Controller Example_21_4
Controller Fault Handler
Power-Up Handler

Tasks

MainTask
- **MainProgram**
  - **Communication**
- **Simulation**
  - **Simulation**
    - Tie back Logic for motors, valves
- **Xfer**
  - **MainRoutine**
  - **Gates**
  - **Motors**
  - **Valves**
  - **Xfer_000Startup**
  - **Xfer_020Operate**
  - **Xfer_040Hold**
  - **Xfer_060Shutdown**
  - **Xfer_080EShutdown**
  - **Xfer_Abnormal**
  - **Xfer_Misc**

Unscheduled

Motion Groups

Ungrouped Axes

Add-On Instructions

- **Gate_Flop**
  - Flop gate control
  - **Logic**
- **Gate_Slide**
  - Slide gate control
  - **Logic**
- **Motor_Conv**
  - Conveyor motor control
  - **Logic**
- **Motor_Std**
  - Standard motor control
  - **Logic**
- **Valve_Disc**
  - Discrete Valve Control
  - **Logic**

Data Types

- **User-Defined**
  - **Gate_Flop_Type**
    - Flop Gate data
  - **Gate_Slide_Type**
    - Slide Gate data
  - **Motor_Conv_Type**
    - Conveyor data
  - **Motor_Std_Type**

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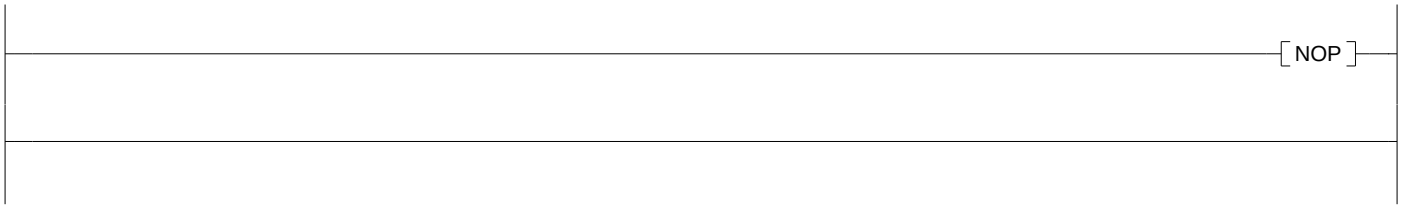
Motor data
Seq_Type
Sequence with up to 63 steps
Unit_Type
Common information for a unit
Valve_Disc_Type
Discrete Valve data
Strings
Add-On-Defined
Gate_Flop
Flop gate control
Gate_Slide
Slide gate control
Motor_Conv
Conveyor motor control
Motor_Std
Standard motor control
Valve_Disc
Discrete Valve Control
Module-Defined
AB:1756_CNB_7SLOT:I:0
AB:1756_CNB_7SLOT:O:0
AB:1756_CNB_SLOT:I:0
AB:1756_CNB_SLOT:O:0

Trends

I/O Configuration

1756 Backplane, 1756-A10
[0] 1756-L71 Example_21_4

0



(End)

Example 21.4 SImulation of devices

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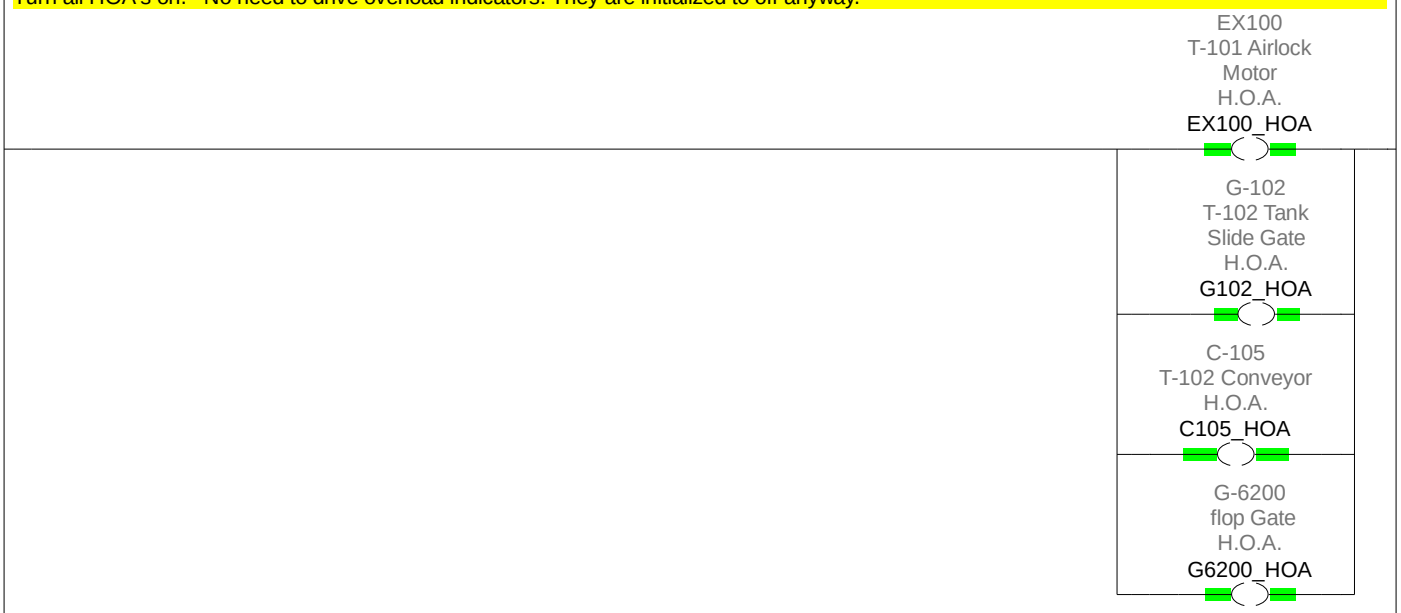
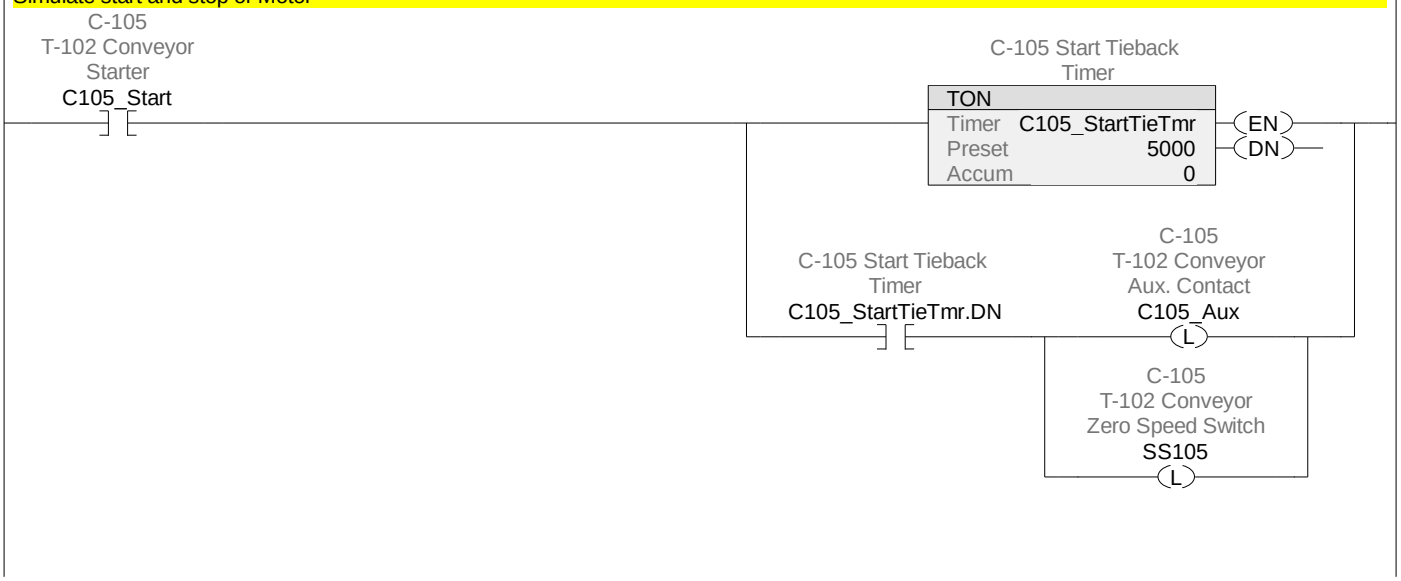
Turn all HOA's on. No need to drive overload indicators. They are initialized to off anyway.

0

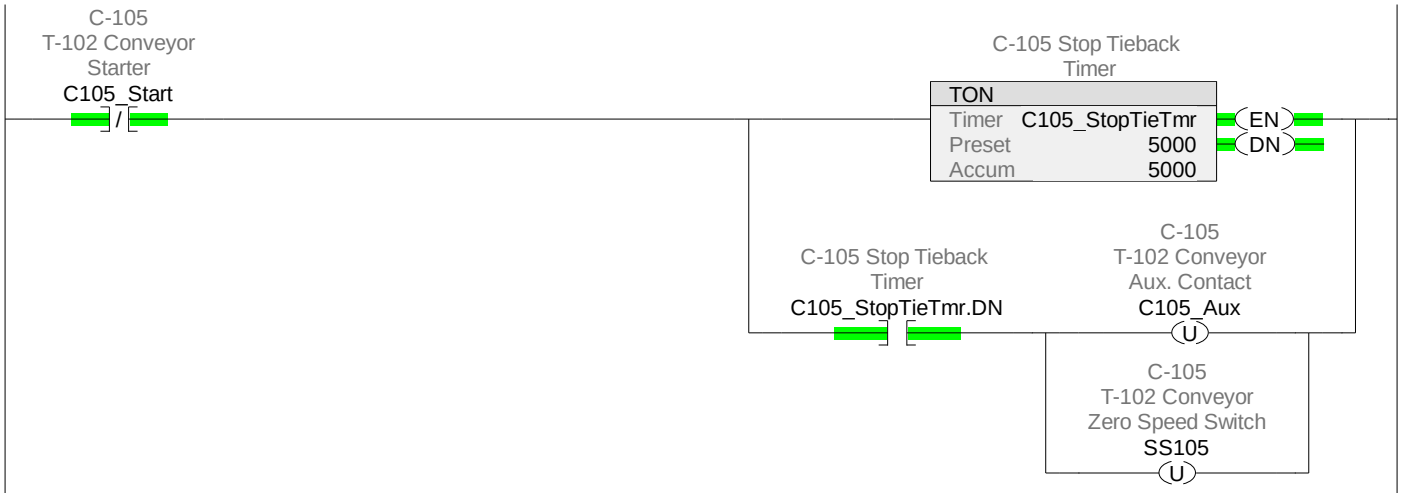


Simulate start and stop of Motor

1



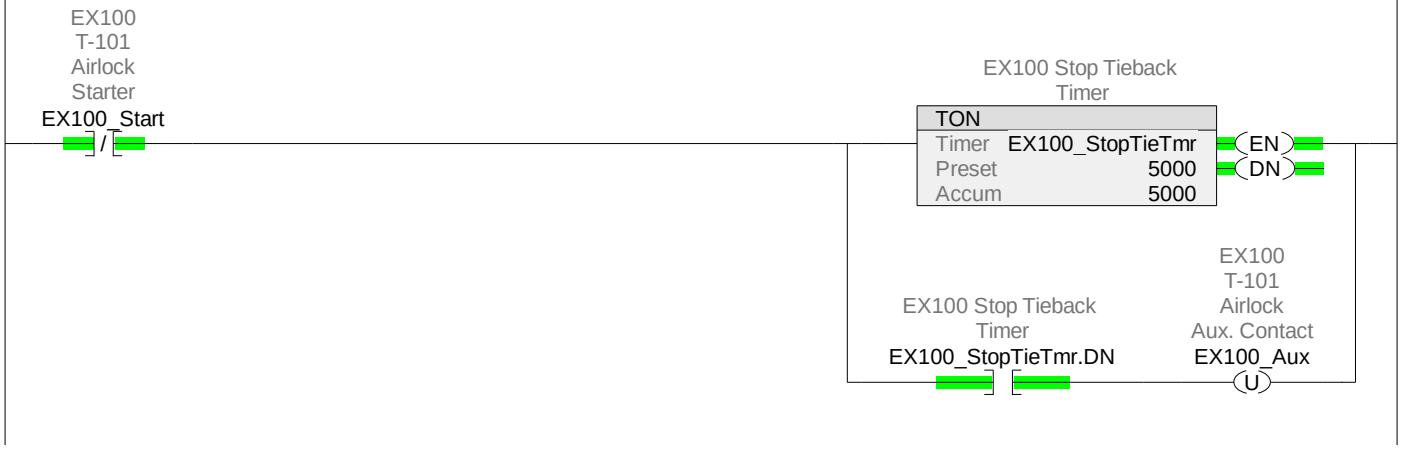
2



Simulate start and stop of Motor

3

4



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Simulate open and close of slide gate

5

G-102 T-102 Tank Slide Gate Starter Open
G102_Start_Open

G-102 Start Tieback Timer
TON
Timer G102_StartTieTmr
Preset 5000
Accum 0
EN
DN

G-102 Start Tieback Timer
G102_StartTieTmr.DN

G-102 T-102 Slide Gate Open LS
ZSO102
L

G-102 Start Tieback Timer
G102_StartTieTmr.DN

G-102 T-102 Tank Slide Gate Open Aux Contact
G102_Open_Aux

G-102 T-102 Slide Gate Closed LS
ZSC102
U

6

G-102 T-102 Tank Slide Gate Starter Close
G102_Start_Close

G-102 Stop Tieback Timer
TON
Timer G102_StopTieTmr
Preset 5000
Accum 0
EN
DN

G-102 Stop Tieback Timer
G102_StopTieTmr.DN

G-102 T-102 Slide Gate Closed LS
ZSC102
L

G-102 Stop Tieback Timer
G102_StopTieTmr.DN

G-102 T-102 Tank Slide Gate Clos Aux Contact
G102_Close_Aux

G-102 T-102 Slide Gate Open LS
ZSO102
U

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Simulate open and close of Valve

7

XV1001 Unit1 Outlet Valve Solenoid
XV1001_Sol_Valve

XV1001 Open Tieback Timer
TON
Timer XV1001_OpenTieTmr
Preset 5000
Accum 0
EN
DN

XV1001 Open Tieback Timer
XV1001_OpenTieTmr.DN

XV1001 Unit1 Outlet Valve Open Limit Switch
XV1001_OpenLS

8

XV1001 Unit1 Outlet Valve Solenoid
XV1001_Sol_Valve

XV1001 Close Tieback Timer
TON
Timer XV1001_CloseTieTmr
Preset 5000
Accum 5000
EN
DN

XV1001 Close Tieback Timer
XV1001_CloseTieTmr.DN

XV1001 Unit1 Outlet Valve Closed Limit Switch
XV1001_CloseLS

9

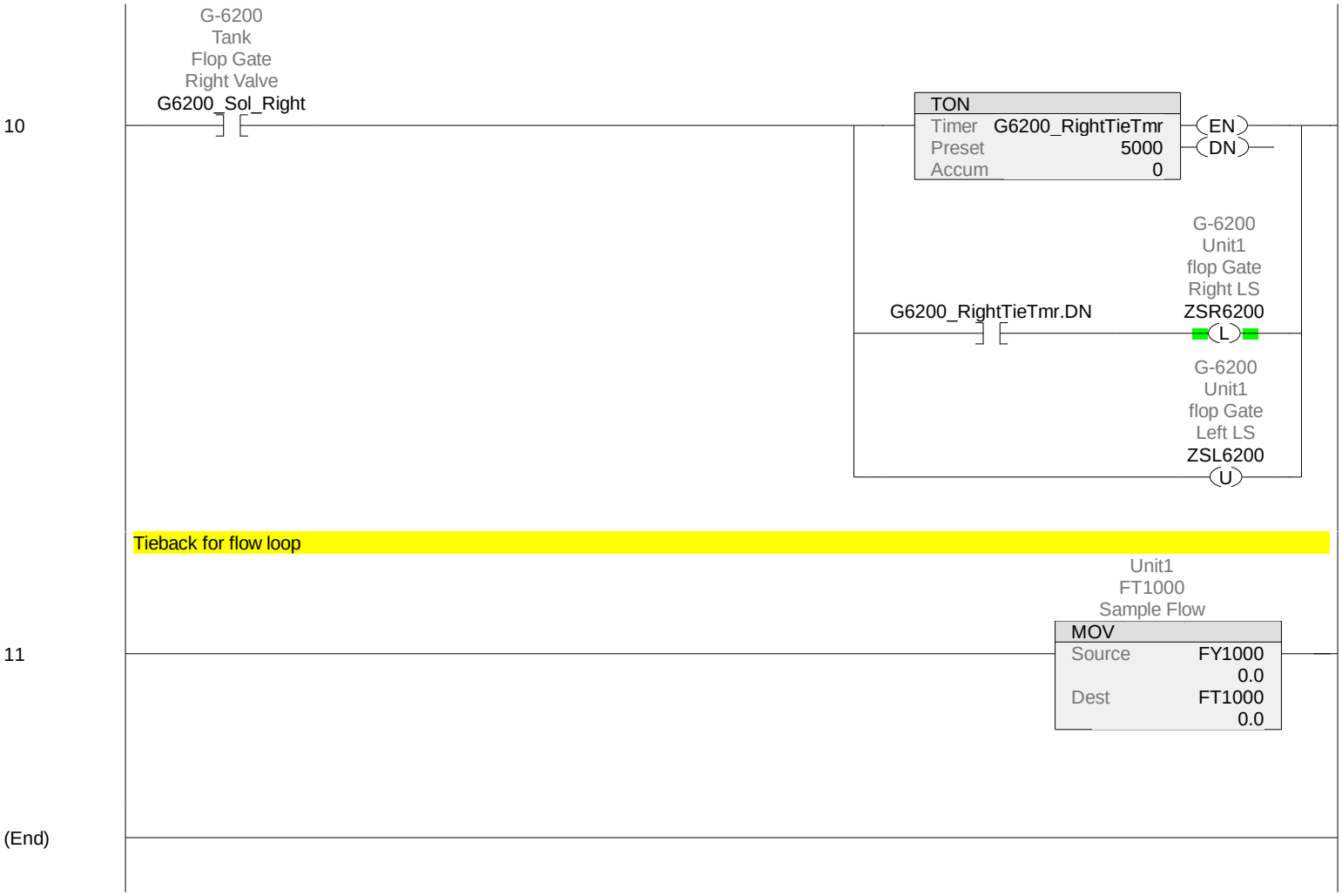
G-6200 Tank Flop Gate Left Valve
G6200_Sol_Left

TON
Timer G6200_LeftTieTmr
Preset 5000
Accum 0
EN
DN

G6200_LeftTieTmr.DN

G-6200 Unit1 flop Gate Left LS
ZSL6200
L

G-6200 Unit1 flop Gate Right LS
ZSR6200
U


10
G-6200
Tank
Flop Gate
Right Valve
G6200_Sol_Right
TON
Timer G6200_RightTieTmr
Preset 5000
Accum 0
EN
DN
G-6200
Unit1
flop Gate
Right LS
ZSR6200
G6200_RightTieTmr.DN
L
G-6200
Unit1
flop Gate
Left LS
ZSL6200
U
Tieback for flow loop
11
Unit1
FT1000
Sample Flow
MOV
Source FY1000
0.0
Dest FT1000
0.0
(End)

Example 21.4 Gates routine that calls AOIs

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0 NOP

1

G-6200
Tank
Flop Gate

Gate_Flop	
Gate_Flop	G6200_DB ...
Left_LS	ZSL6200
	0
Right_LS	ZSR6200
	1
HOA_Switch	G6200_HOA
	1
Alarm_Reset	Xfer.Alm_Reset
	0
Maint	Xfer.Maint
	0
Man_Left	Xfer.Man_StartOpen
	0
Man_Right	Xfer.Man_StopClose
	0
Select_Dev_Num	Xfer.Man_DevNum
	0
This_Dev_Num	4
Sol_Left	G6200_Sol_Left
	0
Sol_Right	G6200_Sol_Right
	0
Tag	G6200

(End)

Example 21.4 Xfer Unit Control

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0 NOP

Main Routine

1 JSR Routine Name Motors

2 JSR Routine Name Gates

3 JSR Routine Name Valves

4 JSR Routine Name Xfer_Abnormal

5 JSR Routine Name Xfer_Misc

6 JSR Routine Name Xfer_000Startup

7 JSR Routine Name Xfer_020Operate

8 JSR Routine Name Xfer_040Hold

9 JSR Routine Name Xfer_060Shutdown

10 JSR Routine Name Xfer_080EShutdown

(End)

Example 21.4 Motors routine that calls AOIs

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0 NOP

1

C-105
T-102 Conveyor

Motor_Conv	
Motor_Conv	C105_DB ...
Aux_Contact	C105_Aux
	0
OL_Trip	C105_OL
	0
HOA_Switch	C105_HOA
	1
Speed_Switch	SS105
	0
Alarm_Reset	Xfer.Alm_Reset
	0
Maint	Xfer.Maint
	0
Man_Start	Xfer.Man_StartOpen
	0
Man_Stop	Xfer.Man_StopClose
	0
Select_Dev_Num	Xfer.Man_DevNum
	0
This_Dev_Num	105
Starter	C105_Start
	0
Tag	C105

2

EX100
T-101
Airlock

Motor_Std	
Motor_Std	EX100_DB ...
Aux_Contact	EX100_Aux
	0
OL_Trip	EX100_OL
	0
HOA_Switch	EX100_HOA
	1
Alarm_Reset	Xfer.Alm_Reset
	0
Maint	Xfer.Maint
	0
Man_Start	Xfer.Man_StartOpen
	0
Man_Stop	Xfer.Man_StopClose
	0
Select_Dev_Num	Xfer.Man_DevNum
	0
This_Dev_Num	100
Starter	EX100_Start
	0
Tag	EX100

3

G-102
T-102 Tank
Slide Gate

Gate_Slide	
Gate_Slide	G102_DB ...
Open_Aux	G102_Open_Aux 0
Close_Aux	G102_Close_Aux 0
OL_Trip	G102_OL 0
HOA_Switch	G102_HOA 1
Open_LS	ZSO102 0
Close_LS	ZSC102 1
Alarm_Reset	Xfer.Alm_Reset 0
Maint	Xfer.Maint 0
Man_Open	Xfer.Man_StartOpen 0
Man_Close	Xfer.Man_StopClose 0
Select_Dev_Num	Xfer.Man_DevNum 0
This_Dev_Num	102
Start_Open	G102_Start_Open 0
Start_Close	G102_Start_Close 0
Tag	G102

(End)

Example 21.4 Valves routine that calls AOIs

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0 NOP

1

XV1001
Unit1
Outlet Valve

Valve_Disc	
Valve_Disc	XV1001_DB ...
Open_LS	XV1001_OpenLS
	0
Close_LS	XV1001_CloseLS
	1
Alarm_Reset	Xfer.Alm_Reset
	0
Maint	Xfer.Maint
	0
Man_Open	Xfer.Man_StartOpen
	0
Man_Close	Xfer.Man_StopClose
	0
Select_Dev_Num	Xfer.Man_DevNum
	0
This_Dev_Num	5
Vlv_Sol	XV1001_Sol_Valve
	0
Tag	XV1001

(End)

Xfer Sequence Logic

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0 [NOP]

Handle operator-requested and auto sequence starts. Also maintains message number for OI

Startup Sequen

1

Xfer Local/remote control indication
Xfer.Local

Xfer Startup Sequence start request from PC
Xfer_Startup.PC_Start

Xfer Operate Auto-start request
Xfer_Operate.Auto_Start

Xfer Hold Auto-start request
Xfer_Hold.Auto_Start

Xfer Shutdown Auto-start request
Xfer_Shutdown.Auto_Start

Xfer Local/remote control indication
Xfer.Local

Xfer Startup Sequence start request from LTP
Xfer_Startup.LTP_Start

Xfer Startup Auto-start request
Xfer_Startup.Auto_Start

Xfer Startup Current step number

GEQ	
Source A	Xfer_Startup.Step_Num
	0
Source B	1

Xfer E-Shutdown Auto-start request
Xfer_EShutdown.Auto_Start

Xfer Startup One-shot storage to start
Xfer_Startup.Ons
ONS

Xfer Startup Current step number

EQU	
Source A	Xfer_Startup.Step_Num
	0
Source B	0

Xfer Startup Current step number

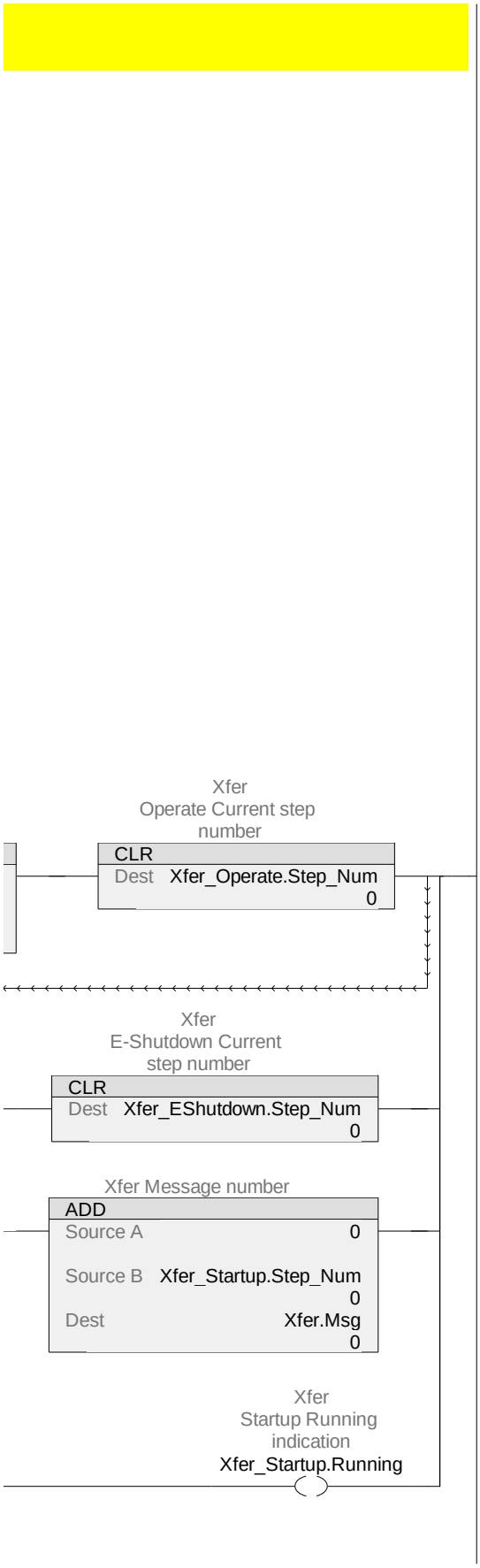
MOV	
Source	
Dest	Xfer_Startup.Step_Nu

Xfer Hold Current step number

CLR	
Dest	Xfer_Hold.Step_Num
	0

Xfer Shutdown Current step number

CLR	
Dest	Xfer_Shutdown.Step_Num
	0


Xfer
Operate Current step number
CLR
Dest Xfer_Operate.Step_Num
0
Xfer
E-Shutdown Current step number
CLR
Dest Xfer_EShutdown.Step_Num
0
Xfer Message number
ADD
Source A 0
Source B Xfer_Startup.Step_Num
0
Dest Xfer.Msg
0
Xfer
Startup Running indication
Xfer_Startup.Running

Automatic Start for Startup - Not Used Yet

2

AFI

Xfer Operate Auto-start request
Xfer_Operate.Auto_Start

Xfer Hold Auto-start request
Xfer_Hold.Auto_Start

Xfer Shutdown Auto-start request
Xfer_Shutdown.Auto_Start

Xfer E-Shutdown Auto-start request
Xfer_EShutdown.Auto_Start

Xfer Startup Running indication
Xfer_Startup.Running

Xfer Startup Auto-start one-shot storage
Xfer_Startup.Auto_Ons
ONS

Xfer Startup Auto-start hold timer
Xfer_Startup.Req_Tmr.TT

Xfer Startup Auto-start hold timer
TON
Timer Xfer_Startup.Req_Tmr
Preset 15000
Accum 0
EN
DN

Xfer Startup Auto-start request
Xfer_Startup.Auto_Start

Step 1 - Open G-102 slide gate

3

Xfer Startup Current step number
EQU
Source A Xfer_Startup.Step_Num
0
Source B 1

G-102 T-102 Tank Slide Gate Open LS status (1=open gate)
G102.Open_Status

Xfer Startup Current step number
MOV
Source 2
Dest Xfer_Startup.Step_Num
0

G-102 T-102 Tank Slide Gate Gate open initiated from sequence
G102.Seq_Open
L

Step 2 - Start conveyor C-105

4

Xfer Startup Current step number
EQU
Source A Xfer_Startup.Step_Num
0
Source B 2

C-105 T-102 Conveyor Run Status (1=running)
C105.Run_Status

Xfer Startup Current step number
MOV
Source 3
Dest Xfer_Startup.Step_Num
0

C-105 T-102 Conveyor Motor start initiated from sequence
C105.Seq_Start
L

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Step 3 - Spare

5

Xfer
Startup Current step
number

EQU
Source A Xfer_Startup.Step_Num
0
Source B 3

Xfer
Startup Current step
number

MOV
Source 4
Dest Xfer_Startup.Step_Num
0

Step 4 - Start EX100 airlock EX100

6

Xfer
Startup Current step
number

EQU
Source A Xfer_Startup.Step_Num
0
Source B 4

EX100
T-101
Airlock Run Status
(1=running)
EX100.Run_Status

Xfer
Startup Current step
number

MOV
Source 5
Dest Xfer_Startup.Step_Num
0

EX100
T-101
Airlock Motor start
initiated from
sequence
EX100.Seq_Start
L

(End)

Xfer Sequence Logic

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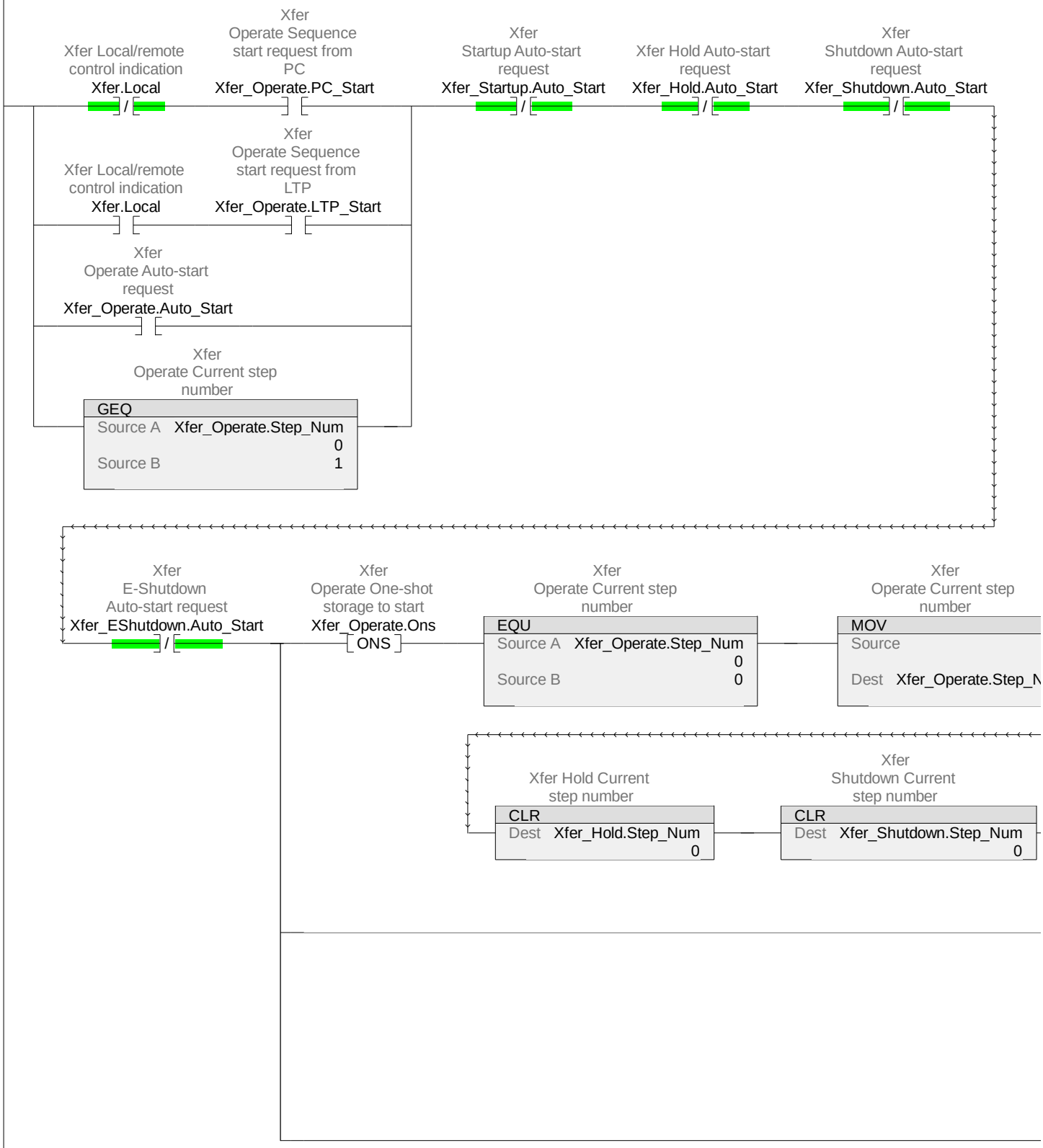
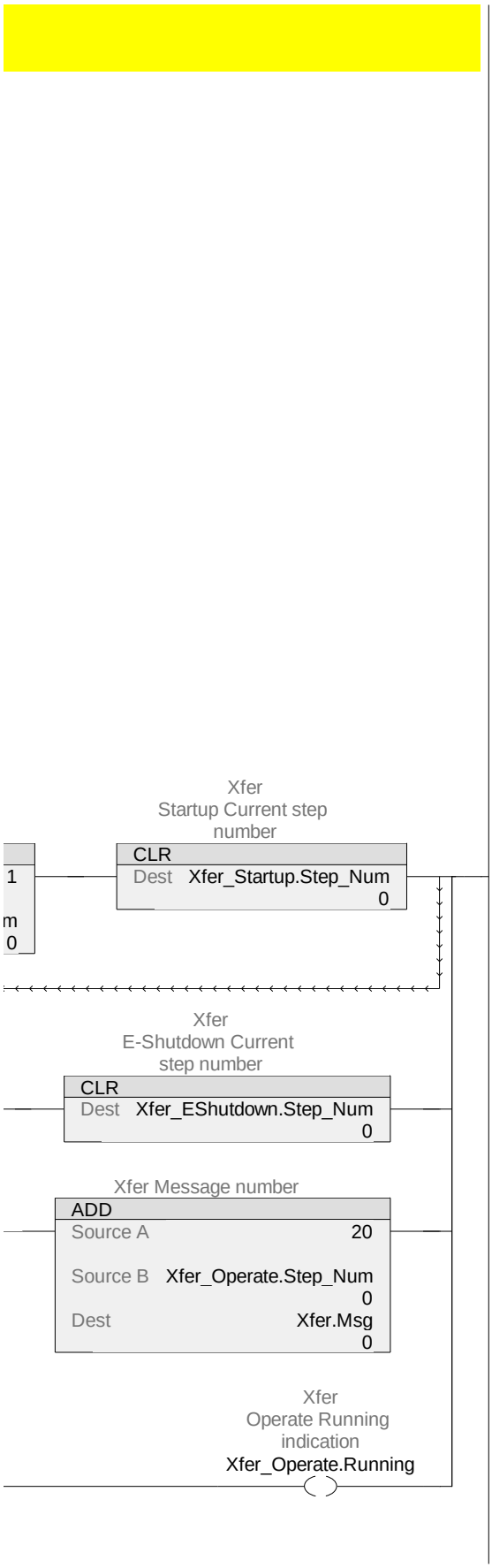
0 [NOP]

andle operator-requested and auto sequence starts. Also maintains message number for OI

Operate Sequence

1




Xfer
Startup Current step
number
CLR
Dest Xfer_Startup.Step_Num
0
Xfer
E-Shutdown Current
step number
CLR
Dest Xfer_EShutdown.Step_Num
0
Xfer Message number
ADD
Source A 20
Source B Xfer_Operate.Step_Num
0
Dest Xfer.Msg
0
Xfer
Operate Running
indication
Xfer_Operate.Running

Automatic Start for Operate

2

Xfer Startup Auto-start request
Xfer_Startup.Auto_Start

Xfer Hold Auto-start request
Xfer_Hold.Auto_Start

Xfer Shutdown Auto-start request
Xfer_Shutdown.Auto_Start

Xfer E-Shutdown Auto-start request
Xfer_EShutdown.Auto_Start

Xfer Operate Running indication
Xfer_Operate.Running

Xfer Startup Current step number

EQU
Source A Xfer_Startup.Step_Num
0
Source B 5

Xfer Operate Auto-start one-shot storage
Xfer_Operate.Auto_Ons
ONS

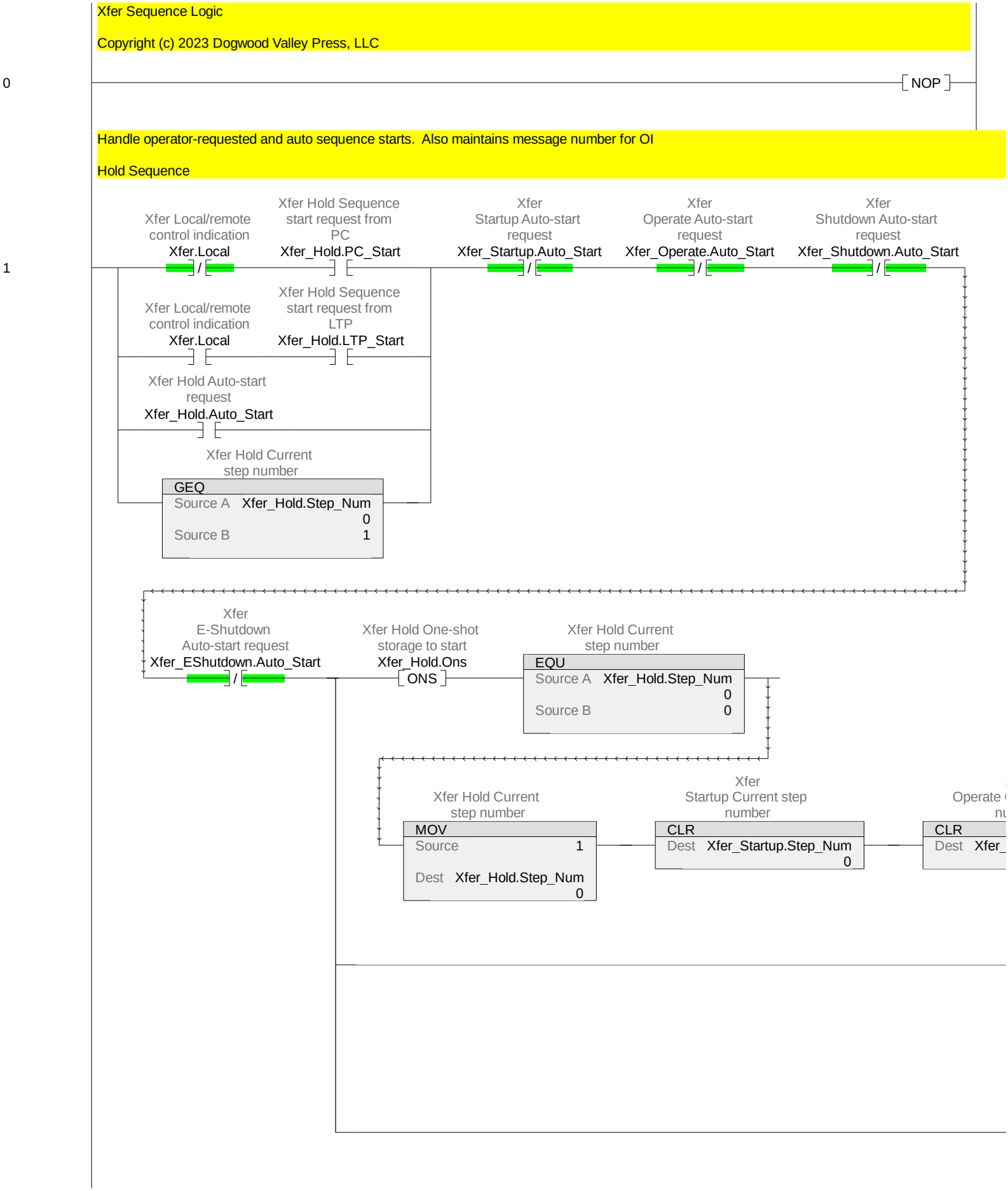
Xfer Operate Auto-start hold timer
Xfer_Operate.Req_Tmr.TT

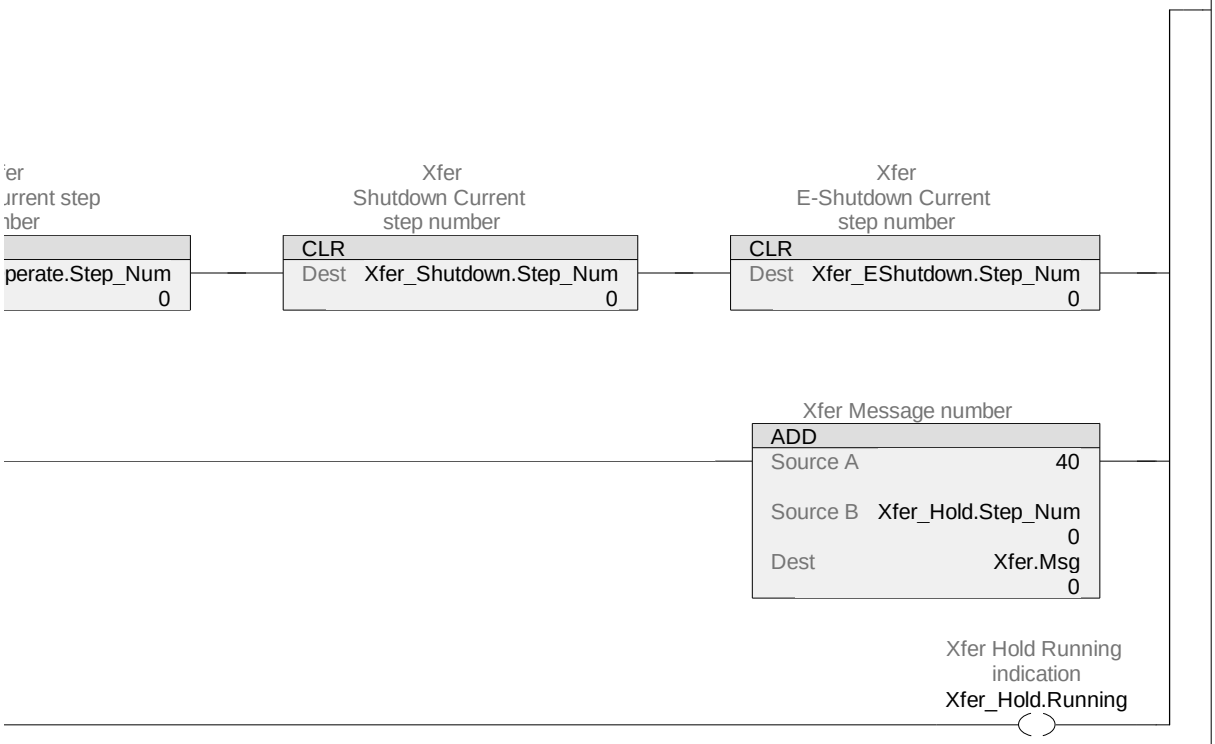
Xfer Operate Auto-start hold timer

TON
Timer Xfer_Operate.Req_Tmr
Preset 15000
Accum 0
EN
DN

Xfer Operate Auto-start request
Xfer_Operate.Auto_Start

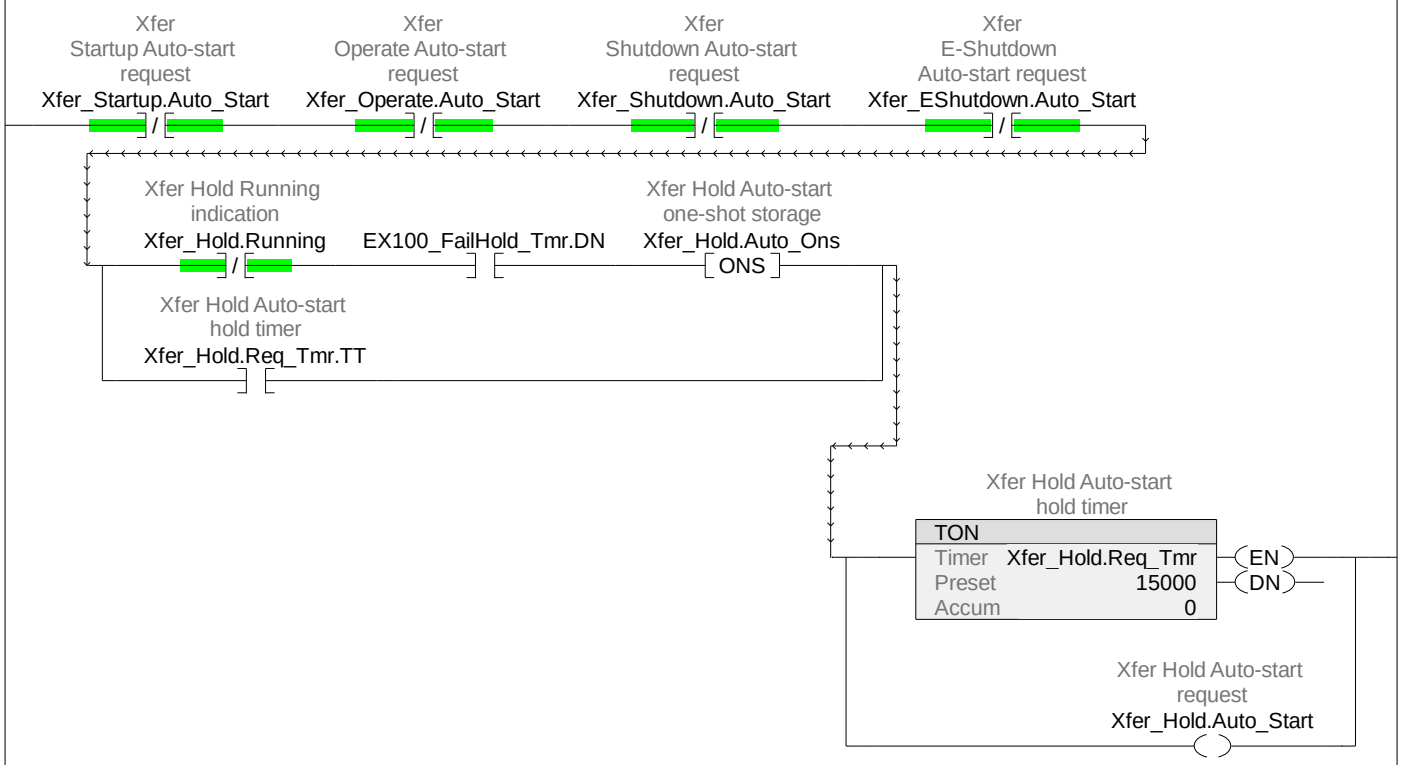
(End)


Xfer Sequence Logic
Copyright (c) 2023 Dogwood Valley Press, LLC
0
NOP
Handle operator-requested and auto sequence starts. Also maintains message number for OI
Hold Sequence
1
Xfer Local/remote control indication
Xfer.Local
Xfer Hold Sequence start request from PC
Xfer_Hold.PC_Start
Xfer Startup Auto-start request
Xfer_Startup.Auto_Start
Xfer Operate Auto-start request
Xfer_Operate.Auto_Start
Xfer Shutdown Auto-start request
Xfer_Shutdown.Auto_Start
Xfer Local/remote control indication
Xfer.Local
Xfer Hold Sequence start request from LTP
Xfer_Hold.LTP_Start
Xfer Hold Auto-start request
Xfer_Hold.Auto_Start
Xfer Hold Current step number
GEQ
Source A Xfer_Hold.Step_Num
0
Source B 1
Xfer E-Shutdown Auto-start request
Xfer_EShutdown.Auto_Start
Xfer Hold One-shot storage to start
Xfer_Hold.Ons
ONS
Xfer Hold Current step number
EQU
Source A Xfer_Hold.Step_Num
0
Source B 0
Xfer Hold Current step number
MOV
Source 1
Dest Xfer_Hold.Step_Num
0
Xfer Startup Current step number
CLR
Dest Xfer_Startup.Step_Num
0
CLR
Dest


er
urrent step
nber
perate.Step_Num
0
Xfer
Shutdown Current
step number
CLR
Dest Xfer_Shutdown.Step_Num
0
Xfer
E-Shutdown Current
step number
CLR
Dest Xfer_EShutdown.Step_Num
0
Xfer Message number
ADD
Source A 40
Source B Xfer_Hold.Step_Num
0
Dest Xfer.Msg
0
Xfer Hold Running
indication
Xfer_Hold.Running

Automatic Start for Hold

2



(End)

Xfer Sequence Logic

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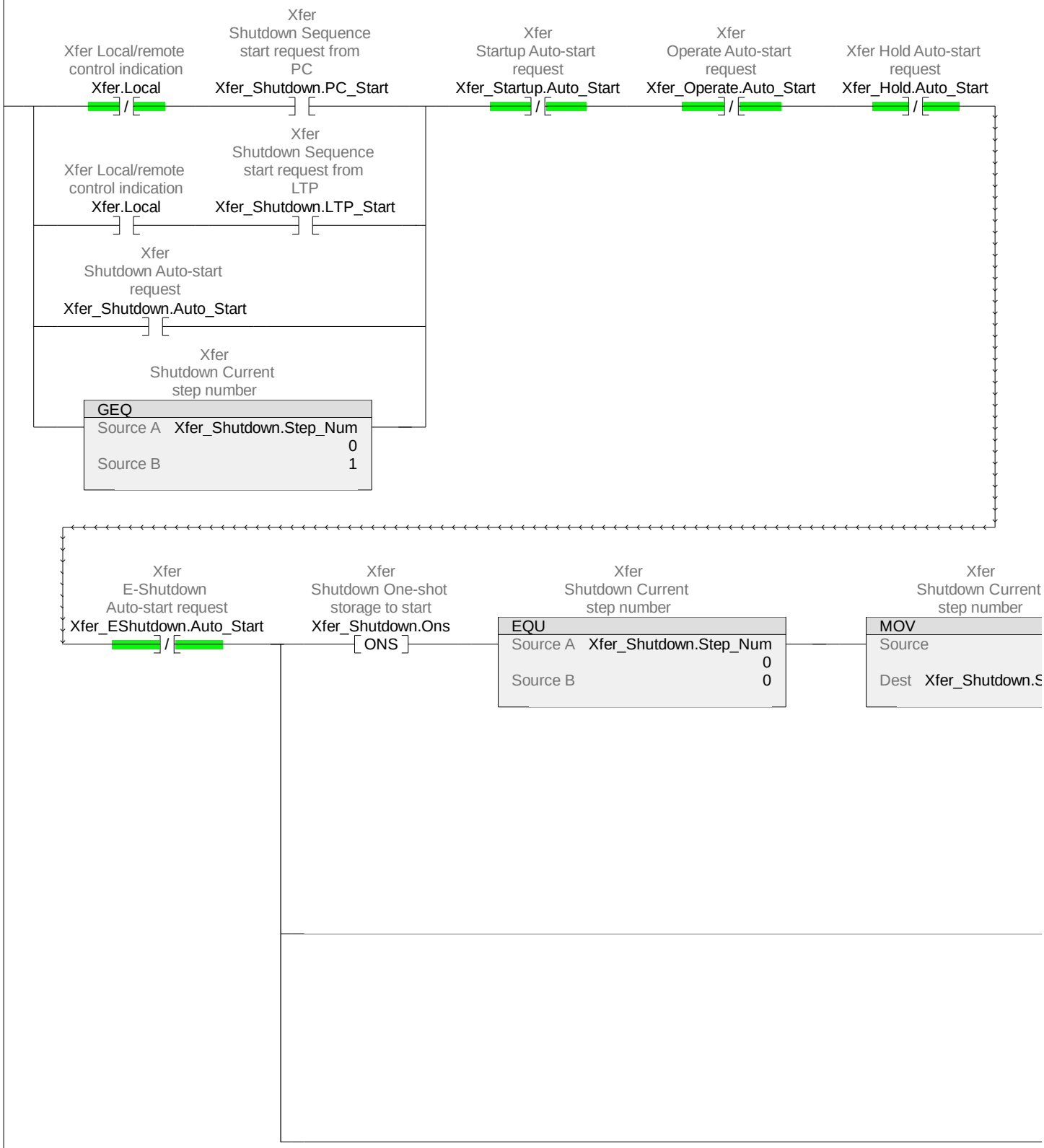
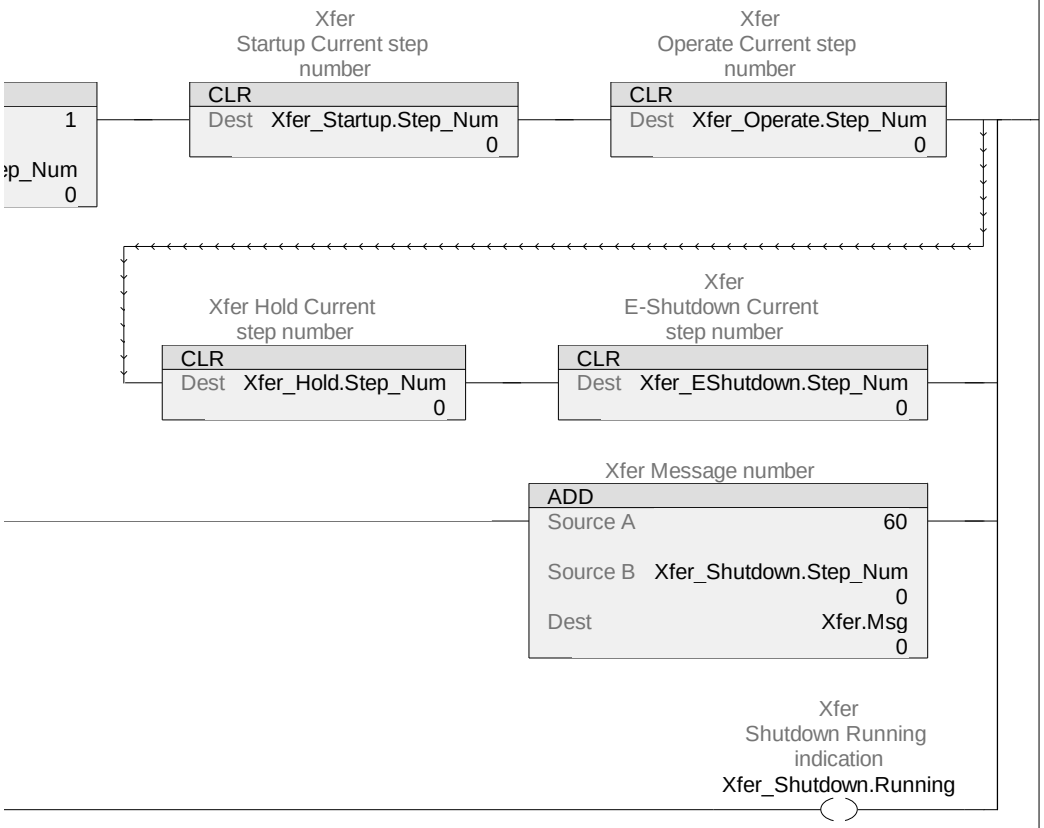
0 [NOP]

Handle operator-requested and auto sequence starts. Also maintains message number for OI

Shutdown Sequence

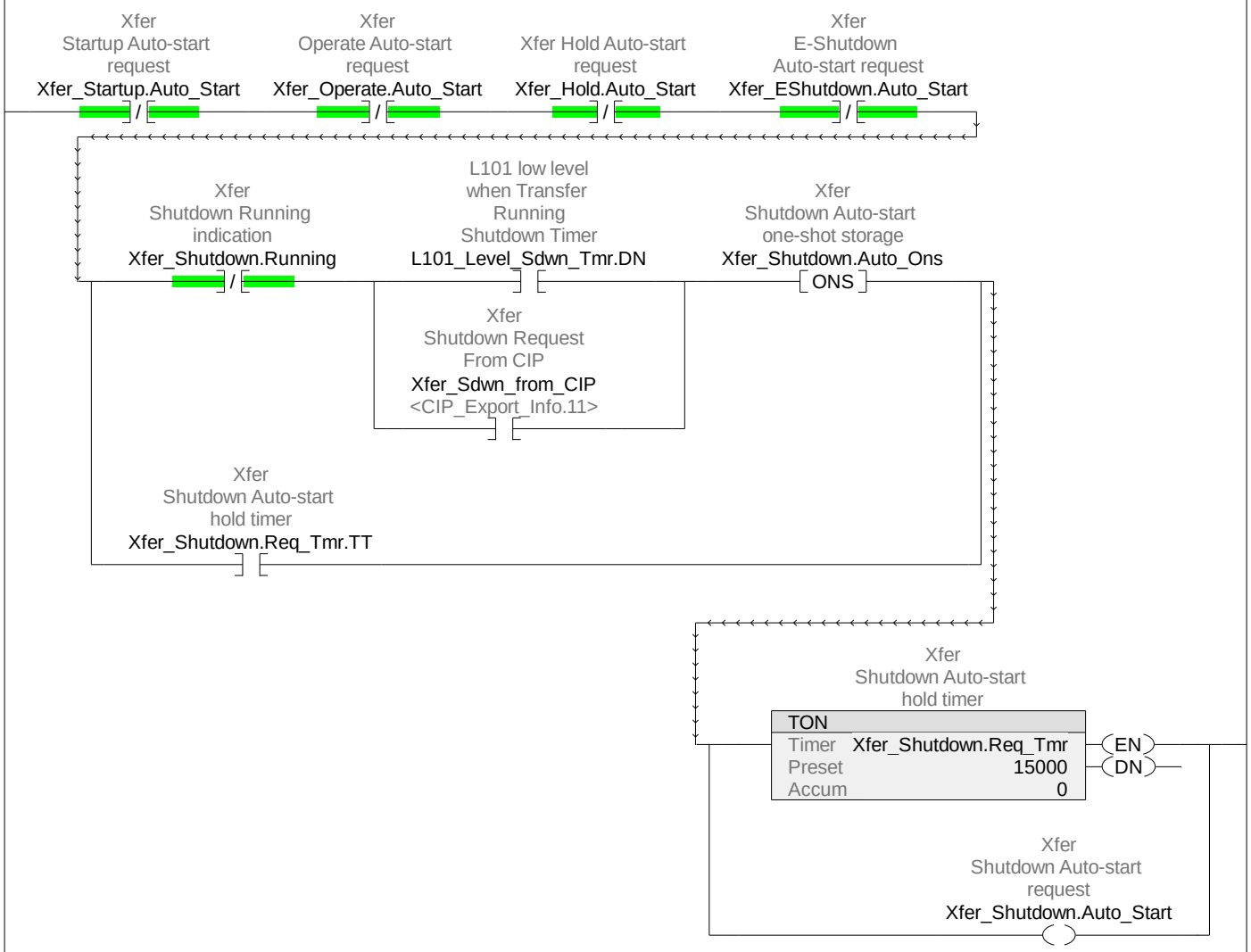
1




Xfer
Startup Current step number
CLR
Dest Xfer_Startup.Step_Num
0
Xfer
Operate Current step number
CLR
Dest Xfer_Operate.Step_Num
0
1
ep_Num
0
Xfer Hold Current step number
CLR
Dest Xfer_Hold.Step_Num
0
Xfer
E-Shutdown Current step number
CLR
Dest Xfer_EShutdown.Step_Num
0
Xfer Message number
ADD
Source A 60
Source B Xfer_Shutdown.Step_Num
0
Dest Xfer.Msg
0
Xfer
Shutdown Running indication
Xfer_Shutdown.Running

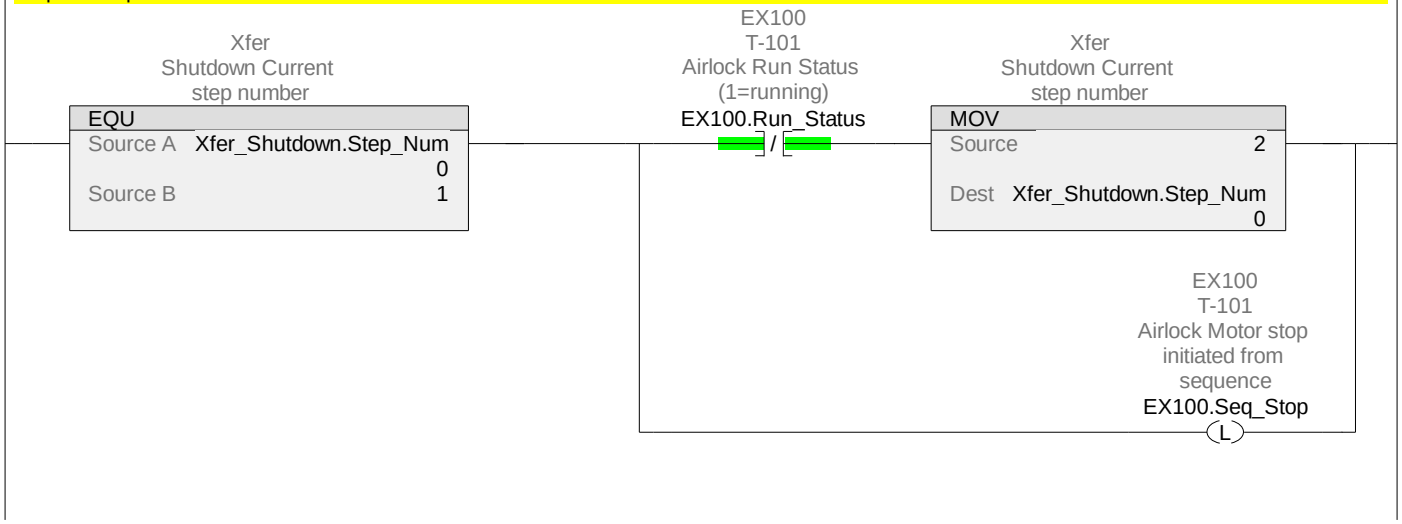
Automatic Start for Shutdown

2



Step 1 - Stop Airlock EX100

3



Step 2 - Wait 30 secs for C-105 to clear

4

Xfer Shutdown Current step number
EQU
Source A Xfer_Shutdown.Step_Num 0
Source B 2

Unit1 C-105 Conveyor Clear Timer
Convey_Time.DN

Xfer Shutdown Current step number
MOV
Source 3
Dest Xfer_Shutdown.Step_Num 0

Unit1 C-105 Conveyor Clear Timer
TON
Timer Convey_Time
Preset 30000
Accum 0
EN
DN

Xfer Remaining time in timed steps
CPT
Dest Xfer.Time_Remaining 0
Expression (Convey_Time.PRE-Convey_Time.ACC)/1000

Step 3 - Spare

5

Xfer Shutdown Current step number
EQU
Source A Xfer_Shutdown.Step_Num 0
Source B 3

Xfer Shutdown Current step number
MOV
Source 4
Dest Xfer_Shutdown.Step_Num 0

Step 4 - Stop C-105 conveyor

6

Xfer Shutdown Current step number
EQU
Source A Xfer_Shutdown.Step_Num 0
Source B 4

C-105 T-102 Conveyor Run Status (1=running)
C105.Run_Status
/

Xfer Shutdown Current step number
MOV
Source 5
Dest Xfer_Shutdown.Step_Num 0

C-105 T-102 Conveyor Motor stop initiated from sequence
C105.Seq_Stop
L

Step 5 - Close G-102 slide gate

7

Xfer
Shutdown Current
step number

EQU
Source A Xfer_Shutdown.Step_Num 0
Source B 5

G-102
T-102 Tank
Slide Gate Close LS
status
(1=closed gate)
G102.Close_Status

Xfer
Shutdown Current
step number

MOV
Source 6
Dest Xfer_Shutdown.Step_Num 0

G-102
T-102 Tank
Slide Gate Gate
close initiated from
sequence
G102.Seq_Close
(L)

Step 6 - Spare

8

Xfer
Shutdown Current
step number

EQU
Source A Xfer_Shutdown.Step_Num 0
Source B 6

Xfer
Shutdown Current
step number

MOV
Source 7
Dest Xfer_Shutdown.Step_Num 0

(End)

Xfer E-Shutdown Sequence Logic

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0 [NOP]

Handle operator-requested and auto sequence starts. Also maintains message number for OI

EShutdown Sequence

1

Xfer Local/remote control indication
Xfer.Local

Xfer E-Shutdown Sequence start request from PC
Xfer_EShutdown.PC_Start

Xfer Startup Auto-start request
Xfer_Startup.Auto_Start

Xfer Operate Auto-start request
Xfer_Operate.Auto_Start

Xfer Hold Auto-start request
Xfer_Hold.Auto_Start

Xfer Local/remote control indication
Xfer.Local

Xfer E-Shutdown Sequence start request from LTP
Xfer_EShutdown.LTP_Start

Xfer E-Shutdown Auto-start request
Xfer_EShutdown.Auto_Start

Xfer E-Shutdown Current step number

GEQ
Source A Xfer_EShutdown.Step_Num
0
Source B 1

Xfer Shutdown Auto-start request
Xfer_Shutdown.Auto_Start

Xfer E-Shutdown One-shot storage to start
Xfer_EShutdown.Ons
ONS

Xfer E-Shutdown Current step number

EQU
Source A Xfer_EShutdown.Step_Num
0
Source B 0

Xfer Startup Current step number

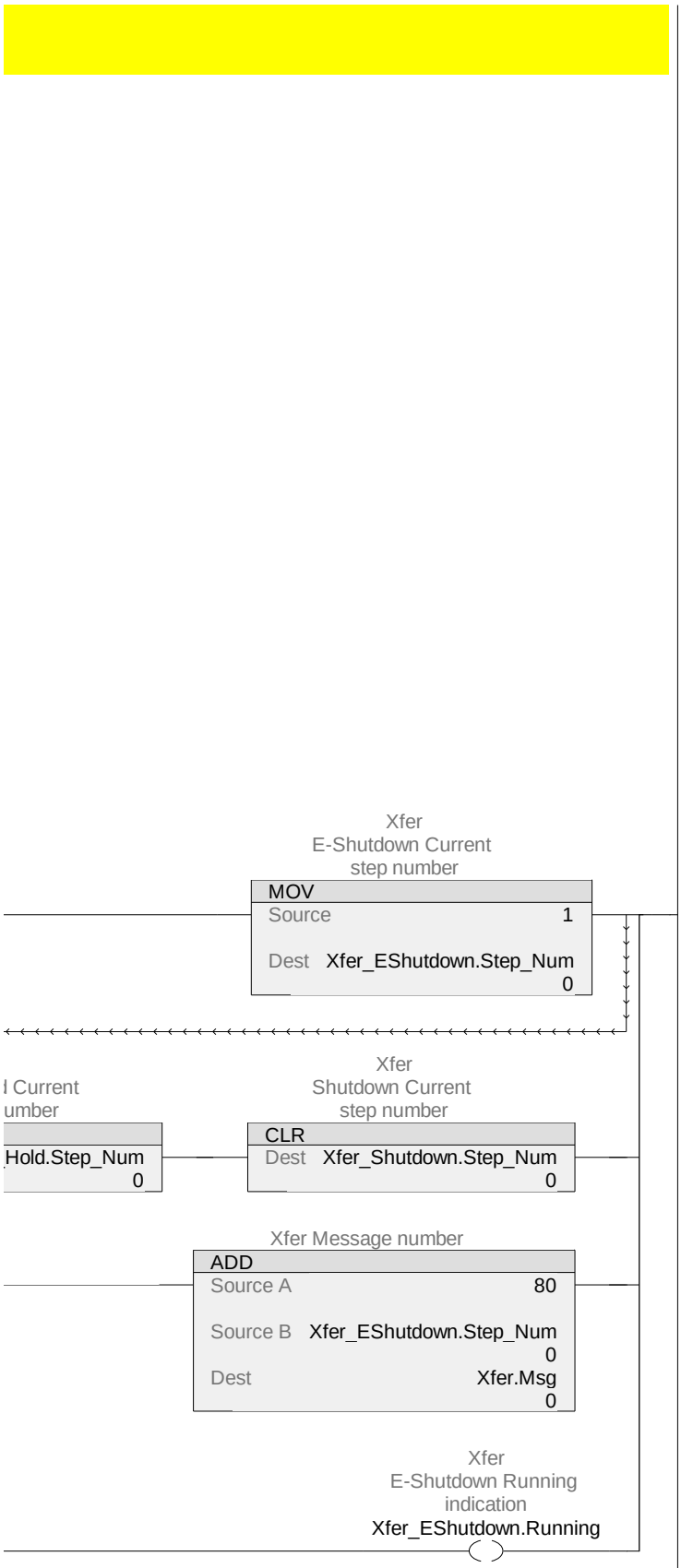
CLR
Dest Xfer_Startup.Step_Num
0

Xfer Operate Current step number

CLR
Dest Xfer_Operate.Step_Num
0

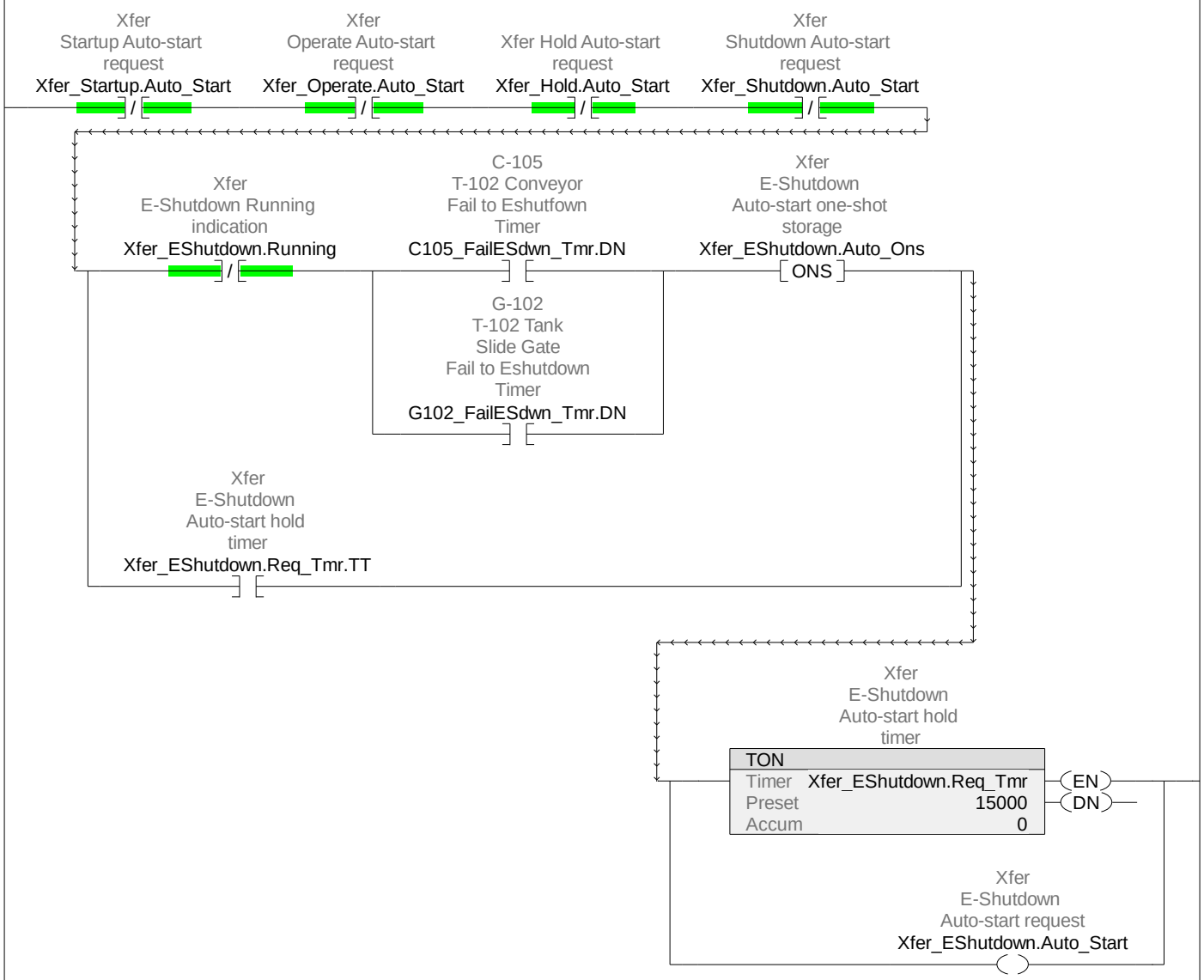
Xfer Ho step

CLR
Dest Xfe


Xfer
E-Shutdown Current
step number
MOV
Source 1
Dest Xfer_EShutdown.Step_Num
0
Xfer
Shutdown Current
step number
CLR
Dest Xfer_Shutdown.Step_Num
0
Hold.Step_Num
0
Xfer Message number
ADD
Source A 80
Source B Xfer_EShutdown.Step_Num
0
Dest Xfer.Msg
0
Xfer
E-Shutdown Running
indication
Xfer_EShutdown.Running

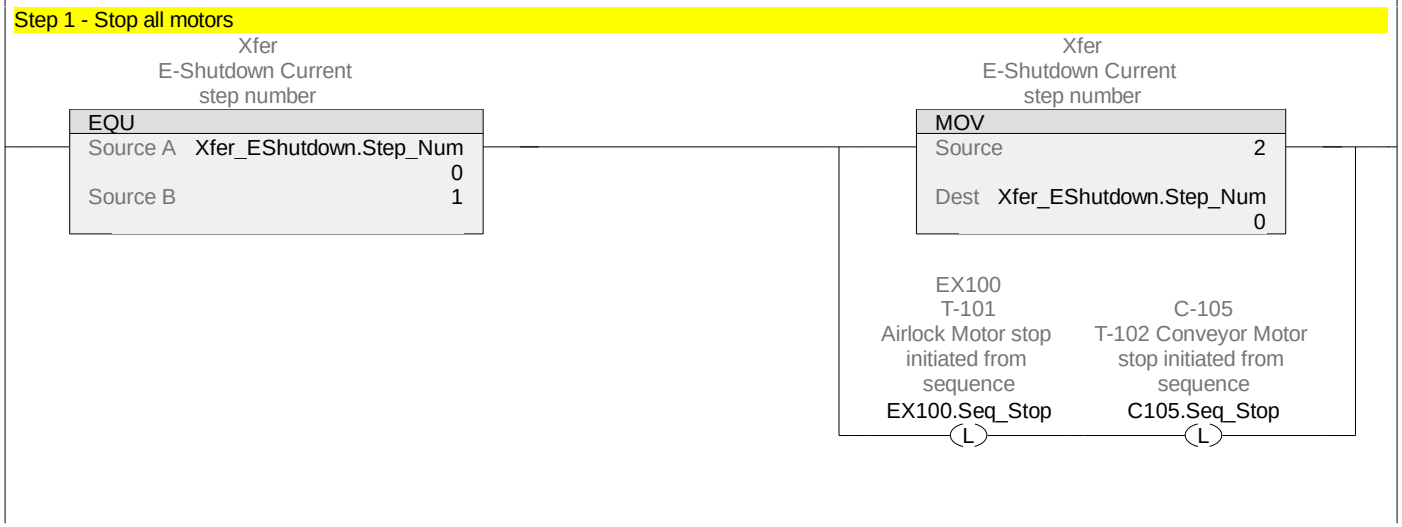
Automatic Start for E-Shutdown

2



Step 1 - Stop all motors

3



Step 2 - Close slide gate

4

Xfer
E-Shutdown Current
step number

EQU	
Source A	Xfer_EShutdown.Step_Num 0
Source B	2

Xfer
E-Shutdown Current
step number

MOV	
Source	3
Dest	Xfer_EShutdown.Step_Num 0

G-102
T-102 Tank
Slide Gate Gate
close initiated from
sequence
G102.Seq_Close
(L)

Step 2 - Spare

5

Xfer
E-Shutdown Current
step number

EQU	
Source A	Xfer_EShutdown.Step_Num 0
Source B	3

Xfer
E-Shutdown Current
step number

MOV	
Source	4
Dest	Xfer_EShutdown.Step_Num 0

Step 4 - Wait 15 seconds for equipment to shut down before allowing maintenance mode.

6

Xfer
E-Shutdown Current
step number

EQU	
Source A	Xfer_EShutdown.Step_Num 0
Source B	4

Xfer
E-Shutdown
In Progress Timer
Xfer_EShutdown_Tmr.DN

Xfer
E-Shutdown Current
step number

MOV	
Source	5
Dest	Xfer_EShutdown.Step_Num 0

Xfer
E-Shutdown
In Progress Timer

TON		
Timer	Xfer_EShutdown_Tmr	(EN)
Preset	15000	(DN)
Accum	0	

Xfer Remaining time
in timed steps

CPT	
Dest	Xfer.Time_Remaining 0
Expression	(Xfer_EShutdown_Tmr.PRE-Xfer_EShutdown_Tmr.ACC)/1000

(End)

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Example 21.4 Xfer_Abnormal routine

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0 NOP

EX100 Fail to Hold

1 EX100 T-101 Airlock Overall Failure Alarm (1= alarm) EX100.Any_Fail — TON Timer EX100_FailHold_Tmr, Preset 1000, Accum 0 — EN, DN

C-105 Fail to EShutdown

2 C-105 T-102 Conveyor Overall Failure Alarm (1= alarm) C105.Any_Fail — C-105 T-102 Conveyor Fail to Eshutfown Timer: TON Timer C105_FailESdwn_Tmr, Preset 1000, Accum 0 — EN, DN

G-102 Fail to EShutdown

3 G-102 T-102 Tank Slide Gate Overall Failure Alarm (1= alarm) G102.Any_Fail — G-102 T-102 Tank Slide Gate Fail to Eshutdown Timer: TON Timer G102_FailESdwn_Tmr, Preset 1000, Accum 0 — EN, DN

Low bin for 20 secs while transfer n progress to Shutdown

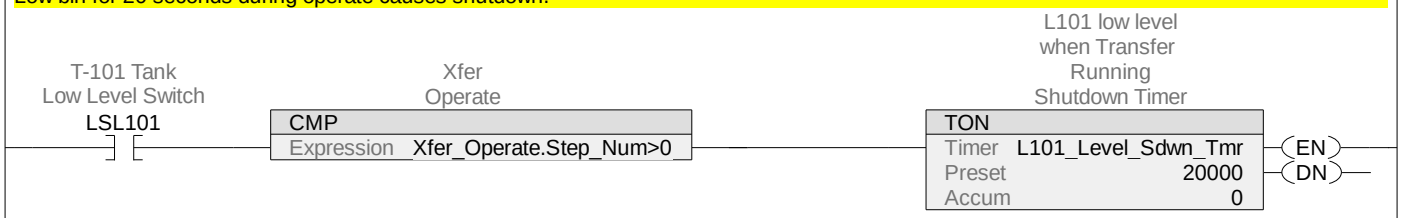
4 T-101 Tank Low Level Switch LSL101 — Xfer Operate Current step number: GEQ Source A Xfer_Operate.Step_Num 0, Source B 1 — L101 low level when Transfer Running Shutdown Timer: TON Timer L101_Level_Sdwn_Tmr, Preset 20000, Accum 0 — EN, DN

Low bin for 2 seconds causes an alarm

5 T-101 Tank Low Level Switch LSL101 — L101 Low Bin Indicator Alarm Timer: TON Timer L101_Level_Alarm_Tmr, Preset 2000, Accum 0 — EN, DN — L101 Low Bin Indicator Alarm Timer L101_Level_Alarm_Tmr.DN — T-101Tank Low Bin Indicator Alarm LSL101_Alarm

Low bin for 20 seconds during operate causes shutdown.

6



(End)

Example 21.4 Xfer_Misc routine

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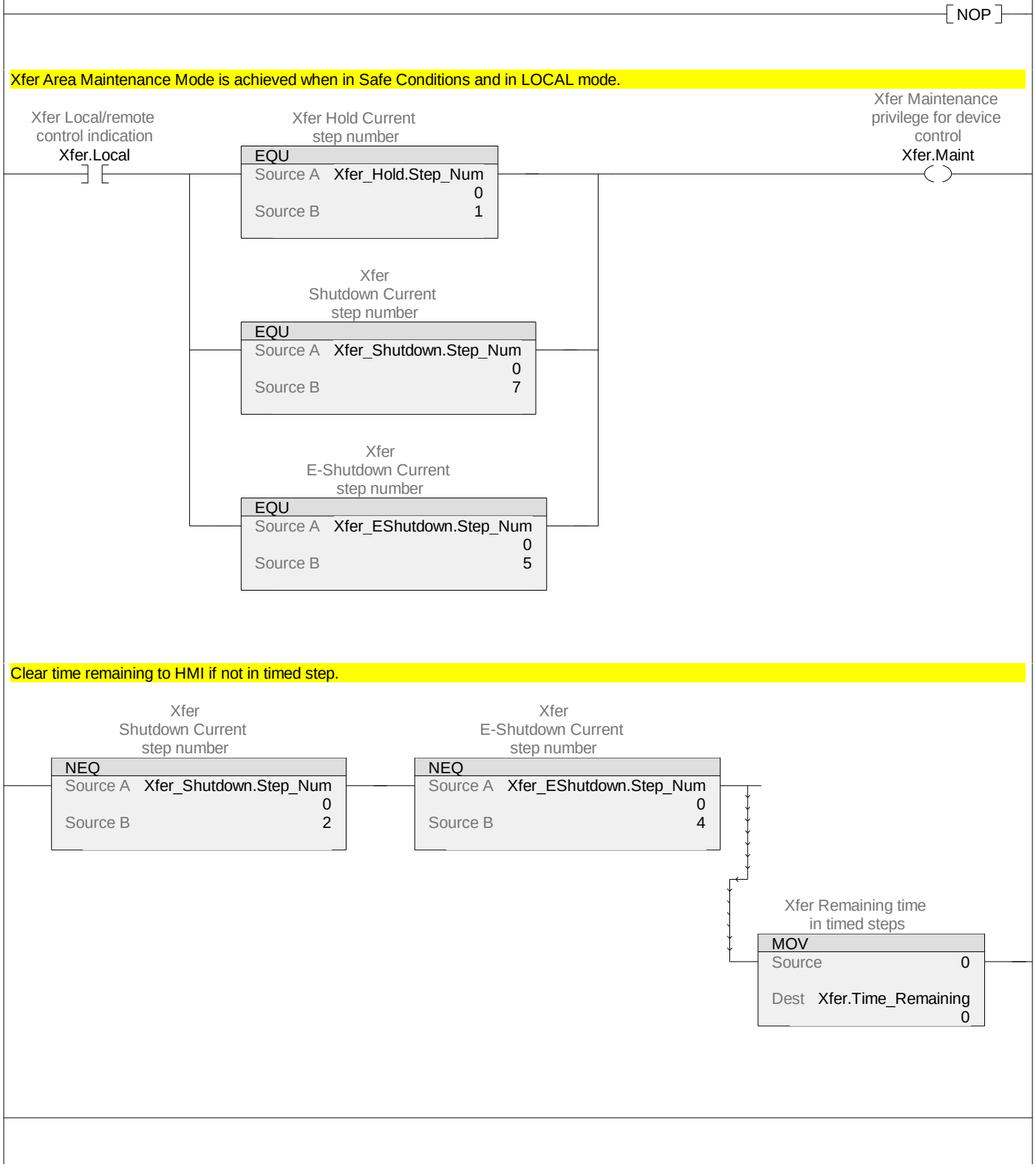
0



Signature Listing

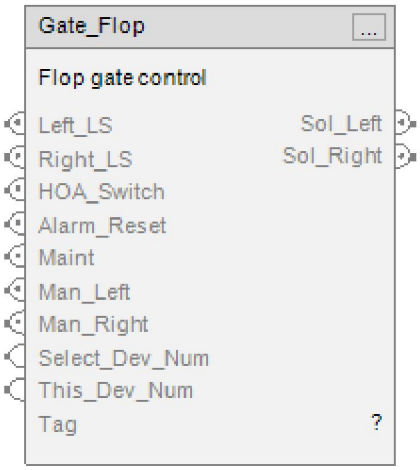
Gate_Flop v1.3

Flop gate control

Available Languages

Relay Ladder

Function Block



Structured Text

```
Gate_Flop(Left_LS, Right_LS, HOA_Switch, Alarm_Reset, Maint, Man_Left, Man_Right, Select_Dev_Num, This_Dev_Num, Sol_Left,
 Sol_Right, Tag);
```

Parameters

Required	Name	Data Type	Usage	Description
X	Gate_Flop	Gate_Flop	InOut	Flop gate control
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
X	Left_LS	BOOL	Input	Gate-left limit switch physical input
X	Right_LS	BOOL	Input	Gate-right limit switch physical input
X	HOA_Switch	BOOL	Input	Hand-Off-Auto switch contact physical input (on when in Auto position)
X	Alarm_Reset	BOOL	Input	Resets alarms
X	Maint	BOOL	Input	Unit Maintenance/Operate Privilege
X	Man_Left	BOOL	Input	Manual left for unit
X	Man_Right	BOOL	Input	Manual right for unit
X	Select_Dev_Num	DINT	Input	Number of device started/stopped at OI
X	This_Dev_Num	DINT	Input	Number of this device for OI control
X	Sol_Left	BOOL	Output	Left position physical output
X	Sol_Right	BOOL	Output	Right position physical output
X	Tag	Gate_Flop_Type	InOut	Flop Gate Tag

Extended Description

Execution

Condition	Description
EnableIn is true	

Revision v1.3 Notes

Use CMP for device number

Name	Default	Data Type	Scope
Alarm_Reset	0	BOOL	Gate_Flop
Resets alarms			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Alarm_Reset - Gate_Flop/Logic - 4(XIO), 8(XIC)			
HOA_Switch	0	BOOL	Gate_Flop
Hand-Off-Auto switch contact physical input (on when in Auto position)			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
HOA_Switch - Gate_Flop/Logic - 0(XIC), 1(XIC), 6(XIO)			
Left_LS	0	BOOL	Gate_Flop
Gate-left limit switch physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Left_LS - Gate_Flop/Logic - 0(XIO), 4(XIC), 4(XIO), 4(XIO), 9(XIC)			
Maint	0	BOOL	Gate_Flop
Unit Maintenance/Operate Privilege			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Maint - Gate_Flop/Logic - 2(XIC), 2(XIO), 3(XIC), 3(XIO)			
Man_Left	0	BOOL	Gate_Flop
Manual left for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Left - Gate_Flop/Logic - 2(XIC)			
Man_Right	0	BOOL	Gate_Flop
Manual right for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Right - Gate_Flop/Logic - 3(XIC)			
Right_LS	0	BOOL	Gate_Flop
Gate-right limit switch physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Right_LS - Gate_Flop/Logic - 1(XIO), 4(XIC), 4(XIO), 4(XIO), 9(XIC)			
Select_Dev_Num	0	DINT	Gate_Flop
Number of device started/stopped at OI			
Usage:	Input Parameter		
Required:	Yes		

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Select_Dev_Num (Continued)
Visible: Yes
External Access: Read/Write
Select_Dev_Num - Gate_Flop/Logic - 2(CMP), 3(CMP)

Sol_Left 0 BOOL Gate_Flop
Left position physical output
Usage: Output Parameter
Required: Yes
Visible: Yes
External Access: Read Only
*Sol_Left - Gate_Flop/Logic - *0(OTE), 0(XIC), 1(XIO), 4(XIC), 5(XIC), 9(XIC)*

Sol_Right 0 BOOL Gate_Flop
Right position physical output
Usage: Output Parameter
Required: Yes
Visible: Yes
External Access: Read Only
*Sol_Right - Gate_Flop/Logic - *1(OTE), 0(XIO), 1(XIC), 4(XIC), 5(XIC), 9(XIC)*

Tag Gate_Flop_Type Gate_Flop
Flop Gate Tag
Usage: InOut Parameter
Required: Yes
Visible: Yes
Constant No
Tag.Run_Status ?? BOOL
Flop Gate Tag Run Status (1=running)
*Tag.Run_Status - Gate_Flop/Logic - *9(OTE)*
Tag.Left_Status ?? BOOL
Flop Gate Tag Left LS status (1=left position)
*Tag.Left_Status - Gate_Flop/Logic - *9(OTE)*
Tag.Right_Status ?? BOOL
Flop Gate Tag Right LS status (1=right position)
*Tag.Right_Status - Gate_Flop/Logic - *9(OTE)*
Tag.Any_Fail ?? BOOL
Flop Gate Tag Overall Failure Alarm (1= alarm)
*Tag.Any_Fail - Gate_Flop/Logic - *7(OTE), 0(XIO), 1(XIO)*
Tag.HOA_Fail ?? BOOL
Flop Gate Tag HOA-switch-not-in-auto alarm (1-alarm)
*Tag.HOA_Fail - Gate_Flop/Logic - *6(OTE), 7(XIC)*
Tag.FTL_Fail ?? BOOL
Flop Gate Tag Fail-to-divert-left failure alarm (1=alarm)
*Tag.FTL_Fail - Gate_Flop/Logic - *5(OTL), *8(OTU), 7(XIC)*
Tag.FTR_Fail ?? BOOL
Flop Gate Tag Fail-to-divert-right failure alarm (1=alarm)
*Tag.FTR_Fail - Gate_Flop/Logic - *5(OTL), *8(OTU), 7(XIC)*
Tag.Seq_Left ?? BOOL
Flop Gate Tag Gate open initiated from sequence
*Tag.Seq_Left - Gate_Flop/Logic - *10(OTU), 2(XIC)*
Tag.Seq_Right ?? BOOL
Flop Gate Tag Gate close initiated from sequence
*Tag.Seq_Right - Gate_Flop/Logic - *10(OTU), 3(XIC)*

This_Dev_Num 0 DINT Gate_Flop
Number of this device for OI control
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write

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This_Dev_Num (Continued)
This_Dev_Num - Gate_Flop/Logic - 2(CMP), 3(CMP)

Name	Default	Data Type	Scope
Fail_Tmr		TIMER	Gate_Flop
Timer for alarms			
Usage:	Local Tag		
External Access:	Read/Write		
*Fail_Tmr - Gate_Flop/Logic - *4(TON)*			
Fail_Tmr.PRE	20000	DINT	
Timer for alarms			
Fail_Tmr.ACC	0	DINT	
Timer for alarms			
Fail_Tmr.EN	0	BOOL	
Timer for alarms			
Fail_Tmr.TT	0	BOOL	
Timer for alarms			
Fail_Tmr.DN	0	BOOL	
Timer for alarms			
Fail_Tmr.DN - Gate_Flop/Logic - 5(XIC)			
Left_Req	0	BOOL	Gate_Flop
Internal used for left logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Left_Req - Gate_Flop/Logic - *2(OTE), 0(XIC), 1(XIO)*			
Right_Req	0	BOOL	Gate_Flop
Internal used for right logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Right_Req - Gate_Flop/Logic - *3(OTE), 0(XIO), 1(XIC)*			

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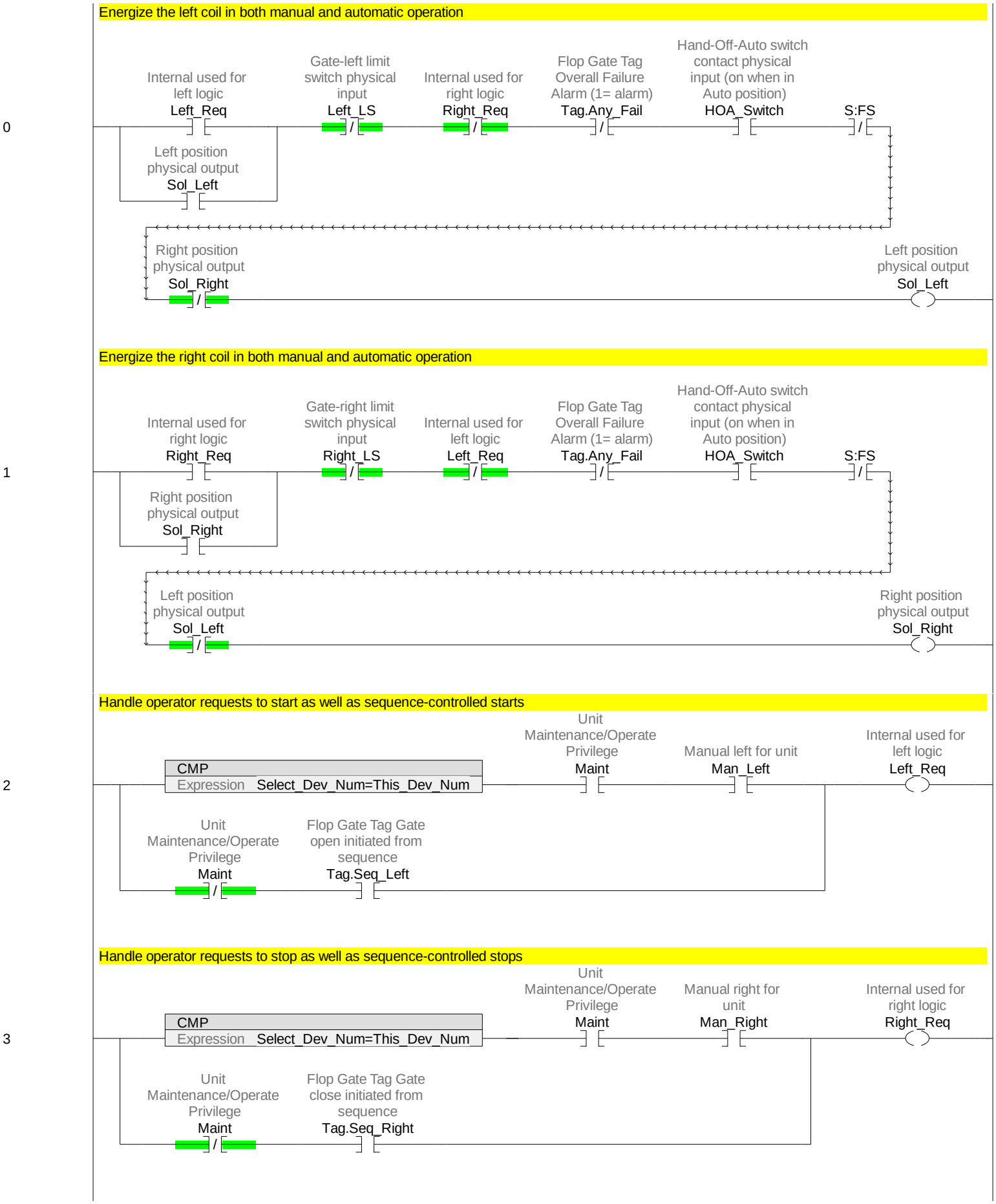
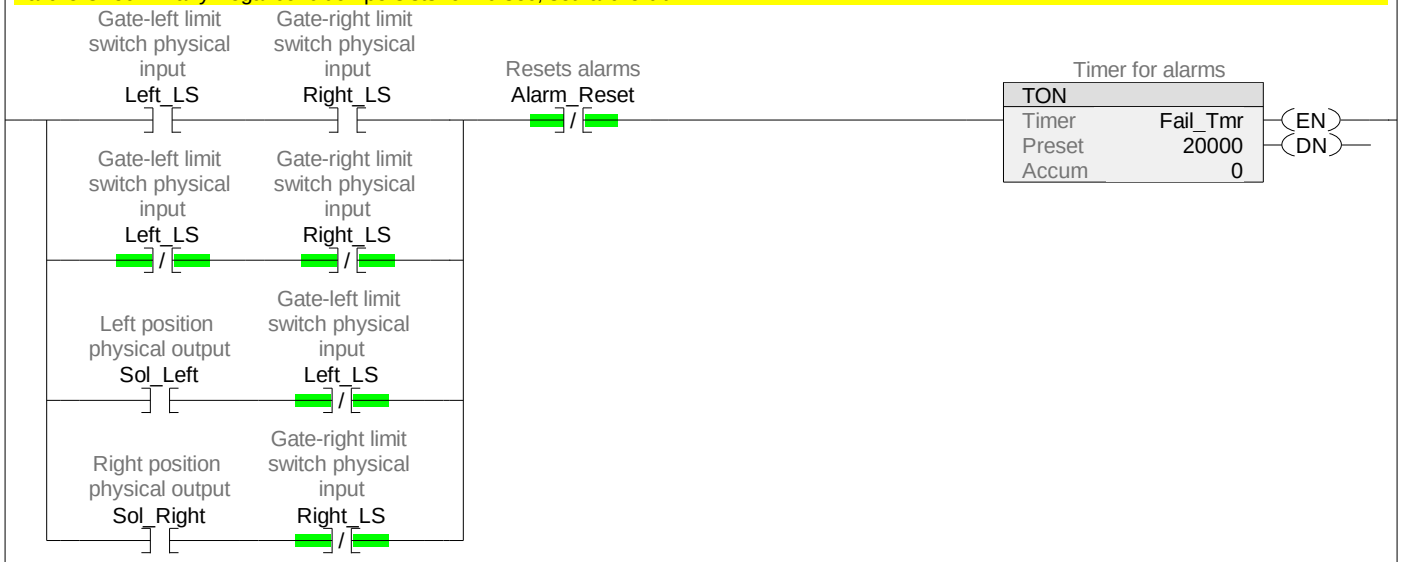

Energize the left coil in both manual and automatic operation
0
Internal used for left logic
Left_Req
Gate-left limit switch physical input
Left_LS
Internal used for right logic
Right_Req
Flop Gate Tag Overall Failure Alarm (1= alarm)
Tag.Any_Fail
Hand-Off-Auto switch contact physical input (on when in Auto position)
HOA_Switch
S:FS
Left position physical output
Sol_Left
Right position physical output
Sol_Right
Left position physical output
Sol_Left
Energize the right coil in both manual and automatic operation
1
Internal used for right logic
Right_Req
Gate-right limit switch physical input
Right_LS
Internal used for left logic
Left_Req
Flop Gate Tag Overall Failure Alarm (1= alarm)
Tag.Any_Fail
Hand-Off-Auto switch contact physical input (on when in Auto position)
HOA_Switch
S:FS
Right position physical output
Sol_Right
Left position physical output
Sol_Left
Right position physical output
Sol_Right
Handle operator requests to start as well as sequence-controlled starts
2
CMP
Expression Select_Dev_Num=This_Dev_Num
Unit Maintenance/Operate Privilege
Maint
Manual left for unit
Man_Left
Internal used for left logic
Left_Req
Unit Maintenance/Operate Privilege
Maint
Flop Gate Tag Gate open initiated from sequence
Tag.Seq_Left
Handle operator requests to stop as well as sequence-controlled stops
3
CMP
Expression Select_Dev_Num=This_Dev_Num
Unit Maintenance/Operate Privilege
Maint
Manual right for unit
Man_Right
Internal used for right logic
Right_Req
Unit Maintenance/Operate Privilege
Maint
Flop Gate Tag Gate close initiated from sequence
Tag.Seq_Right

Failure Check. If any illegal condition persists for 20 sec, set failure bit.

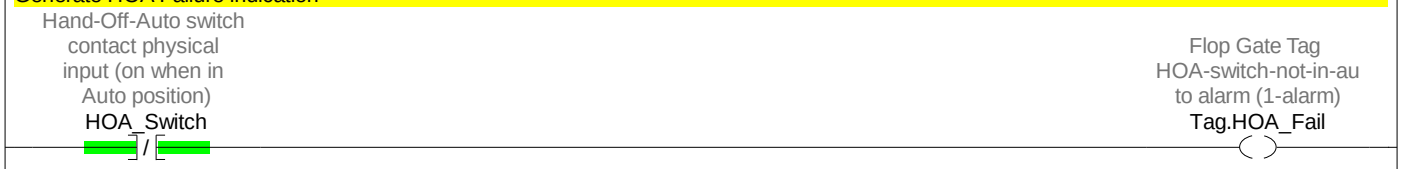
4



5

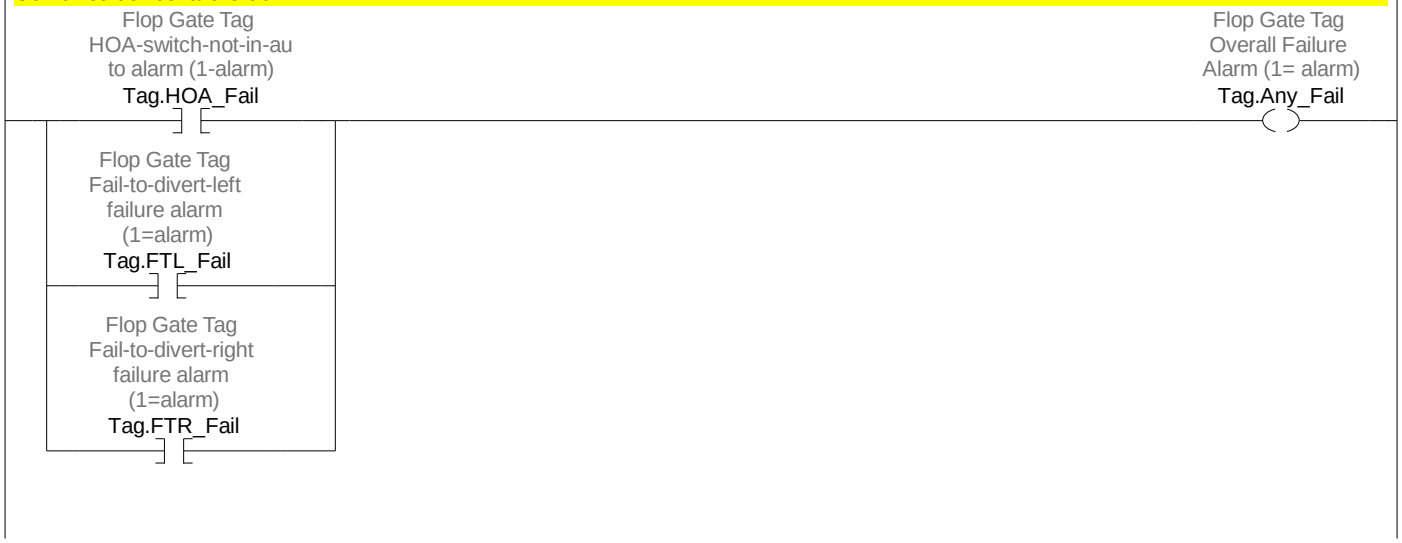
Generate HOA Failure indication

6



Combined device failure bit

7



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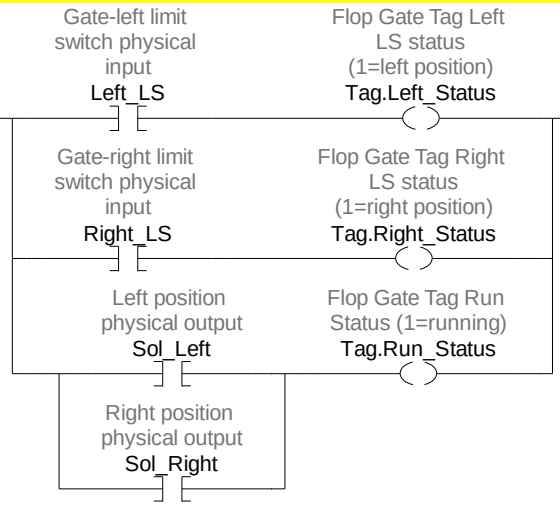
Unlatch fail bits when alarm reset

8

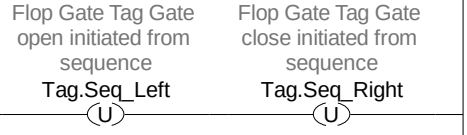
Pass limit switch and aux statuses to OI

9



Unlatch sequence start and stop command bits

10



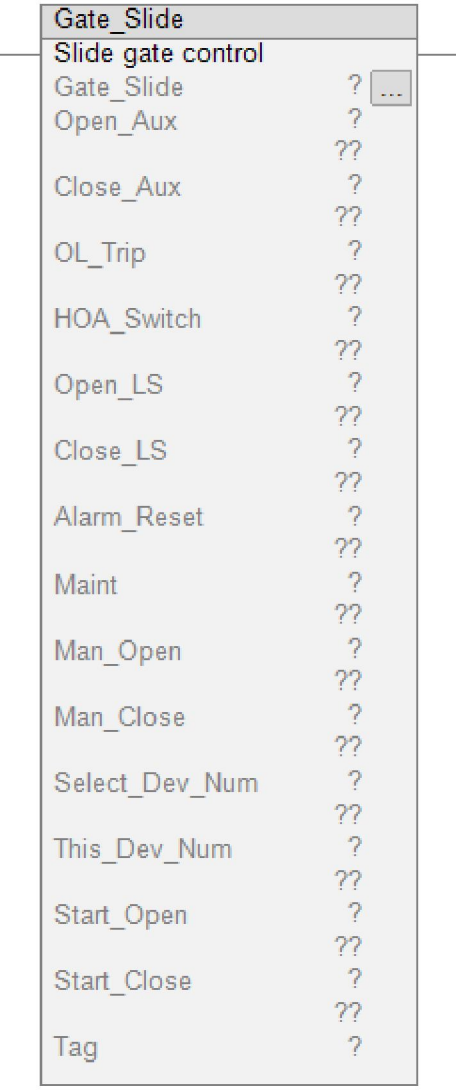
(End)

Gate_Slide v1.3

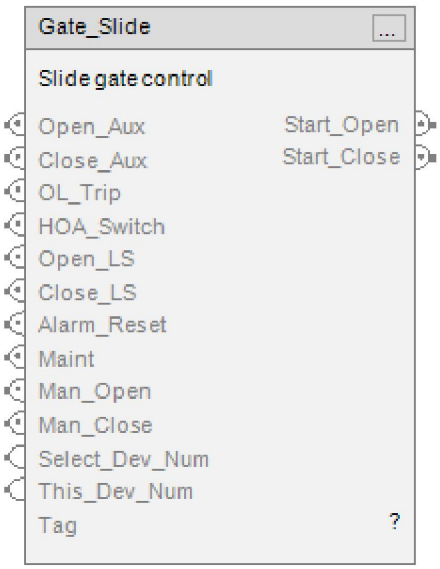
Slide gate control

Available Languages

Relay Ladder



Function Block



Structured Text

```
Gate_Slide(Open_Aux, Close_Aux, OL_Trip, HOA_Switch, Open_LS, Close_LS, Alarm_Reset, Maint, Man_Open, Man_Close,
 Select_Dev_Num, This_Dev_Num, Start_Open, Start_Close, Tag);
```

Parameters

Required	Name	Data Type	Usage	Description
X	Gate_Slide	Gate_Slide	InOut	Slide gate control
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
X	Open_Aux	BOOL	Input	Open auxillary contact physical input
X	Close_Aux	BOOL	Input	Close auxiliary contact physical input
X	OL_Trip	BOOL	Input	Overload trip contact physical input
X	HOA_Switch	BOOL	Input	Hand-Off-Auto switch contact physical input (on when in Auto position)
X	Open_LS	BOOL	Input	Gate-open limit switch physical input
X	Close_LS	BOOL	Input	Gate-closed limit switch physical input
X	Alarm_Reset	BOOL	Input	Resets alarms
X	Maint	BOOL	Input	Unit Maintenance/Operate Privilege
X	Man_Open	BOOL	Input	Manual open for unit
X	Man_Close	BOOL	Input	Manual close for unit
X	Select_Dev_Num	DINT	Input	Number of device started/stopped at OI
X	This_Dev_Num	DINT	Input	Number of this device for OI control
X	Start_Open	BOOL	Output	Open motor starter contact physical input
X	Start_Close	BOOL	Output	Close motor starter contact physical input
X	Tag	Gate_Slide_Type	InOut	Slide Gate Tag

Extended Description

Execution

Condition	Description
EnableIn is true	

Revision v1.3 Notes

Correct name of "Dev_Num" input parameters

Name	Default	Data Type	Scope
Alarm_Reset	0	BOOL	Gate_Slide
Resets alarms			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Alarm_Reset - Gate_Slide/Logic - 7(XIC)			
Close_Aux	0	BOOL	Gate_Slide
Close auxiliary contact physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Close_Aux - Gate_Slide/Logic - 5(XIO), 8(XIC)			
Close_LS	0	BOOL	Gate_Slide
Gate-closed limit switch physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Close_LS - Gate_Slide/Logic - 1(XIO), 8(XIC)			
HOA_Switch	0	BOOL	Gate_Slide
Hand-Off-Auto switch contact physical input (on when in Auto position)			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
HOA_Switch - Gate_Slide/Logic - 0(XIC), 1(XIC), 5(XIC), 5(XIO)			
Maint	0	BOOL	Gate_Slide
Unit Maintenance/Operate Privilege			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Maint - Gate_Slide/Logic - 2(XIC), 2(XIO), 3(XIC), 3(XIO)			
Man_Close	0	BOOL	Gate_Slide
Manual close for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Close - Gate_Slide/Logic - 3(XIC)			
Man_Open	0	BOOL	Gate_Slide
Manual open for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Open - Gate_Slide/Logic - 2(XIC)			
OL_Trip	0	BOOL	Gate_Slide
Overload trip contact physical input			
Usage:	Input Parameter		
Required:	Yes		

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OL_Trip (Continued)
Visible: Yes
External Access: Read/Write
OL_Trip - Gate_Slide/Logic - 0(XIO), 1(XIO), 5(XIC), 5(XIO)

Open_Aux 0 BOOL Gate_Slide
Open auxillary contact physical input
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write
Open_Aux - Gate_Slide/Logic - 5(XIO), 8(XIC)

Open_LS 0 BOOL Gate_Slide
Gate-open limit switch physical input
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write
Open_LS - Gate_Slide/Logic - 0(XIO), 8(XIC)

Select_Dev_Num 0 DINT Gate_Slide
Number of device started/stopped at OI
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write
Select_Dev_Num - Gate_Slide/Logic - 2(CMP), 3(CMP)

Start_Close 0 BOOL Gate_Slide
Close motor starter contact physical input
Usage: Output Parameter
Required: Yes
Visible: Yes
External Access: Read Only
*Start_Close - Gate_Slide/Logic - *1(OTE), 0(XIO), 1(XIC), 4(XIC), 5(XIC)*

Start_Open 0 BOOL Gate_Slide
Open motor starter contact physical input
Usage: Output Parameter
Required: Yes
Visible: Yes
External Access: Read Only
*Start_Open - Gate_Slide/Logic - *0(OTE), 0(XIC), 1(XIO), 4(XIC), 5(XIC)*

Tag Gate_Slide_Type Gate_Slide
Slide Gate Tag
Usage: InOut Parameter
Required: Yes
Visible: Yes
Constant No
Tag.Run_Status ?? BOOL
Slide Gate Tag Run Status (1=running)
*Tag.Run_Status - Gate_Slide/Logic - *8(OTE)*
Tag.Open_Status ?? BOOL
Slide Gate Tag Open LS status (1=open gate)
*Tag.Open_Status - Gate_Slide/Logic - *8(OTE)*
Tag.Close_Status ?? BOOL
Slide Gate Tag Close LS status (1=closed gate)
*Tag.Close_Status - Gate_Slide/Logic - *8(OTE)*
Tag.Any_Fail ?? BOOL

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Tag (Continued)
Slide Gate Tag Overall Failure Alarm (1= alarm)
*Tag.Any_Fail - Gate_Slide/Logic - *6(OTE), 0(XIO), 1(XIO)*

Tag.Aux_Fail	??	BOOL	
Slide Gate Tag Auxiliary failure alarm (1=alarm)			
*Tag.Aux_Fail - Gate_Slide/Logic - *5(OTL), *7(OTU), 6(XIC)*			
Tag.OL_Fail	??	BOOL	
Slide Gate Tag Overload alarm (1=alarm)			
*Tag.OL_Fail - Gate_Slide/Logic - *5(OTE), 6(XIC)*			
Tag.HOA_Fail	??	BOOL	
Slide Gate Tag HOA-switch-not-in-auto alarm (1-alarm)			
*Tag.HOA_Fail - Gate_Slide/Logic - *5(OTE), 6(XIC)*			
Tag.Seq_Open	??	BOOL	
Slide Gate Tag Gate open initiated from sequence			
*Tag.Seq_Open - Gate_Slide/Logic - *9(OTU), 2(XIC)*			
Tag.Seq_Close	??	BOOL	
Slide Gate Tag Gate close initiated from sequence			
*Tag.Seq_Close - Gate_Slide/Logic - *9(OTU), 3(XIC)*			
This_Dev_Num	0	DINT	Gate_Slide
Number of this device for OI control			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
This_Dev_Num - Gate_Slide/Logic - 2(CMP), 3(CMP)			

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Name	Default	Data Type	Scope
Close_Req	0	BOOL	Gate_Slide
Internal used for close logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Close_Req - Gate_Slide/Logic - *3(OTE), 0(XIO), 1(XIC)*			
Fail_Tmr		TIMER	Gate_Slide
Timer for aux-fail alarm			
Usage:	Local Tag		
External Access:	Read/Write		
*Fail_Tmr - Gate_Slide/Logic - *4(TON)*			
Fail_Tmr.PRE	20000	DINT	
Timer for aux-fail alarm			
Fail_Tmr.ACC	0	DINT	
Timer for aux-fail alarm			
Fail_Tmr.EN	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.TT	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.DN	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.DN - Gate_Slide/Logic - 5(XIC)			
Open_Req	0	BOOL	Gate_Slide
Internal used for open logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Open_Req - Gate_Slide/Logic - *2(OTE), 0(XIC), 1(XIO)*			

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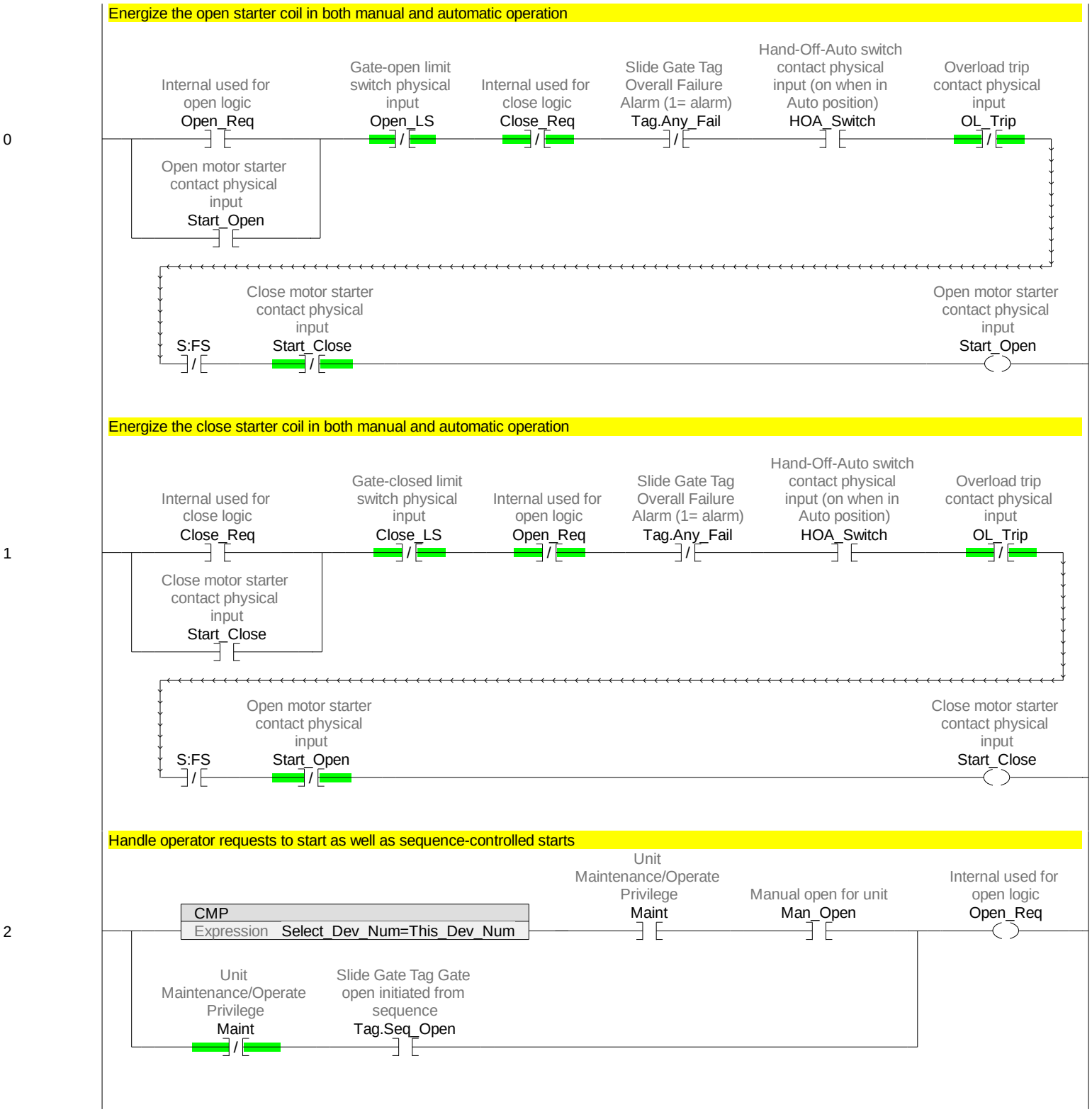
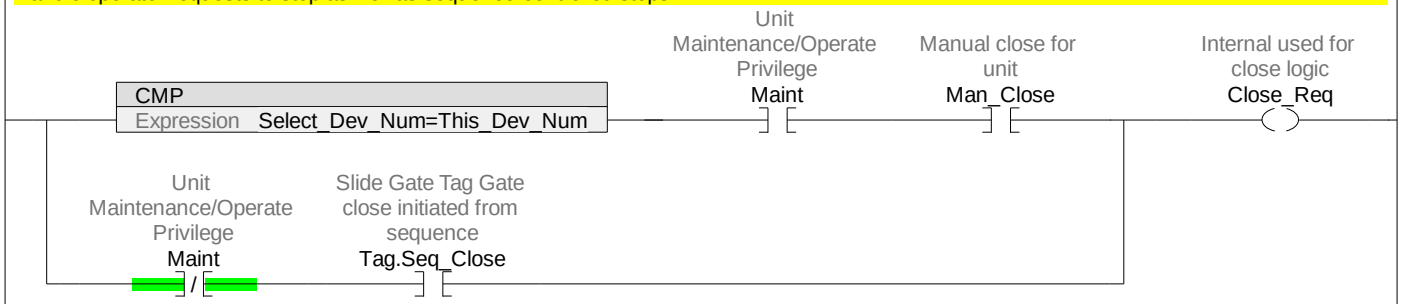

Energize the open starter coil in both manual and automatic operation
0
Internal used for open logic
Open_Req
Gate-open limit switch physical input
Open_LS
Internal used for close logic
Close_Req
Slide Gate Tag Overall Failure Alarm (1= alarm)
Tag.Any_Fail
Hand-Off-Auto switch contact physical input (on when in Auto position)
HOA_Switch
Overload trip contact physical input
OL_Trip
Open motor starter contact physical input
Start_Open
Close motor starter contact physical input
Start_Close
S:FS
Open motor starter contact physical input
Start_Open
Energize the close starter coil in both manual and automatic operation
1
Internal used for close logic
Close_Req
Gate-closed limit switch physical input
Close_LS
Internal used for open logic
Open_Req
Slide Gate Tag Overall Failure Alarm (1= alarm)
Tag.Any_Fail
Hand-Off-Auto switch contact physical input (on when in Auto position)
HOA_Switch
Overload trip contact physical input
OL_Trip
Close motor starter contact physical input
Start_Close
Open motor starter contact physical input
Start_Open
S:FS
Close motor starter contact physical input
Start_Close
Handle operator requests to start as well as sequence-controlled starts
2
CMP
Expression Select_Dev_Num=This_Dev_Num
Unit Maintenance/Operate Privilege
Maint
Manual open for unit
Man_Open
Internal used for open logic
Open_Req
Unit Maintenance/Operate Privilege
Maint
Slide Gate Tag Gate open initiated from sequence
Tag.Seq_Open

Handle operator requests to stop as well as sequence-controlled stops

3

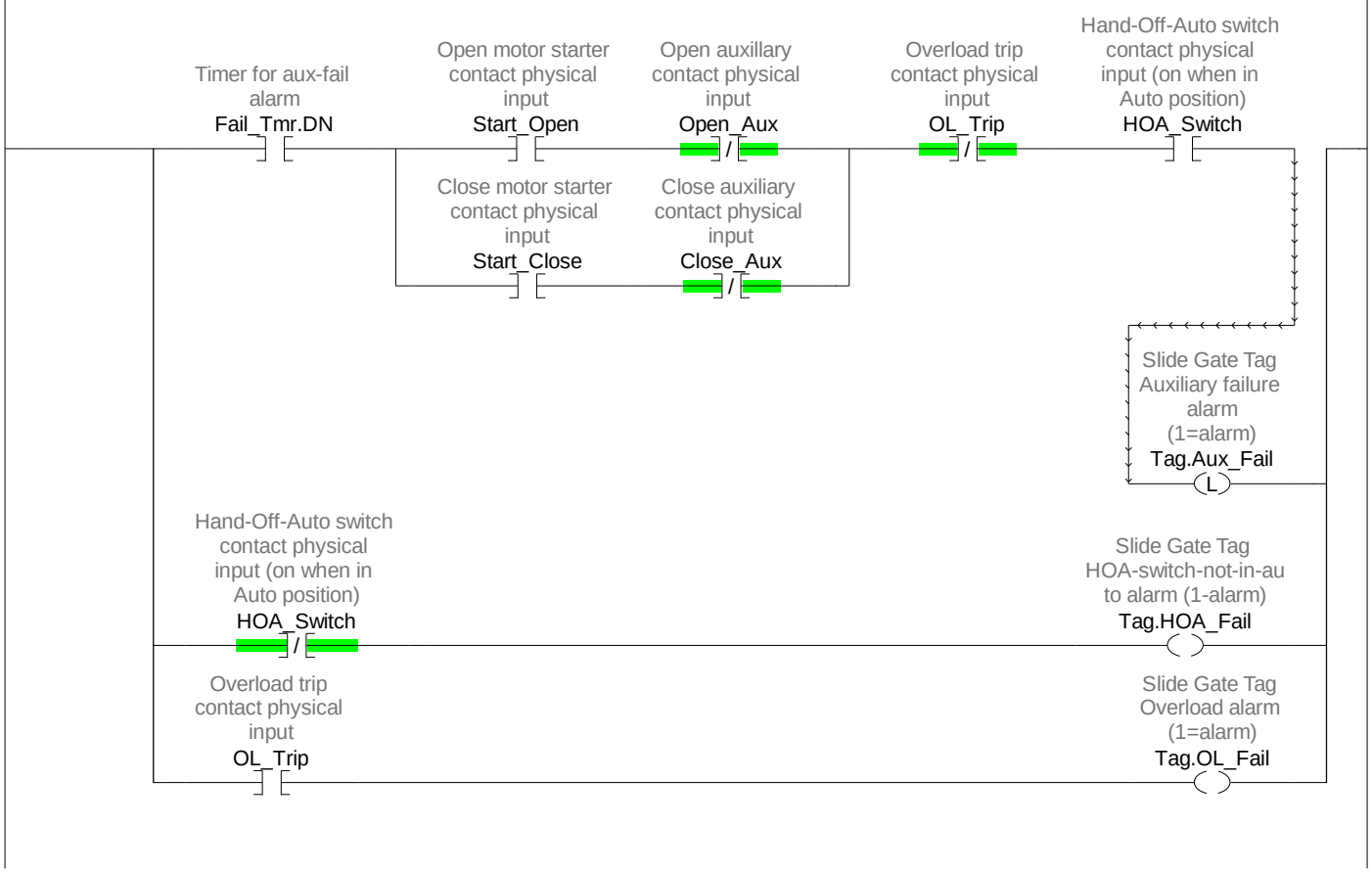


Delays checking for aux failure until 20 seconds

4

Failures: No aux after first 20 seconds. HOA switch not in auto, overload fail.

5



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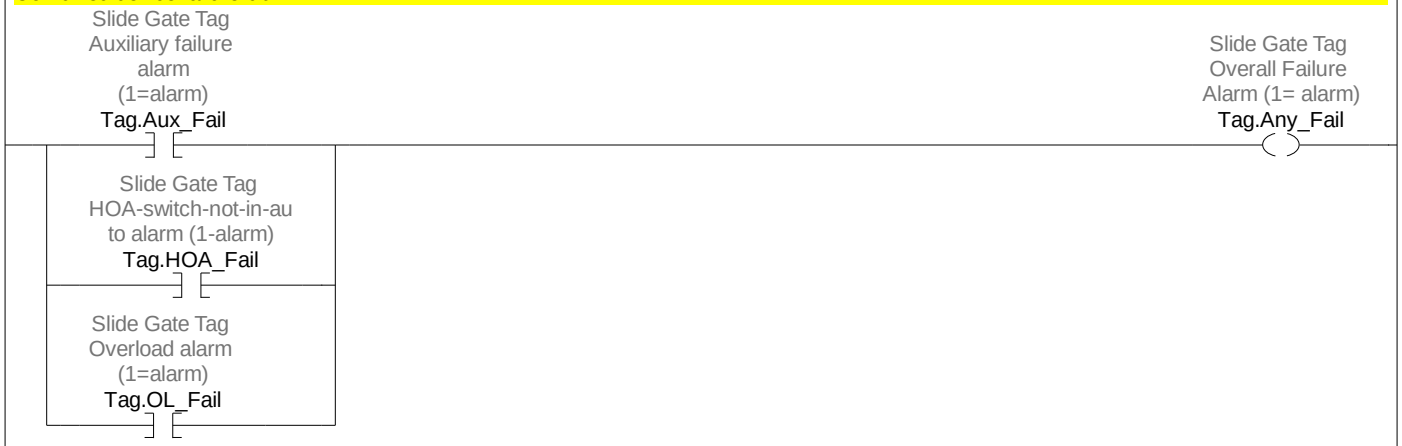
Combined device failure bit

6

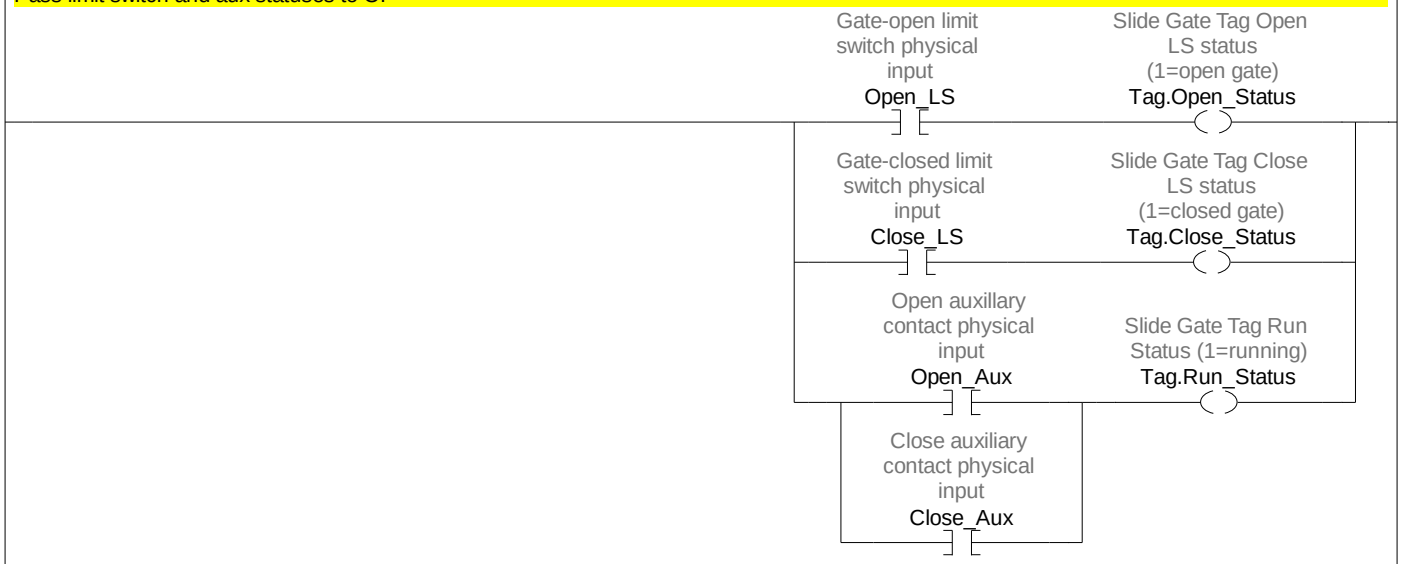


Unlatch fail bits when alarm reset

7

Pass limit switch and aux statuses to OI

8



Unlatch sequence start and stop command bits

9

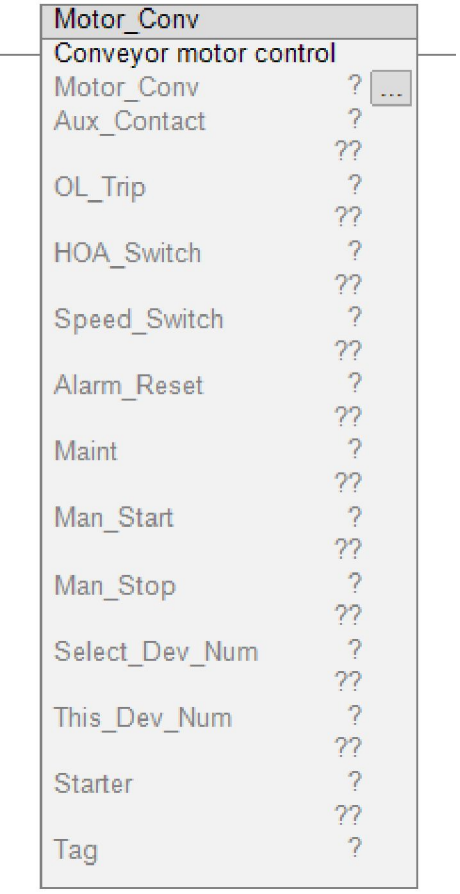
(End)

Motor_Conv v1.3

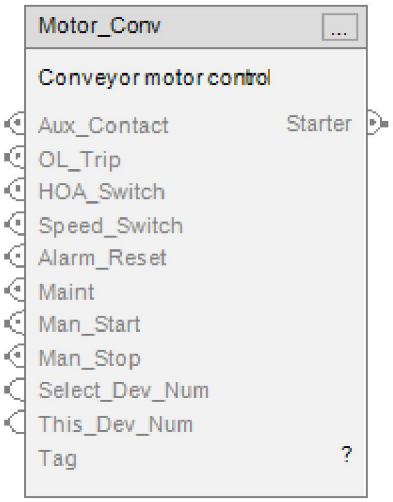
Conveyor motor control

Available Languages

Relay Ladder



Function Block



Structured Text

```
Motor_Conv(Aux_Contact, OL_Trip, HOA_Switch, Speed_Switch, Alarm_Reset, Maint, Man_Start, Man_Stop, Select_Dev_Num,
 This_Dev_Num, Starter, Tag);
```

Parameters

Required	Name	Data Type	Usage	Description
X	Motor_Conv	Motor_Conv	InOut	Conveyor motor control
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
X	Aux_Contact	BOOL	Input	Auxillary contact physical input
X	OL_Trip	BOOL	Input	Overload trip contact physical input
X	HOA_Switch	BOOL	Input	Hand-Off-Auto switch contact physical input (on when in Auto position)
X	Speed_Switch	BOOL	Input	Speed Switch physical input (1=running)
X	Alarm_Reset	BOOL	Input	Resets alarms
X	Maint	BOOL	Input	Unit Maintenance/Operate Privilege
X	Man_Start	BOOL	Input	Manual start for unit
X	Man_Stop	BOOL	Input	Manual stop for unit
X	Select_Dev_Num	DINT	Input	Number of device started/stopped at OI
X	This_Dev_Num	DINT	Input	Number of this device for OI control
X	Starter	BOOL	Output	Motor starter contact physical input
X	Tag	Motor_Conv_Type	InOut	Motor Tag

Extended Description

Execution

Condition	Description
EnableIn is true	

Revision v1.3 Notes

Name	Default	Data Type	Scope
Alarm_Reset	0	BOOL	Motor_Conv
Resets alarms			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Alarm_Reset - Motor_Conv/Logic - 6(XIC)			
Aux_Contact	0	BOOL	Motor_Conv
Auxillary contact physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Aux_Contact - Motor_Conv/Logic - 4(XIO)			
HOA_Switch	0	BOOL	Motor_Conv
Hand-Off-Auto switch contact physical input (on when in Auto position)			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
HOA_Switch - Motor_Conv/Logic - 0(XIC), 4(XIC), 4(XIC), 4(XIO)			
Maint	0	BOOL	Motor_Conv
Unit Maintenance/Operate Privilege			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Maint - Motor_Conv/Logic - 1(XIC), 1(XIO), 2(XIC), 2(XIO)			
Man_Start	0	BOOL	Motor_Conv
Manual start for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Start - Motor_Conv/Logic - 1(XIC)			
Man_Stop	0	BOOL	Motor_Conv
Manual stop for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Stop - Motor_Conv/Logic - 2(XIC)			
OL_Trip	0	BOOL	Motor_Conv
Overload trip contact physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
OL_Trip - Motor_Conv/Logic - 0(XIO), 4(XIC), 4(XIO), 4(XIO)			
Select_Dev_Num	0	DINT	Motor_Conv
Number of device started/stopped at OI			
Usage:	Input Parameter		
Required:	Yes		

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Select_Dev_Num (Continued)
Visible: Yes
External Access: Read/Write
Select_Dev_Num - Motor_Conv/Logic - 1(CMP), 2(CMP)

Speed_Switch 0 BOOL Motor_Conv
Speed Switch physical input (1=running)
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write
Speed_Switch - Motor_Conv/Logic - 4(XIO), 7(XIC)

Starter 0 BOOL Motor_Conv
Motor starter contact physical input
Usage: Output Parameter
Required: Yes
Visible: Yes
External Access: Read Only
*Starter - Motor_Conv/Logic - *0(OTE), 0(XIC), 3(XIC)*

Tag Motor_Conv_Type Motor_Conv
Motor Tag
Usage: InOut Parameter
Required: Yes
Visible: Yes
Constant No
Tag.Run_Status ?? BOOL
Motor Tag Run Status (1=running)
*Tag.Run_Status - Motor_Conv/Logic - *7(OTE)*
Tag.Any_Fail ?? BOOL
Motor Tag Overall Failure Alarm (1= alarm)
*Tag.Any_Fail - Motor_Conv/Logic - *5(OTE), 0(XIO)*
Tag.Aux_Fail ?? BOOL
Motor Tag Auxiliary failure alarm (1=alarm)
*Tag.Aux_Fail - Motor_Conv/Logic - *4(OTL), *6(OTU), 4(XIO), 5(XIC)*
Tag.SS_Fail ?? BOOL
Motor Tag Speed Switch failure alarm (1=alarm)
*Tag.SS_Fail - Motor_Conv/Logic - *4(OTL), *6(OTU), 5(XIC)*
Tag.OL_Fail ?? BOOL
Motor Tag Overload alarm (1=alarm)
*Tag.OL_Fail - Motor_Conv/Logic - *4(OTE), 5(XIC)*
Tag.HOA_Fail ?? BOOL
Motor Tag HOA-switch-not-in-auto alarm (1-alarm)
*Tag.HOA_Fail - Motor_Conv/Logic - *4(OTE), 5(XIC)*
Tag.Seq_Start ?? BOOL
Motor Tag Motor start initiated from sequence
*Tag.Seq_Start - Motor_Conv/Logic - *8(OTU), 1(XIC)*
Tag.Seq_Stop ?? BOOL
Motor Tag Motor stop initiated from sequence
*Tag.Seq_Stop - Motor_Conv/Logic - *8(OTU), 2(XIC)*

This_Dev_Num 0 DINT Motor_Conv
Number of this device for OI control
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write
This_Dev_Num - Motor_Conv/Logic - 1(CMP), 2(CMP)

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Name	Default	Data Type	Scope
Fail_Tmr		TIMER	Motor_Conv
Timer for aux-fail alarm			
Usage:	Local Tag		
External Access:	Read/Write		
*Fail_Tmr - Motor_Conv/Logic - *3(TON)*			
Fail_Tmr.PRE	40000	DINT	
Timer for aux-fail alarm			
Fail_Tmr.ACC	0	DINT	
Timer for aux-fail alarm			
Fail_Tmr.ACC - Motor_Conv/Logic - 4(CMP)			
Fail_Tmr.EN	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.TT	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.DN	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.DN - Motor_Conv/Logic - 4(XIC), 4(XIC)			
Start_Req	0	BOOL	Motor_Conv
Internal used for start logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Start_Req - Motor_Conv/Logic - *1(OTE), 0(XIC)*			
Stop_Req	0	BOOL	Motor_Conv
Internal used for stop logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Stop_Req - Motor_Conv/Logic - *2(OTE), 0(XIO)*			

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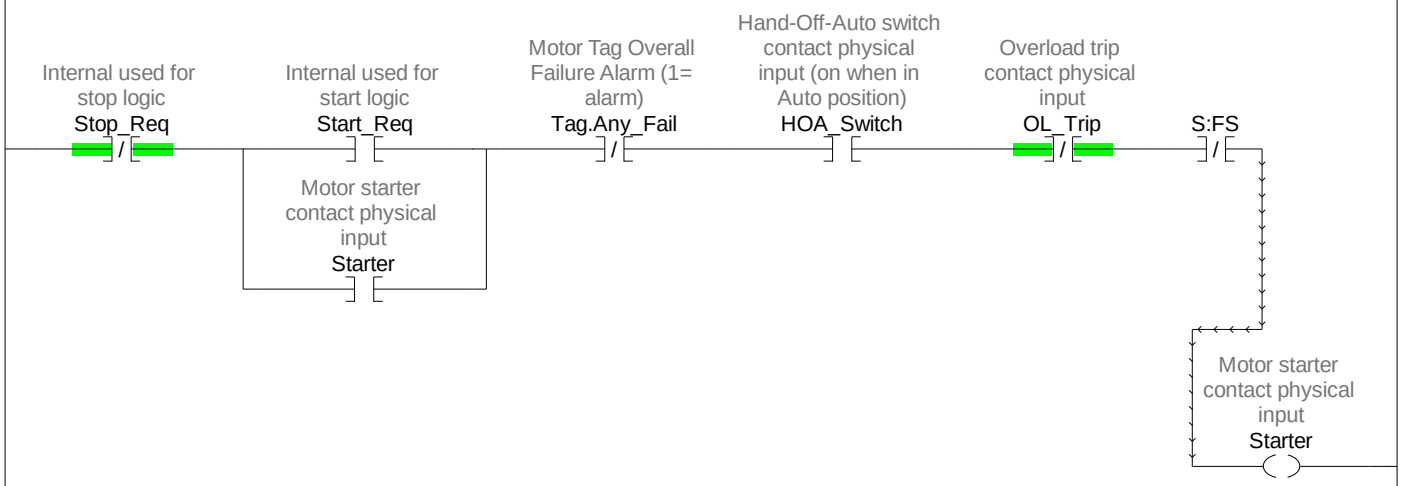
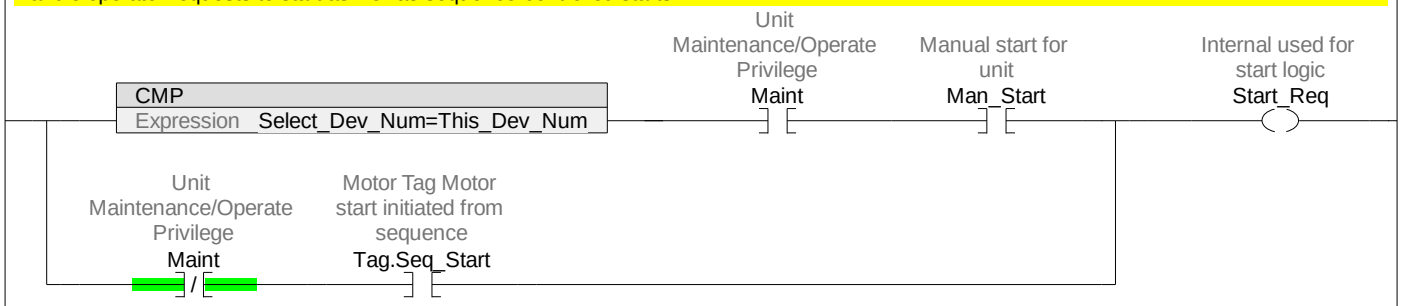
Energize the starter coil in both manual and automatic operation

0



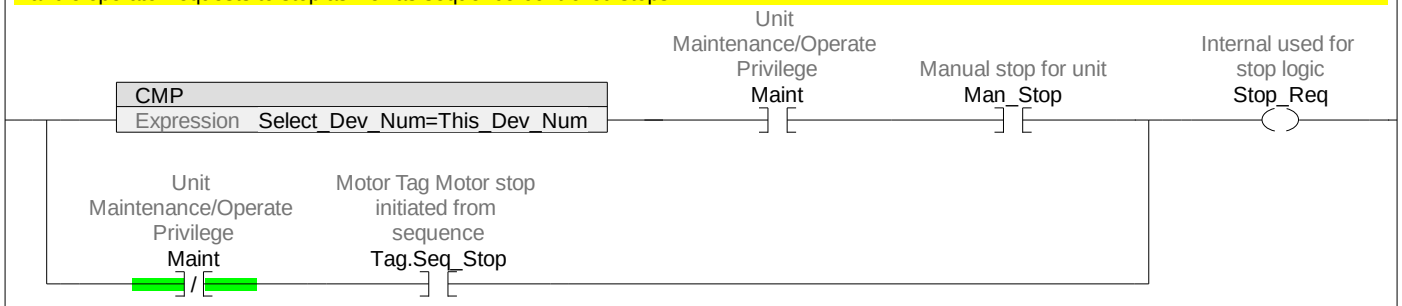
Handle operator requests to start as well as sequence-controlled starts

1



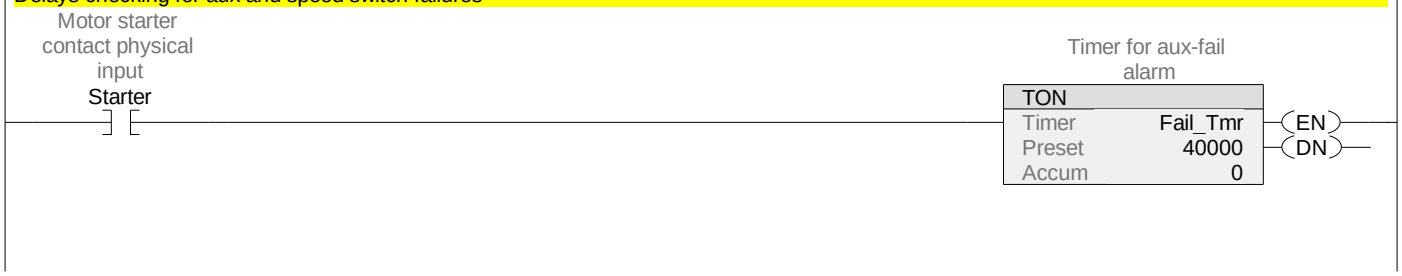
Handle operator requests to stop as well as sequence-controlled stops

2



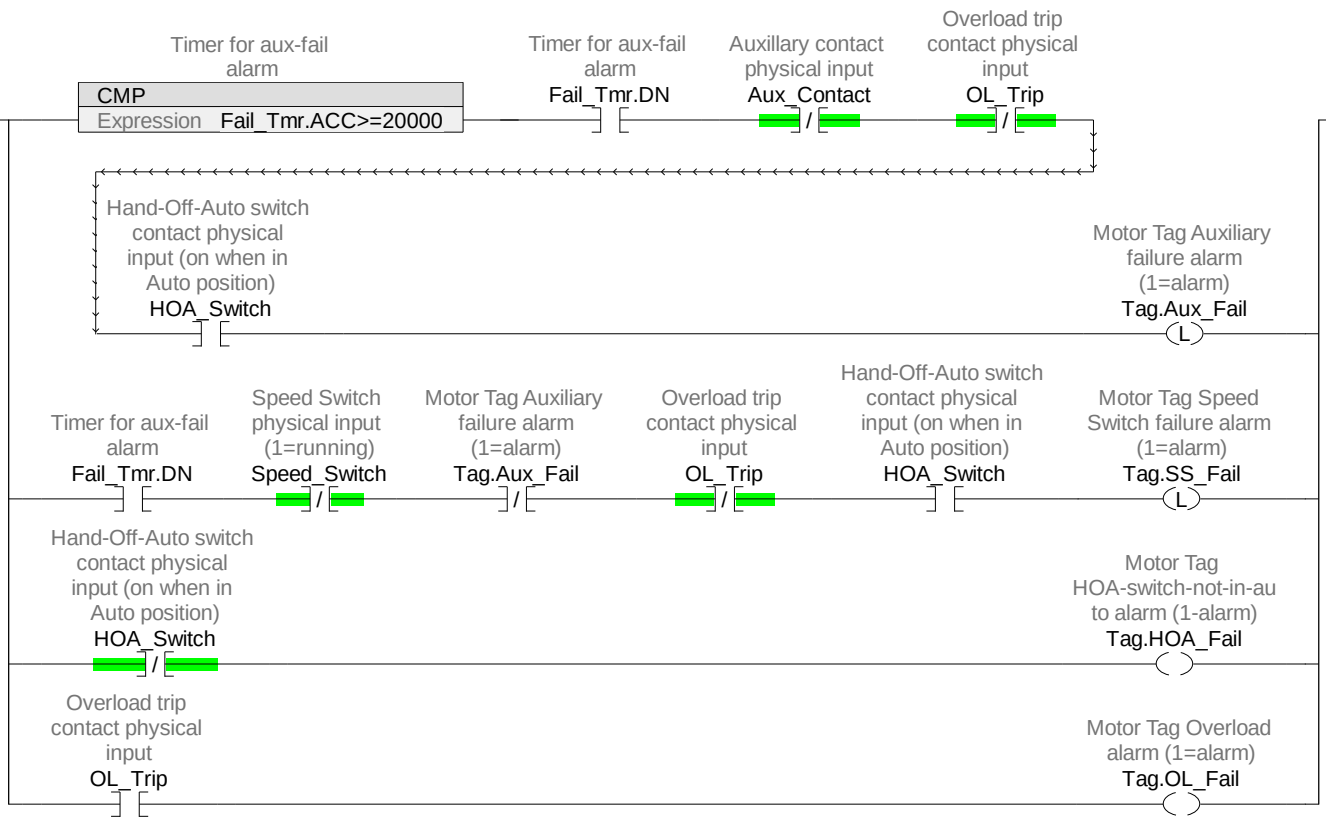
Delays checking for aux and speed switch failures

3



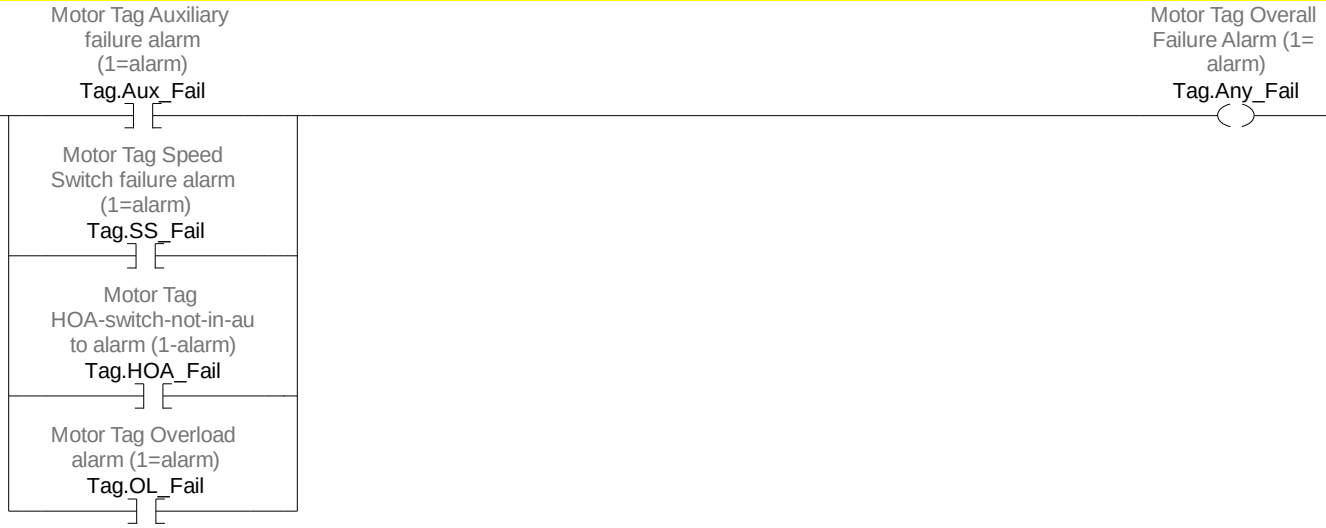
Failures: No aux after first 20 seconds. No speed switch after 40 seconds. HOA switch not in auto, overload fail.

4



Combined device failure bit

5



Unlatch fail bits when alarm reset

6

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Pass speed switch status to OI

7

Speed Switch physical input (1=running)
Speed_Switch

Motor Tag Run Status (1=running)
Tag.Run_Status

Unlatch sequence start and stop command bits

8

Motor Tag Motor start initiated from sequence
Tag.Seq_Start
U

Motor Tag Motor stop initiated from sequence
Tag.Seq_Stop
U

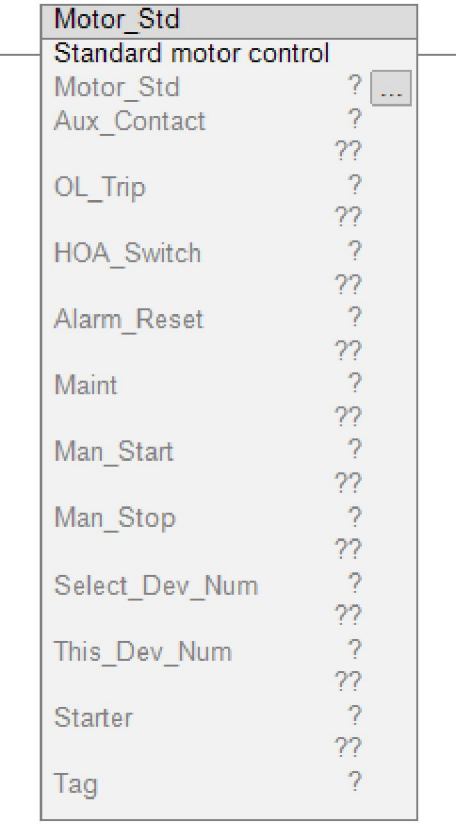
(End)

Motor_Std v1.3

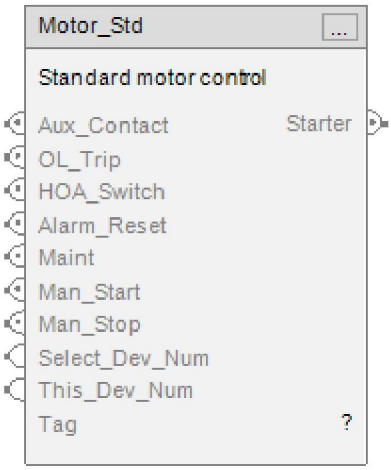
Standard motor control

Available Languages

Relay Ladder



Function Block



Structured Text

```
Motor_Std(Aux_Contact, OL_Trip, HOA_Switch, Alarm_Reset, Maint, Man_Start, Man_Stop, Select_Dev_Num, This_Dev_Num, Starter, Tag);
```

Parameters

Required	Name	Data Type	Usage	Description
X	Motor_Std	Motor_Std	InOut	Standard motor control

	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
X	Aux_Contact	BOOL	Input	Auxillary contact physical input
X	OL_Trip	BOOL	Input	Overload trip contact physical input
X	HOA_Switch	BOOL	Input	Hand-Off-Auto switch contact physical input (on when in Auto position)
X	Alarm_Reset	BOOL	Input	Resets alarms
X	Maint	BOOL	Input	Unit Maintenance/Operate Privilege
X	Man_Start	BOOL	Input	Manual start for unit
X	Man_Stop	BOOL	Input	Manual stop for unit
X	Select_Dev_Num	DINT	Input	Number of device started/stopped at OI
X	This_Dev_Num	DINT	Input	Number of this device for OI control
X	Starter	BOOL	Output	Motor starter contact physical input
X	Tag	Motor_Std_Type	InOut	Motor Tag

Extended Description

Execution

Condition	Description
EnableIn is true	

Revision v1.3 Notes

Name	Default	Data Type	Scope
Alarm_Reset	0	BOOL	Motor_Std
Resets alarms			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Alarm_Reset - Motor_Std/Logic - 6(XIC)			
Aux_Contact	0	BOOL	Motor_Std
Auxillary contact physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Aux_Contact - Motor_Std/Logic - 4(XIO), 7(XIC)			
HOA_Switch	0	BOOL	Motor_Std
Hand-Off-Auto switch contact physical input (on when in Auto position)			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
HOA_Switch - Motor_Std/Logic - 0(XIC), 4(XIC), 4(XIO)			
Maint	0	BOOL	Motor_Std
Unit Maintenance/Operate Privilege			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Maint - Motor_Std/Logic - 1(XIC), 1(XIO), 2(XIC), 2(XIO)			
Man_Start	0	BOOL	Motor_Std
Manual start for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Start - Motor_Std/Logic - 1(XIC)			
Man_Stop	0	BOOL	Motor_Std
Manual stop for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Stop - Motor_Std/Logic - 2(XIC)			
OL_Trip	0	BOOL	Motor_Std
Overload trip contact physical input			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
OL_Trip - Motor_Std/Logic - 0(XIO), 4(XIC), 4(XIO)			
Select_Dev_Num	0	DINT	Motor_Std
Number of device started/stopped at OI			
Usage:	Input Parameter		
Required:	Yes		

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Select_Dev_Num (Continued)
Visible: Yes
External Access: Read/Write
Select_Dev_Num - Motor_Std/Logic - 1(CMP), 2(CMP)

Starter	0	BOOL	Motor_Std

Motor starter contact physical input
Usage: Output Parameter
Required: Yes
Visible: Yes
External Access: Read Only
*Starter - Motor_Std/Logic - *0(OTE), 0(XIC), 3(XIC)*

Tag		Motor_Std_Type	Motor_Std

Motor Tag
Usage: InOut Parameter
Required: Yes
Visible: Yes
Constant No

Tag.Run_Status	??	BOOL

Motor Tag Run Status (1=running)
*Tag.Run_Status - Motor_Std/Logic - *7(OTE)*

Tag.Any_Fail	??	BOOL

Motor Tag Overall Failure Alarm (1= alarm)
*Tag.Any_Fail - Motor_Std/Logic - *5(OTE), 0(XIO)*

Tag.Aux_Fail	??	BOOL

Motor Tag Auxiliary failure alarm (1=alarm)
*Tag.Aux_Fail - Motor_Std/Logic - *4(OTL), *6(OTU), 5(XIC)*

Tag.OL_Fail	??	BOOL

Motor Tag Overload alarm (1=alarm)
*Tag.OL_Fail - Motor_Std/Logic - *4(OTE), 5(XIC)*

Tag.HOA_Fail	??	BOOL

Motor Tag HOA-switch-not-in-auto alarm (1-alarm)
*Tag.HOA_Fail - Motor_Std/Logic - *4(OTE), 5(XIC)*

Tag.Seq_Start	??	BOOL

Motor Tag Motor start initiated from sequence
*Tag.Seq_Start - Motor_Std/Logic - *8(OTU), 1(XIC)*

Tag.Seq_Stop	??	BOOL

Motor Tag Motor stop initiated from sequence
*Tag.Seq_Stop - Motor_Std/Logic - *8(OTU), 2(XIC)*

This_Dev_Num	0	DINT	Motor_Std

Number of this device for OI control
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write
This_Dev_Num - Motor_Std/Logic - 1(CMP), 2(CMP)

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Name	Default	Data Type	Scope
Fail_Tmr		TIMER	Motor_Std
Timer for aux-fail alarm			
Usage:	Local Tag		
External Access:	Read/Write		
*Fail_Tmr - Motor_Std/Logic - *3(TON)*			
Fail_Tmr.PRE	20000	DINT	
Timer for aux-fail alarm			
Fail_Tmr.ACC	0	DINT	
Timer for aux-fail alarm			
Fail_Tmr.EN	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.TT	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.DN	0	BOOL	
Timer for aux-fail alarm			
Fail_Tmr.DN - Motor_Std/Logic - 4(XIC)			
Start_Req	0	BOOL	Motor_Std
Internal used for start logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Start_Req - Motor_Std/Logic - *1(OTE), 0(XIC)*			
Stop_Req	0	BOOL	Motor_Std
Internal used for stop logic			
Usage:	Local Tag		
External Access:	Read/Write		
*Stop_Req - Motor_Std/Logic - *2(OTE), 0(XIO)*			

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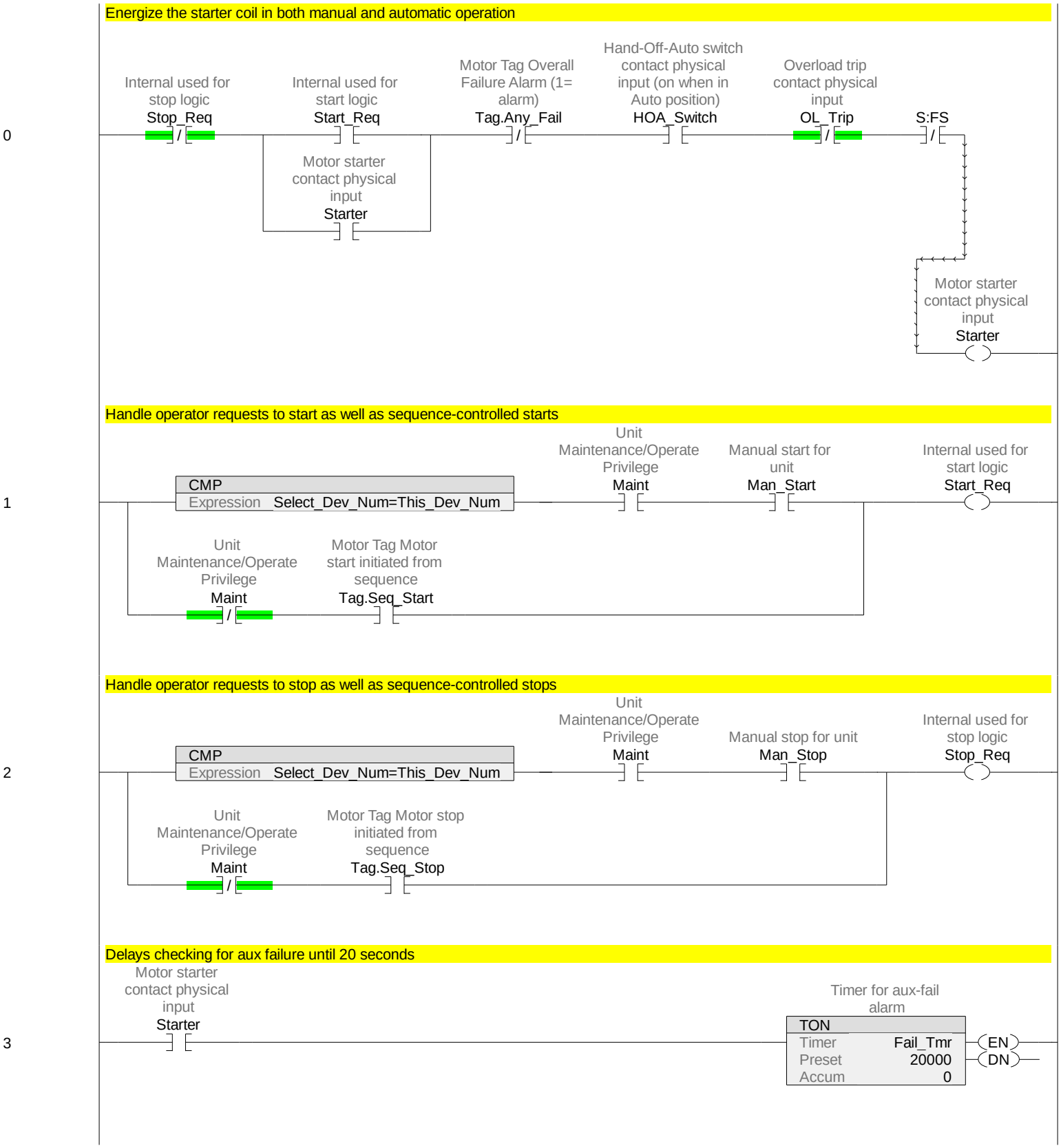
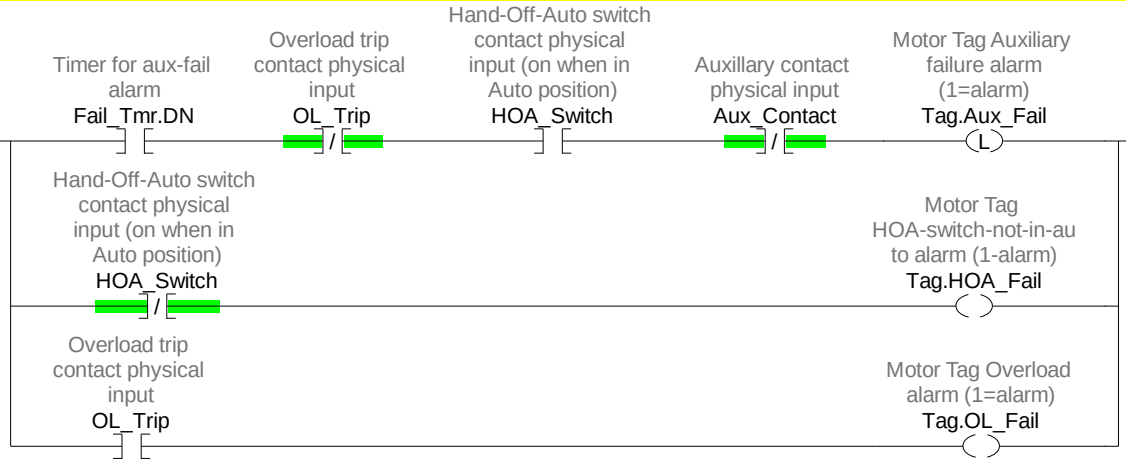

Energize the starter coil in both manual and automatic operation
0
Internal used for stop logic
Stop_Req
Internal used for start logic
Start_Req
Motor Tag Overall Failure Alarm (1= alarm)
Tag.Any_Fail
Hand-Off-Auto switch contact physical input (on when in Auto position)
HOA_Switch
Overload trip contact physical input
OL_Trip
S:FS
Motor starter contact physical input
Starter
Motor starter contact physical input
Starter
Handle operator requests to start as well as sequence-controlled starts
1
CMP
Expression Select_Dev_Num=This_Dev_Num
Unit Maintenance/Operate Privilege
Maint
Manual start for unit
Man_Start
Internal used for start logic
Start_Req
Unit Maintenance/Operate Privilege
Maint
Motor Tag Motor start initiated from sequence
Tag.Seq_Start
Handle operator requests to stop as well as sequence-controlled stops
2
CMP
Expression Select_Dev_Num=This_Dev_Num
Unit Maintenance/Operate Privilege
Maint
Manual stop for unit
Man_Stop
Internal used for stop logic
Stop_Req
Unit Maintenance/Operate Privilege
Maint
Motor Tag Motor stop initiated from sequence
Tag.Seq_Stop
Delays checking for aux failure until 20 seconds
3
Motor starter contact physical input
Starter
Timer for aux-fail alarm
TON
Timer Fail_Tmr
Preset 20000
Accum 0
EN
DN

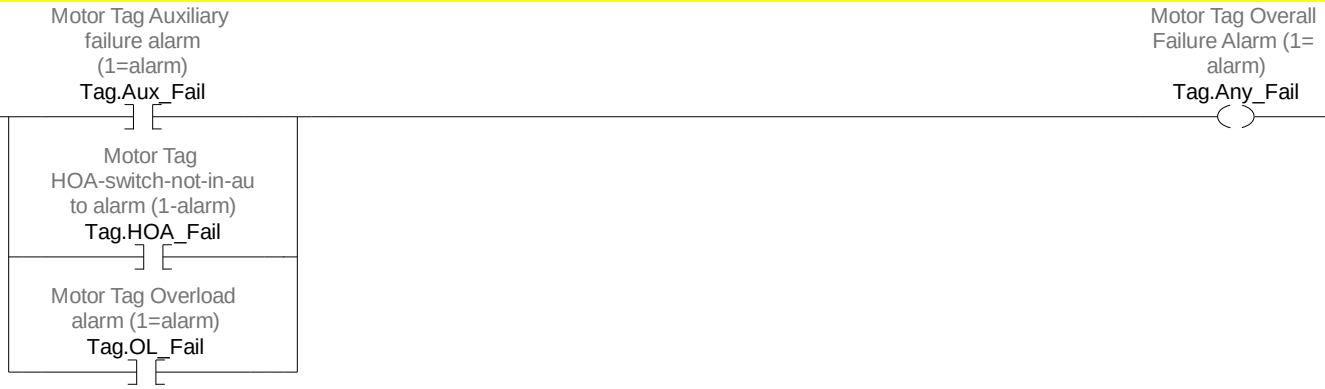
Failures: No aux after first 20 seconds. HOA switch not in auto, overload fail.

4



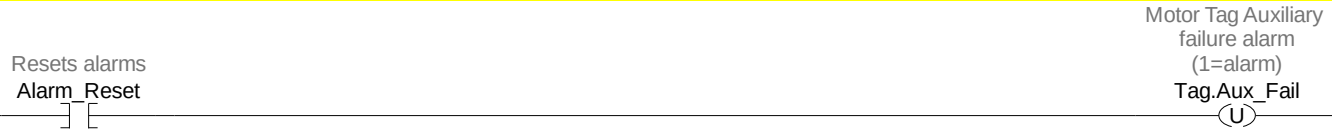
Combined device failure bit

5



Unlatch fail bits when alarm reset

6

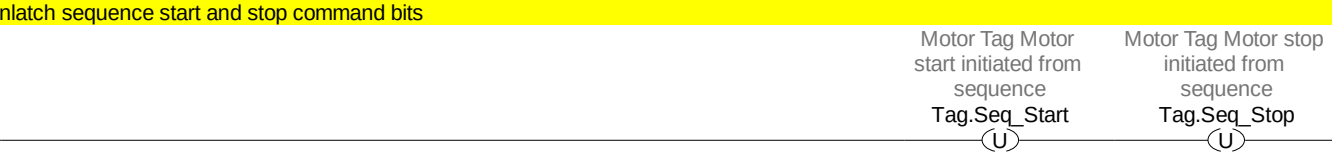


Pass aux contact switch status to OI

7

Unlatch sequence start and stop command bits

8



(End)

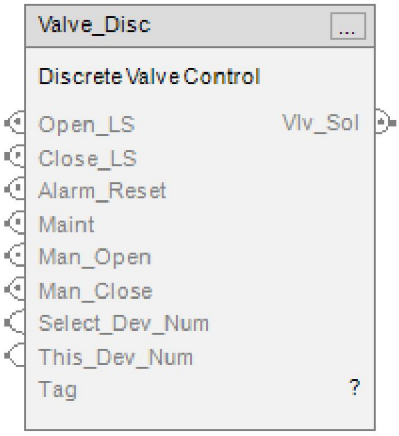
Valve_Disc v1.5

Discrete Valve Control

Available Languages

Relay Ladder

Function Block



Structured Text

```
Valve_Disc(Open_LS, Close_LS, Alarm_Reset, Maint, Man_Open, Man_Close, Select_Dev_Num, This_Dev_Num, Vlv_Sol, Tag);
```

Parameters

Required	Name	Data Type	Usage	Description
X	Valve_Disc	Valve_Disc	InOut	Discrete Valve Control
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
X	Open_LS	BOOL	Input	Valve-Open limit switch

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X	Close_LS	BOOL	Input	Valve-Closed limit switch
X	Alarm_Reset	BOOL	Input	Resets alarms
X	Maint	BOOL	Input	Unit Maintenance/Operate Privilege
X	Man_Open	BOOL	Input	Manual start/open for unit
X	Man_Close	BOOL	Input	Manual stop/close for unit
X	Select_Dev_Num	DINT	Input	Number of device started/stopped at OI
X	This_Dev_Num	DINT	Input	Number of this device for OI control
X	Vlv_Sol	BOOL	Output	Valve solenoid (1=open, 0=close)
X	Tag	Valve_Disc_Type	InOut	Valve Tag

Extended Description

Execution

Condition	Description
EnableIn is true	

Revision v1.5 Notes

Correct name of "Dev_Num" input parameters

Name	Default	Data Type	Scope
Alarm_Reset	0	BOOL	Valve_Disc
Resets alarms			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Alarm_Reset - Valve_Disc/Logic - 5(XIC)			
Close_LS	0	BOOL	Valve_Disc
Valve-Closed limit switch			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Close_LS - Valve_Disc/Logic - 2(XIC), 2(XIO), 2(XIO), 6(XIC)			
Maint	0	BOOL	Valve_Disc
Unit Maintenance/Operate Privilege			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Maint - Valve_Disc/Logic - 0(XIC), 0(XIO), 1(XIC), 1(XIO)			
Man_Close	0	BOOL	Valve_Disc
Manual stop/close for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Close - Valve_Disc/Logic - 1(XIC)			
Man_Open	0	BOOL	Valve_Disc
Manual start/open for unit			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Man_Open - Valve_Disc/Logic - 0(XIC)			
Open_LS	0	BOOL	Valve_Disc
Valve-Open limit switch			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Open_LS - Valve_Disc/Logic - 2(XIC), 2(XIO), 2(XIO), 6(XIC)			
Select_Dev_Num	0	DINT	Valve_Disc
Number of device started/stopped at OI			
Usage:	Input Parameter		
Required:	Yes		
Visible:	Yes		
External Access:	Read/Write		
Select_Dev_Num - Valve_Disc/Logic - 0(CMP), 1(CMP)			
Tag		Valve_Disc_Type	Valve_Disc
Valve Tag			
Usage:	InOut Parameter		
Required:	Yes		

Tag (Continued)
Visible: Yes
Constant No

Tag.Open_Status ?? BOOL
Valve Tag Open LS status (1=open valve)
*Tag.Open_Status - Valve_Disc/Logic - *6(OTE)*

Tag.Close_Status ?? BOOL
Valve Tag Close LS status (1=closed valve)
*Tag.Close_Status - Valve_Disc/Logic - *6(OTE)*

Tag.Any_Fail ?? BOOL
Valve Tag Overall Failure Alarm (1= alarm)
*Tag.Any_Fail - Valve_Disc/Logic - *4(OTE)*

Tag.FTO_Fail ?? BOOL
Valve Tag Fail-to-open alarm (1=alarm)
*Tag.FTO_Fail - Valve_Disc/Logic - *3(OTL), *5(OTU), 4(XIC)*

Tag.FTC_Fail ?? BOOL
Valve Tag Fail-to-close alarm (1=alarm)
*Tag.FTC_Fail - Valve_Disc/Logic - *3(OTL), *5(OTU), 4(XIC)*

Tag.Seq_Open ?? BOOL
Valve Tag Valve open initiated from sequence
*Tag.Seq_Open - Valve_Disc/Logic - *7(OTU), 0(XIC)*

Tag.Seq_Close ?? BOOL
Valve Tag Valve close initiated from sequence
*Tag.Seq_Close - Valve_Disc/Logic - *7(OTU), 1(XIC)*

This_Dev_Num 0 DINT Valve_Disc
Number of this device for OI control
Usage: Input Parameter
Required: Yes
Visible: Yes
External Access: Read/Write
This_Dev_Num - Valve_Disc/Logic - 0(CMP), 1(CMP)

Vlv_Sol 0 BOOL Valve_Disc
Valve solenoid (1=open, 0=close)
Usage: Output Parameter
Required: Yes
Visible: Yes
External Access: Read Only
*Vlv_Sol - Valve_Disc/Logic - *0(OTL), *1(OTU), 2(XIC), 2(XIO), 3(XIC), 3(XIO)*

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Name	Default	Data Type	Scope
Fail_Tmr		TIMER	Valve_Disc
Timer for alarms			
Usage:	Local Tag		
External Access:	Read/Write		
*Fail_Tmr - Valve_Disc/Logic - *2(TON)*			
Fail_Tmr.PRE	20000	DINT	
Timer for alarms			
Fail_Tmr.ACC	0	DINT	
Timer for alarms			
Fail_Tmr.EN	0	BOOL	
Timer for alarms			
Fail_Tmr.TT	0	BOOL	
Timer for alarms			
Fail_Tmr.DN	0	BOOL	
Timer for alarms			
Fail_Tmr.DN - Valve_Disc/Logic - 3(XIC)			

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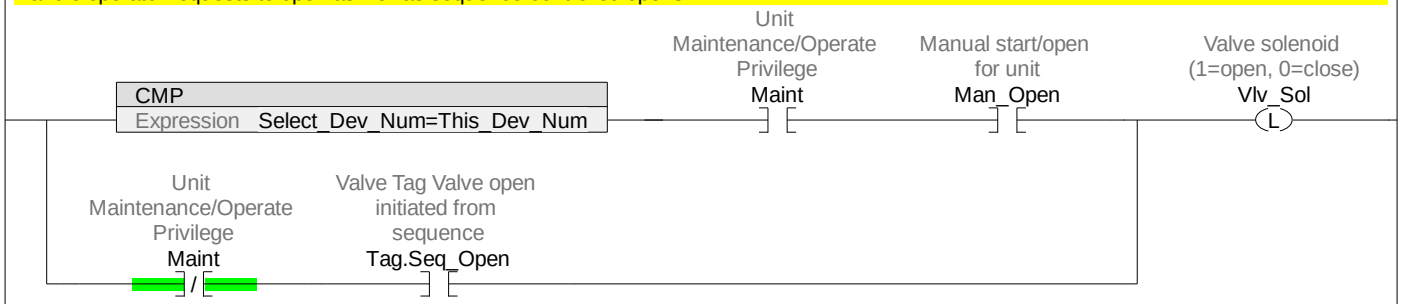
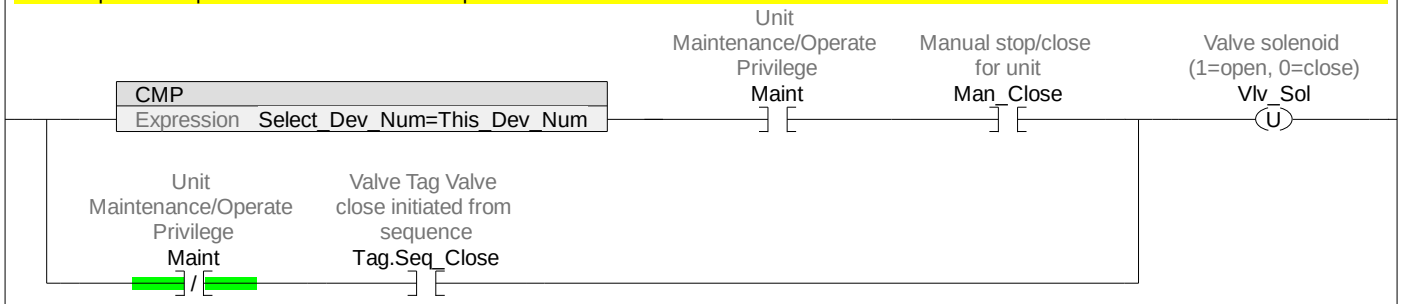
Handle operator requests to open as well as sequence-controlled opens

0



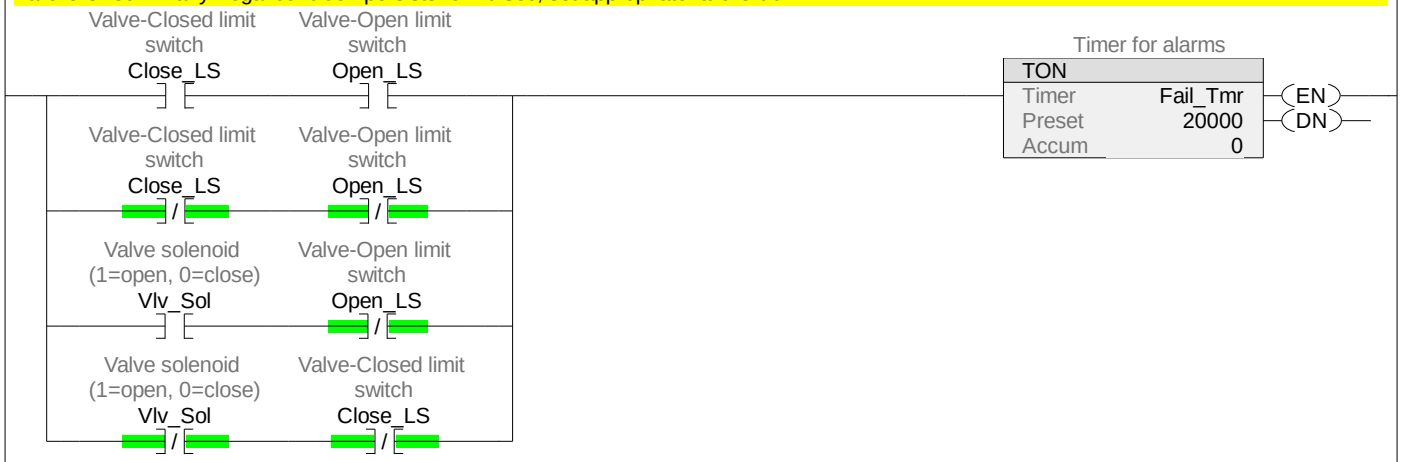
Handle operator requests to close as well as sequence-controlled closes

1



Failure Check. If any illegal condition persists for 20 sec, set appropriate failure bit.

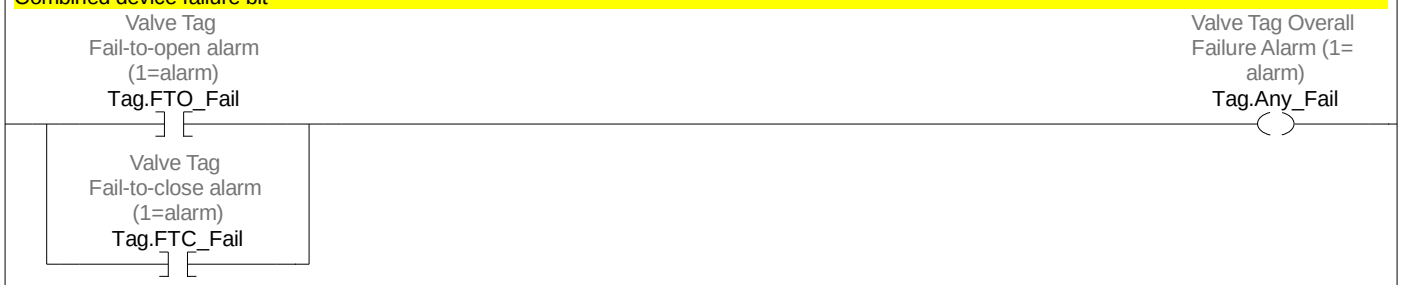
2



3

Combined device failure bit

4



Unlatch fail bits when alarm reset

5

Pass limit switch statuses to OI

6

Unlatch sequence start and stop command bits

7

(End)

Example_21_4
Label does not exist 1
MainTask
MainProgram
Communication
Ladder Diagram 3
Simulation
Simulation
Ladder Diagram 4
Xfer
Gates
Ladder Diagram 9
MainRoutine
Ladder Diagram 10
Motors
Ladder Diagram 11
Valves
Ladder Diagram 13
Xfer_000Startup
Ladder Diagram 14
Xfer_020Operate
Ladder Diagram 19
Xfer_040Hold
Ladder Diagram 23
Xfer_060Shutdown
Ladder Diagram 26
Xfer_080EShutdown
Ladder Diagram 32
Xfer_Abnormal
Ladder Diagram 38
Xfer_Misc
Ladder Diagram 40
Add-On Instruction Signature Listing
Add-On Instructions
Instruction Definition 42
Gate_Flop
Parameter Listing 44
Local Tag Listing 47
Logic Routine 48
Instruction Definition 51
Gate_Slide
Parameter Listing 53
Local Tag Listing 56
Logic Routine 57
Instruction Definition 60
Motor_Conv
Parameter Listing 62
Local Tag Listing 64
Logic Routine 65
Instruction Definition 68
Motor_Std
Parameter Listing 70
Local Tag Listing 72
Logic Routine 73
Instruction Definition 75
Valve_Disc
Parameter Listing 77
Local Tag Listing 79
Logic Routine 80

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