



College of Engineering and Technology
Electrical and Control Engineering Department



Automated Industrial Systems I

EE512

EX2: Star/Delta Motor Starter

Lecturer name:

Student name :

Registration # :

Experiment 2

Star/Delta Motor Starter

1- Objective

To perform a soft start for a three phase induction motor by star/delta starting method.

2- Theory

The Star Delta starting method is a motor starting mechanism that minimizes the large amount of starting current that motors draw in. The Star Delta, as the name suggests basically involves feeding the motor with $1/\sqrt{3}$ (58%) of the full load current until it attains speed then applying the full load current.

It is required three contactors i.e., the Star Contactor (K3), the Delta Contactor (K4) and the Main Contactor (K1). However for the motor to be started in Star Delta, its internal connection at the terminal box has to be wired in Delta-giving it capability of receiving the full-load current at any instant.


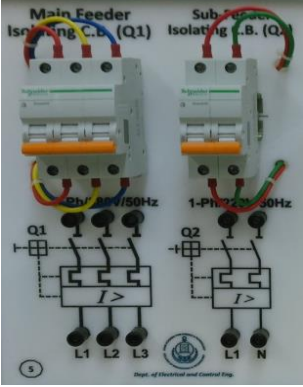
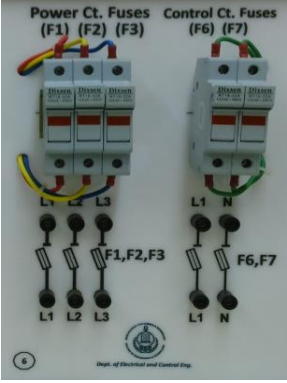
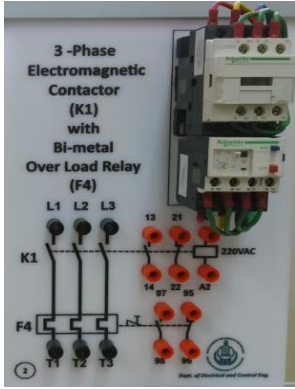
When the power is fed into the circuit, K1 allows current to flow to the motor. Current flows into the motor and out to the K3 which is the star-connected starter. After a specified period defined by the clock delay (usually 5 sec) the K4 (Delta) Closes and K3 opens to allow the motor to receive the full load current and run at delta.

Traditionally, in many regions there was a requirement that all motor connections be fitted with a reduced voltage starter for motors greater than 4KW (5HP). This was to curb the high inrush of starting currents associated with starting induction motors.

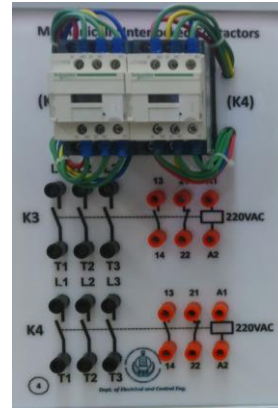
The star and delta contactors are mechanically interlocked i.e., if one of them is closed the other cannot close. This is done to avoid dead short circuit in case both the contactors closing simultaneously. Electrical interlocking has also been provided, by using contactors control contacts.

An advantage of this method could be low or reduced cost as compared to other methods.

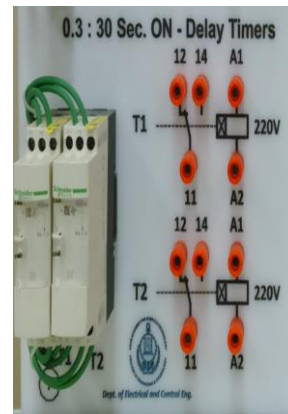
3- Instruments & Equipments

<p>Three phase induction motor</p>	
<p>Main and Sub feeder isolating circuit breakers (board #5)</p>	
<p>Power and control circuits fuses (board #6)</p>	
<p>Three phase electromagnetic contactor with bi-metal overload relay (board #2)</p>	

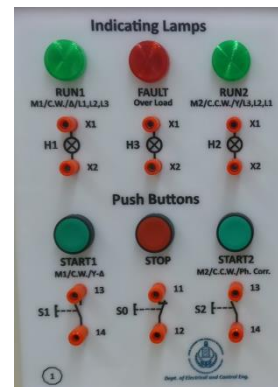
Three phase mechanically interlocked contactors (board #4)



On delay timer (board #7)



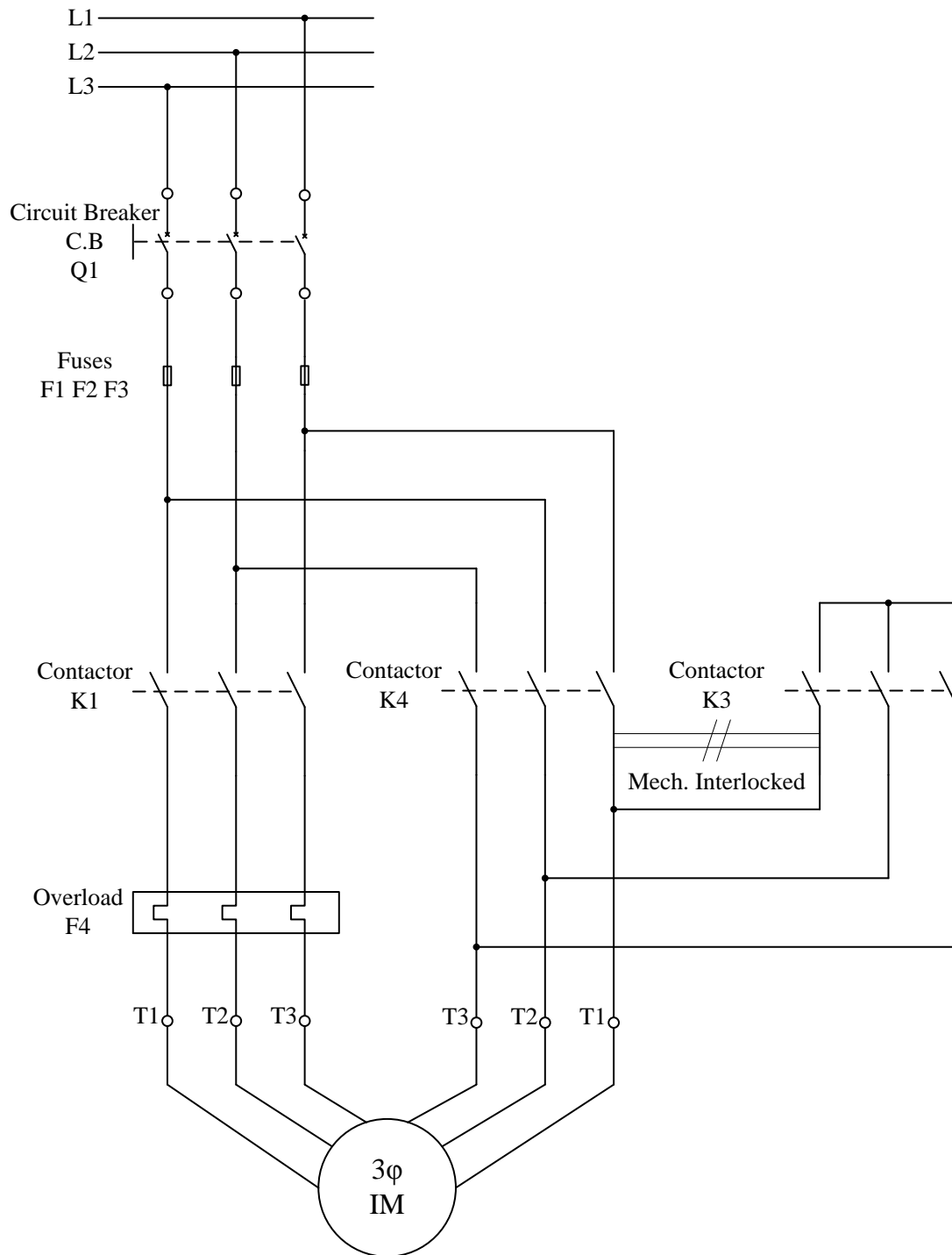
Indicating lamps and Pushbuttons (board #1)



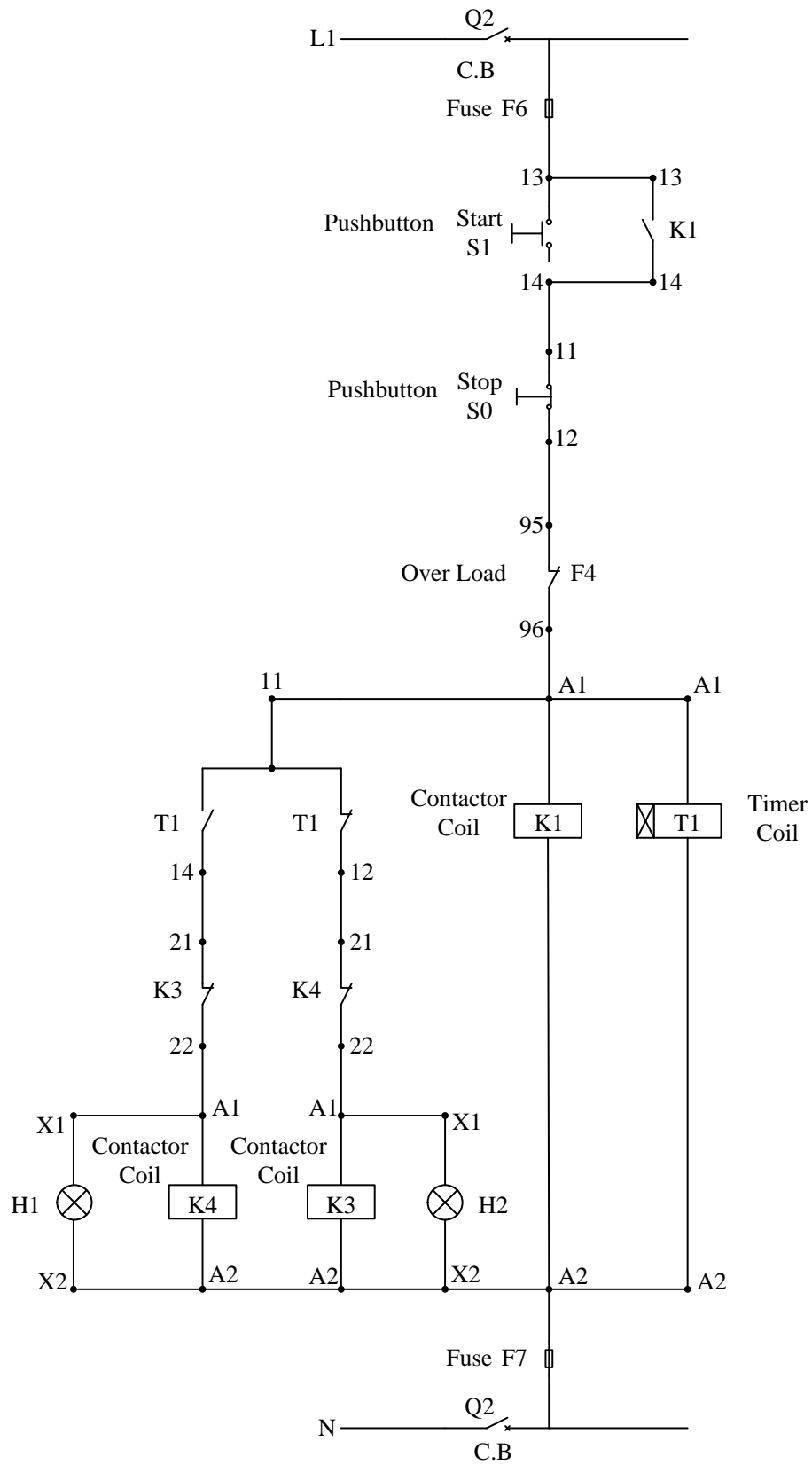
Multimeter



4- Connection



Power Circuit



Control Circuit

Power and Control circuits connections diagram

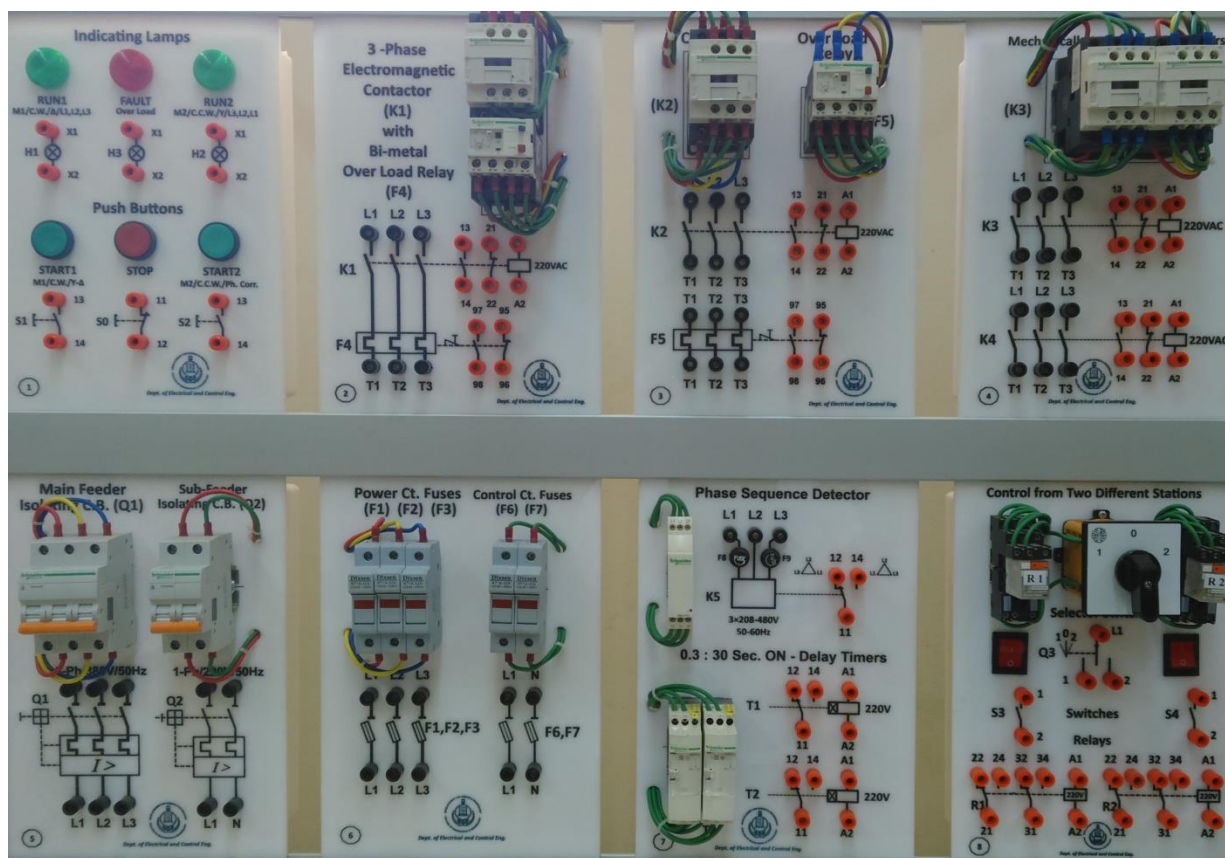
5- Procedure

- a. Connect the circuits as shown in the diagram.
- b. Switch on the main and sub feeder isolating circuit breakers (Q1, Q2).
- c. Use the start and stop pushbuttons for motor operation.
- d. Measure the current firstly in star then in delta connections.

6- Results

Current in star =A
 Current in delta=A

7- Connect the power and control circuits on the following figure



8- Add your own comments

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9- Use internet resources to provide advantages, disadvantages and then discuss different applications of star/delta motor starter circuit

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