



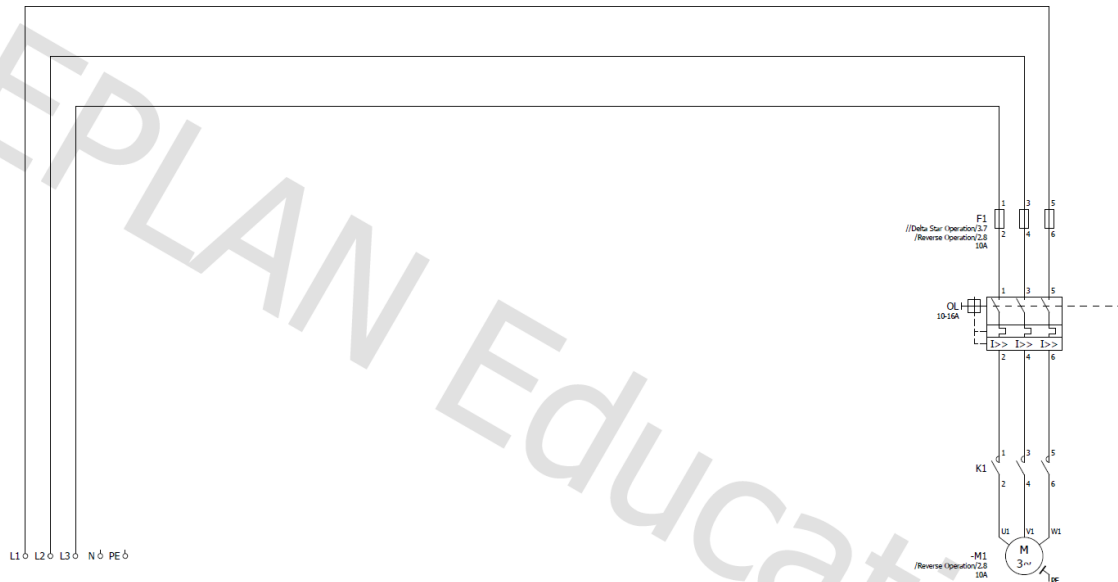
Few PLC Starter Programs

Using EPLAN, CodeSys and TwinCat3

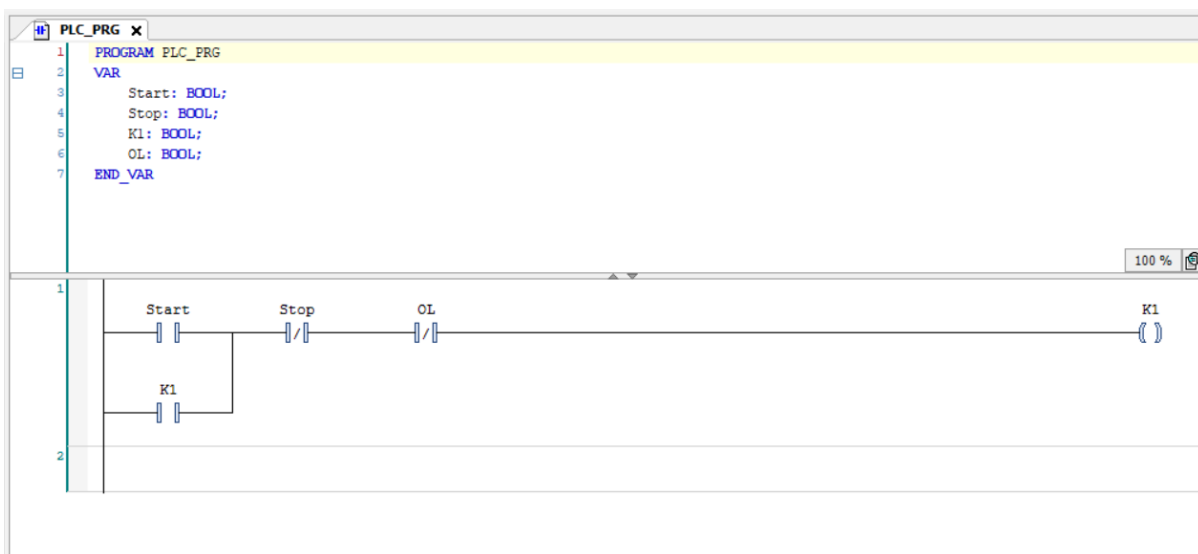
By: Mohamed Awad

Start Stop Three Phase Motor:

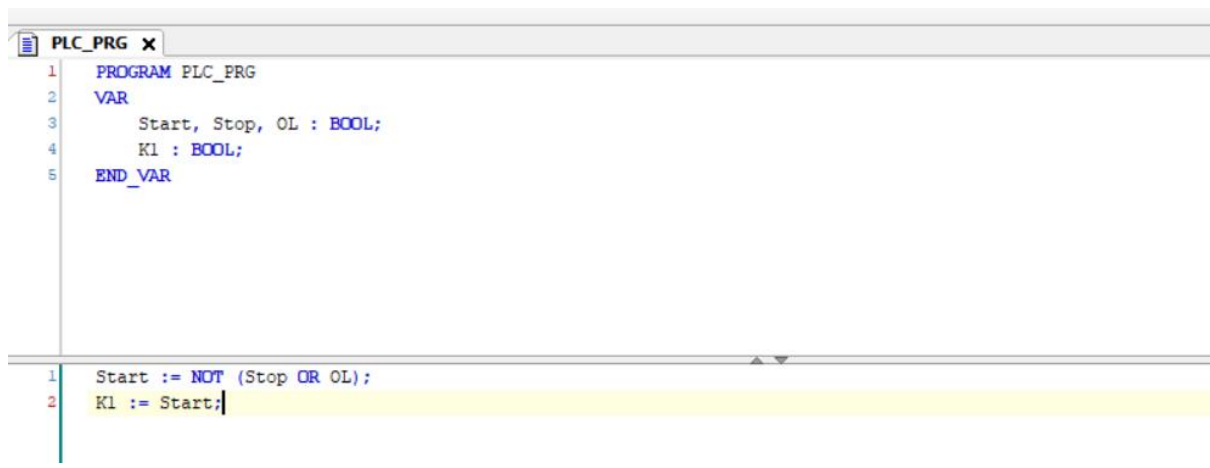
1- EPLAN Power Circuit:



2- CodeSys Ladder Diagram:



3- CodeSys Structured Text:



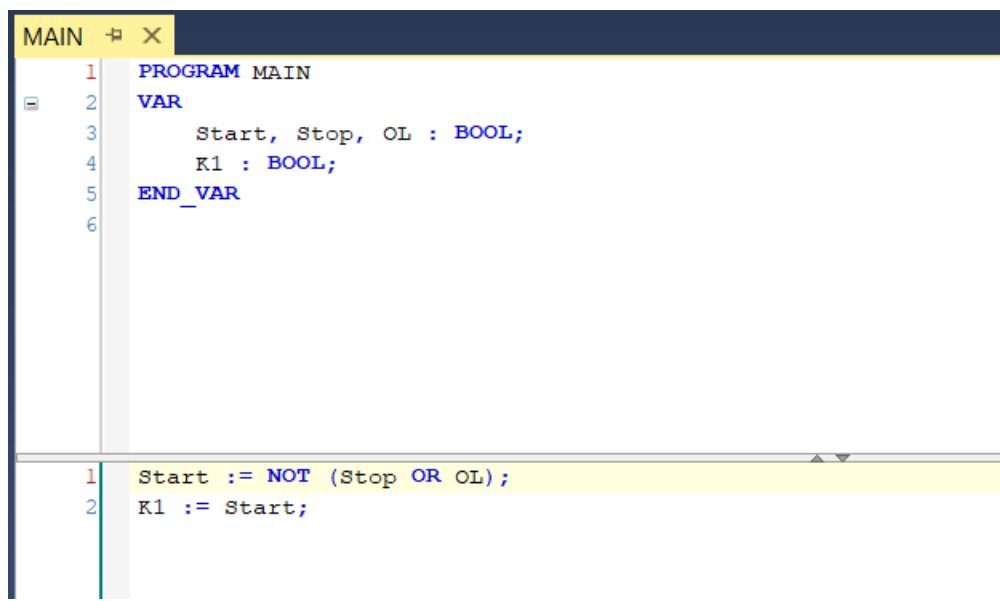
The screenshot shows the CodeSys Structured Text editor with a window titled "PLC_PRG x". The editor contains the following code:

```
1 PROGRAM PLC_PRG
2 VAR
3     Start, Stop, OL : BOOL;
4     K1 : BOOL;
5 END_VAR
```

The bottom section of the editor shows the following code:

```
1 Start := NOT (Stop OR OL);
2 K1 := Start;
```

4- TwinCat3 Structured Text:



The screenshot shows the TwinCat3 Structured Text editor with a window titled "MAIN x". The editor contains the following code:

```
1 PROGRAM MAIN
2 VAR
3     Start, Stop, OL : BOOL;
4     K1 : BOOL;
5 END_VAR
```

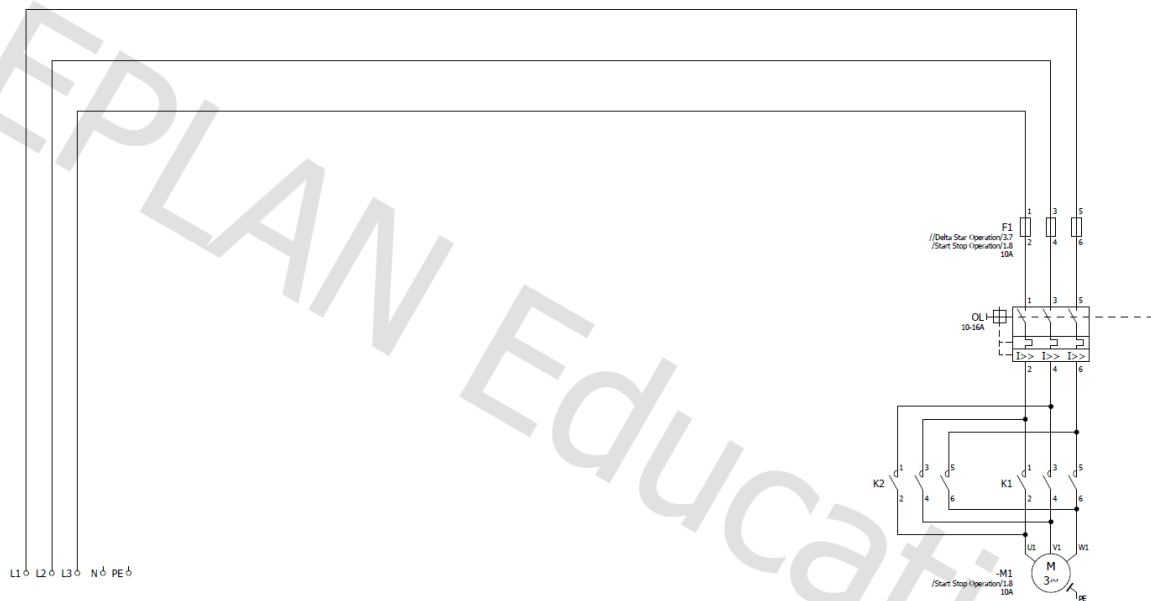
The bottom section of the editor shows the following code:

```
1 Start := NOT (Stop OR OL);
2 K1 := Start;
```

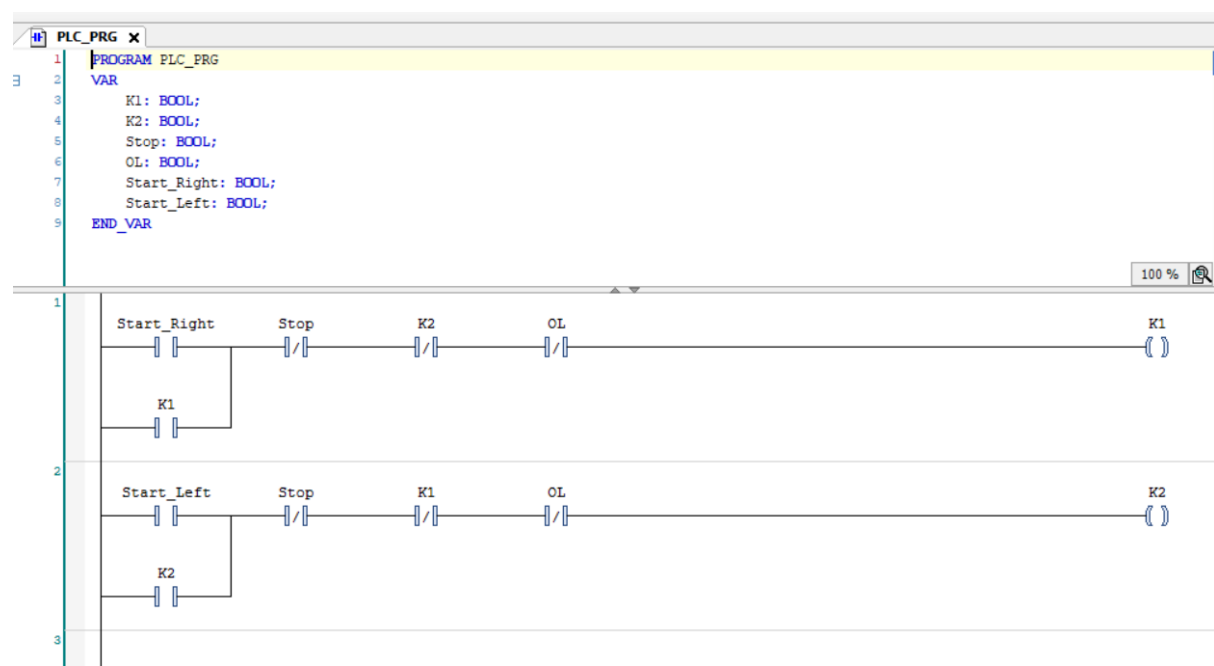
Indirect Reverse Operation Three Phase

Motor:

1- EPLAN Power Circuit:



2- CodeSys Ladder Diagram:



3- CodeSys Structured Text:

```
PLC_PRG x
1  PROGRAM PLC_PRG
2  VAR
3      K1: BOOL;
4      K2: BOOL;
5      Stop: BOOL;
6      OL: BOOL;
7      Start_Right: BOOL;
8      Start_Left: BOOL;
9      Motor_Running: BOOL := FALSE;
10 END_VAR

1  IF NOT (Stop OR OL) THEN
2      IF NOT (K1 AND K2) THEN
3          IF Start_Right THEN
4              K1 := TRUE;
5              K2 := FALSE;
6              Motor_Running := TRUE;
7          ELSIF Start_Left THEN
8              K1 := FALSE;
9              K2 := TRUE;
10             Motor_Running := TRUE;
11         END_IF;
12     ELSIF Stop THEN
13         K1 := FALSE;
14         K2 := FALSE;
15         Motor_Running := FALSE;
16     END_IF;
17 ELSE
18     K1 := FALSE;
19     K2 := FALSE;
20     Motor_Running := FALSE;
21 END_IF;
22
```

4- TwinCat3 Structured Text:

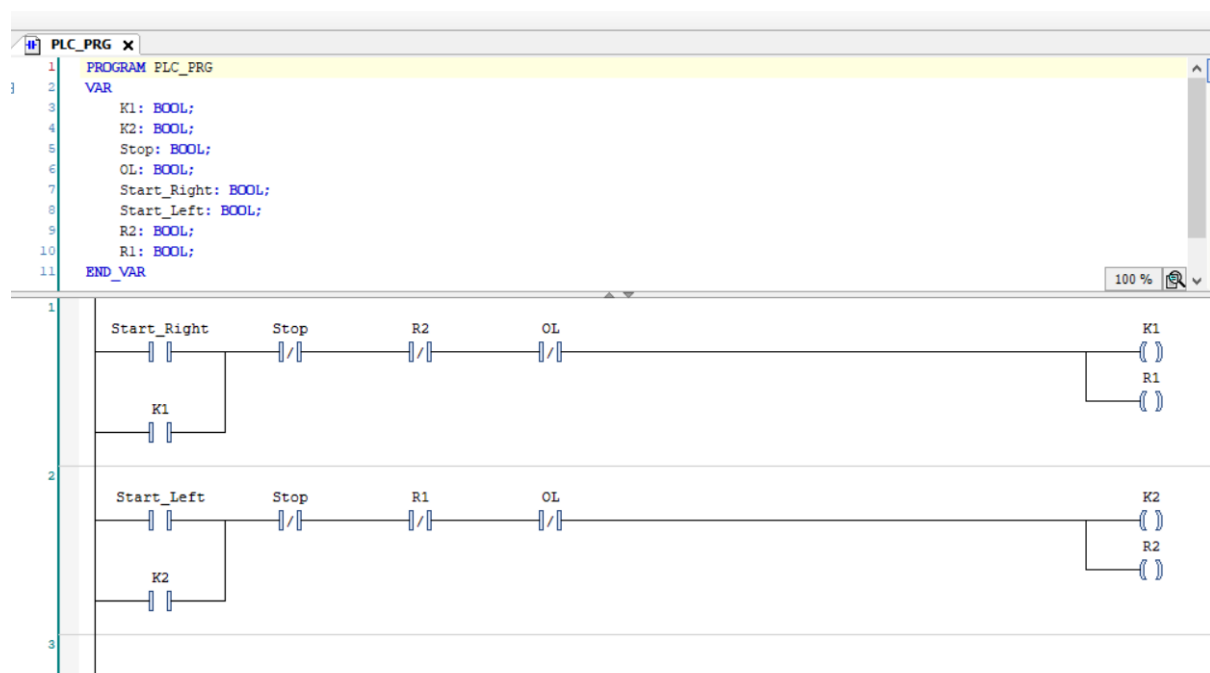
```
MAIN  [X]
1  PROGRAM MAIN
2  VAR
3      K1: BOOL;
4      K2: BOOL;
5      Stop: BOOL;
6      OL: BOOL;
7      Start_Right: BOOL;
8      Start_Left: BOOL;
9      Motor_Running: BOOL := FALSE;
10 END_VAR
11
12 IF NOT (Stop OR OL) THEN
13     IF NOT (K1 AND K2) THEN
14         IF Start_Right THEN
15             K1 := TRUE;
16             K2 := FALSE;
17             Motor_Running := TRUE;
18         ELSIF Start_Left THEN
19             K1 := FALSE;
20             K2 := TRUE;
21             Motor_Running := TRUE;
22         END_IF;
23     ELSIF Stop THEN
24         K1 := FALSE;
25         K2 := FALSE;
26         Motor_Running := FALSE;
27     END_IF;
28 ELSE
29     K1 := FALSE;
30     K2 := FALSE;
31     Motor_Running := FALSE;
32 END_IF;
```

Direct Reverse Operation Three Phase Motor:

1- EPLAN Power Circuit:



2- CodeSys Ladder Diagram:

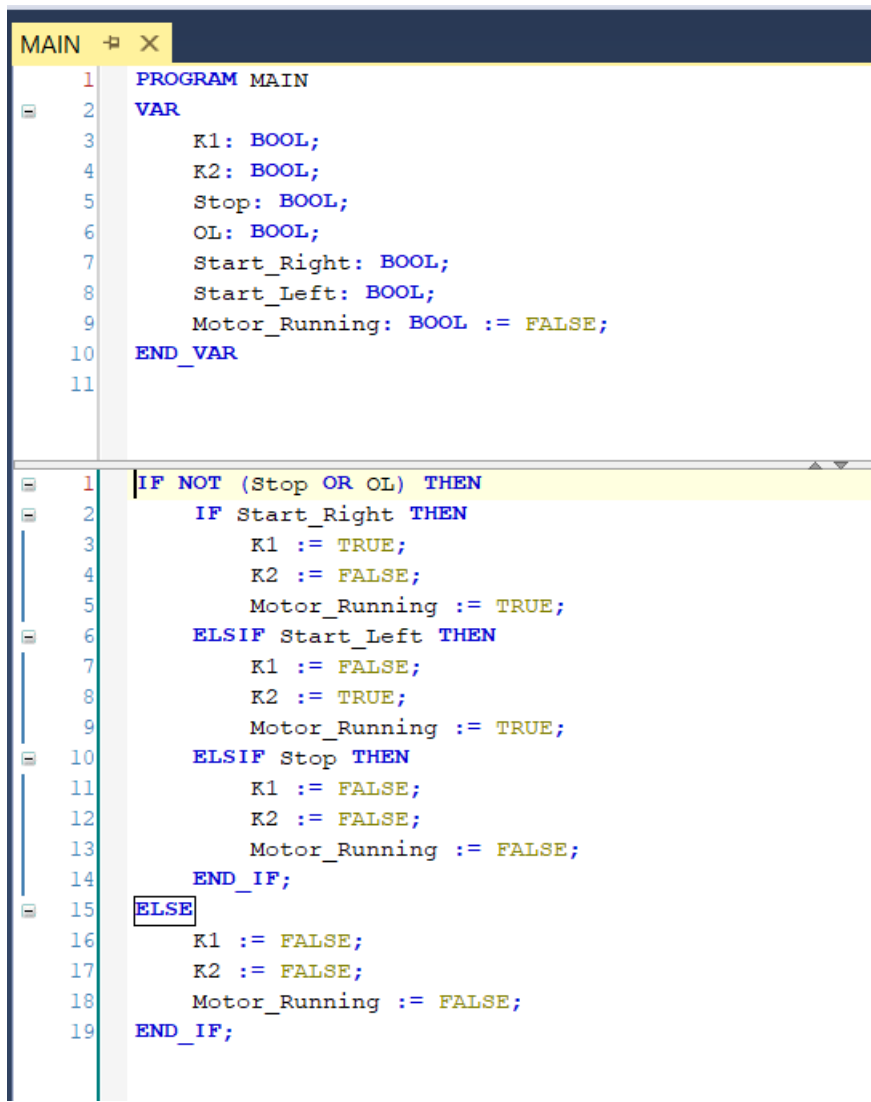


3- CodeSys Structured Text:

```
PLC_PRG x
1  PROGRAM PLC_PRG
2  VAR
3      K1: BOOL;
4      K2: BOOL;
5      Stop: BOOL;
6      OL: BOOL;
7      Start_Right: BOOL;
8      Start_Left: BOOL;
9      Motor_Running: BOOL := FALSE;
10 END_VAR

1  IF NOT (Stop OR OL) THEN
2      IF Start_Right THEN
3          K1 := TRUE;
4          K2 := FALSE;
5          Motor_Running := TRUE;
6      ELSIF Start_Left THEN
7          K1 := FALSE;
8          K2 := TRUE;
9          Motor_Running := TRUE;
10     ELSIF Stop THEN
11         K1 := FALSE;
12         K2 := FALSE;
13         Motor_Running := FALSE;
14     END_IF;
15 ELSE
16     K1 := FALSE;
17     K2 := FALSE;
18     Motor_Running := FALSE;
19 END_IF;
20
```

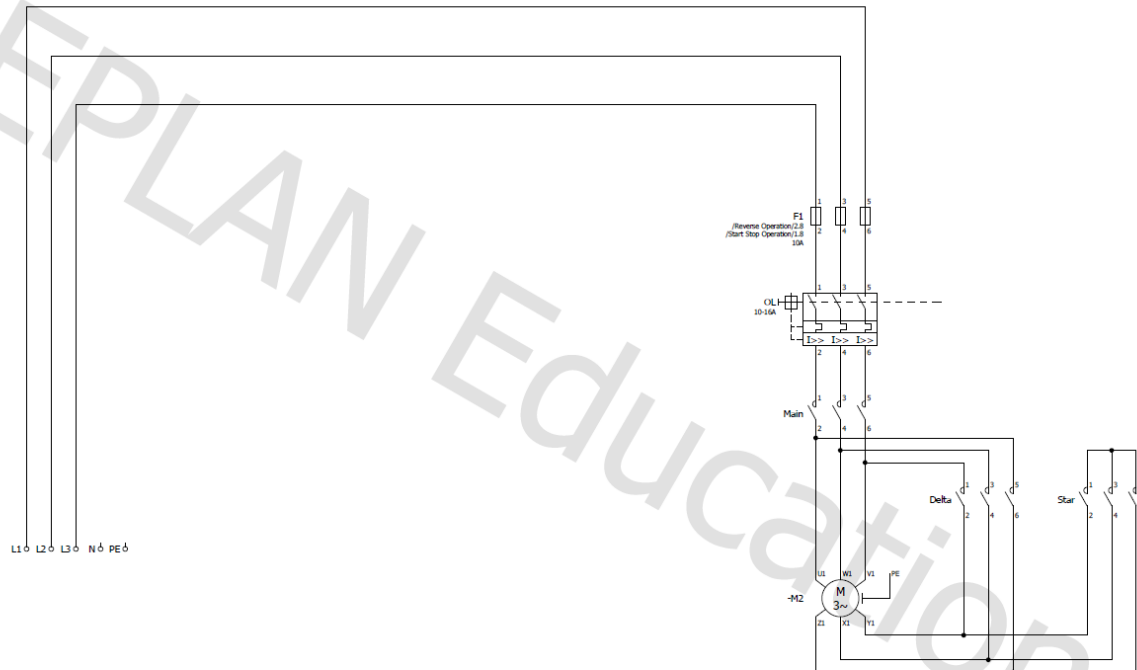

4- TwinCat3 Structured Text:



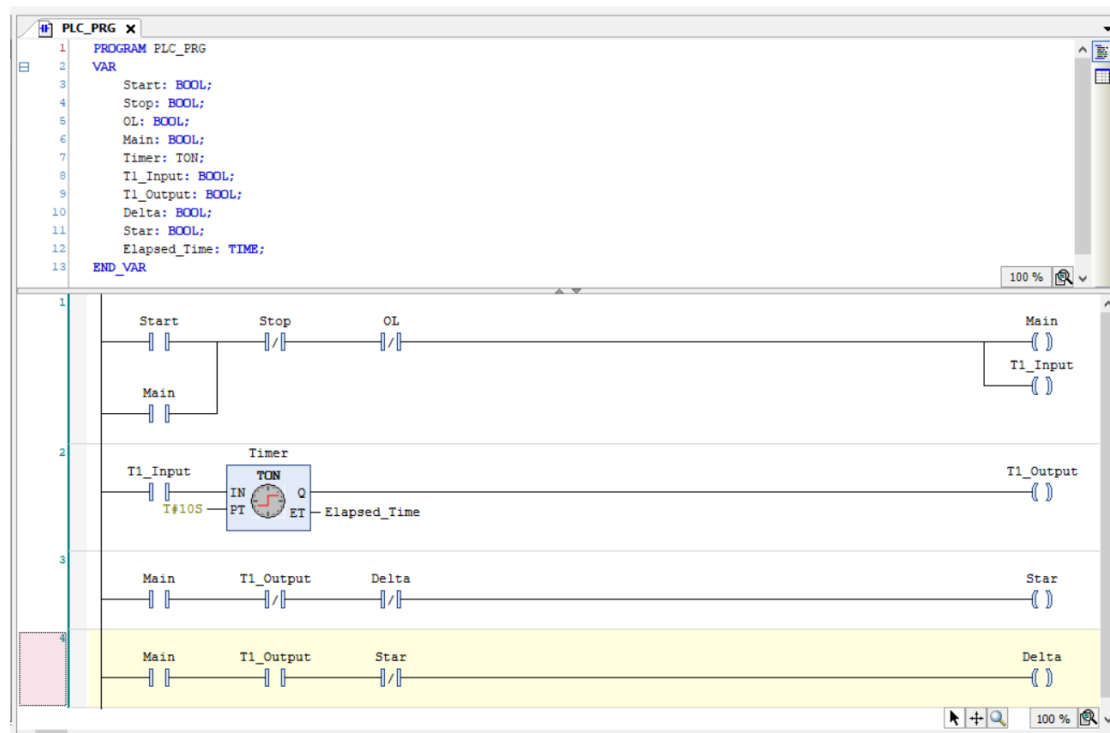
```
1 PROGRAM MAIN
2 VAR
3     K1: BOOL;
4     K2: BOOL;
5     Stop: BOOL;
6     OL: BOOL;
7     Start_Right: BOOL;
8     Start_Left: BOOL;
9     Motor_Running: BOOL := FALSE;
10 END_VAR
11
12 IF NOT (Stop OR OL) THEN
13     IF Start_Right THEN
14         K1 := TRUE;
15         K2 := FALSE;
16         Motor_Running := TRUE;
17     ELSIF Start_Left THEN
18         K1 := FALSE;
19         K2 := TRUE;
20         Motor_Running := TRUE;
21     ELSIF Stop THEN
22         K1 := FALSE;
23         K2 := FALSE;
24         Motor_Running := FALSE;
25     END_IF;
26 ELSE
27     K1 := FALSE;
28     K2 := FALSE;
29     Motor_Running := FALSE;
30 END_IF;
```

Star Delta Operation Three Phase Motor:

1- EPLAN Power Circuit:



2- CodeSys Ladder Diagram:



3- CodeSys Structured Text:

```
PLC_PRG x
1 PROGRAM PLC_PRG
2 VAR
3     Main, Start, Stop, OL: BOOL;
4     StarContact: BOOL := FALSE;
5     DeltaContact: BOOL := FALSE;
6     Timer: TON := (PT := T#10S); // Initialize timer with a preset time of 10 seconds
7 END_VAR
8
9 VAR
10     CONSTANT startDelay : TIME := T#10s; // 10-second delay for switching from star to delta connection
11 END_VAR
12
13 IF NOT ( Stop OR OL) THEN
14     IF Start THEN
15         Main := TRUE;
16     ELSE
17         Main := FALSE;
18     END_IF
19     IF Main THEN
20         IF NOT Timer.Q THEN
21             // Start motor in Star connection
22             StarContact := TRUE;
23             DeltaContact := FALSE;
24         ELSIF Timer.Q THEN
25             // Switch to Delta connection after 10 seconds
26             StarContact := FALSE;
27             DeltaContact := TRUE;
28         END_IF
29     END_IF
30 ELSE
31     Main := FALSE;
32     Timer(IN := FALSE); // Reset the timer
33 END_IF
34
35 // Timer for switching from Star to Delta connection
36 Timer(IN := Main, PT := startDelay);
37
```

4- TwinCat3 Structured Text:

```
MAIN  + X
1  PROGRAM MAIN
2  PROGRAM PLC_PRG
3  VAR
4      Main, Start, Stop, OL: BOOL;
5      StarContact: BOOL := FALSE;
6      DeltaContact: BOOL := FALSE;
7      Timer: TON := (PT := T#10S); // Initialize timer with a preset time of 10 seconds
8  END_VAR
9
10 VAR
11     CONSTANT startDelay : TIME := T#10s; // 10-second delay for switching from star to delta connect
12 END_VAR
13
14 IF NOT ( Stop OR OL) THEN
15     IF Start THEN
16         Main := TRUE;
17     ELSE
18         Main := FALSE;
19     END_IF
20     IF Main THEN
21         IF NOT Timer.Q THEN
22             // Start motor in Star connection
23             StarContact := TRUE;
24             DeltaContact := FALSE;
25         ELSIF Timer.Q THEN
26             // Switch to Delta connection after 10 seconds
27             StarContact := FALSE;
28             DeltaContact := TRUE;
29         END_IF
30     END_IF
31 ELSE
32     Main := FALSE;
33     Timer(IN := FALSE); // Reset the timer
34 END_IF
35
36 // Timer for switching from Star to Delta connection
37 Timer(IN := Main, PT := startDelay);
```