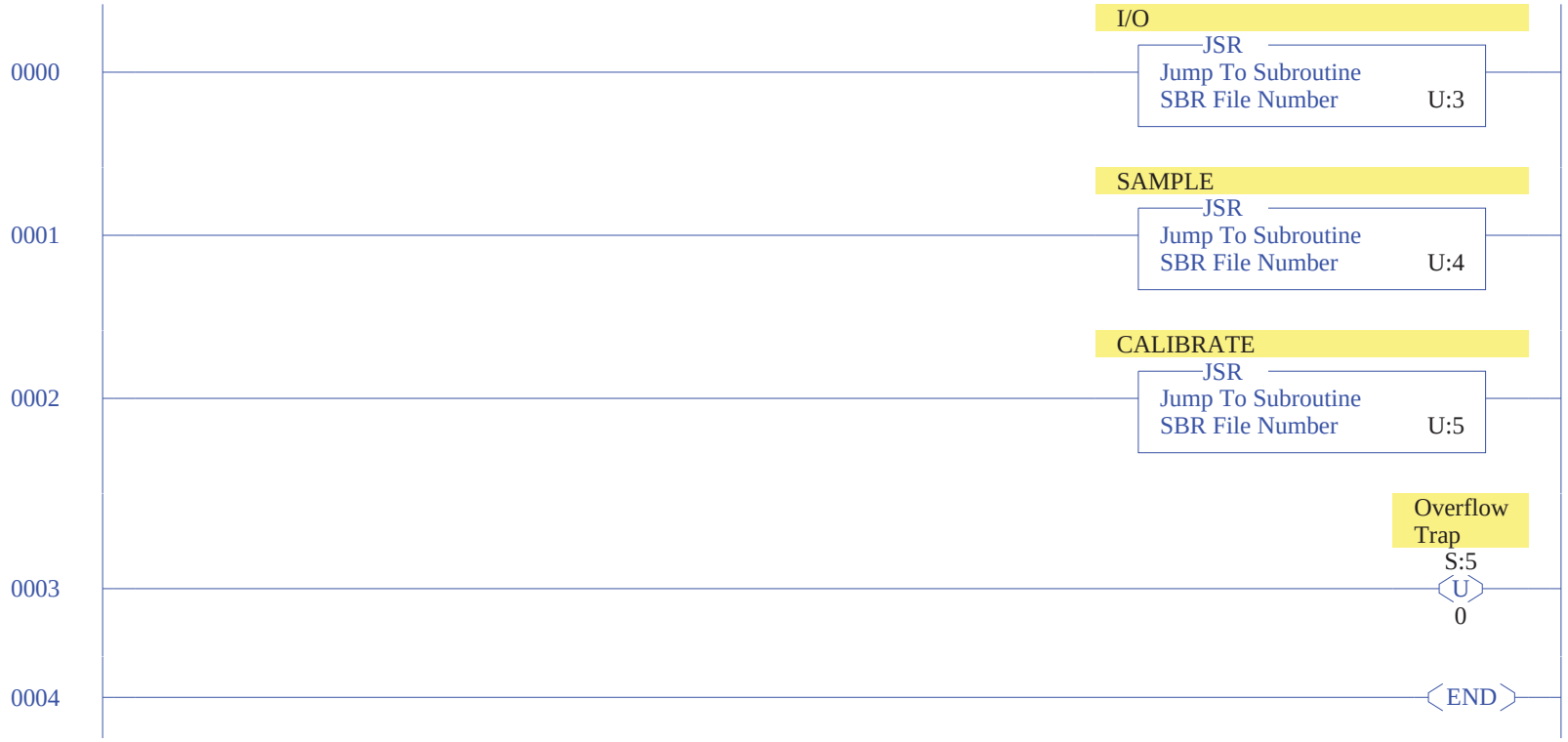
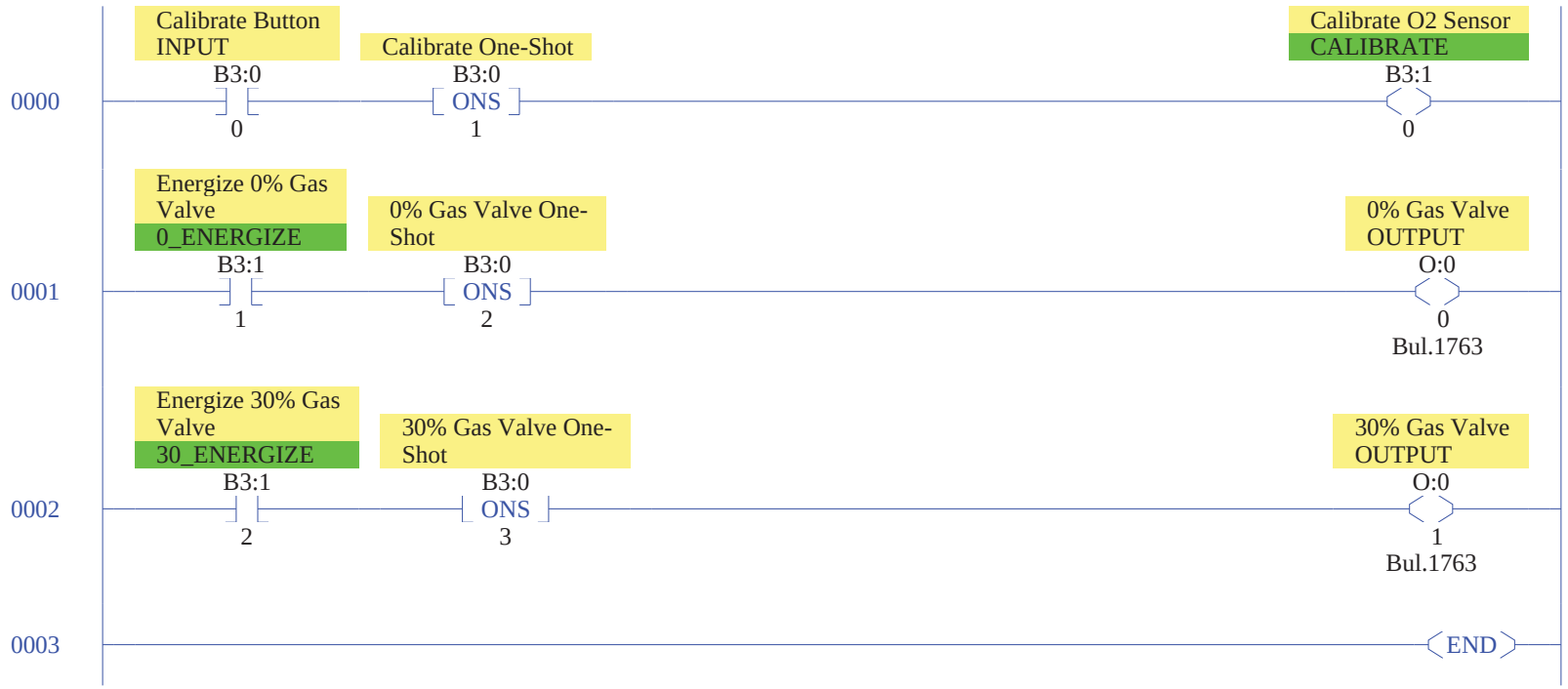
LAD 2 - MAIN --- Total Rungs in File = 5



LAD 3 - I/O --- Total Rungs in File = 4



0000

First Pass
S:1
15

FLL
Fill File
Source 0
Dest #N10:0
Length 30

RUNNING TOTAL OF DATA SAMPLES (%)

CLR
Clear
Dest L9:0
0<

O2 Sensor Input Signal

FLL
Fill File
Source 0
Dest #N7:0
Length 8

Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp

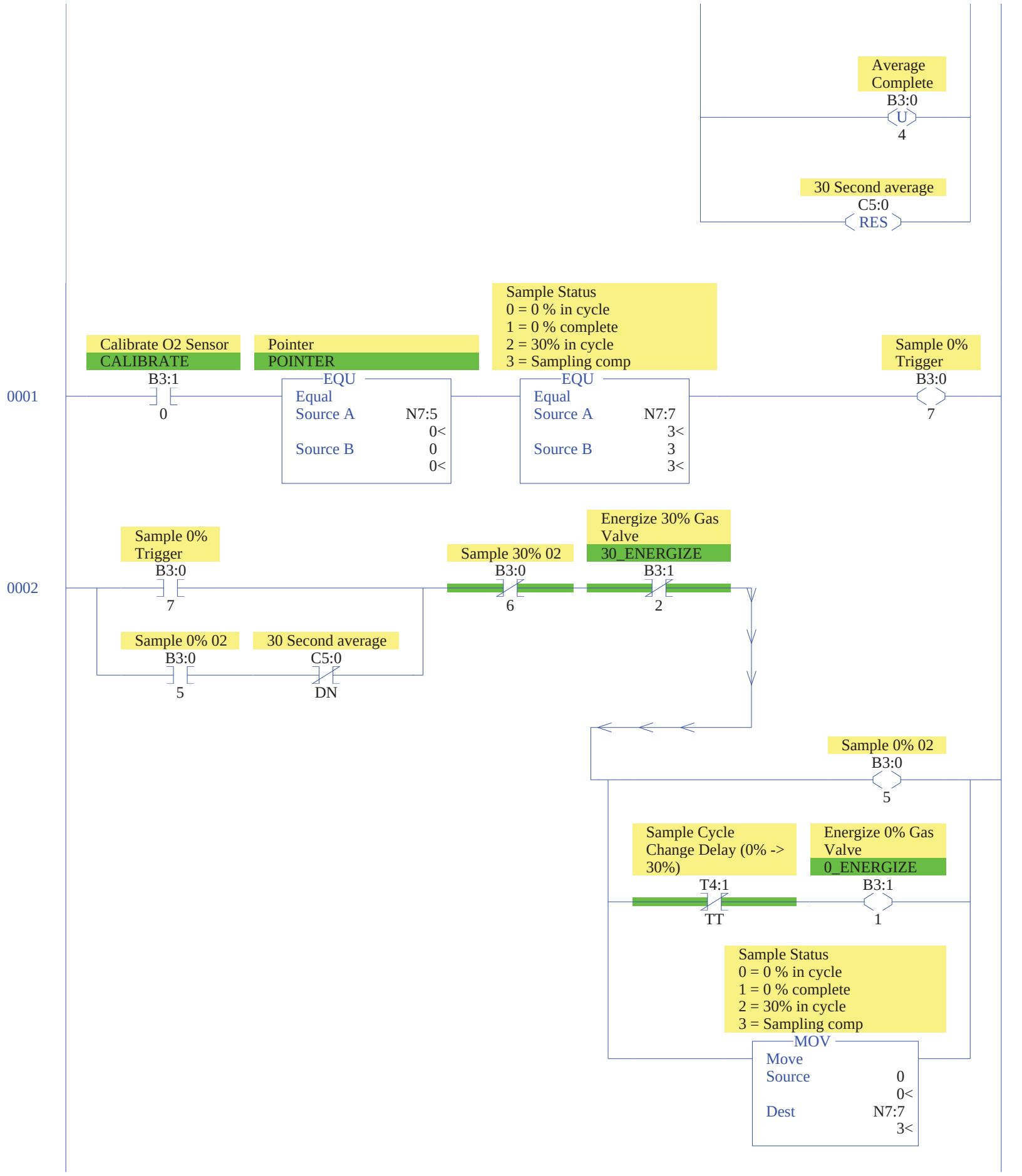
MOV
Move
Source 3
3<
Dest N7:7
3<

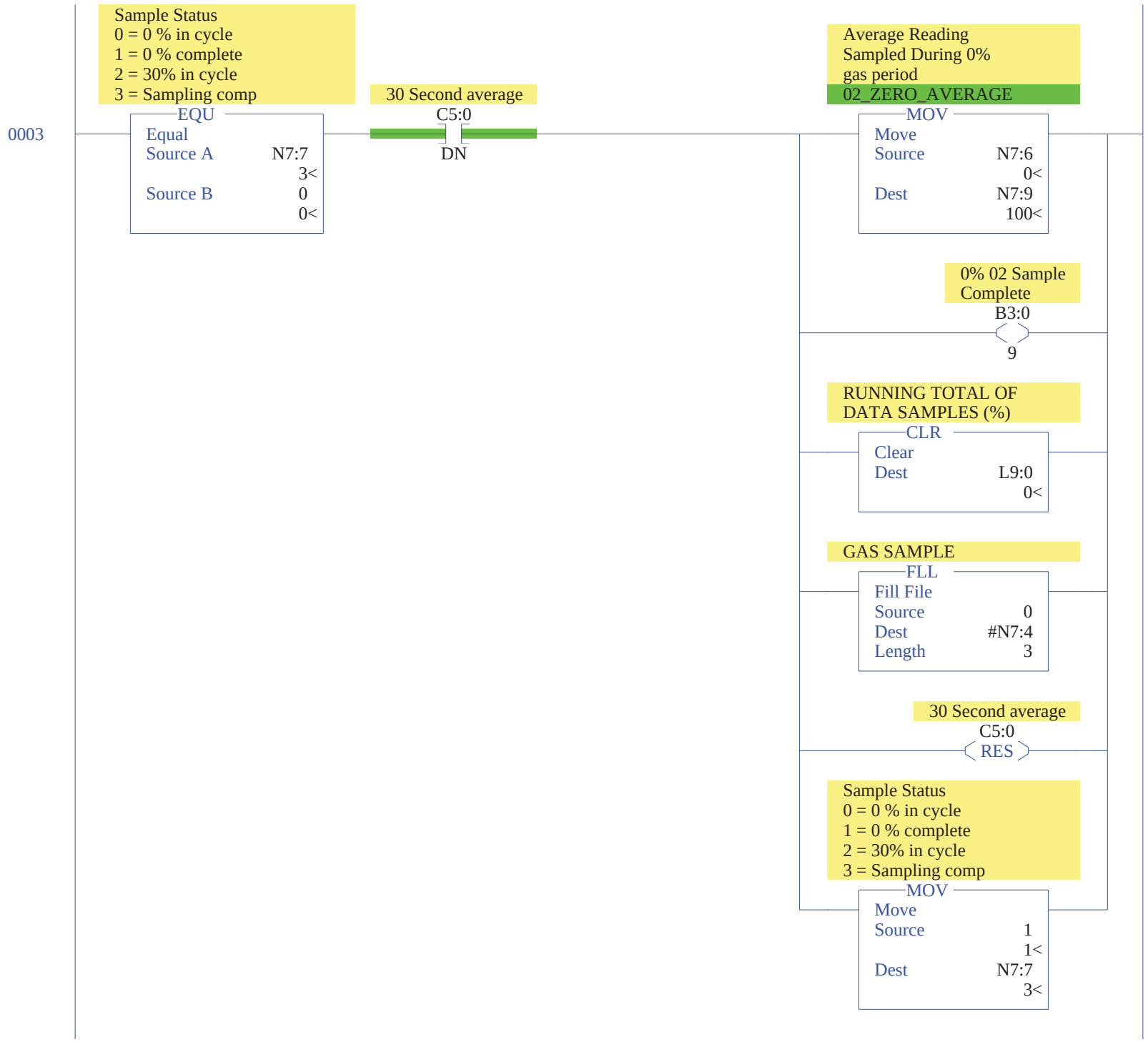
O2 input min (for SCP instruction, default value = 0)

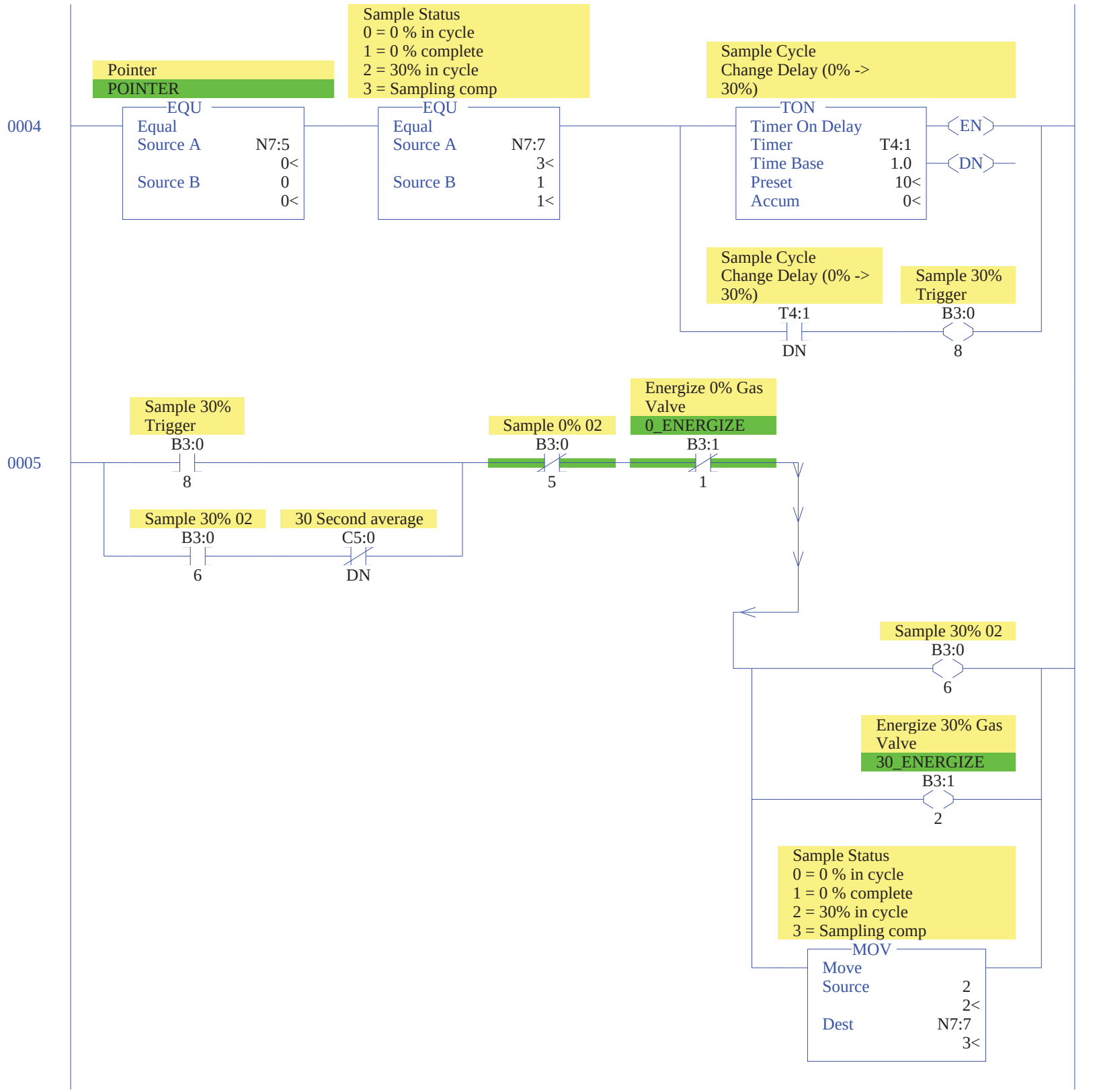
MOV
Move
Source 0
0<
Dest N7:2
100<

O2 Input Max (for SCP instruction, default value = 16383)

MOV
Move
Source 16383
16383<
Dest N7:3
14597<

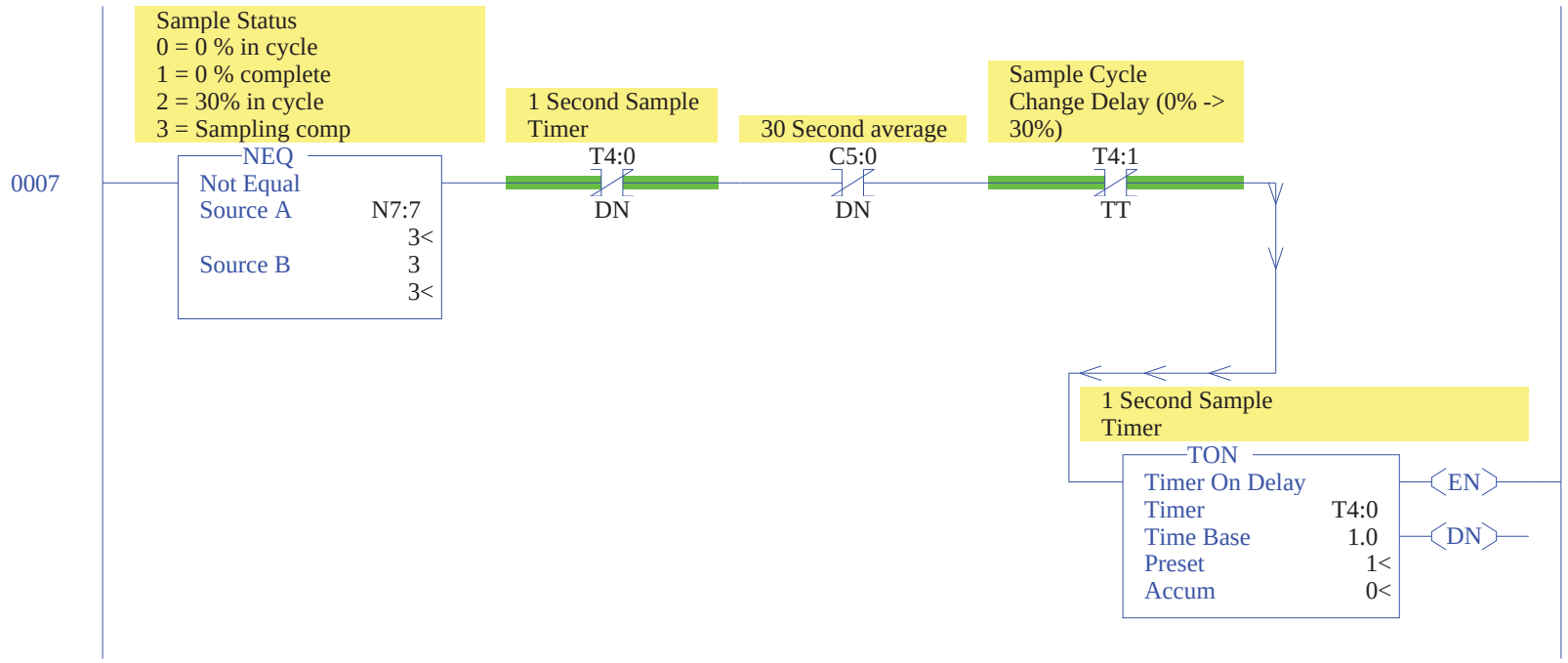

Average Complete
B3:0
U
4
30 Second average
C5:0
RES
Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
Calibrate O2 Sensor
CALIBRATE
B3:1
0
Pointer
POINTER
EQU
Equal
Source A N7:5
0<
Source B 0
0<
EQU
Equal
Source A N7:7
3<
Source B 3
3<
Sample 0% Trigger
B3:0
7
0001
Sample 0% Trigger
B3:0
7
Sample 30% 02
B3:0
6
Energize 30% Gas Valve
30_ENERGIZE
B3:1
2
0002
Sample 0% 02
B3:0
5
30 Second average
C5:0
DN
Sample 0% 02
B3:0
5
Sample Cycle Change Delay (0% -> 30%)
T4:1
TT
Energize 0% Gas Valve
0_ENERGIZE
B3:1
1
Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
MOV
Move
Source 0
0<
Dest N7:7
3<

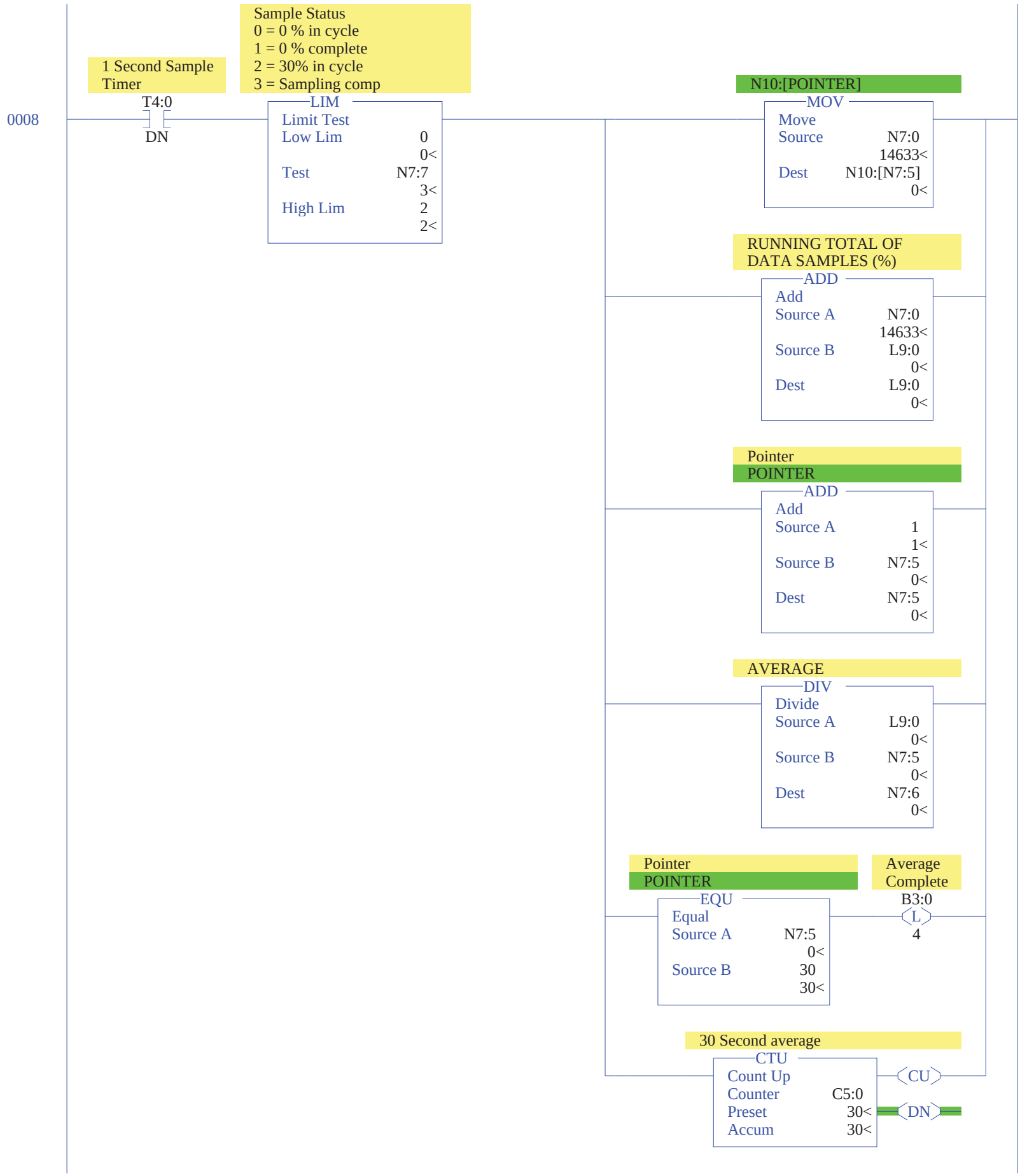

Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
30 Second average
C5:0
Average Reading
Sampled During 0%
gas period
02_ZERO_AVERAGE
0003
EQU
Equal
Source A N7:7
3<
Source B 0
0<
DN
MOV
Move
Source N7:6
0<
Dest N7:9
100<
0% 02 Sample
Complete
B3:0
9
RUNNING TOTAL OF
DATA SAMPLES (%)
CLR
Clear
Dest L9:0
0<
GAS SAMPLE
FLL
Fill File
Source 0
Dest #N7:4
Length 3
30 Second average
C5:0
RES
Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
MOV
Move
Source 1
1<
Dest N7:7
3<

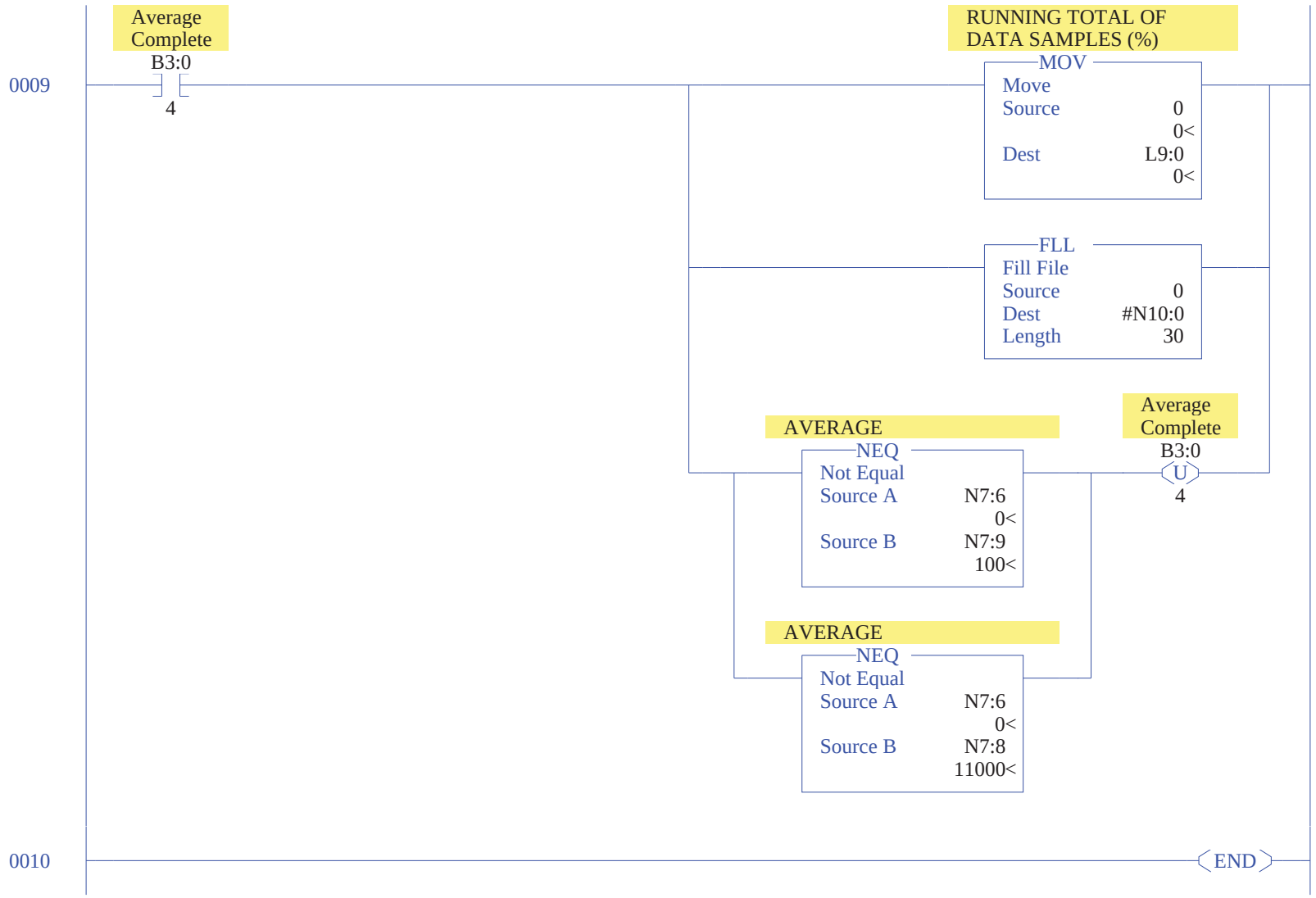

Pointer
POINTER
Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
Sample Cycle
Change Delay (0% -> 30%)
0004
EQU
Equal
Source A N7:5
0<
Source B 0
0<
EQU
Equal
Source A N7:7
3<
Source B 1
1<
TON
Timer On Delay
Timer T4:1
Time Base 1.0
Preset 10<
Accum 0<
EN
DN
Sample Cycle
Change Delay (0% -> 30%)
T4:1
DN
Sample 30%
Trigger
B3:0
8
Sample 30%
Trigger
B3:0
8
0005
Sample 0% 02
B3:0
5
Energize 0% Gas
Valve
0_ENERGIZE
B3:1
1
Sample 30% 02
B3:0
6
30 Second average
C5:0
DN
Sample 30% 02
B3:0
6
Energize 30% Gas
Valve
30_ENERGIZE
B3:1
2
Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
MOV
Move
Source 2
2<
Dest N7:7
3<

0006


Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
EQU
Equal
Source A N7:7 3<
Source B 2 2<
30 Second average
C5:0
DN
Sample 0% 02
B3:0
5
Average reading sampled during 30% gas period
02_TEST_GAS_AVERAGE
MOV
Move
Source N7:6 0<
Dest N7:8 11000<
30% 02 Sample Complete
B3:0
11
RUNNING TOTAL OF DATA SAMPLES (%)
CLR
Clear
Dest L9:0 0<
GAS SAMPLE
FLL
Fill File
Source 0
Dest #N7:4
Length 3
Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
MOV
Move
Source 3 3<
Dest N7:7 3<


Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
1 Second Sample Timer
30 Second average
Sample Cycle Change Delay (0% -> 30%)
0007
NEQ
Not Equal
Source A N7:7 3<
Source B 3 3<
T4:0
DN
C5:0
DN
T4:1
TT
1 Second Sample Timer
TON
Timer On Delay
Timer T4:0
Time Base 1.0
Preset 1<
Accum 0<
EN
DN


0008
1 Second Sample Timer
T4:0
DN
Sample Status
0 = 0 % in cycle
1 = 0 % complete
2 = 30% in cycle
3 = Sampling comp
LIM
Limit Test
Low Lim 0 0<
Test N7:7 3<
High Lim 2 2<
N10:[POINTER]
MOV
Move
Source N7:0 14633<
Dest N10:[N7:5] 0<
RUNNING TOTAL OF DATA SAMPLES (%)
ADD
Add
Source A N7:0 14633<
Source B L9:0 0<
Dest L9:0 0<
Pointer
POINTER
ADD
Add
Source A 1 1<
Source B N7:5 0<
Dest N7:5 0<
AVERAGE
DIV
Divide
Source A L9:0 0<
Source B N7:5 0<
Dest N7:6 0<
Pointer
POINTER
EQU
Equal
Source A N7:5 0<
Source B 30 30<
Average Complete
B3:0
L
4
30 Second average
CTU
Count Up
Counter C5:0
Preset 30<
Accum 30<
CU
DN


0009
Average Complete
B3:0
4
RUNNING TOTAL OF DATA SAMPLES (%)
MOV
Move
Source 0
0<
Dest L9:0
0<
FLL
Fill File
Source 0
Dest #N10:0
Length 30
AVERAGE
NEQ
Not Equal
Source A N7:6
0<
Source B N7:9
100<
Average Complete
B3:0
U
4
AVERAGE
NEQ
Not Equal
Source A N7:6
0<
Source B N7:8
11000<
0010
END

CALIBRATION CALCULATIONS:

Input Min = O2_Zero_Average

0% 02 Sample Complete
B3:0
9

0% 02 Sample Complete One-Shot
B3:0
ONS
10

O2 input min (for SCP instruction, default value = 0)

0000

MOV
Move
Source N7:9 100<
Dest N7:2 100<

Input Max = ((O2_Maximum_ Concentration / O2_Calibration_Gas_Concentration) *
(O2_Test_Gas_Average - O2_Zero_Average)) + O2_Zero_Average

O2_Maximum_ Concentration = 40(%)
O2_Calibration_Gas_ Concentration = 30(%)
O2_Test_Gas_Average = average reading sampled during 30% gas period
O2_Zero_Average = average reading sampled during 0% gas period

30% 02 Sample Complete
B3:0
11

30% 02 Sample Complete One-Shot
B3:0
ONS
12

Difference of 02_Test_Gas_Average & 02_Zero_Average

0001

SUB
Subtract
Source A N7:8 11000<
Source B N7:9 100<
Dest N7:10 10900<

MUL
Multiply
Source A 1.33 1.33<
Source B N7:10 10900<
Dest F8:0 14597.0<

ADD
Add
Source A F8:0 14597.0<
Source B N7:9 100<
Dest F8:0 14597.0<

O2 Input Max (for SCP instruction, default value = 16383)

MOV
Move
Source F8:0 14597.0<
Dest N7:3 14597<

LAD 5 - CALIBRATE --- Total Rungs in File = 4