PLC Drive Speed Control: 0–10 V and 4–20 mA

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Article address: https://drgmotor.com/en/blog/electric-motors/plc-drive-speed-control-0-10v-4-20ma

Technical assumptions

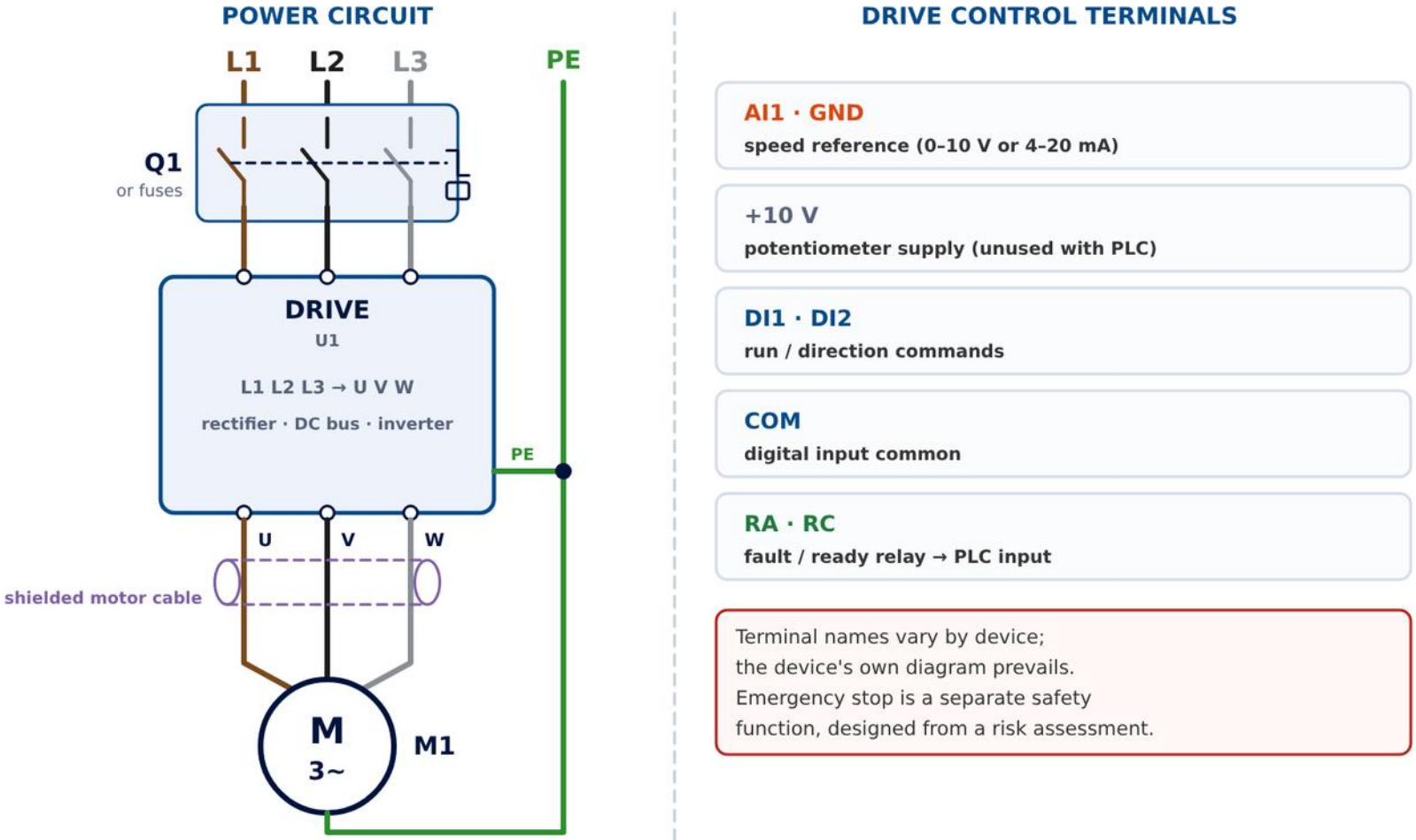
- 400 V 50 Hz three-phase supply, drive with three-phase induction motor
- PLC digital I/O 24 V DC; analogue output 0–10 V or 4–20 mA
- Scaling example: 0–10 V and 4–20 mA ↔ 0–50 Hz, linear
- Terminal names are generic; the device's own wiring diagram prevails
- Values are examples; device selection and settings follow the motor nameplate and device documentation

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

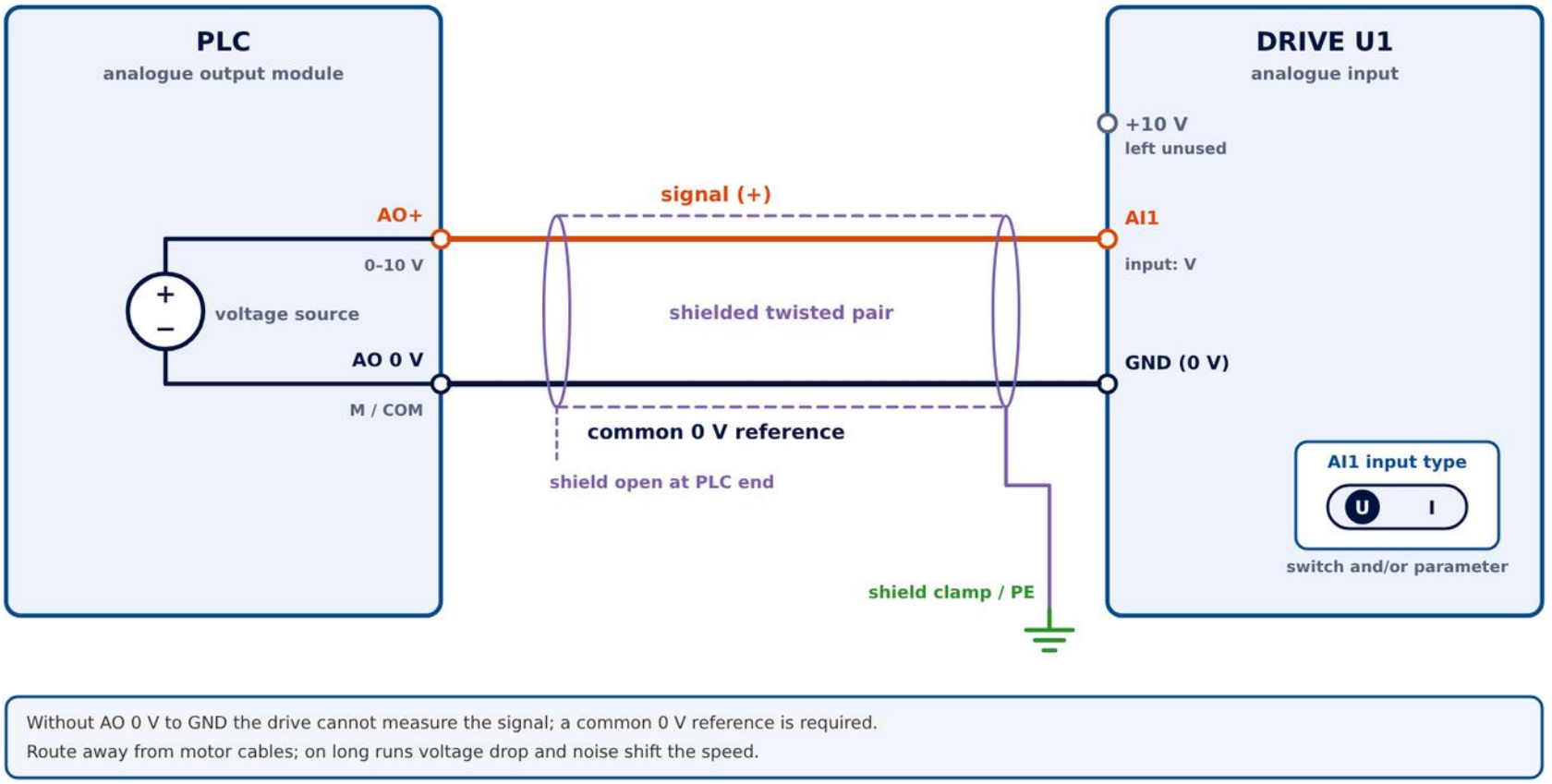
- DRG-90L-4 (1,5 kW, 1500 rpm): https://drgmotor.com/en/buy-electric-motors-online/1-5-kw-1500-rpm-three-phase-motor-aluminium-drg-90l-4
- DRG-112M-4 (4 kW, 1500 rpm): https://drgmotor.com/en/buy-electric-motors-online/4-kw-1500-rpm-three-phase-motor-aluminium-drg-112m-4
- DRG-132M-4 (7,5 kW, 1500 rpm): 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



PLC-controlled drive: power circuit and control terminals

L1-L2-L3 → Q1 → drive U1 → U V W → M1 3~ · PE · 400 V 50 Hz example

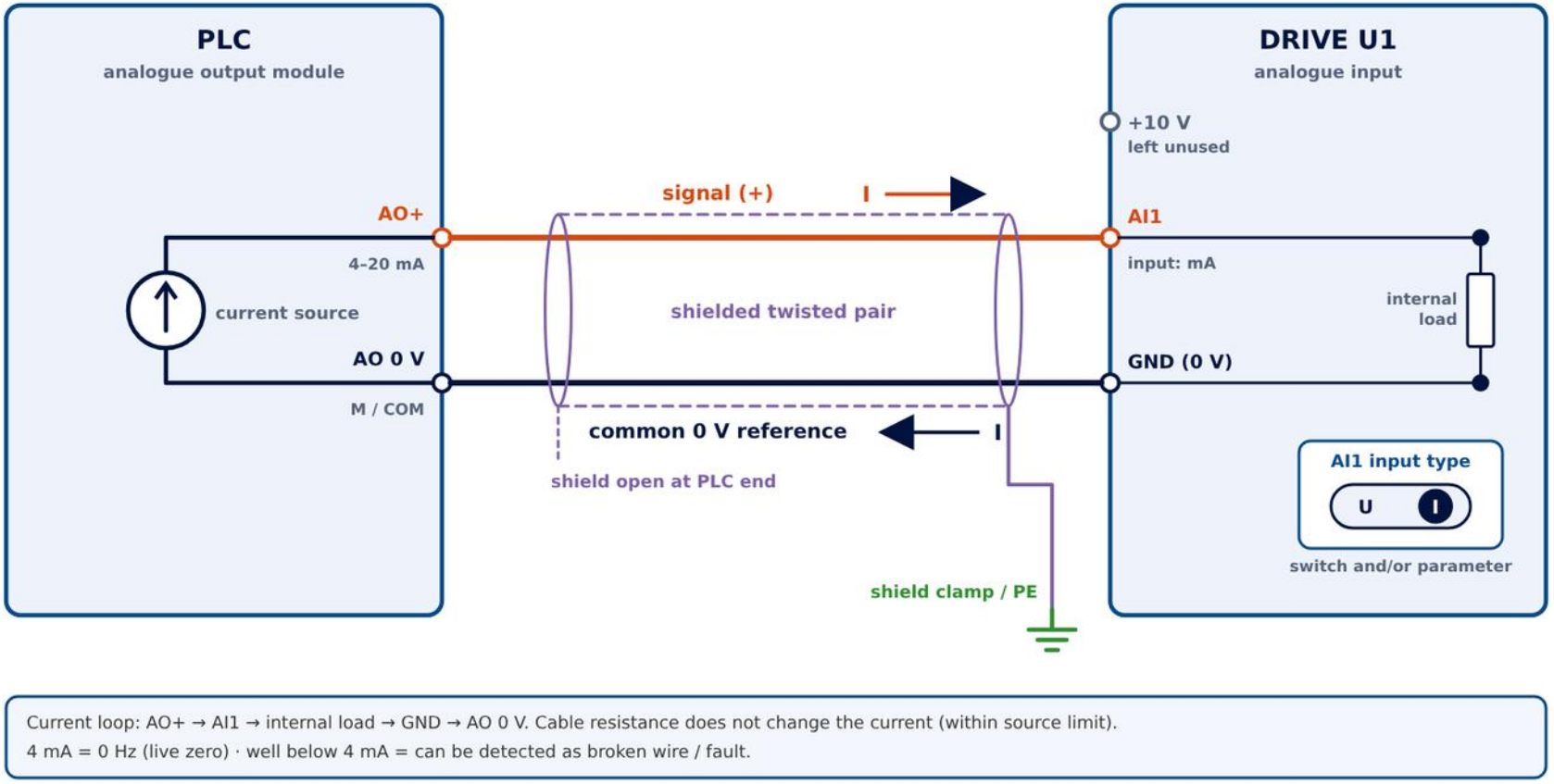
Figure 1



PLC analogue output → drive AI1: 0–10 V voltage wiring

AO+ → AI1 · AO 0 V → GND · shield at one end (drive side) · terminal names vary by device

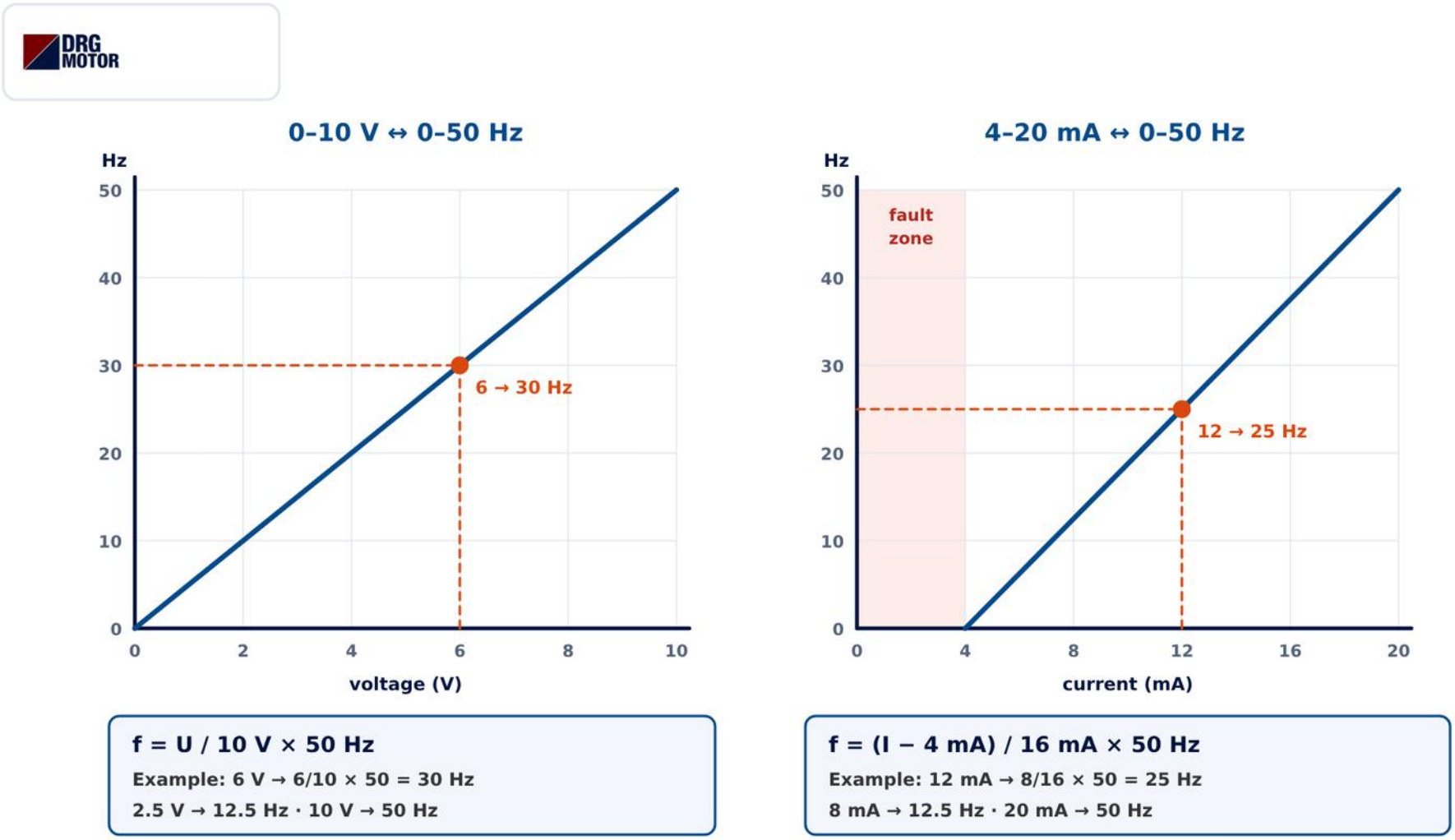
Figure 2



PLC analogue output → drive AI1: 4–20 mA current wiring

AO+ → AI1 · AO 0 V → GND · shield at one end (drive side) · terminal names vary by device

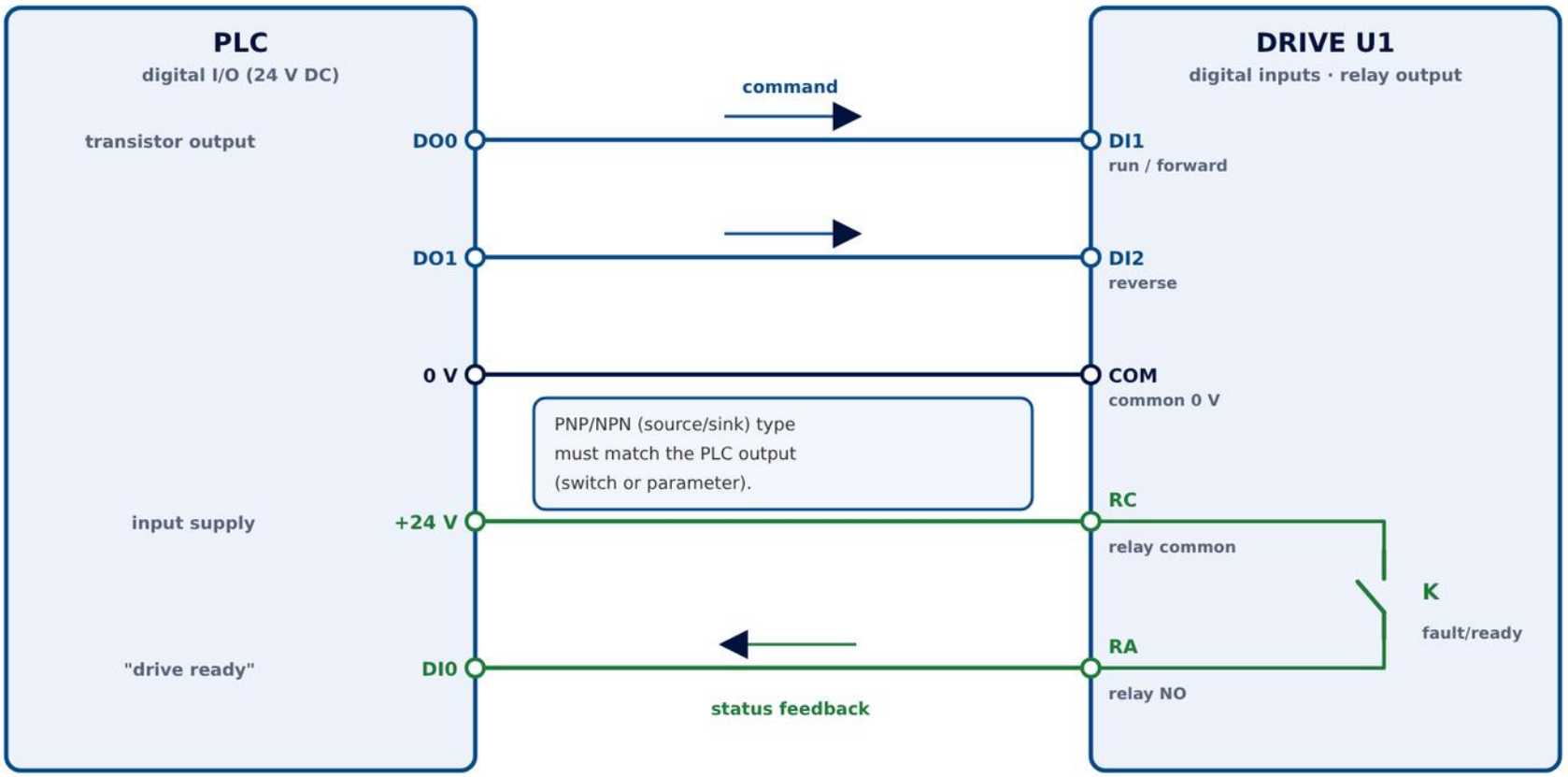
Figure 3



Analogue signal → frequency scaling

Linear scaling and intermediate-value examples for 0–10 V and 4–20 mA · below 4 mA = fault zone

Figure 4

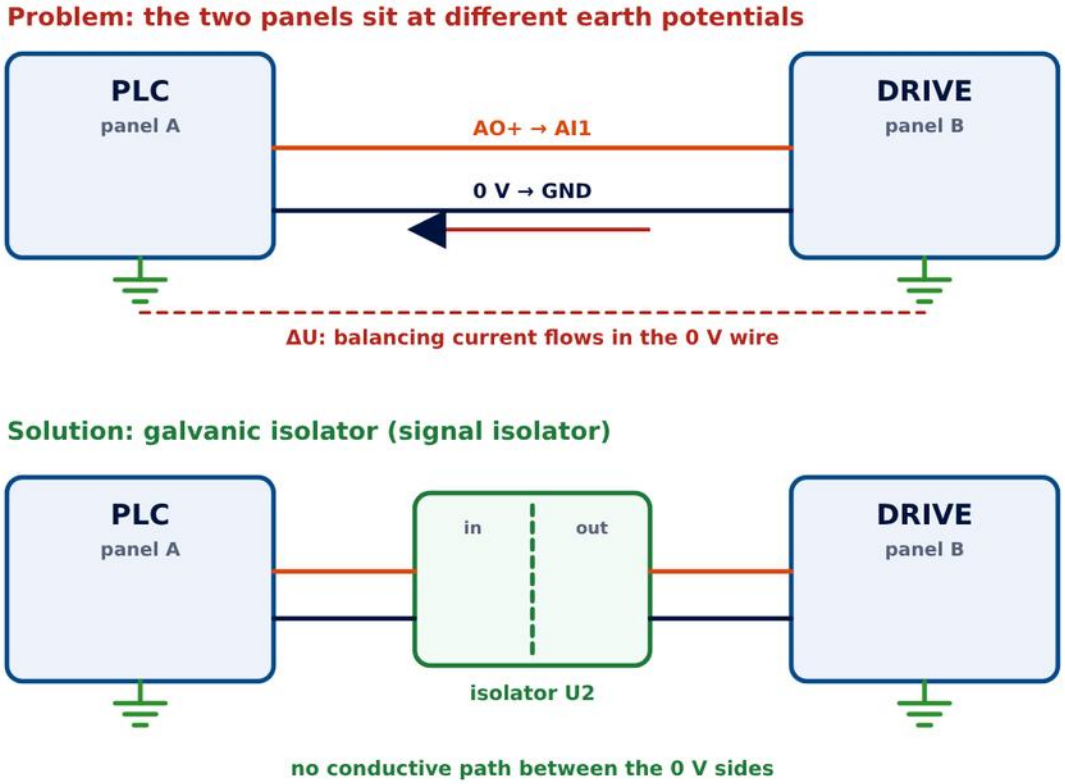


To make a broken wire look like a fault, set the relay to a function that keeps the contact closed when healthy.

PLC digital outputs for run/direction and drive fault relay back to the PLC

DO0 → DI1 · DO1 → DI2 · 0 V → COM · +24 V → RC · RA → DI0 · terminal names vary by device

Figure 5



When is an isolator needed?

- **PLC and drive in separate panels with different earth points**
- **Neither the PLC output nor the drive input is isolated (check data)**
- **One analogue channel feeds several drives or devices**
- **Speed wanders with a steady signal, or offset at zero**
- **Long run, heavy noise, large drives close to the cable**

Match the isolator input/output type (V or mA) and its supply to the devices.

Galvanic isolation of the analogue signal: ground loop and remedy

Different earth potentials drive current through the 0 V wire; the isolator breaks that path

Figure 6