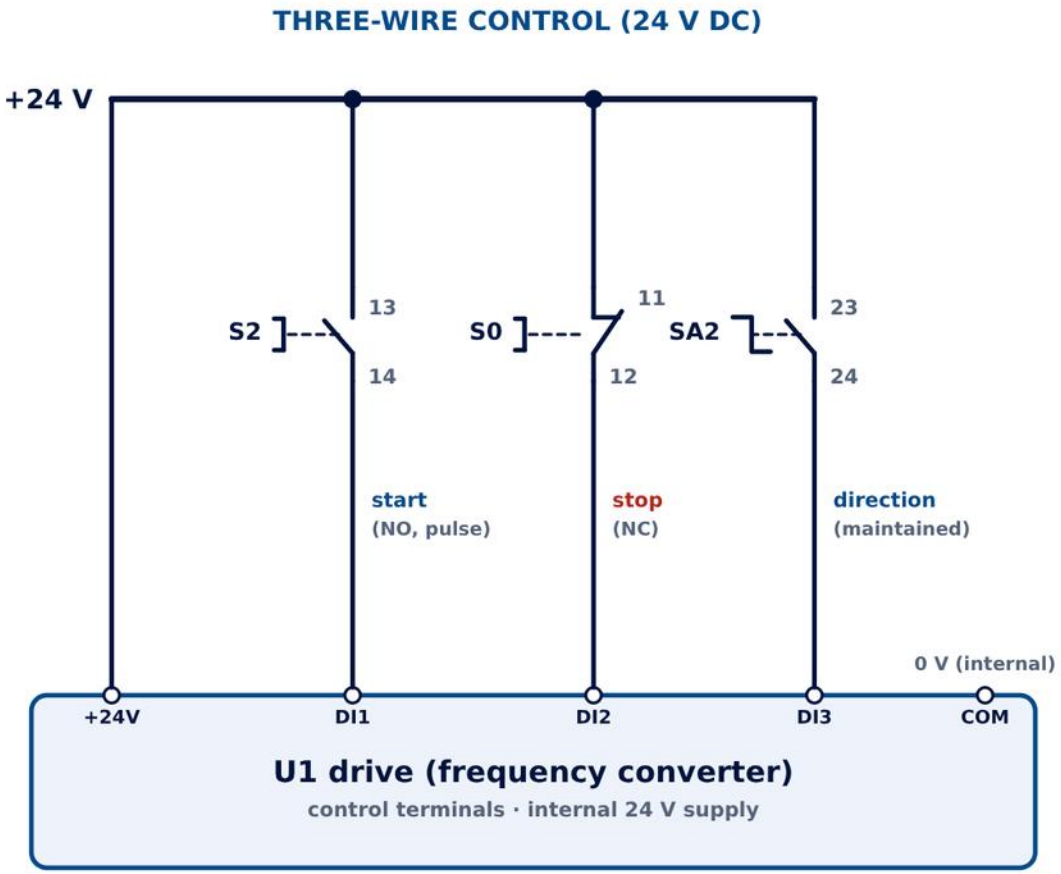
Two-wire logic
DI1 closed → drive runs (accelerates on ramp).
DI1 open → stops with the selected stop mode.
DI2 open → forward · DI2 closed → reverse.
Maintained contact: the command lasts while it is closed.

Unexpected restart risk
If SA1 is still closed when power returns, the motor may restart on its own.
Set the device’s start interlock / auto-restart function according to the machine risk.

Two-wire control: DI1 maintained contact = run, DI2 = direction

Drive’s internal +24 V supply · source (PNP) wiring · terminal names vary by device

Figure 2



Three-wire logic

S2 (start) pulse → drive runs and holds the command internally.
S0 (stop, NC) opens → stops.
SA2 → direction (DI3).
Three-wire mode and input functions are selected in the drive settings.

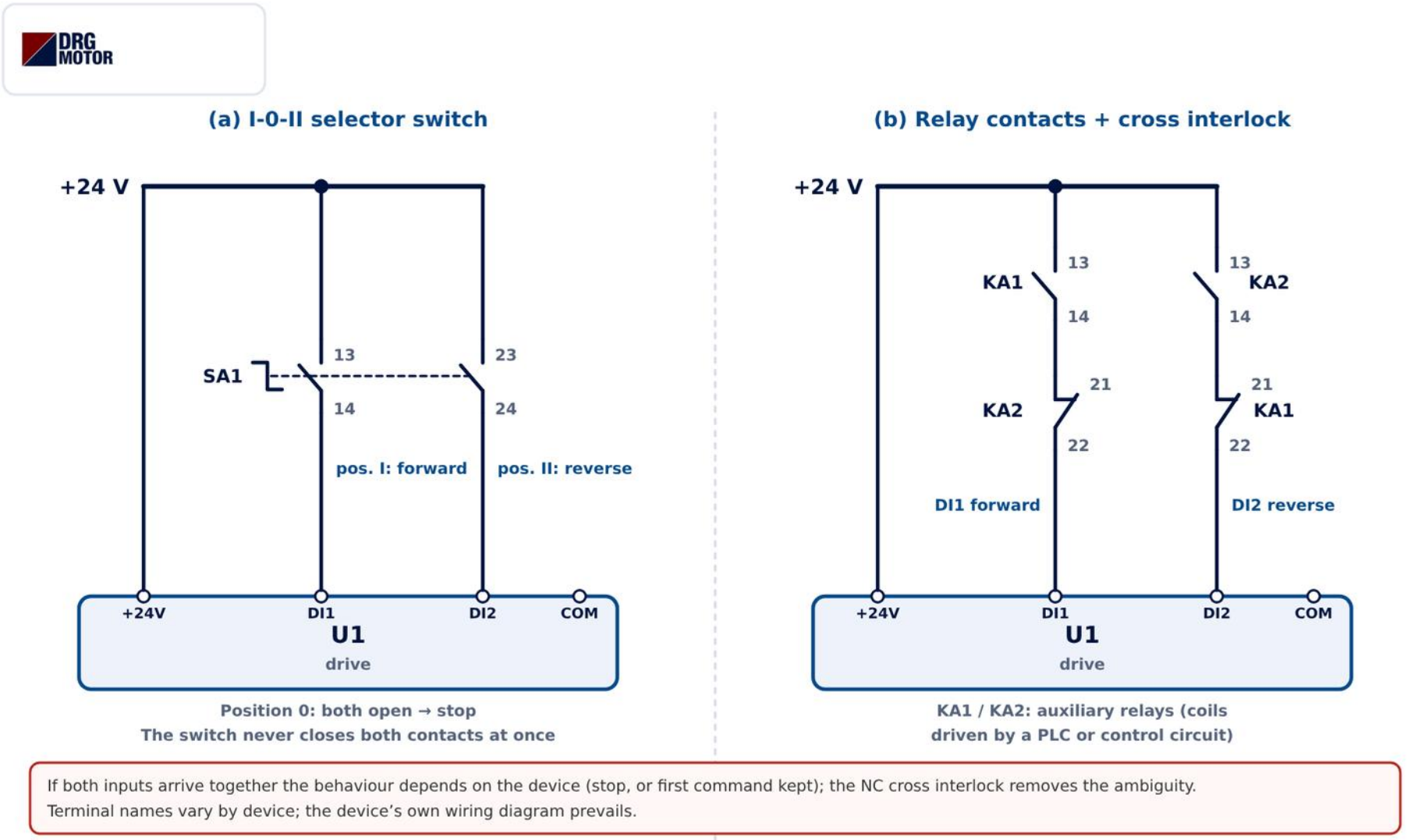
Note

NC stop: a broken wire stops the motor.
After power returns a new start pulse is needed.
Terminal names vary by device; the device's own wiring diagram prevails.

Three-wire control: start NO pulse, stop NC, direction switch

Self-holding is done inside the drive; no external relay · source (PNP) wiring

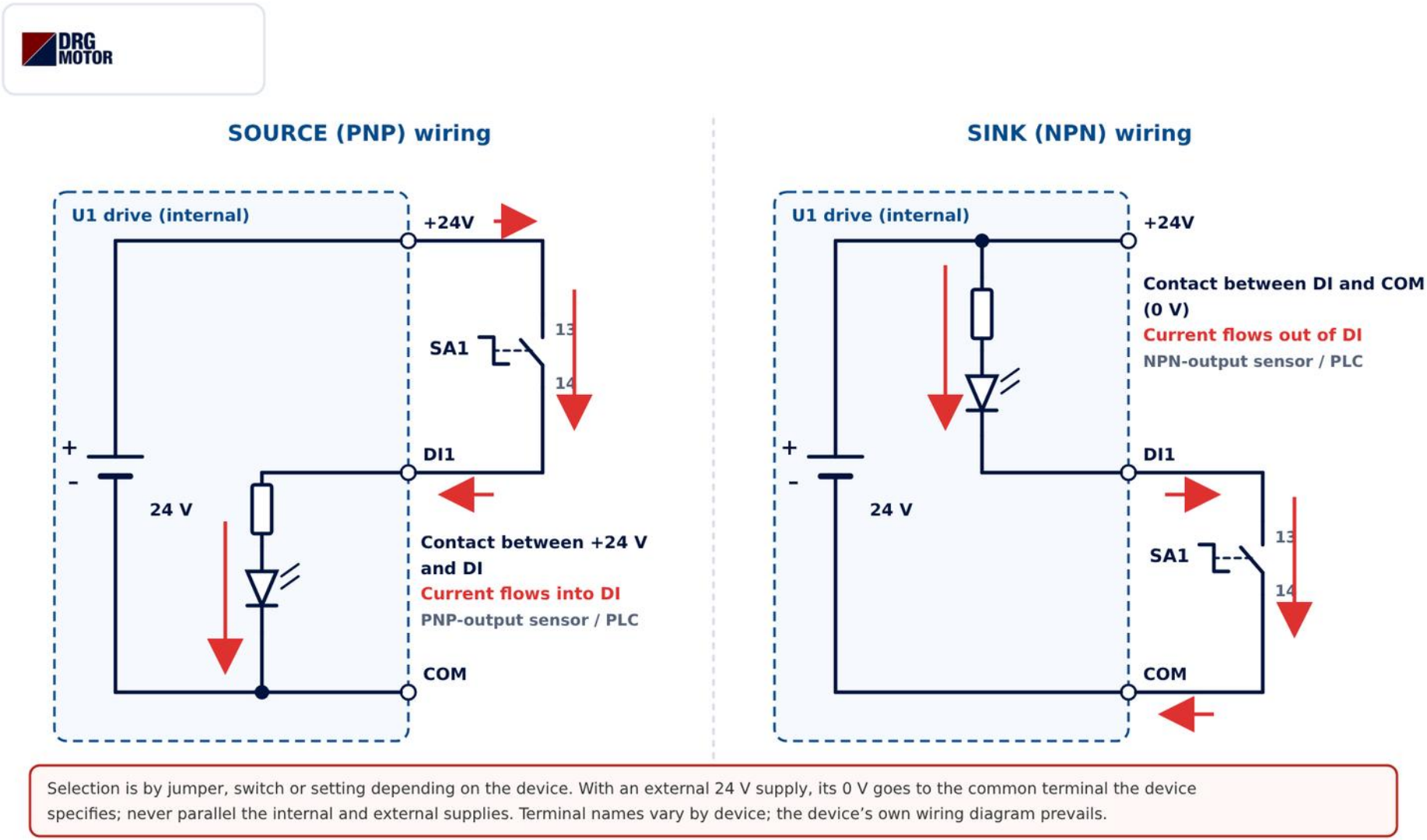
Figure 3



Forward/reverse with two inputs: DI1 forward, DI2 reverse

Each input is both run and direction command · opening the contact stops the motor on ramp

Figure 4



Selection is by jumper, switch or setting depending on the device. With an external 24 V supply, its 0 V goes to the common terminal the device specifies; never parallel the internal and external supplies. Terminal names vary by device; the device's own wiring diagram prevails.

Internal 24 V and COM: source (PNP) versus sink (NPN) wiring

Red arrows: current direction · LED: input optocoupler · the same switch, two different places

Figure 5

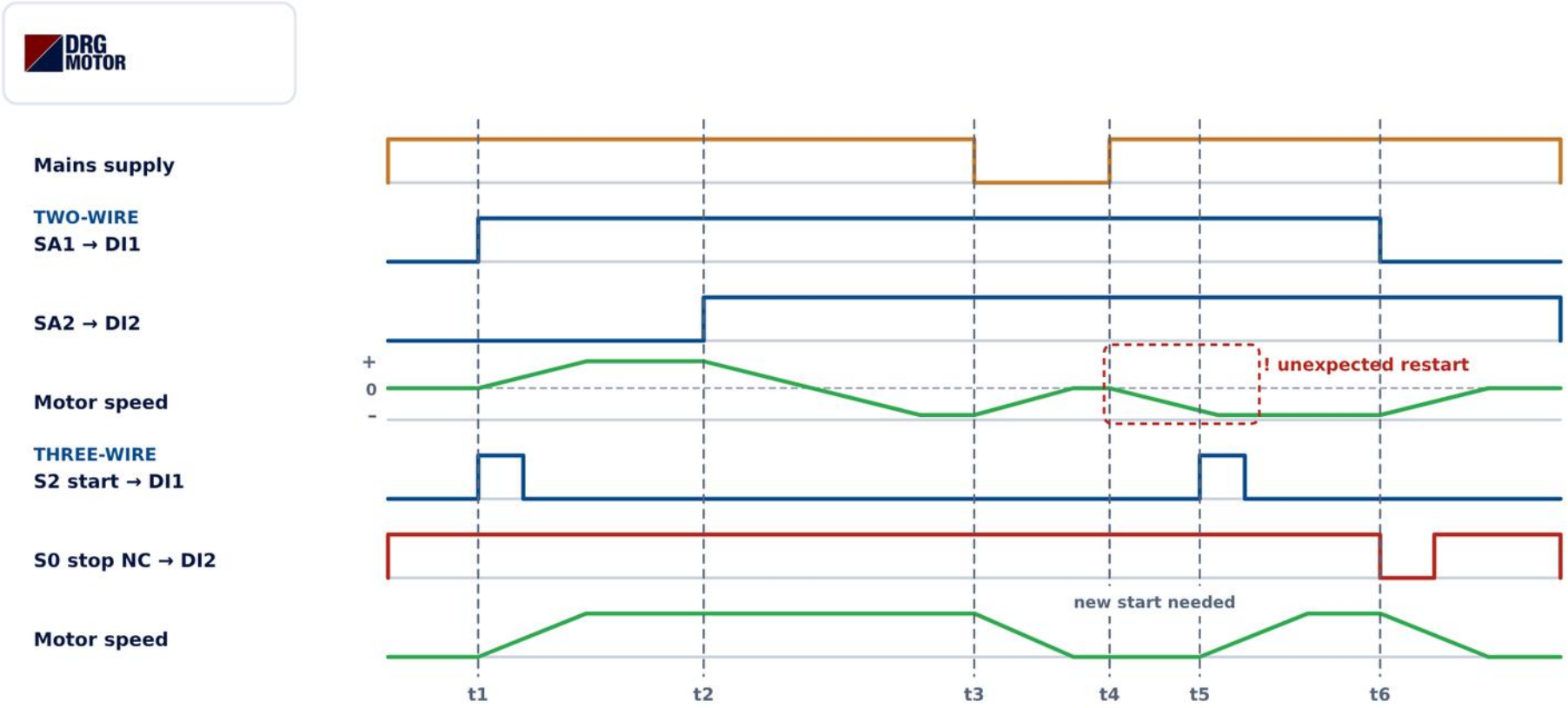
Mode	Input state	Drive command	Motor
Two-wire	DI1 open	stop	stopped
Two-wire	DI1 closed, DI2 open	run forward	runs forward
Two-wire	DI1 closed, DI2 closed	run reverse	runs reverse
Two-wire	power back, DI1 still closed	run (command present)	may restart by itself!
Three-wire	S2 pulse, S0 closed	run (drive holds)	runs
Three-wire	S2 released	run continues	runs
Three-wire	S0 pressed (DI2 open)	stop	stopped
Three-wire	power lost and restored	command cleared	stopped; new start needed
Fwd/rev	DI1 / DI2 alone	forward / reverse	runs that way
Fwd/rev	DI1 and DI2 together	device-dependent	stops / first command

“Open/closed” refers to the input contact. Stop mode (ramp / coast) and input functions depend on the drive settings.

State table: two-wire, three-wire and forward/reverse inputs

Red rows need care: unexpected restart and both inputs together

Figure 6



t1 run command · t2 two-wire: DI2 closes → speed passes through zero into reverse · t3 power lost, motor coasts · t4 power returns: in the two-wire circuit DI1 is still closed so the motor may restart by itself; the three-wire circuit stays stopped · t5 three-wire: new start pulse · t6 two-wire: DI1 opens, three-wire: S0 pressed → ramp stop.
Ramp times not to scale; set on the drive according to load and motor nameplate.

Timing diagram: power loss in two-wire and three-wire control

High level = contact closed / supply on · speed curve: up forward, down reverse

Figure 7