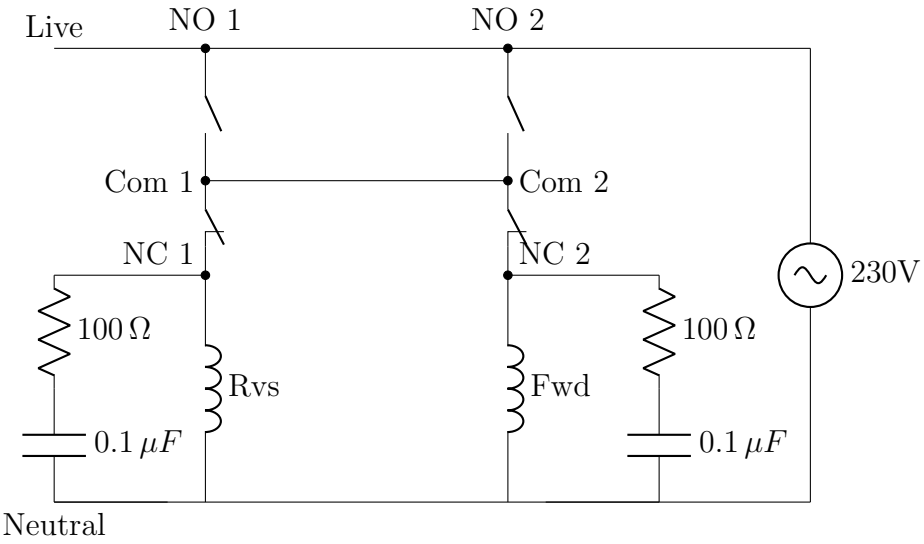
Electrical Interlock Control Circuit

Chat GPT

Thursday 15th May, 2025



Operation Summary

Relay Contact Behavior

- When **Relay 1** is energized:
  - NO 1 closes (connects to Com 1).
  - NC 1 opens (disconnects from Com 1).
- When **Relay 2** is energized:
  - NO 2 closes (connects to Com 2).
  - NC 2 opens (disconnects from Com 2).

When Relay 1 is ON

- Current path:

  `Live` → `NO 1` → `Com 1` → `Com 2` → `NC 2` → `Fwd coil` → `Neutral`

- **Forward motor is energized.**
- If Relay 2 turns ON, NC 2 opens, disabling the forward motor.

When Relay 2 is ON

- Current path:

  `Live` → `NO 2` → `Com 2` → `Com 1` → `NC 1` → `Rvs coil` → `Neutral`

- **Reverse motor is energized.**
- If Relay 1 turns ON, NC 1 opens, disabling the reverse motor.

Electrical Interlock

- Prevents both relays from energizing their respective coils simultaneously.
- Cross-wired NC contacts ensure mutual exclusion between forward and reverse drive circuits.

Snubber Protection Considerations

- Each contactor coil is an inductive load and can generate voltage spikes when de-energized.
- A snubber circuit, consisting of a resistor and capacitor in series, is placed across each coil to suppress these spikes.
- This protection reduces arcing at relay contacts, prevents EMI, and prolongs the life of both the coil and control components.
- Recommended values:
  - Capacitor: $0.1\,\mu$F, X2-rated, at least 275VAC.
  - Resistor: $100\,\Omega$, rated 1W or higher.
- The RC snubber is connected directly across the terminals of the contactor coil.