

PROJECT ABSTRACT

Single-Phase Motor Starter Panel with Thermal Overload Protection

A bench-built single-phase DOL motor starter panel with power contactor, adjustable thermal overload relay, MCB protection, no-volt release wiring and start/stop/e-stop station — delivered built-to-order with wired panel, diagrams, test procedure, report, PPT and viva kit.

01. Title

Single-Phase Motor Starter Panel with Thermal Overload Protection

02. Introduction / Background

Single-phase induction motors drive pumps, compressors and fans across homes, farms and small industry — and every one should sit behind a proper starter panel. Direct switching with a plain switch gives no overload protection: a stalled motor draws locked-rotor current until its windings burn, and after a supply interruption a plain switch restarts the motor the instant power returns — a genuine hazard. The standard answer is the DOL starter: a contactor switched through start/stop pushbuttons, a thermal overload relay tripping on sustained overcurrent, and a control circuit wired so the contactor cannot re-energize by itself after a power failure (no-volt release). This project builds that exact panel on a bench board with real switchgear, wiring practice, and a test procedure proving each protection function.

03. Problem Statement

Students study motor protection as relay characteristics on paper but rarely wire a starter, set an overload relay, or demonstrate no-volt release behavior. The project addresses this by delivering a real wired panel — MCB, contactor, thermal overload relay, pushbutton station, e-stop and pilot lamps — with power and control circuit diagrams and a buyer-run procedure that verifies overload trip, no-volt release and emergency stop on the bench.

04. Objectives

- Wire a single-phase DOL starter: MCB -> contactor -> thermal overload relay -> motor.
- Provide adjustable thermal overload protection with documented setting procedure.

- Implement no-volt release: contactor drops on supply failure and requires manual restart.
- Provide start/stop pushbuttons with seal-in logic plus a latching emergency stop.
- Indicate supply, run and trip states with pilot lamps.
- Deliver power/control wiring diagrams and a buyer-run protection test procedure plus the student kit.

05. Proposed Methodology

The methodology has three stages. (1) Panel build: switchgear is mounted in an enclosure on DIN rail with terminal blocks; power and control circuits are wired per the provided diagrams with correct wire sizing. (2) Setting: the overload relay is set to the demo motor's rated current following the documented procedure. (3) Verification: the buyer runs the test procedure — simulated overload to prove trip and lockout, supply interruption to prove no-volt release, and e-stop operation — recording results for the report.

06. System Architecture / Working

Power circuit: 230 V AC -> MCB (short-circuit protection/isolation) -> contactor main contacts -> thermal overload relay heaters -> single-phase demo motor. Control circuit: start pushbutton (NO) seals the contactor coil through the stop button (NC), overload NC contact and latched e-stop, with an auxiliary contact providing seal-in. Pilot lamps show supply healthy, motor running and overload tripped. Pressing start energizes the contactor; overload trip, stop, e-stop or supply failure all drop it, and restart always requires a fresh start press.

07. Hardware / Software Requirements

- Hardware: single-phase power contactor with auxiliary contacts, thermal overload relay (adjustable), MCB, start/stop pushbutton station, latching emergency stop, pilot lamps, panel enclosure with DIN rail and terminal blocks, fractional-HP single-phase demo motor.
- Software: none — this is a pure electromechanical build; documentation covers theory and test.
- Test: multimeter and clamp meter for the buyer's verification procedure.

08. Expected Outcomes

A wired, working DOL starter panel that starts/stops the demo motor correctly, trips and locks out on simulated overload, stays off after supply interruption until restarted, and stops instantly on e-stop — each behavior verified by the buyer's own test procedure; plus wiring diagrams, report, PPT and viva Q&A.

09. Applications

DOL starters are the workhorse of small motor installations: agricultural pumps, workshop machinery, compressors and HVAC. The panel teaches the switchgear, wiring and protection practices used across that installed base.

10. Future Scope

Star-delta or autotransformer reduced-voltage starting for comparison; soft-starter module retrofit; single-phasing protection relay addition; and energy-monitoring instrumentation on the panel.