Assignment: To develop the logic and HMI (graphic user interface) for the manual operation of a motor. An overload sensor and a speed sensor are used to implement simple logic to protect the motor.

Inputs:

- START push button (momentary contact).
- STOP pushbutton (momentary contact).
- Overload sensor (output is true if overload condition occurs): this is simulated by a Toggle switch (latched contact) on the graphic user interface.
- Motor Speed sensor (output is true if motor rotates at its rated speed, output false if motor is stationary or rotating at low speed either due to mechanical problems or due to low supply voltage): this is simulated by a Toggle switch (latched contact) on the user interface.

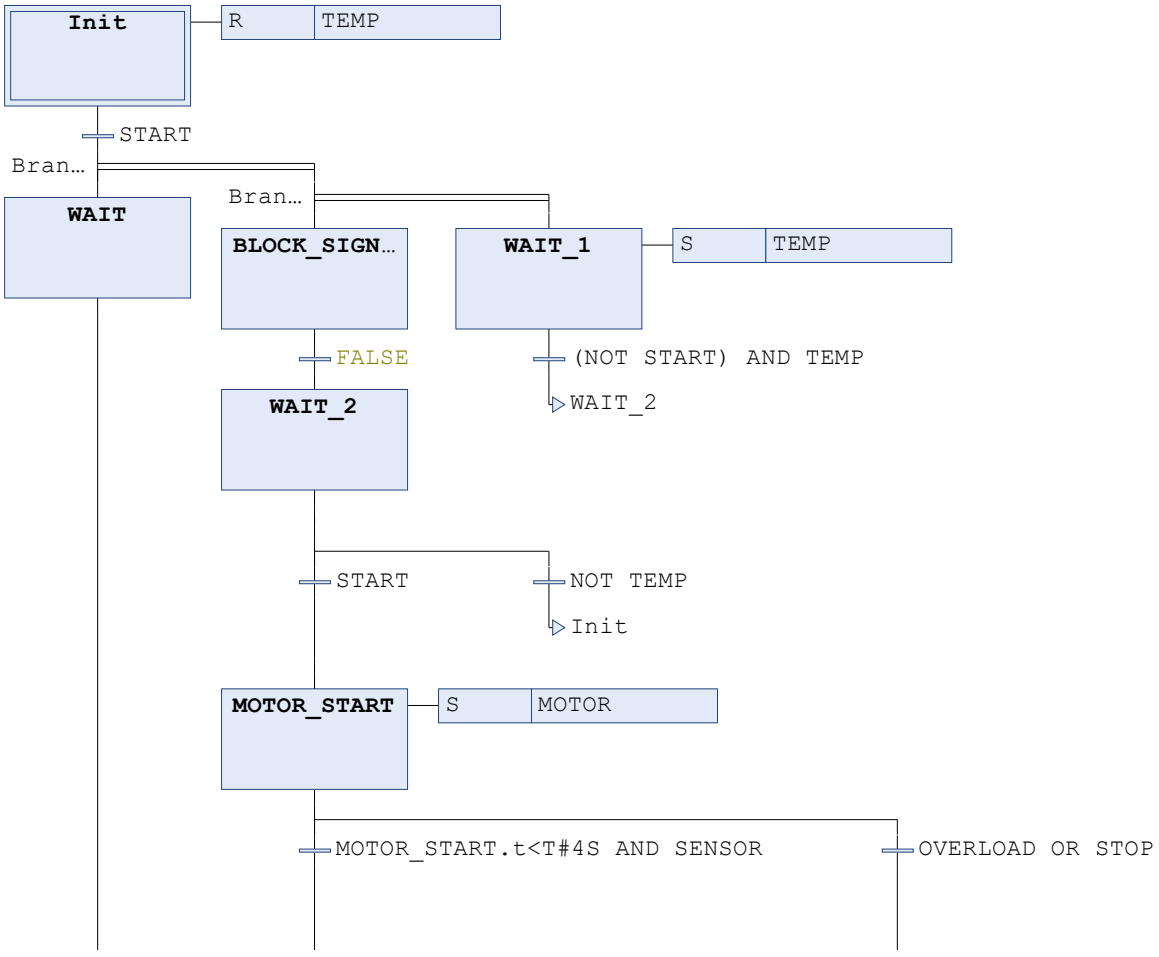
OUTPUTs:

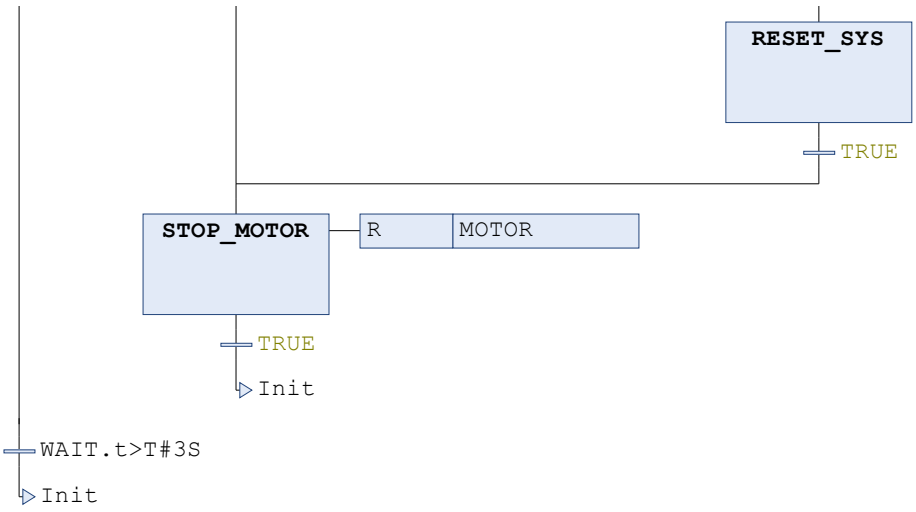
- Motor status Indicator (true if motor is energized, false if motor is deenergized).

Operational Logic.

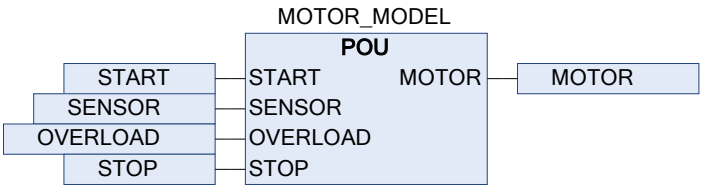
- The Motor is energized if the START push button is **pressed twice in succession within 3 seconds.** A single press of the start button or two consecutive presses that are more than 3 secs apart, will not start the motor. This logic prevents the motor from starting due to an accidental push of the Start button.
- After the Motor is energized, it is automatically turned off if it does not acquire the rated speed within 4 seconds after the start of the motor, as indicated by the motor speed sensor output.
- The Motor stops if the STOP push button is pressed or an overload (excessive current) condition is detected by the overload sensor.

```
1   FUNCTION_BLOCK  POU
2   VAR_INPUT
3       START :  BOOL ;
4   END_VAR
5   VAR_OUTPUT
6       MOTOR :  BOOL ;
7   END_VAR
8   VAR_INPUT
9       SENSOR :  BOOL ;
10      OVERLOAD :  BOOL ;
11      STOP :  BOOL ;
12  END_VAR
13
14  VAR
15      TEMP :  BOOL ;
16  END_VAR
17
```




RESET_SYS
TRUE
STOP_MOTOR
R
MOTOR
TRUE
Init
WAIT.t>T#3S
Init

```
1       PROGRAM  PLC_PRG
2       VAR
3           START :  BOOL ;
4           STOP :  BOOL ;
5           OVERLOAD :  BOOL ;
6           SENSOR :  BOOL ;
7           MOTOR :  BOOL ;
8           MOTOR_MODEL :  POU ;
9       END_VAR
10
```


MOTOR_MODEL
POU
START
SENSOR
OVERLOAD
STOP
START
SENSOR
OVERLOAD
STOP
MOTOR
MOTOR

General
Visualization size algorithm version: Respecting scrollbar location
Background
Use background color: False
Background color: 16777215
Interface
VAR_IN_OUT

END_VAR
Visualization Element List
Push Switch LED Id: 0
Element name: GenElemInst_2
Type of element: Push Switch LED
Tab Order: default
Static optimized: False
Position
X: 300
Y: 200
Width: 70
Height: 70
Variable: PLC_PRG.START
Image settings
Transparent: False
Transparent color: Black
Isotropic type: Isotropic
Horizontal alignment: Left
Vertical alignment: Top
Element behavior: Image tapper
Tap FALSE: False
Center
X: 335
Y: 235
Animation duration: 0
Input configuration
OnValueChanged: Configure...
Background
Image: Gray
Push Switch LED Id: 1