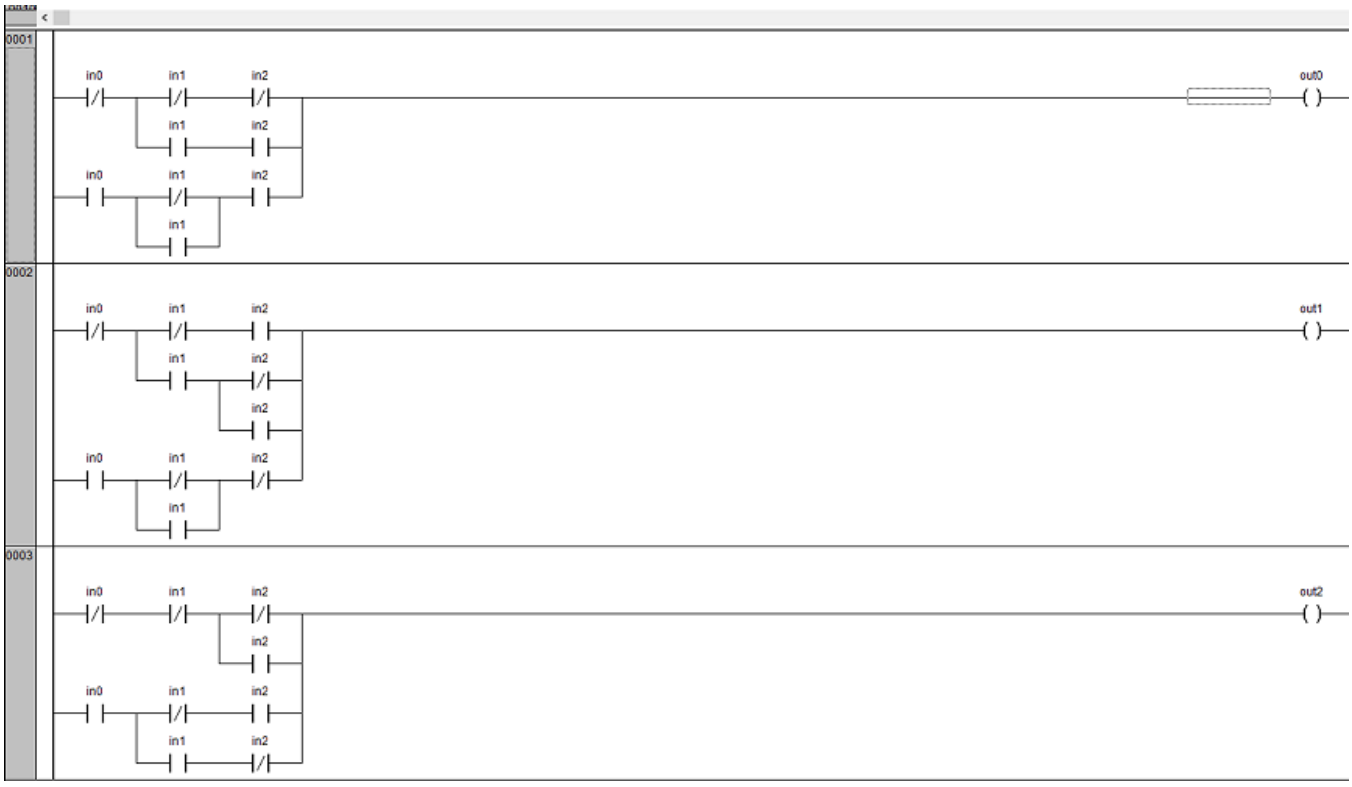
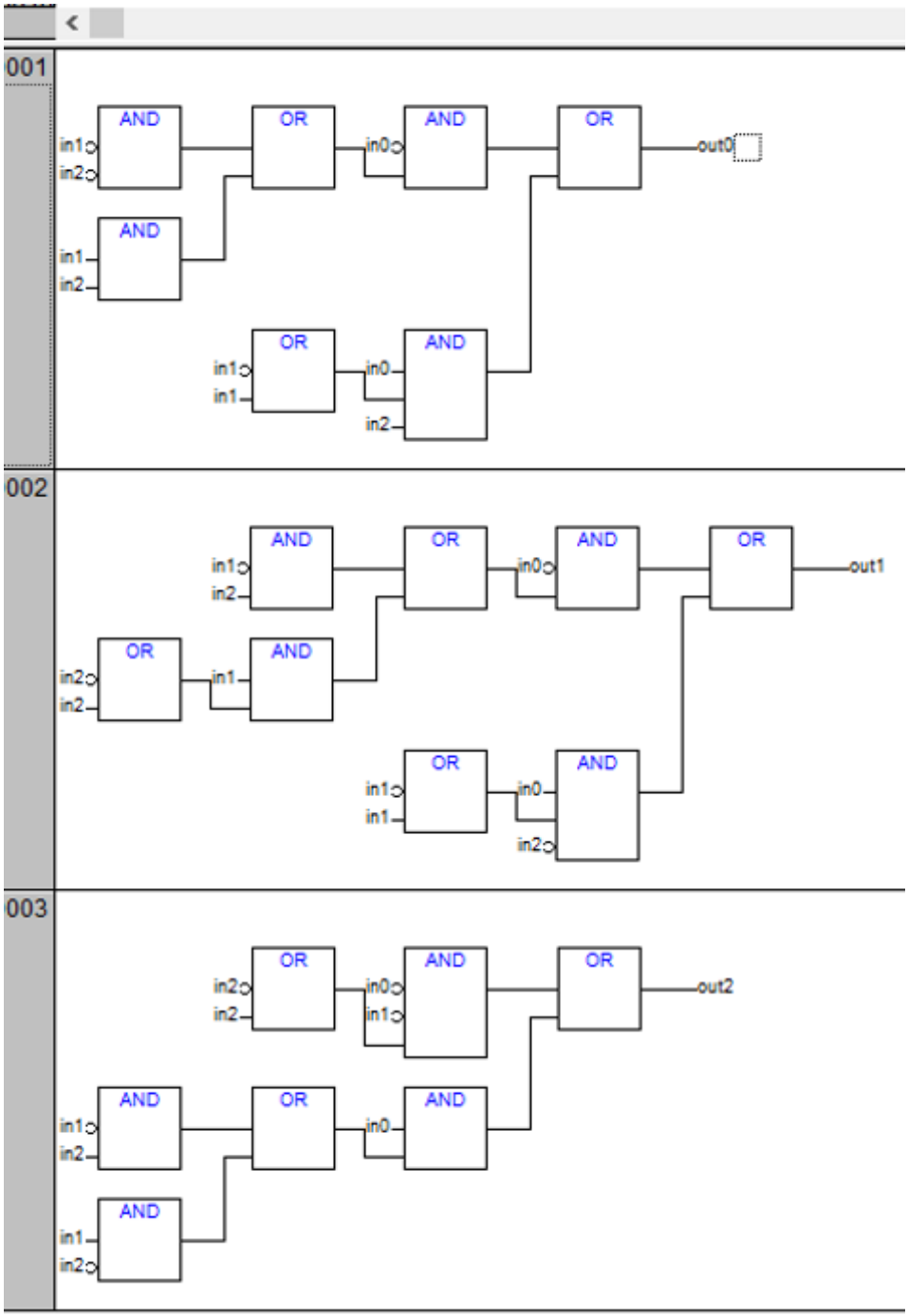
Exercise 4

Part 1 - Logic Functions

in0=switch1
in1=switch2
in2=switch3
out0=red
out1=yellow
out2=green



Conversion from ladder to FBD

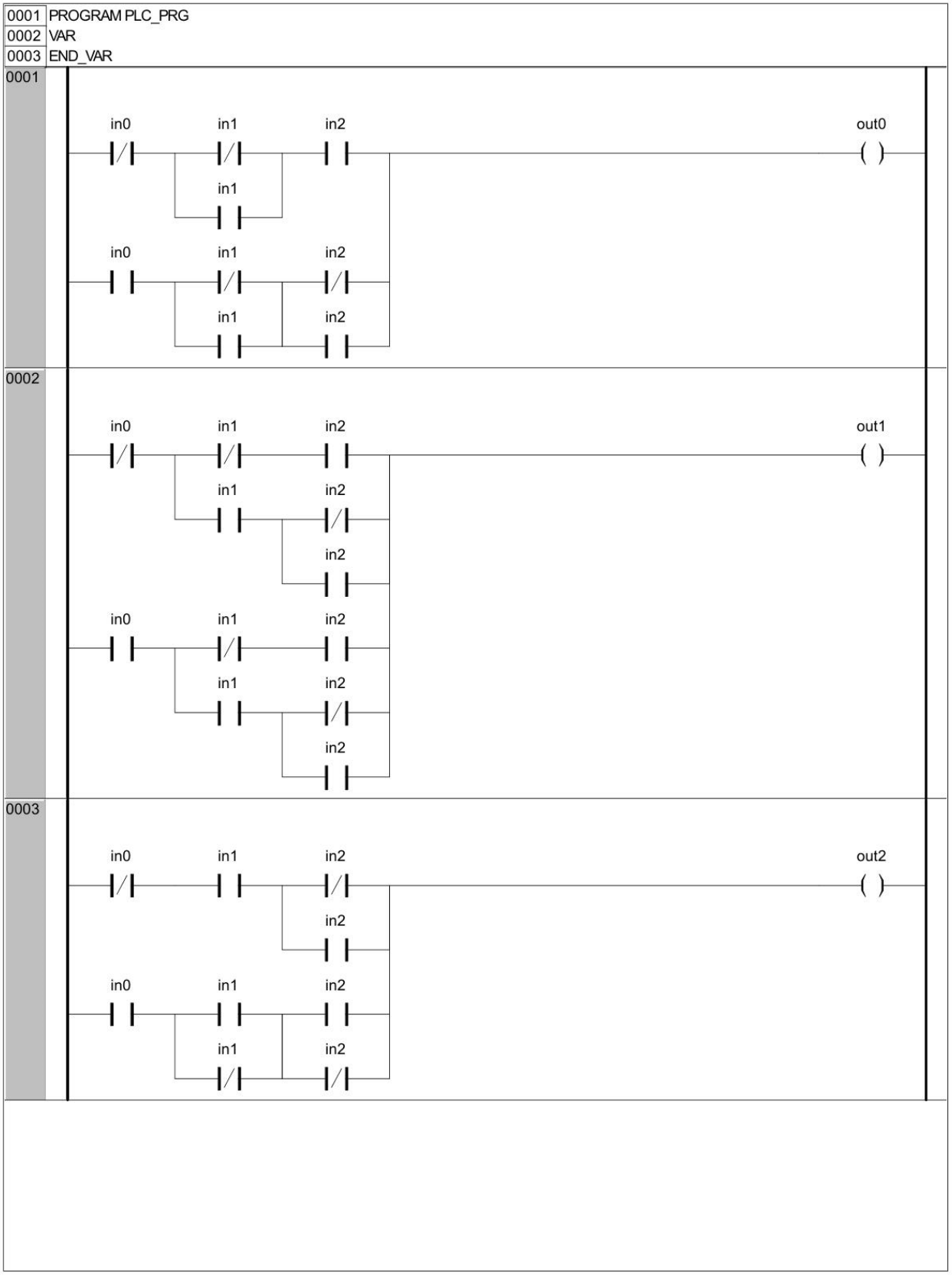


The FBD solution is correct.

Part 2 - Priority of Networks

The program given(below) does not work as intended because of the way the program reads the rungs. When in0 is high, neither out2 and out0 is high, because they are also in rung2 and 3.When in1 is high, out2 is high and out 1 in low, because out low is in rung 3 which comes after rung 2. And when in2 is high, out1 and out0 are high because there are no more rungs are rung 3 which contain these outputs.

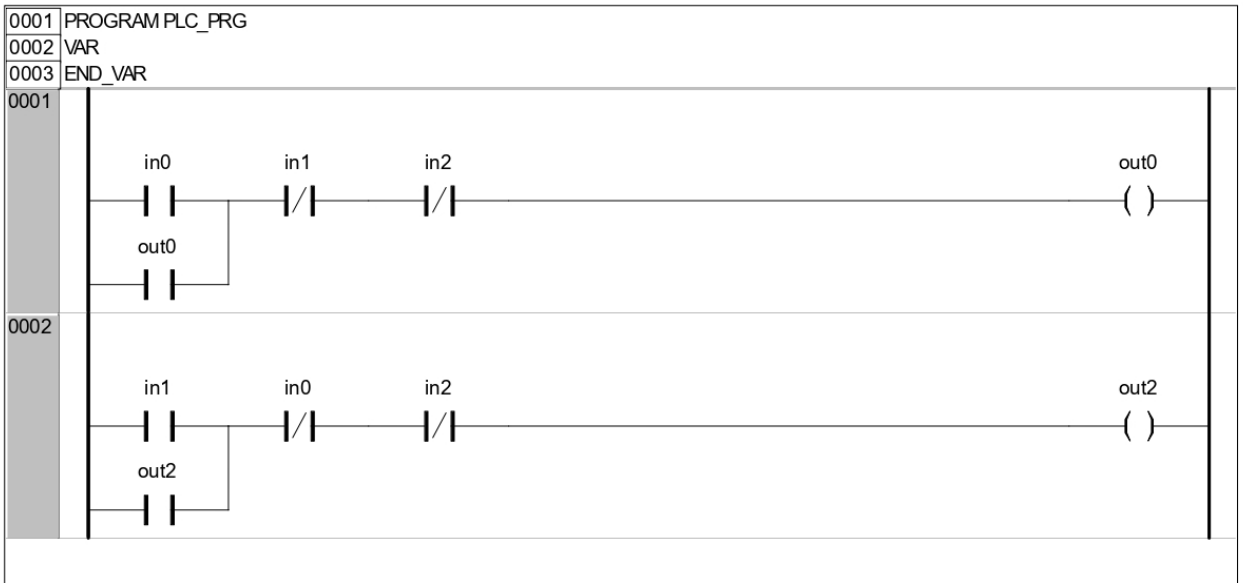
One way to solve this problem is by setting up a truthtable of when the outputs are high and putting them in different rungs, like i have done below.


0001 PROGRAM PLC_PRG
0002 VAR
0003 END_VAR
0001
in0
in1
in2
out0
in1
in0
in1
in2
in1
in2
0002
in0
in1
in2
out1
in1
in2
in2
in0
in1
in2
in1
in2
in2
0003
in0
in1
in2
out2
in2
in0
in1
in2
in1
in2

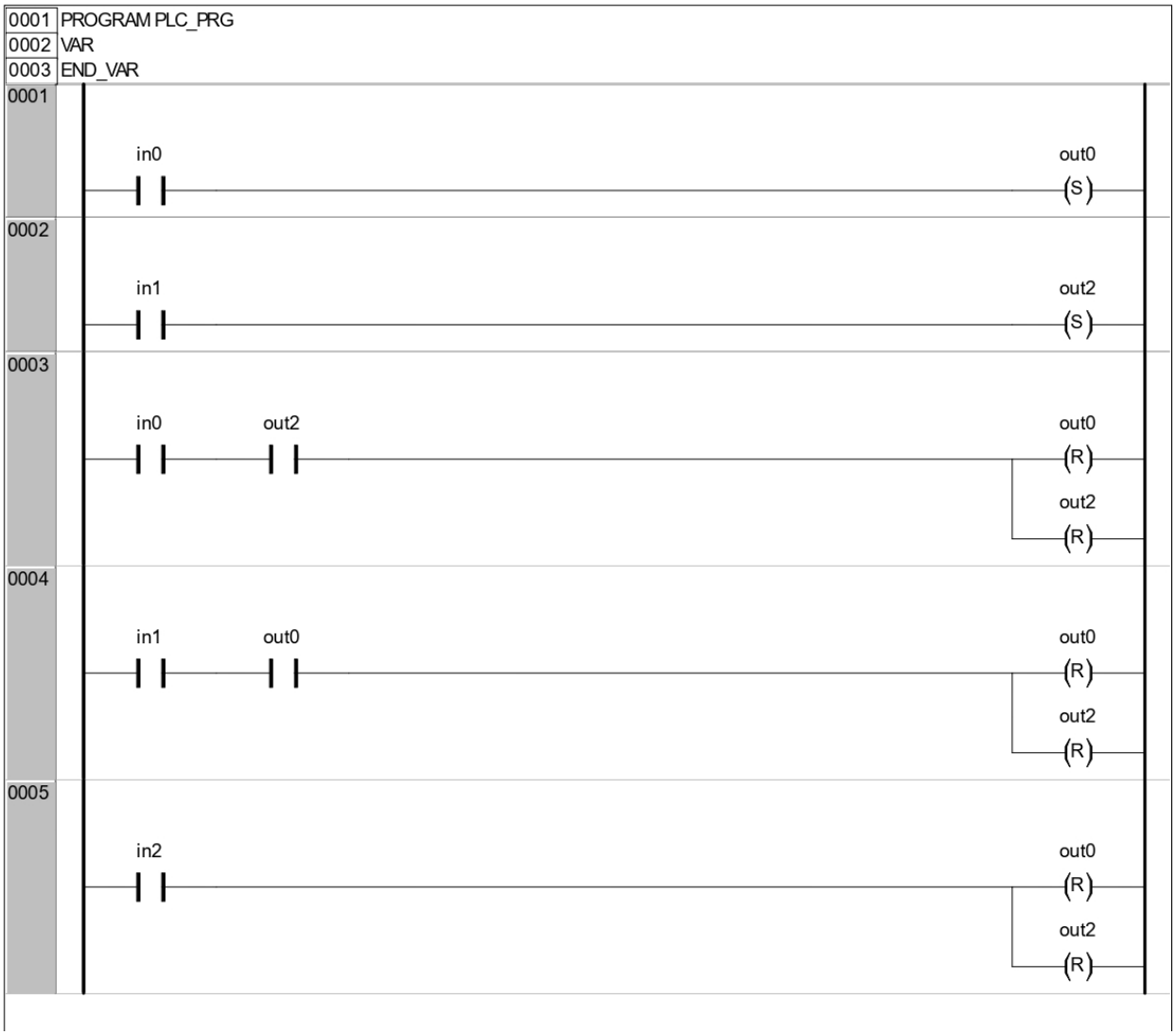
Part 3 - Retentive Coils

in0=switch1
in1=switch2
in2=switch3
out0=red
out2=green

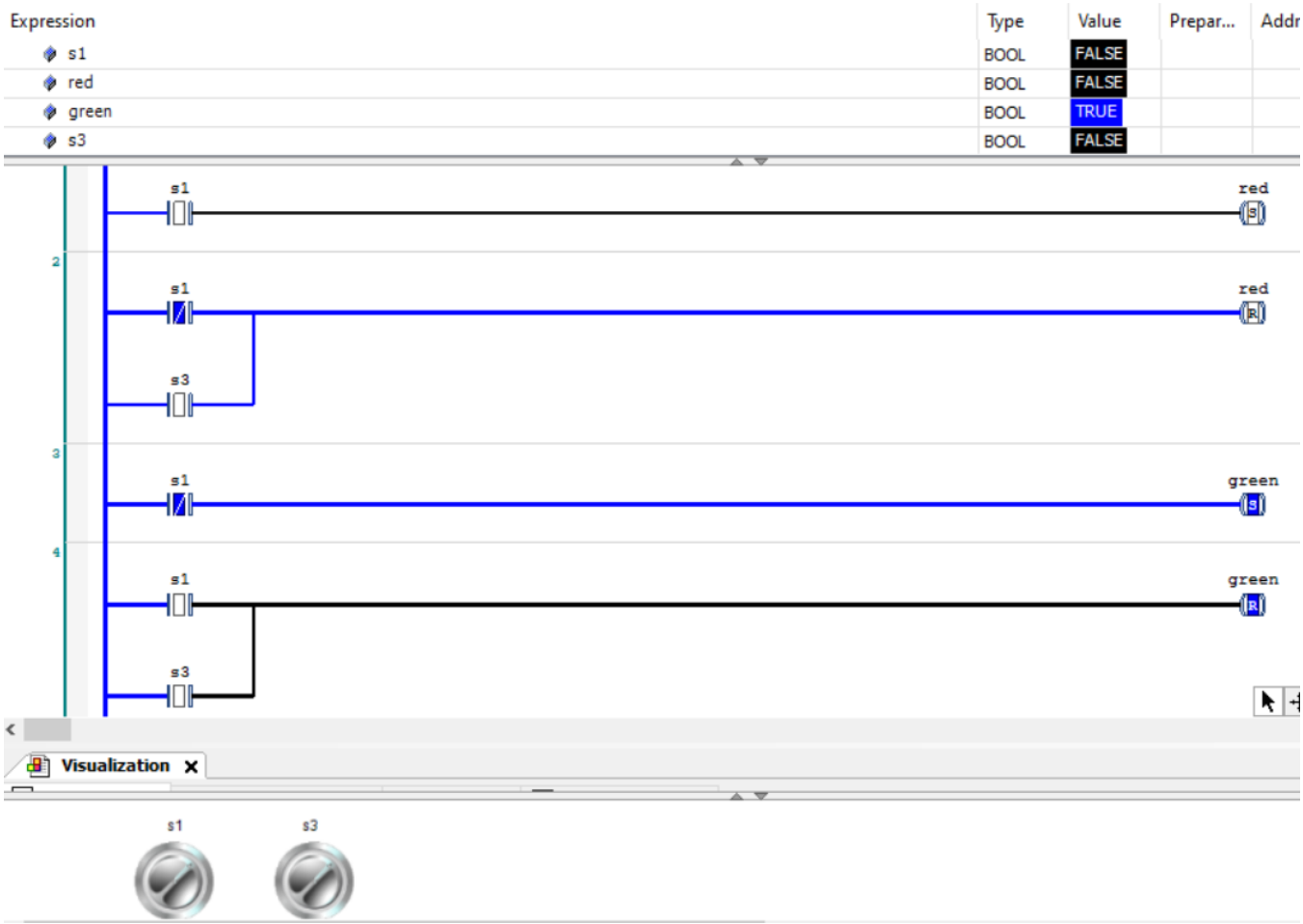
Solution with normal coils.



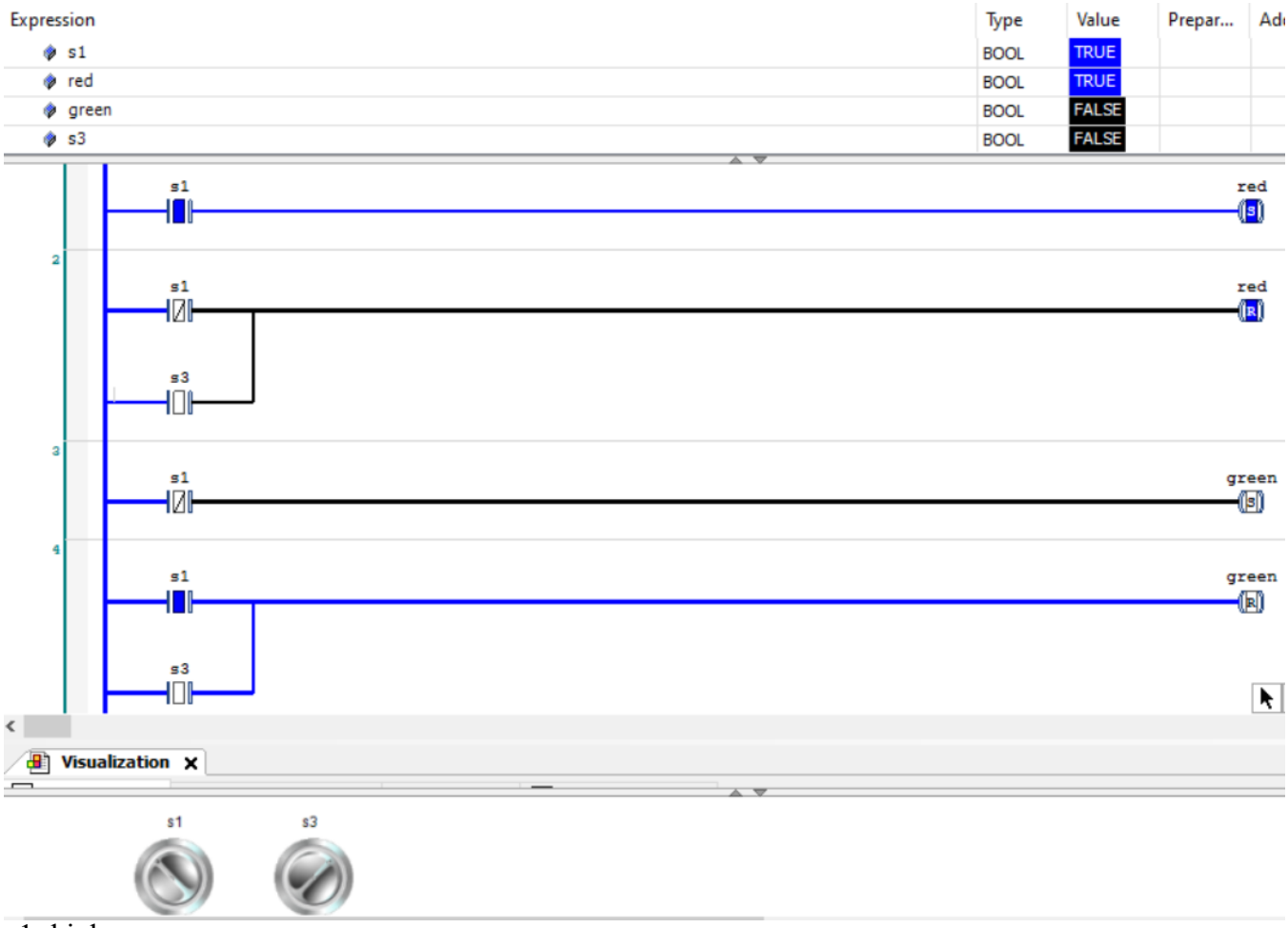
Solution with retentive coils.



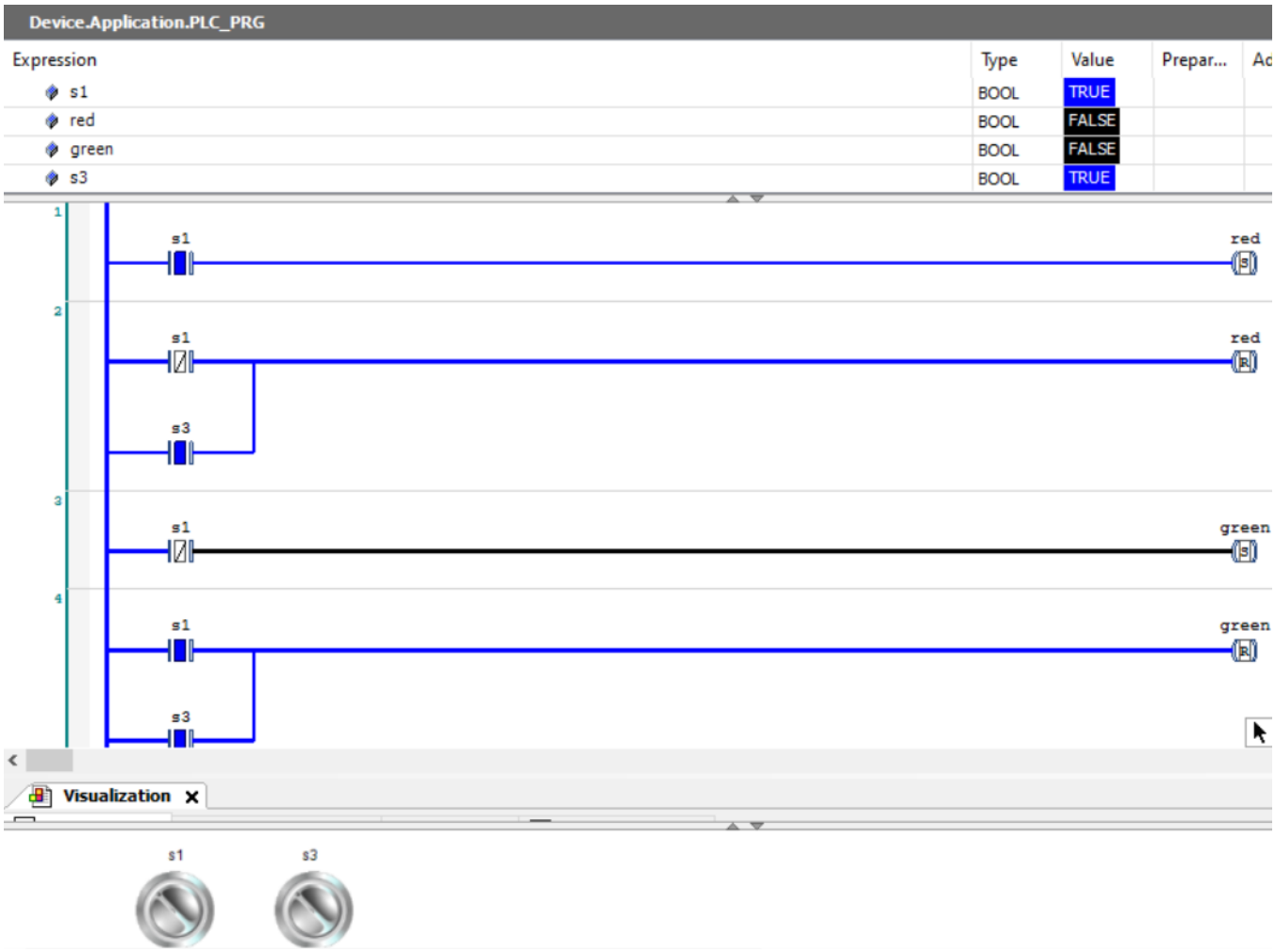
The functionality can be achieved by only using one input switch. I have demonstrated this in a newer version of codesys on my computer using the simulation.


Expression
Type
Value
Prepar...
Addr
s1
BOOL
FALSE
red
BOOL
FALSE
green
BOOL
TRUE
s3
BOOL
FALSE
s1
red
2
s1
red
s3
3
s1
green
4
s1
green
s3
Visualization
s1
s3

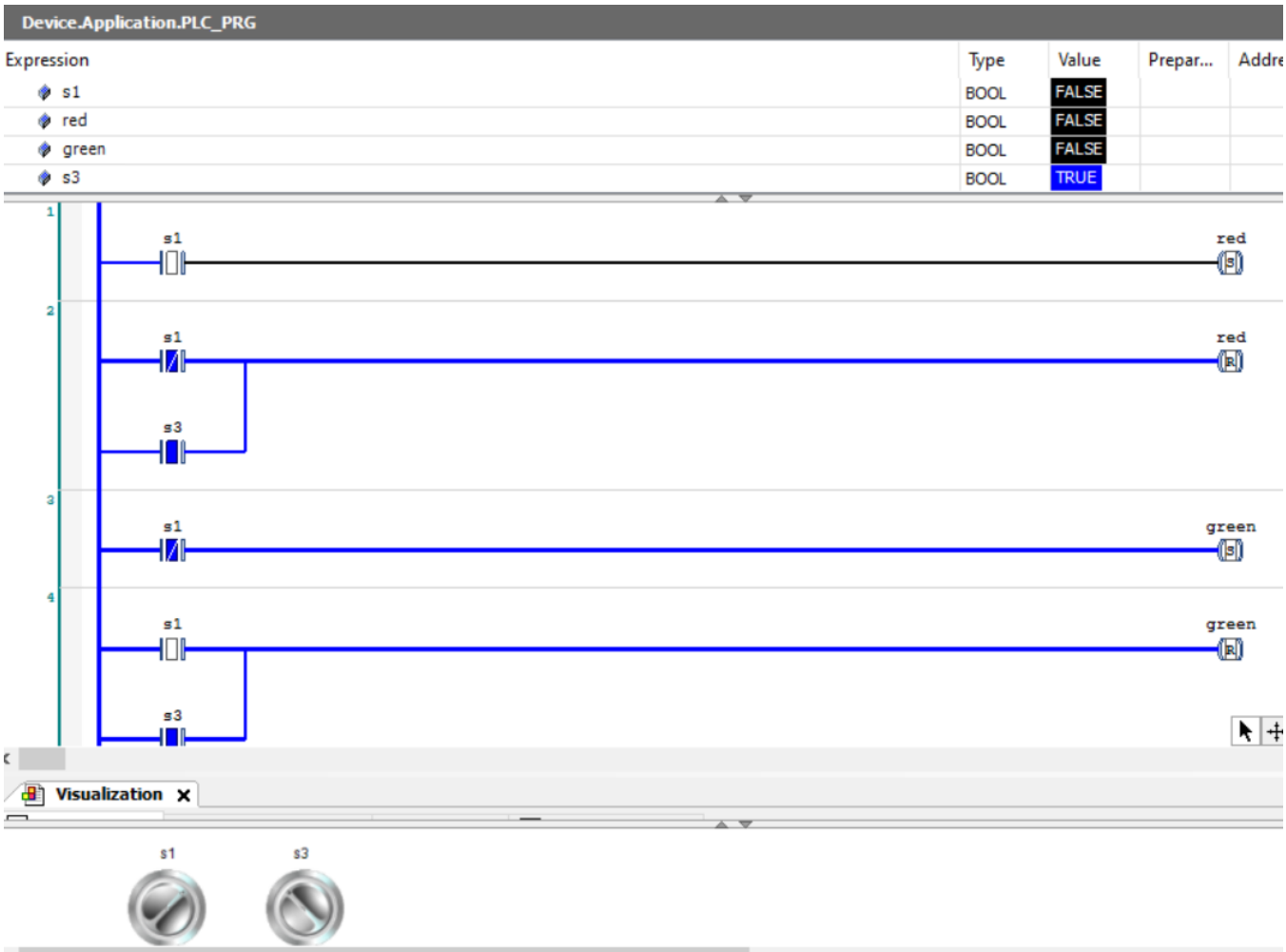
s1=low
s3=low



s1=high
s3=low



s1=high
s3=high



s1=low
s3=high

When s3 is high, both red and green are always low. If s1 is high and s3 low, output red is high and if s1 is low and s3 is low, out green is high.