Few PLC Starter Programs

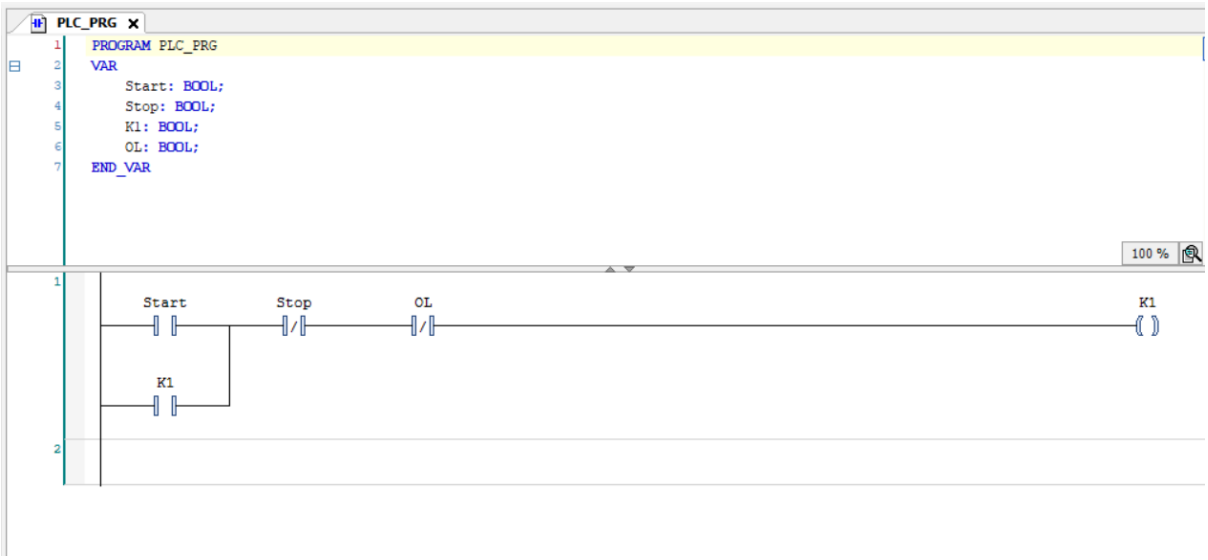
Using EPLAN, CodeSys and TwinCat3

By: Mohamed Awad

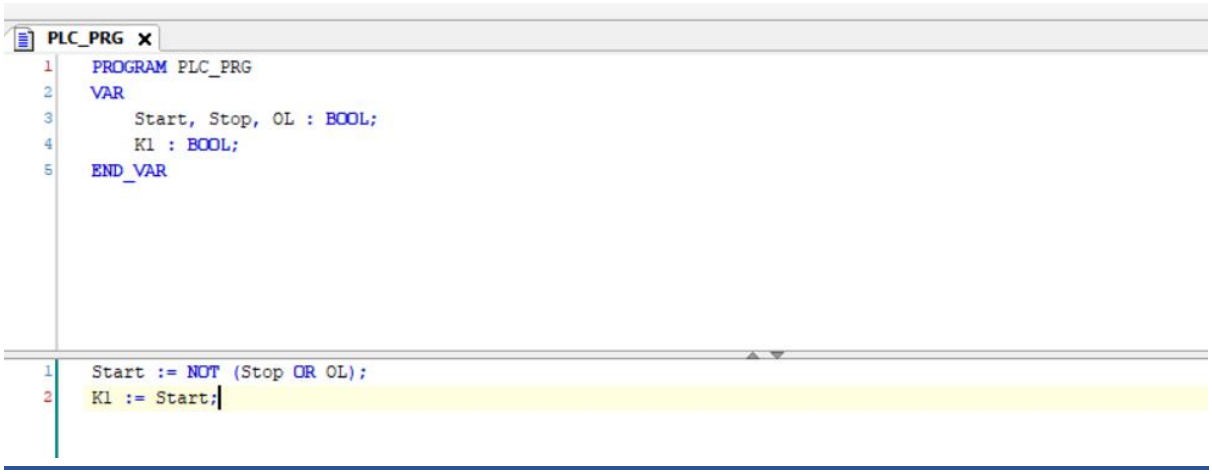
Start Stop Three Phase Motor:

1- EPLAN Power Circuit:

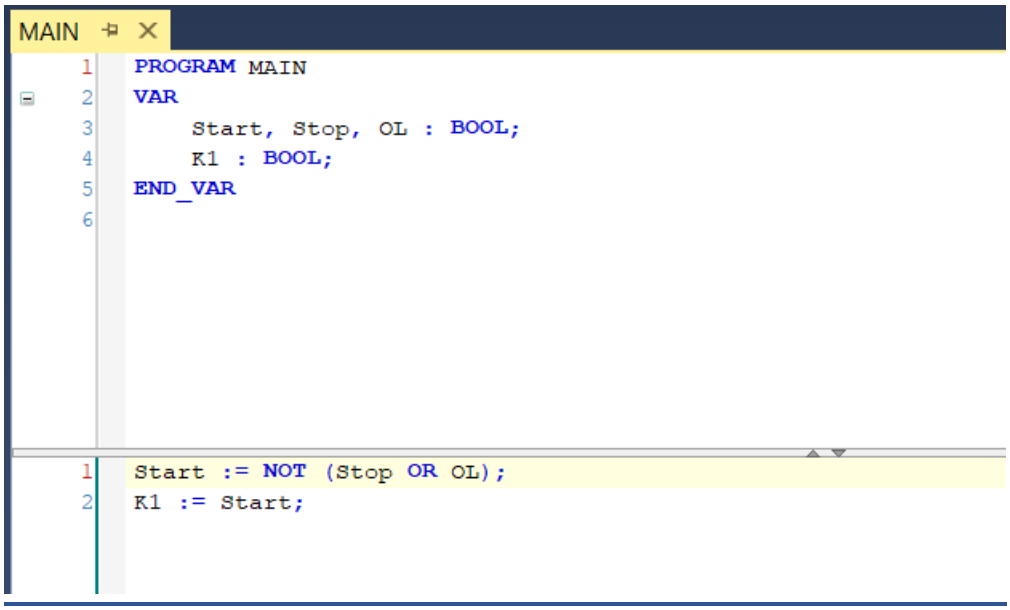
2- CodeSys Ladder Diagram:



3- CodeSys Structured Text:



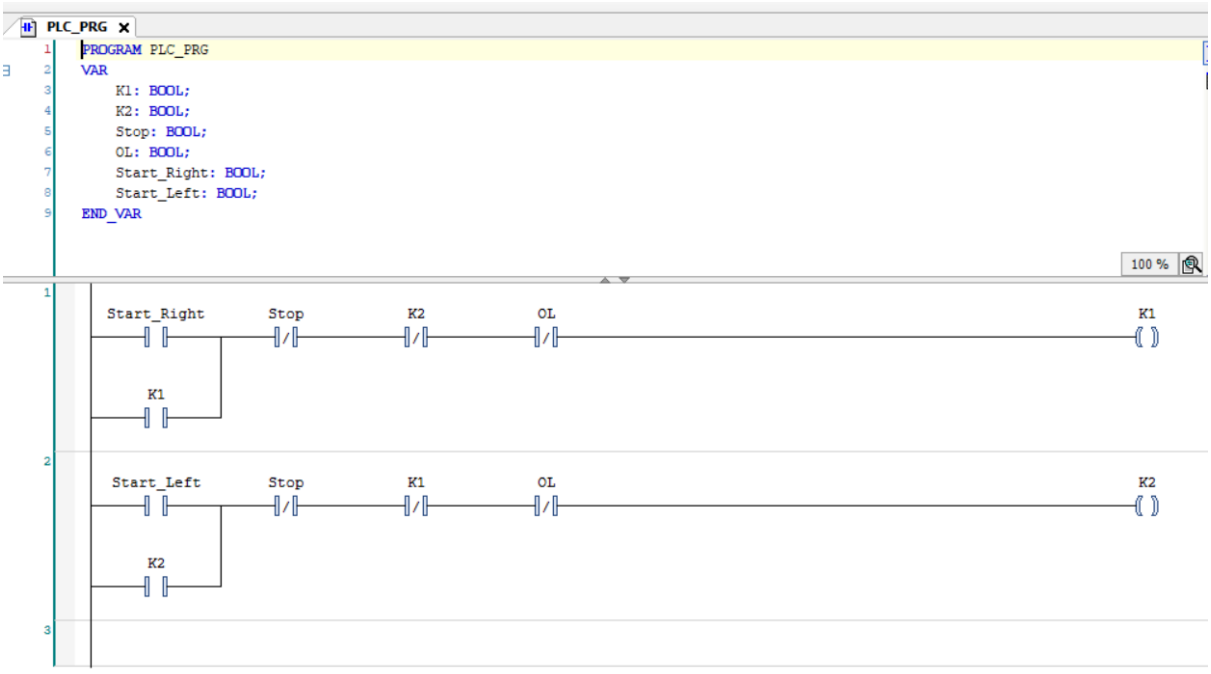
4- TwinCat3 Structured Text:



Indirect Reverse Operation Three Phase Motor:

1- EPLAN Power Circuit:

2- CodeSys Ladder Diagram:



3- CodeSys Structured Text:

PLC_PRG

```
PROGRAM PLC_PRG
VAR
    K1: BOOL;
    K2: BOOL;
    Stop: BOOL;
    OL: BOOL;
    Start_Right: BOOL;
    Start_Left: BOOL;
    Motor_Running: BOOL := FALSE;
END_VAR
```

```
IF NOT (Stop OR OL) THEN
    IF NOT (K1 AND K2) THEN
        IF Start_Right THEN
            K1 := TRUE;
            K2 := FALSE;
            Motor_Running := TRUE;
        ELSIF Start_Left THEN
            K1 := FALSE;
            K2 := TRUE;
            Motor_Running := TRUE;
        END_IF;
    ELSIF Stop THEN
        K1 := FALSE;
        K2 := FALSE;
        Motor_Running := FALSE;
    END_IF;
ELSE
    K1 := FALSE;
    K2 := FALSE;
    Motor_Running := FALSE;
END_IF;
```

4- TwinCat3 Structured Text:

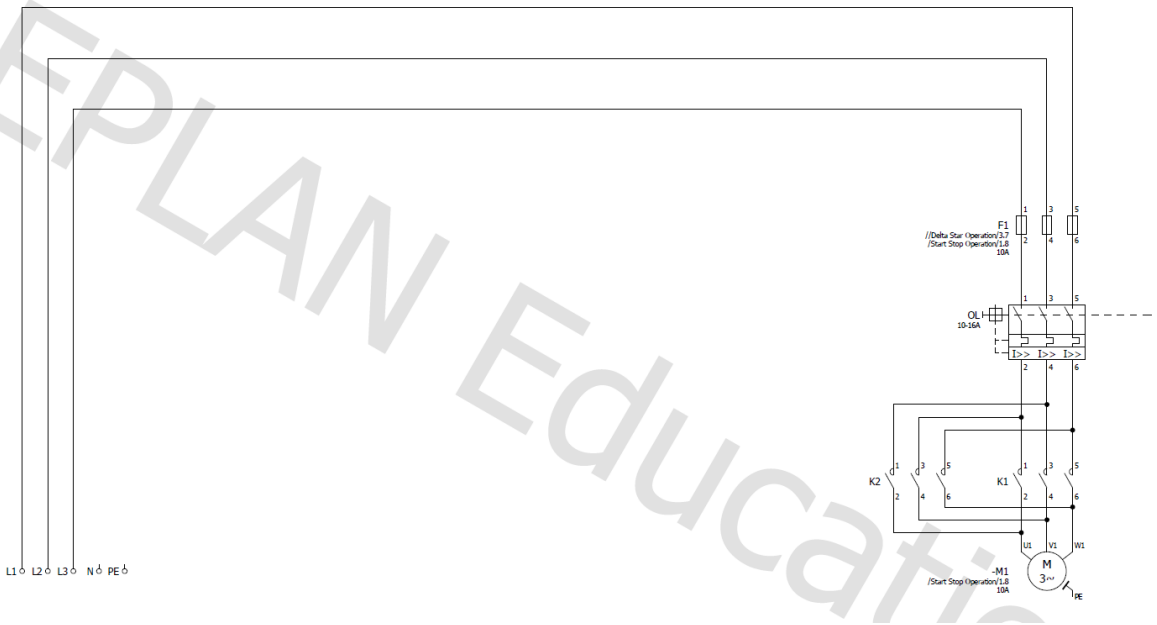
MAIN

```
PROGRAM MAIN
VAR
    K1: BOOL;
    K2: BOOL;
    Stop: BOOL;
    OL: BOOL;
    Start_Right: BOOL;
    Start_Left: BOOL;
    Motor_Running: BOOL := FALSE;
END_VAR
```

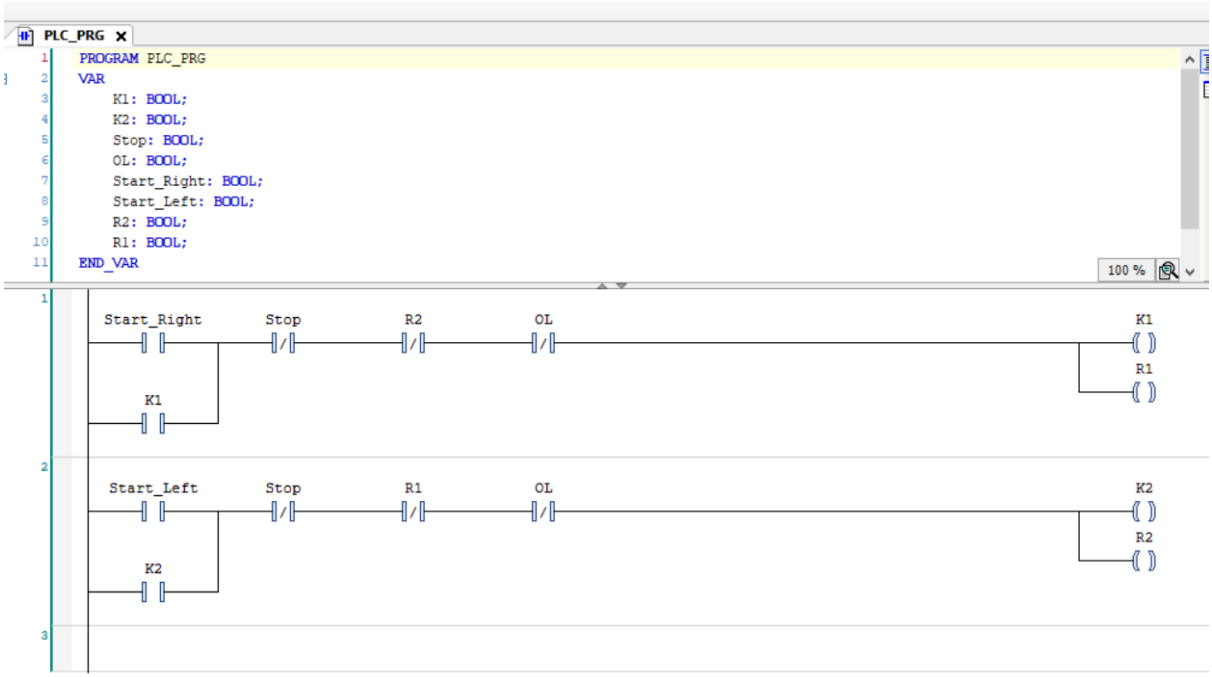
```
IF NOT (Stop OR OL) THEN
    IF NOT (K1 AND K2) THEN
        IF Start_Right THEN
            K1 := TRUE;
            K2 := FALSE;
            Motor_Running := TRUE;
        ELSIF Start_Left THEN
            K1 := FALSE;
            K2 := TRUE;
            Motor_Running := TRUE;
        END_IF;
    ELSIF Stop THEN
        K1 := FALSE;
        K2 := FALSE;
        Motor_Running := FALSE;
    END_IF;
ELSE
    K1 := FALSE;
    K2 := FALSE;
    Motor_Running := FALSE;
END_IF;
```

Direct Reverse Operation Three Phase Motor:

1- EPLAN Power Circuit:



2- CodeSys Ladder Diagram:



3- CodeSys Structured Text:

PLC_PRG

```
PROGRAM PLC_PRG
VAR
    K1: BOOL;
    K2: BOOL;
    Stop: BOOL;
    OL: BOOL;
    Start_Right: BOOL;
    Start_Left: BOOL;
    Motor_Running: BOOL := FALSE;
END_VAR
```

```
IF NOT (Stop OR OL) THEN
    IF Start_Right THEN
        K1 := TRUE;
        K2 := FALSE;
        Motor_Running := TRUE;
    ELSIF Start_Left THEN
        K1 := FALSE;
        K2 := TRUE;
        Motor_Running := TRUE;
    ELSIF Stop THEN
        K1 := FALSE;
        K2 := FALSE;
        Motor_Running := FALSE;
    END_IF;
ELSE
    K1 := FALSE;
    K2 := FALSE;
    Motor_Running := FALSE;
END_IF;
```

4- TwinCat3 Structured Text:

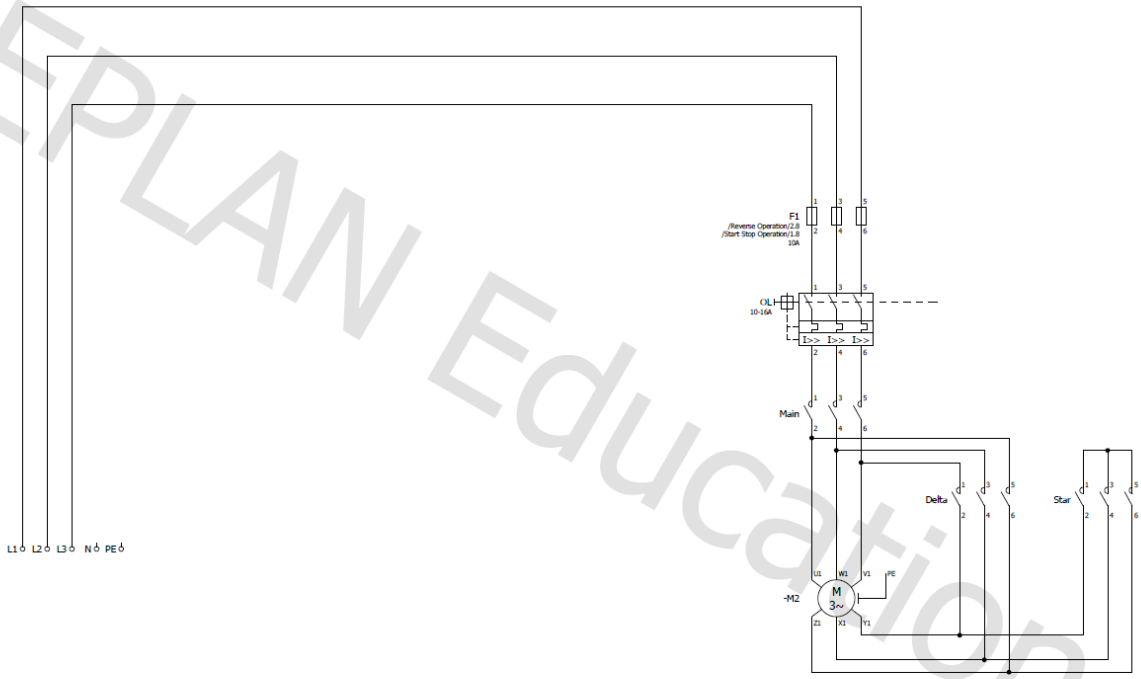
MAIN

```
PROGRAM MAIN
VAR
    K1: BOOL;
    K2: BOOL;
    Stop: BOOL;
    OL: BOOL;
    Start_Right: BOOL;
    Start_Left: BOOL;
    Motor_Running: BOOL := FALSE;
END_VAR
```

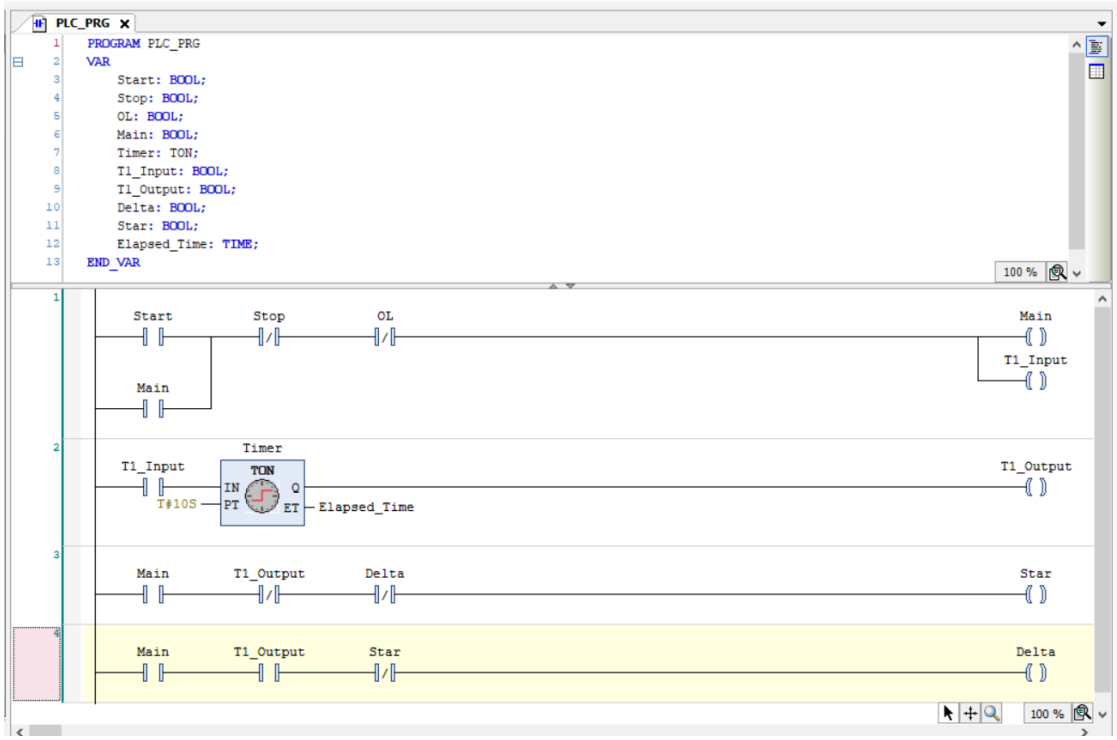
```
IF NOT (Stop OR OL) THEN
    IF Start_Right THEN
        K1 := TRUE;
        K2 := FALSE;
        Motor_Running := TRUE;
    ELSIF Start_Left THEN
        K1 := FALSE;
        K2 := TRUE;
        Motor_Running := TRUE;
    ELSIF Stop THEN
        K1 := FALSE;
        K2 := FALSE;
        Motor_Running := FALSE;
    END_IF;
ELSE
    K1 := FALSE;
    K2 := FALSE;
    Motor_Running := FALSE;
END_IF;
```

Star Delta Operation Three Phase Motor:

1- EPLAN Power Circuit:



2- CodeSys Ladder Diagram:



3- CodeSys Structured Text:

PLC_PRG

```
PROGRAM PLC_PRG
VAR
    Main, Start, Stop, OL: BOOL;
    StarContact: BOOL := FALSE;
    DeltaContact: BOOL := FALSE;
    Timer: TON := (PT := T#10S); // Initialize timer with a preset time of 10 seconds
END_VAR

VAR
    CONSTANT startDelay : TIME := T#10s; // 10-second delay for switching from star to delta connection
END_VAR
```

```
IF NOT ( Stop OR OL) THEN
    IF Start THEN
        Main := TRUE;
    ELSE
        Main := FALSE;
    END_IF
    IF Main THEN
        IF NOT Timer.Q THEN
            // Start motor in Star connection
            StarContact := TRUE;
            DeltaContact := FALSE;
        ELSIF Timer.Q  THEN
            // Switch to Delta connection after 10 seconds
            StarContact := FALSE;
            DeltaContact := TRUE;
        END_IF
    END_IF
ELSE
    Main := FALSE;
    Timer(IN := FALSE); // Reset the timer
END_IF

// Timer for switching from Star to Delta connection
Timer(IN := Main, PT := startDelay);
```

4- TwinCat3 Structured Text:

MAIN

```
PROGRAM MAIN
PROGRAM PLC_PRG
VAR
    Main, Start, Stop, OL: BOOL;
    StarContact: BOOL := FALSE;
    DeltaContact: BOOL := FALSE;
    Timer: TON := (PT := T#10S); // Initialize timer with a preset time of 10 seconds
END_VAR

VAR
    CONSTANT startDelay : TIME := T#10s; // 10-second delay for switching from star to delta connect
END_VAR
```

```
IF NOT ( Stop OR OL) THEN
    IF Start THEN
        Main := TRUE;
    ELSE
        Main := FALSE;
    END_IF
    IF Main THEN
        IF NOT Timer.Q THEN
            // Start motor in Star connection
            StarContact := TRUE;
            DeltaContact := FALSE;
        ELSIF Timer.Q  THEN
            // Switch to Delta connection after 10 seconds
            StarContact := FALSE;
            DeltaContact := TRUE;
        END_IF
    END_IF
ELSE
    Main := FALSE;
    Timer(IN := FALSE); // Reset the timer
END_IF

// Timer for switching from Star to Delta connection
Timer(IN := Main, PT := startDelay);
```