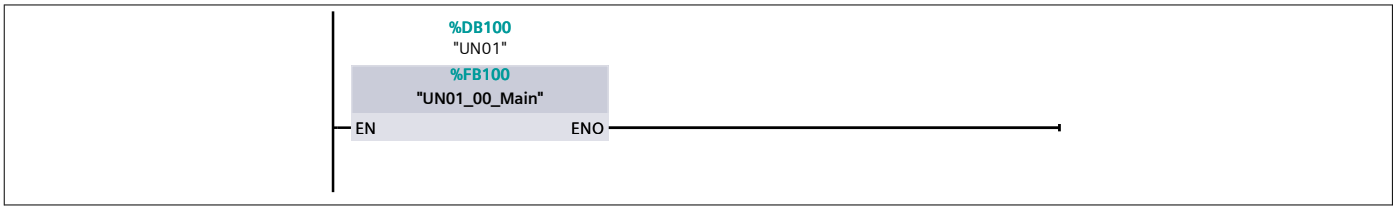
Program blocks

Main [OB1]

Main Properties					
General					
Name	Main	**Number**	1	**Type**	OB
Language	LAD	**Numbering**	Automatic		
Information					
Title	"Main Program Sweep (Cycle)"	**Author**		**Comment**	Test network
Family		**Version**	0.1	**User-defined ID**	

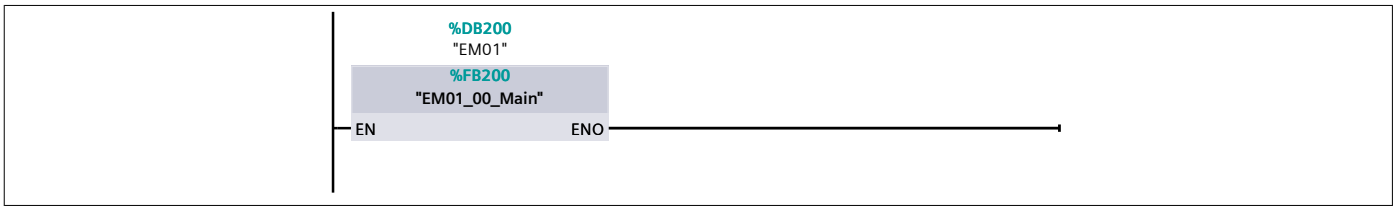
Name	Data type	Default value
Input		
Initial_Call	Bool	
Remanence	Bool	
Temp		
Constant		

Network 1: Machine with simplified PackML modes/states



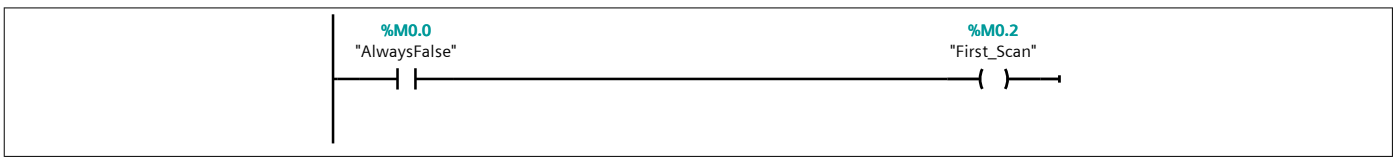
Network 2: Axis 1

Servo axis, procedure and jogging



Network 3:

Reset first scan bit



Program blocks

MC-Servo [OB91]

MC-Servo Properties					
General					
Name	MC-Servo	**Number**	91	**Type**	OB
Language	LAD	**Numbering**	Automatic		
Information					
Title		**Author**		**Comment**	
Family		**Version**	1.0	**User-defined ID**	

Name	Data type	Default value
▼ Input		
Initial_Call	Bool	
PIP_Input	Bool	
PIP_Output	Bool	
IO_System	USInt	
Event_Count	Int	
Synchronous	Bool	

Program blocks

MC-Interpolator [OB92]

MC-Interpolator Properties					
General					
Name	MC-Interpolator	**Number**	92	**Type**	OB
Language	LAD	**Numbering**	Automatic		
Information					
Title		**Author**		**Comment**	
Family		**Version**	1.0	**User-defined ID**	

Name	Data type	Default value
▼ Input		
Initial_Call	Bool	
PIP_Input	Bool	
PIP_Output	Bool	
IO_System	USInt	
Event_Count	Int	
Reduction	UInt	

Program blocks

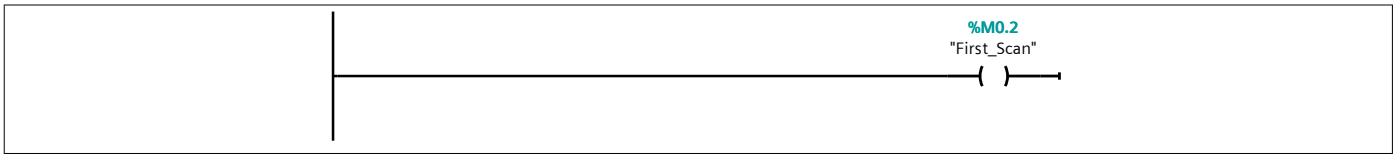
Startup [OB100]

Startup Properties					
General					
Name	Startup	**Number**	100	**Type**	OB
Language	LAD	**Numbering**	Automatic		
Information					
Title	"Complete Restart"	**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

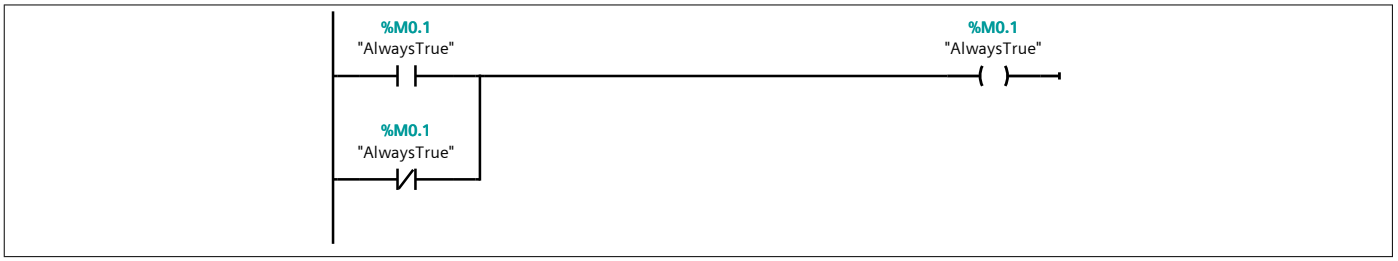
Name	Data type	Default value
Input		
LostRetentive	Bool	
LostRTC	Bool	
Temp		
Constant		

Network 1:

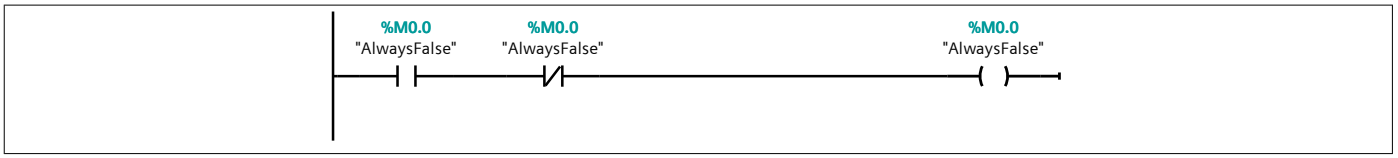
Cleared in last rung of OB1



Network 2:



Network 3:



Program blocks / System blocks / Program resources

MC_HOME [FB1201]

MC_HOME Properties					
General					
Name	MC_HOME	**Number**	1201	**Type**	FB
Language	Motion_DB	**Numbering**	Automatic		
Information					
Title		**Author**	SIMATIC	**Comment**	
Family	MC_1500	**Version**	7.0	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
Axis	TO_Axis		
Execute	Bool	false	Non-retain
Position	LReal	0.0	Non-retain
Mode	Int	0	Non-retain
Sensor	DInt	0	Non-retain
▼ Output			
ReferenceMarkPosition	LReal	0.0	Non-retain
Done	Bool	false	Non-retain
Busy	Bool	false	Non-retain
CommandAborted	Bool	false	Non-retain
Error	Bool	false	Non-retain
ErrorId	Word	16#0	Non-retain
InOut			
Static			

Program blocks / System blocks / Program resources

MC_MOVEJOG [FB1203]

MC_MOVEJOG Properties					
General					
Name	MC_MOVEJOG	**Number**	1203	**Type**	FB
Language	Motion_DB	**Numbering**	Automatic		
Information					
Title		**Author**	SIMATIC	**Comment**	
Family	MC_1500	**Version**	7.0	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
Axis	TO_SpeedAxis		
JogForward	Bool	false	Non-retain
JogBackward	Bool	false	Non-retain
Velocity	LReal	100.0	Non-retain
Acceleration	LReal	-1.0	Non-retain
Deceleration	LReal	-1.0	Non-retain
Jerk	LReal	-1.0	Non-retain
PositionControlled	Bool	true	Non-retain
▼ Output			
InVelocity	Bool	false	Non-retain
Busy	Bool	false	Non-retain
CommandAborted	Bool	false	Non-retain
Error	Bool	false	Non-retain
ErrorId	Word	16#0	Non-retain
InOut			
Static			

Program blocks / System blocks / Program resources

MC_RESET [FB1207]

MC_RESET Properties					
General					
Name	MC_RESET	**Number**	1207	**Type**	FB
Language	Motion_DB	**Numbering**	Automatic		
Information					
Title		**Author**	SIMATIC	**Comment**	
Family	MC_1500	**Version**	7.0	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
Axis	TO_Object		
Execute	Bool	false	Non-retain
Restart	Bool	false	Non-retain
▼ Output			
Done	Bool	false	Non-retain
Busy	Bool	false	Non-retain
CommandAborted	Bool	false	Non-retain
Error	Bool	false	Non-retain
ErrorId	Word	16#0	Non-retain
InOut			
Static			

Program blocks / System blocks / Program resources

MC_HALT [FB1200]

MC_HALT Properties					
General					
Name	MC_HALT	**Number**	1200	**Type**	FB
Language	Motion_DB	**Numbering**	Automatic		
Information					
Title		**Author**	SIMATIC	**Comment**	
Family	MC_1500	**Version**	7.0	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
Axis	TO_SpeedAxis		
Execute	Bool	false	Non-retain
Deceleration	LReal	-1.0	Non-retain
Jerk	LReal	-1.0	Non-retain
AbortAcceleration	Bool	false	Non-retain
▼ Output			
Done	Bool	false	Non-retain
Busy	Bool	false	Non-retain
CommandAborted	Bool	false	Non-retain
Error	Bool	false	Non-retain
ErrorId	Word	16#0	Non-retain
InOut			
Static			

Program blocks / System blocks / Program resources

MC_POWER [FB1206]

MC_POWER Properties					
General					
Name	MC_POWER	**Number**	1206	**Type**	FB
Language	Motion_DB	**Numbering**	Automatic		
Information					
Title		**Author**	SIMATIC	**Comment**	
Family	MC_1500	**Version**	7.0	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
Axis	TO_Axis		
Enable	Bool	false	Non-retain
StartMode	DInt	1	Non-retain
StopMode	Int	0	Non-retain
▼ Output			
Status	Bool	false	Non-retain
Busy	Bool	false	Non-retain
Error	Bool	false	Non-retain
ErrorId	Word	16#0	Non-retain
InOut			
Static			

Program blocks / System blocks / Program resources

MC_MOVERELATIVE [FB1204]

MC_MOVERELATIVE Properties					
General					
Name	MC_MOVERELATIVE	**Number**	1204	**Type**	FB
Language	Motion_DB	**Numbering**	Automatic		
Information					
Title		**Author**	SIMATIC	**Comment**	
Family	MC_1500	**Version**	7.0	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
Axis	TO_PositioningAxis		
Execute	Bool	false	Non-retain
Distance	LReal	0.0	Non-retain
Velocity	LReal	-1.0	Non-retain
Acceleration	LReal	-1.0	Non-retain
Deceleration	LReal	-1.0	Non-retain
Jerk	LReal	-1.0	Non-retain
▼ Output			
Done	Bool	false	Non-retain
Busy	Bool	false	Non-retain
CommandAborted	Bool	false	Non-retain
Error	Bool	false	Non-retain
ErrorId	Word	16#0	Non-retain
InOut			
Static			

Program blocks / 0_UN01_ExampleMachine

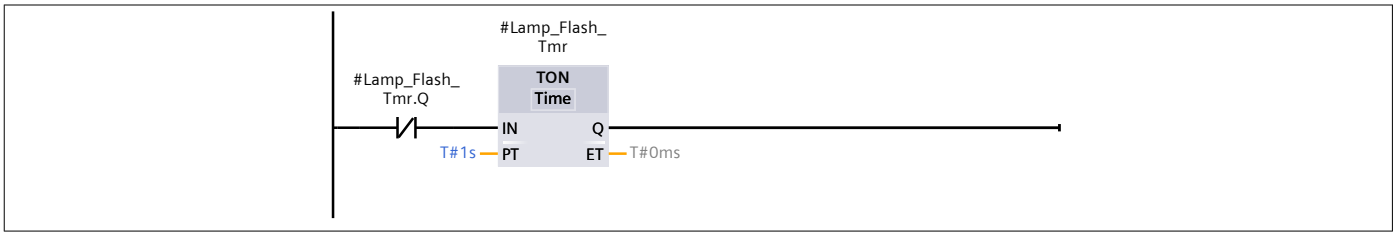
UN01_00_Main [FB100]

UN01_00_Main Properties					
General					
Name	UN01_00_Main	**Number**	100	**Type**	FB
Language	LAD	**Numbering**	Manual		
Information					
Title	Example machine for simplified PackML	**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

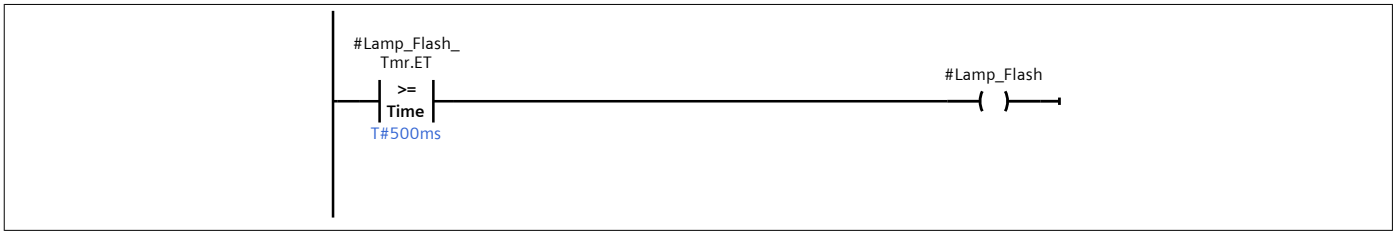
Name	Data type	Default value	Retain
Input			
Output			
InOut			
▼ Static			
UP01_PackML	"UN01_UP01_PackML"		
Lamp_Flash_Tmr	TON_TIME		Non-retain
Lamp_Flash	Bool	false	Non-retain
Temp			
Constant			

Network 1: PackML

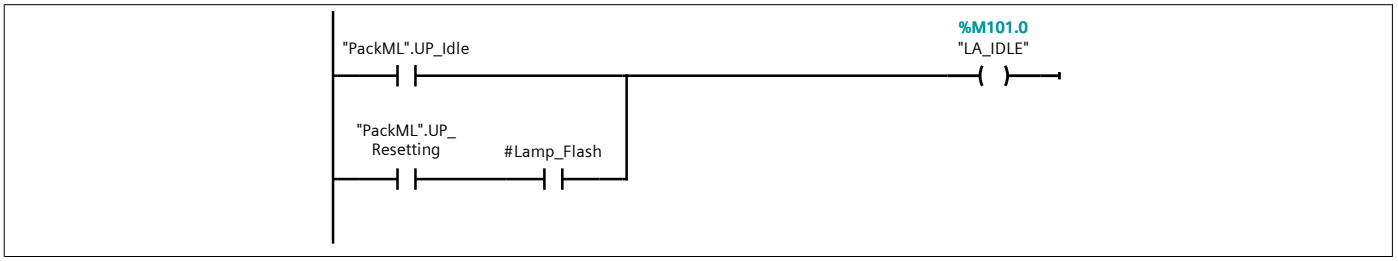
Network 2: Timer for flashing indicators



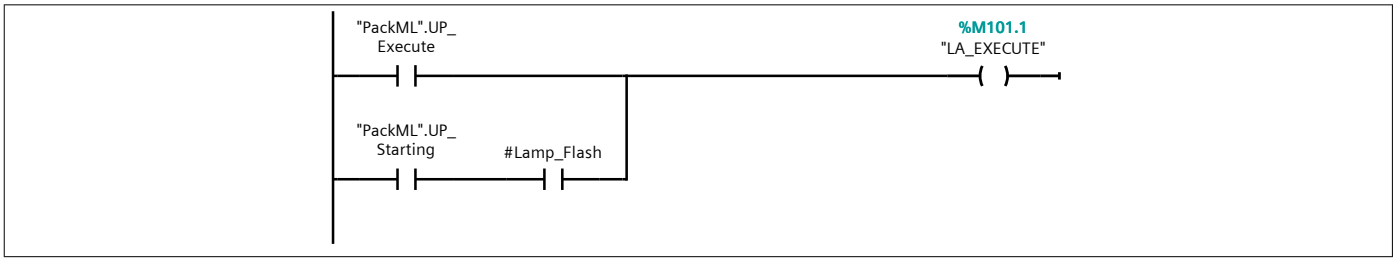
Network 3: Flash bit for flashing indicators



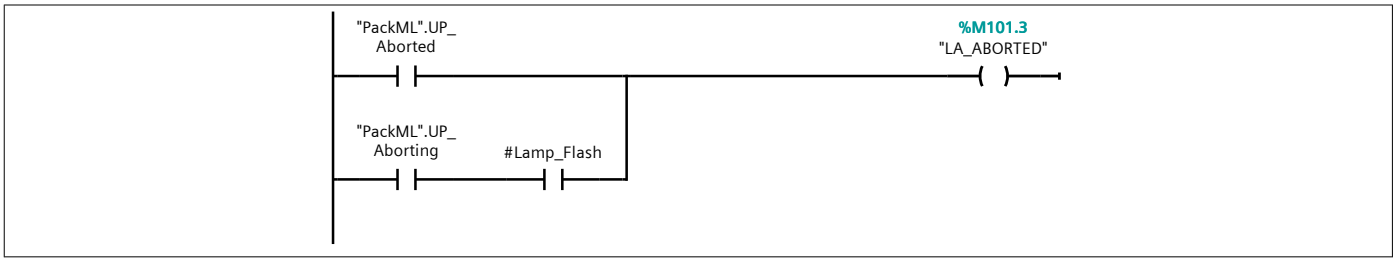
Network 4: Idle/Resetting state indicator



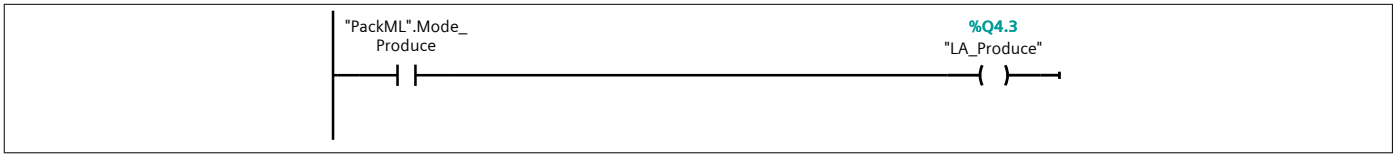
Network 5: Execute/Starting state indicator



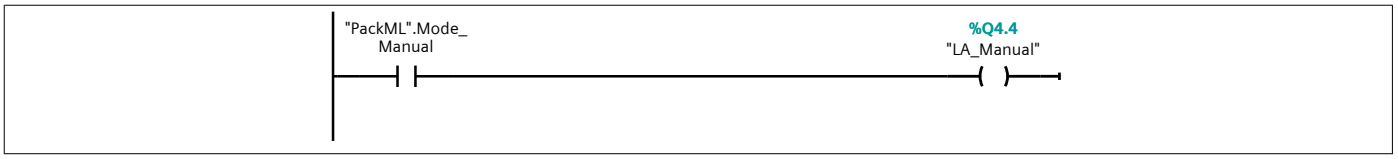
Network 6: Aborted/Aborting state indicator



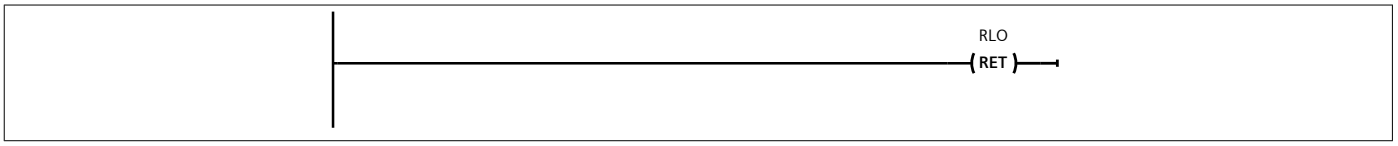
Network 7:



Network 8:



Network 9:



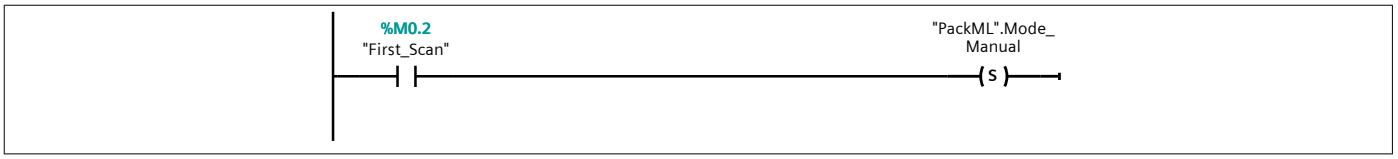
Program blocks / 0_UN01_ExampleMachine

UN01_UP01_PackML [FB105]

UN01_UP01_PackML Properties					
General					
Name	UN01_UP01_PackML	**Number**	105	**Type**	FB
Language	LAD	**Numbering**	Manual		
Information					
Title		**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

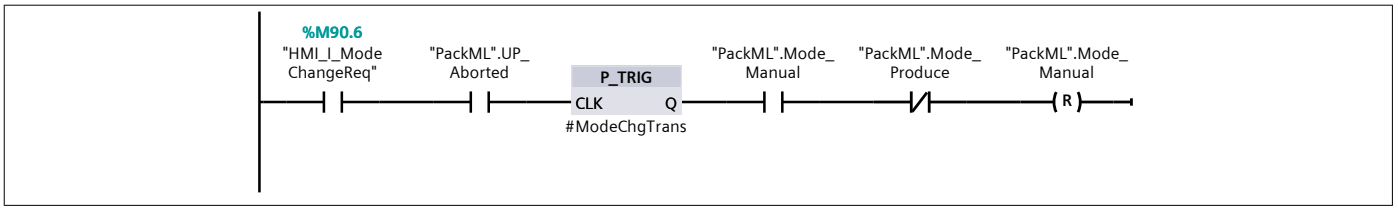
Name	Data type	Default value	Retain
Input			
Output			
InOut			
▼ Static			
ModeChgTrans	Bool	false	Non-retain
ModeChg2Trans	Bool	false	Non-retain
Wrk_Instr_Err_Trans	Array[1..32] of Bool		Non-retain
Temp			
Constant			

Network 1: On first scan - set to manual mode

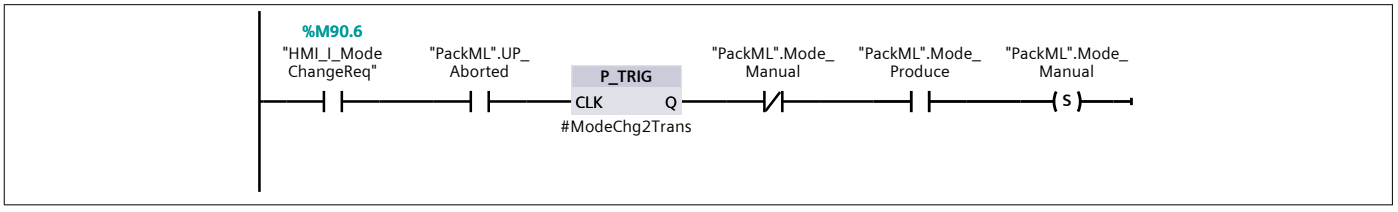


Network 2: Toggle between modes

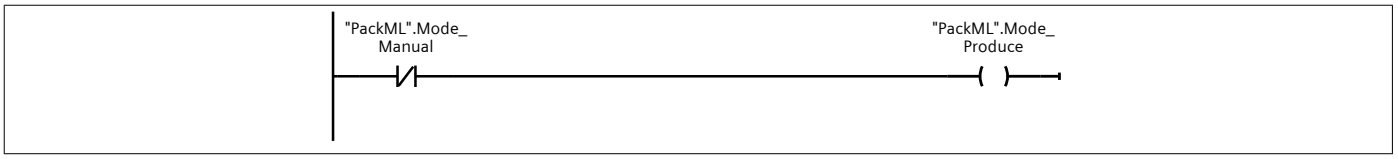
Only allowed when aborted



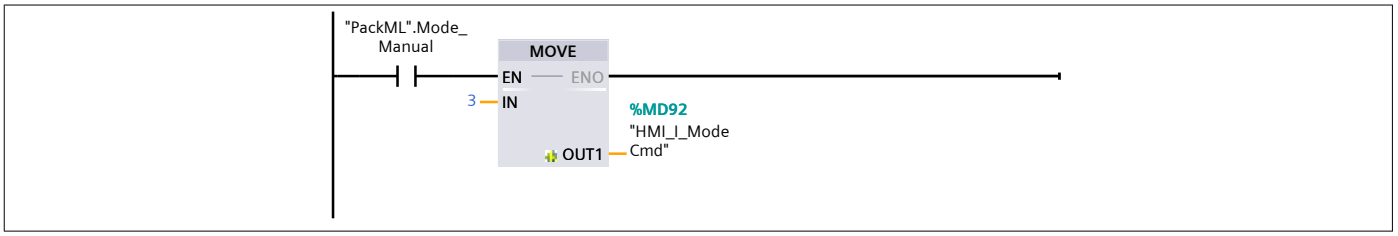
Network 3:



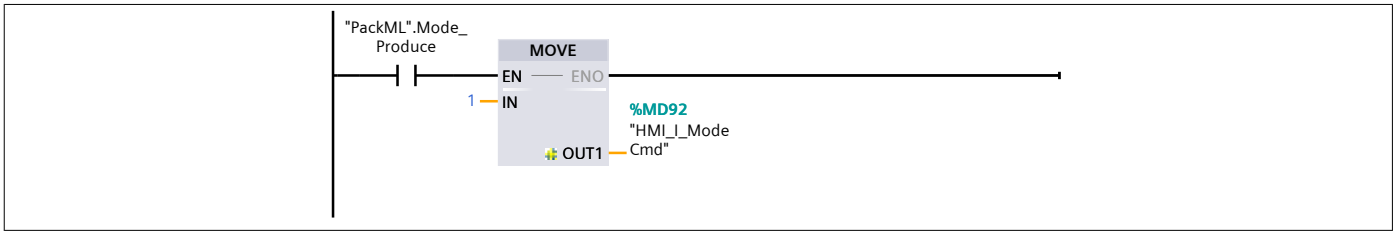
Network 4:



Network 5: Display mode for operator

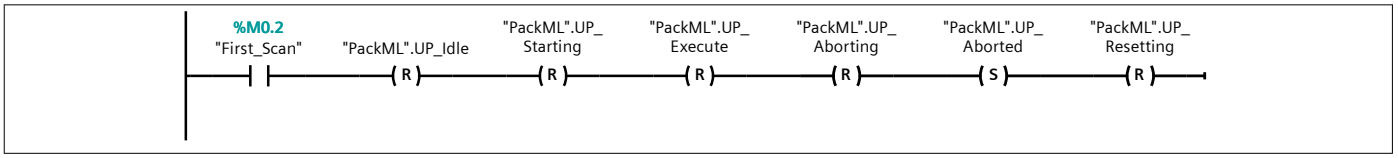


Network 6:



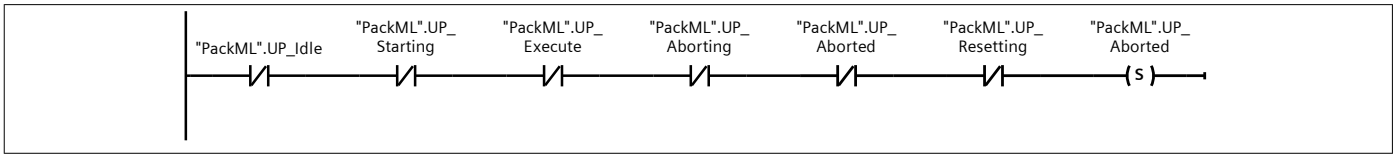
Network 7: First scan

First scan - set to ABORTED state



Network 8: No states active

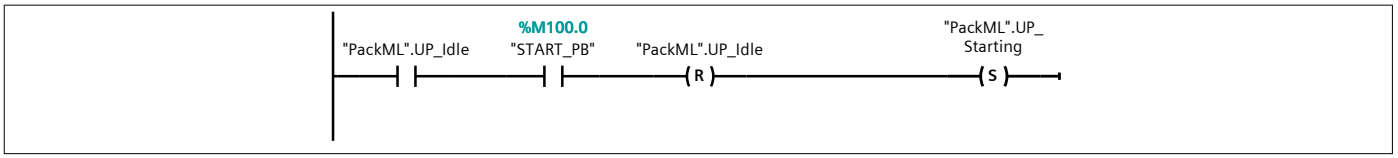
If no PackML states active, set to ABORTED. This happens if updated software is downloaded and processor does not transition from STOP to RUN



Network 9: Transition from IDLE to STARTING

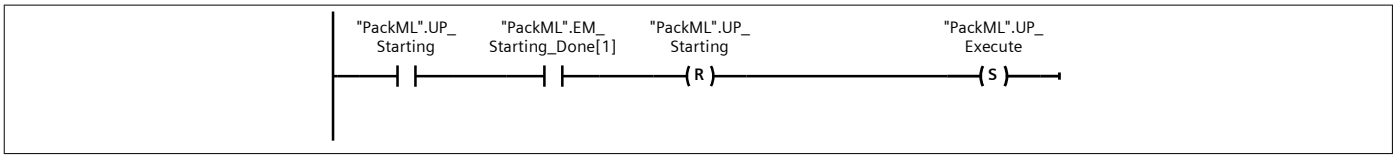
IDLE -
Wait for start pushbutton press.

Next state is STARTING

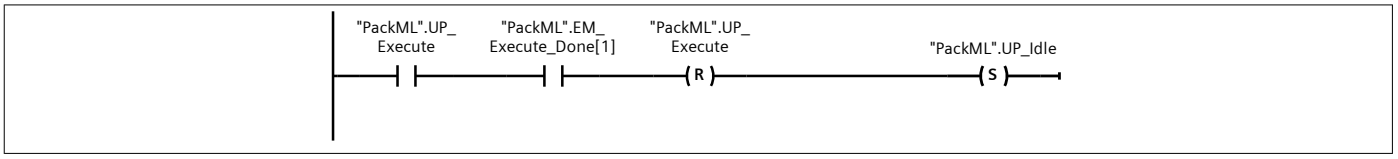


Network 10: Transition from STARTING to EXECUTE

Wait for all axes to start.

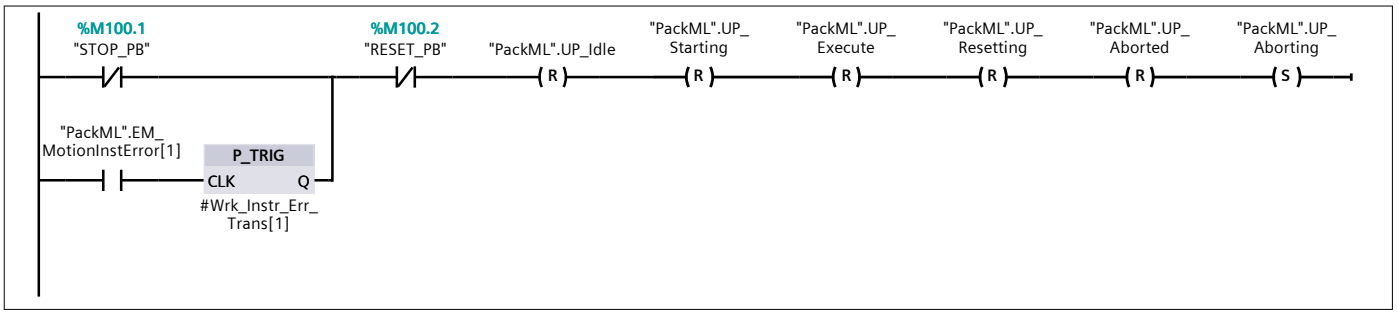


Network 11: Transition from EXECUTE to IDLE



Network 12: Transition to ABORTING

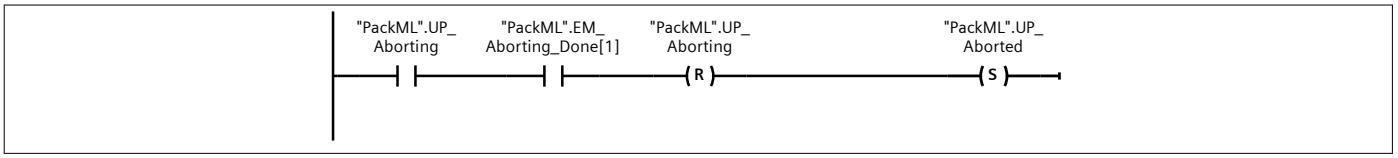
ABORTING -
From any state if stop or error in motion blocks for any axis.
On error transition so source of error can persist and not keep triggering Abort



Network 13: Transtion from ABORTING to ABORTED

Exit when all axes aborting complete

Next step is ABORTED

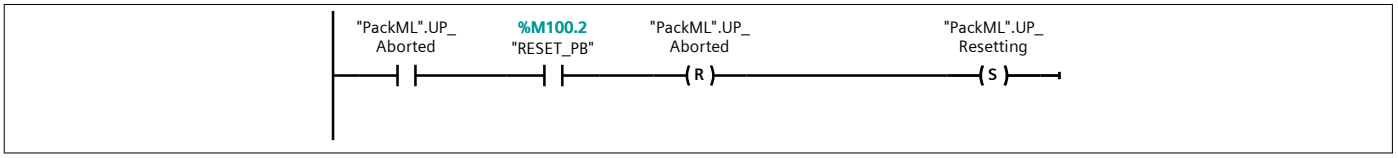


Network 14: Transition from ABORTED to RESETTING

ABORTED -

Stay in state until reset pressed.

Next state is RESETTING

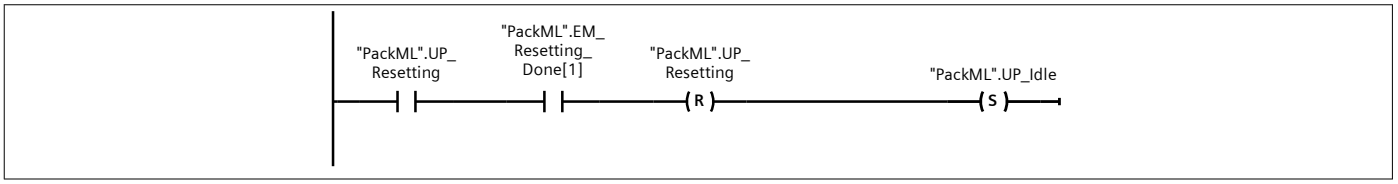


Network 15: Transition from RESETTING to IDLE

RESETTING -

Wait for all axes to finish resetting.

Next step IDLE



Program blocks / 0_UN01_ExampleMachine

UN01 [DB100]

UN01 Properties					
General					
Name	UN01	**Number**	100	**Type**	DB
Language	DB	**Numbering**	Manual		
Information					
Title		**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

Name	Data type	Start value	Retain
Input			
Output			
InOut			
▼ Static			
UP01_PackML	"UN01_UP01_PackML"		False
Lamp_Flash_Tmr	TON_TIME		False
Lamp_Flash	Bool	false	False

Program blocks / 0_UN01_ExampleMachine

PackML [DB10]

PackML Properties					
General					
Name	PackML	**Number**	10	**Type**	DB
Language	DB	**Numbering**	Manual		
Information					
Title	Machine Data	**Author**		**Comment**	Machine Data
Family		**Version**	1.0	**User-defined ID**	

Name	Data type	Start value	Retain
▼ Static			
Mode_Manual	Bool	false	False
Mode_Produce	Bool	false	False
UP_Aborted	Bool	false	False
UP_Aborting	Bool	false	False
UP_Execute	Bool	false	False
UP_Idle	Bool	false	False
UP_Resetting	Bool	false	False
UP_Starting	Bool	false	False
EM_Aborting_Done	Array[0..31] of Bool		False
EM_Execute_Done	Array[0..31] of Bool		False
EM_Resetting_Done	Array[0..31] of Bool		False
EM_Starting_Done	Array[0..31] of Bool		False
EM_MotionInstError	Array[0..31] of Bool		False

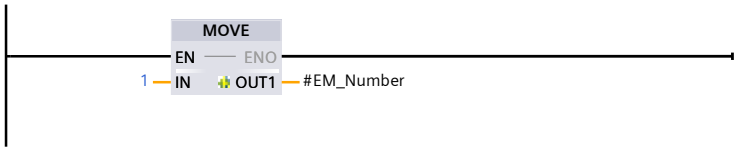
Program blocks / EM01_Axis01

EM01_00_Main [FB200]

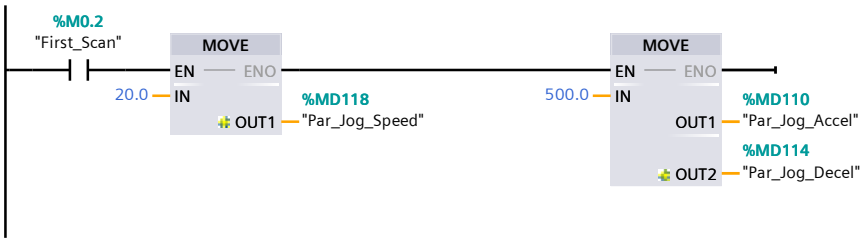
EM01_00_Main Properties					
General					
Name	EM01_00_Main	**Number**	200	**Type**	FB
Language	LAD	**Numbering**	Manual		
Information					
Title		**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

Name	Data type	Default value	Retain
Input			
Output			
InOut			
▼ Static			
EM_Number	DInt	0	Non-retain
Wrk_NoStepsActive	Bool	false	Non-retain
Wrk_MotionStepsError	Bool	false	Non-retain
Wrk_JogFault	Bool	false	Non-retain
CM00_Procedure	"EM01_CM00_Procedure"		
CM02_ServoAxisObject	"EM01_CM02_ServoAxisObject"		
CM03_ServoAxisJog	"EM01_CM03_ServoAxisJog"		
Temp			
Constant			

Network 1:

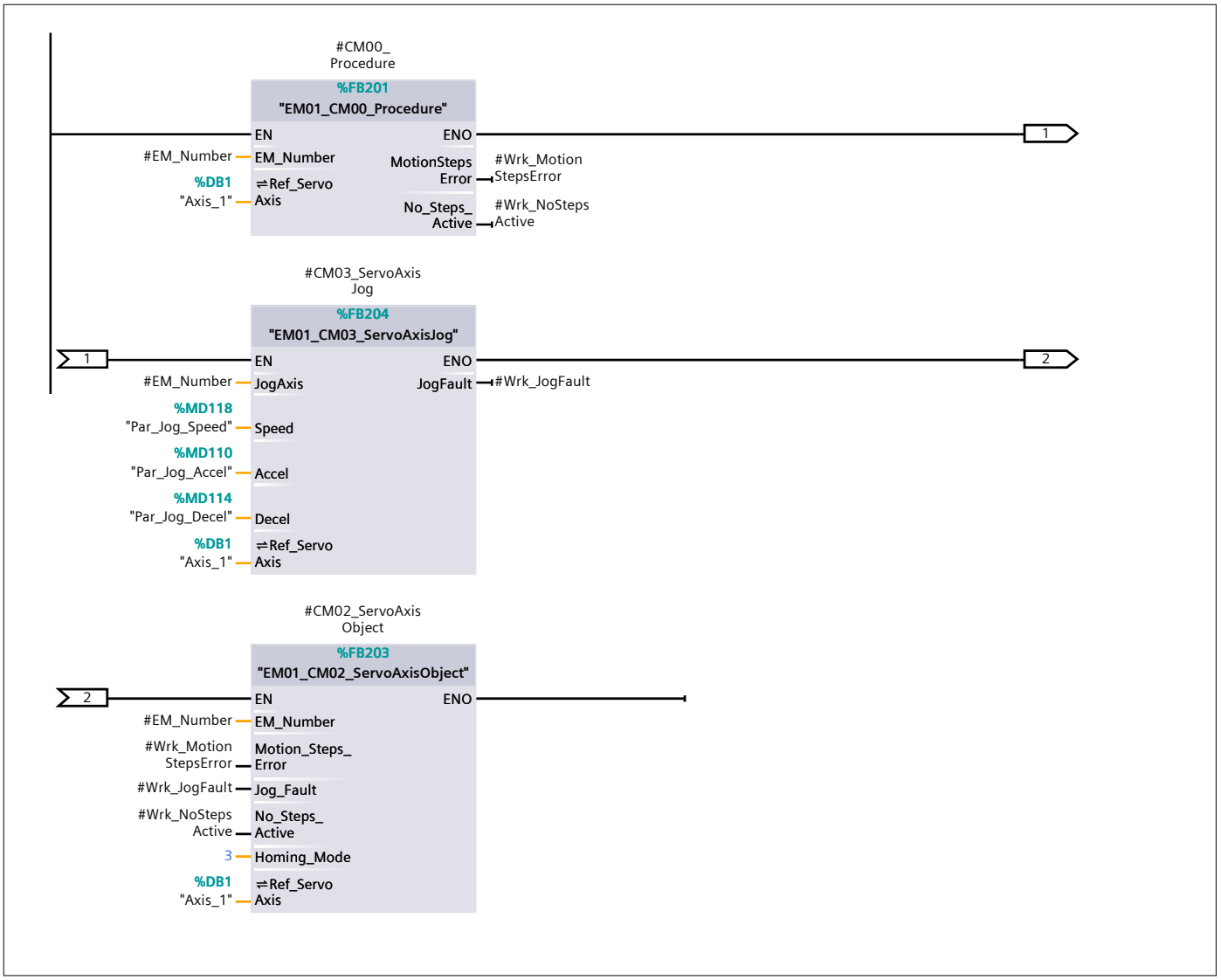


Network 2: Set jogging parameters

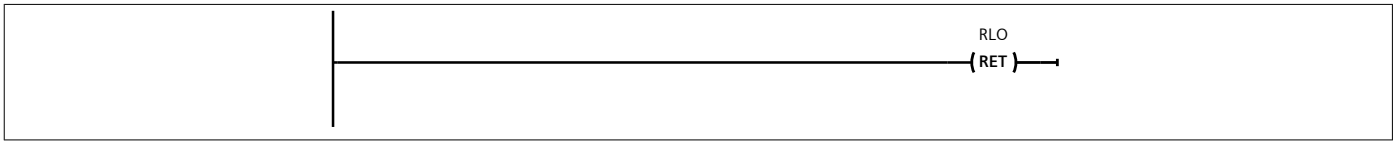


Network 3: Call other function blocks

Servo axis, procedure and jogging



Network 4:



Program blocks / EM01_Axis01

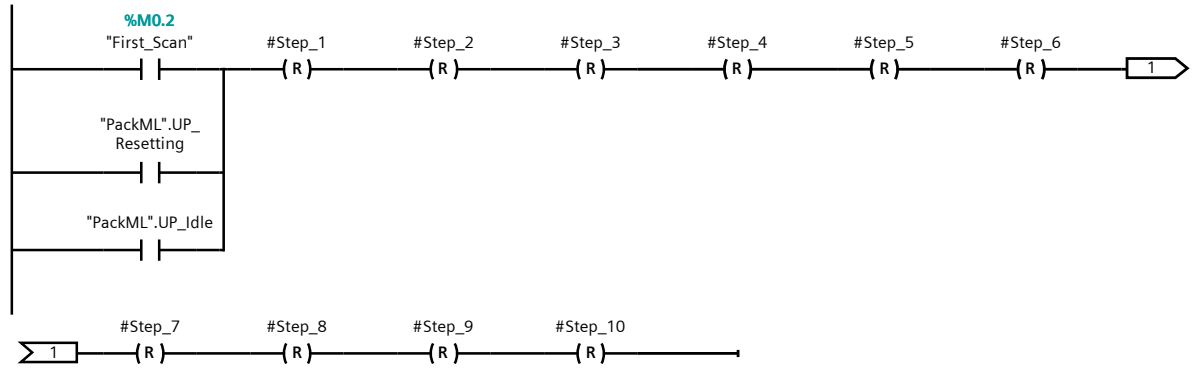
EM01_CM00_Procedure [FB201]

EM01_CM00_Procedure Properties					
General					
Name	EM01_CM00_Procedure	**Number**	201	**Type**	FB
Language	LAD	**Numbering**	Manual		
Information					
Title		**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
EM_Number	DInt	0	Non-retain
▼ Output			
MotionStepsError	Bool	false	Non-retain
No_Steps_Active	Bool	false	Non-retain
▼ InOut			
Ref_ServoAxis	TO_PositioningAxis		
▼ Static			
Step_1	Bool	false	Non-retain
Step_2	Bool	false	Non-retain
Step_3	Bool	false	Non-retain
Step_4	Bool	false	Non-retain
Step_5	Bool	false	Non-retain
Step_6	Bool	false	Non-retain
Step_7	Bool	false	Non-retain
Step_8	Bool	false	Non-retain
Step_9	Bool	false	Non-retain
Step_10	Bool	false	Non-retain
Delay	TON_TIME		Non-retain
Wrk_MC_Move2	MC_MOVERELATIVE		
Wrk_MC_Move1	MC_MOVERELATIVE		
Wrk_MC_MoveErr_Trans	Bool	false	Non-retain
Wrk_MC_Move2_Err_Trans	Bool	false	Non-retain
Temp			
Constant			

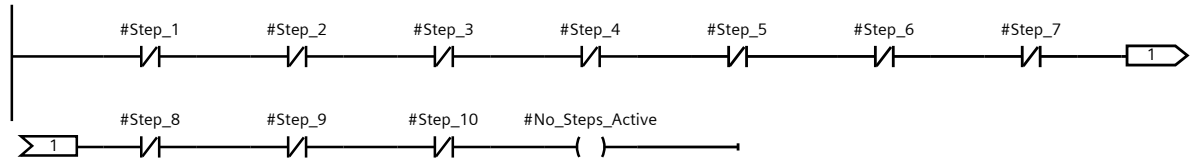
Network 1: Reset of all steps

First scan or resetting or idle - clear all steps

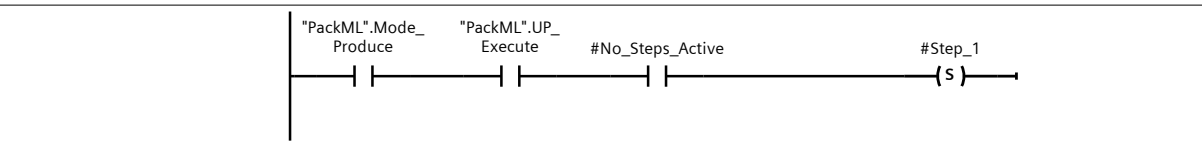


Network 2: Indication that all steps reset

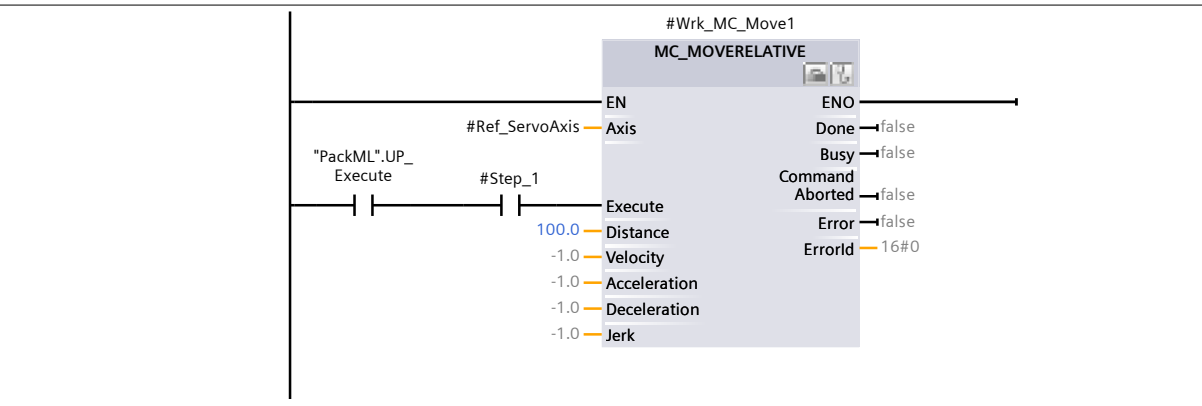
Used by RESETTING state and initial execute step



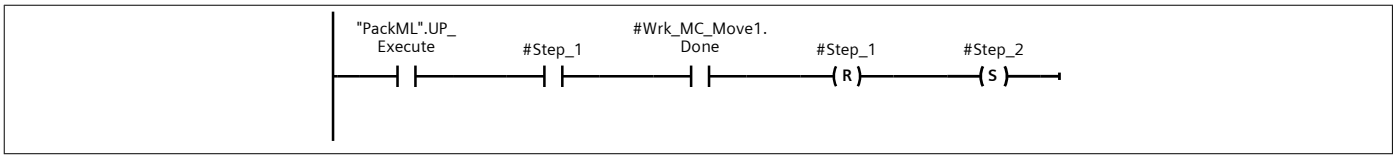
Network 3:



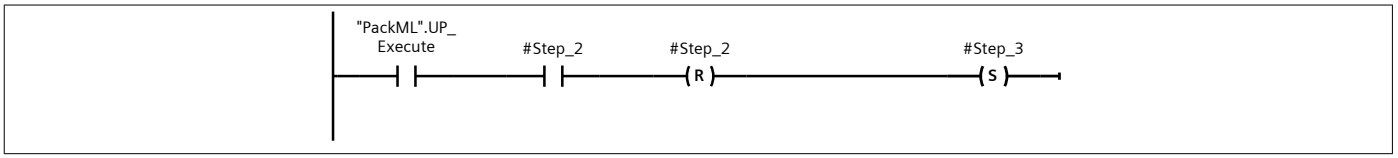
Network 4: First motion



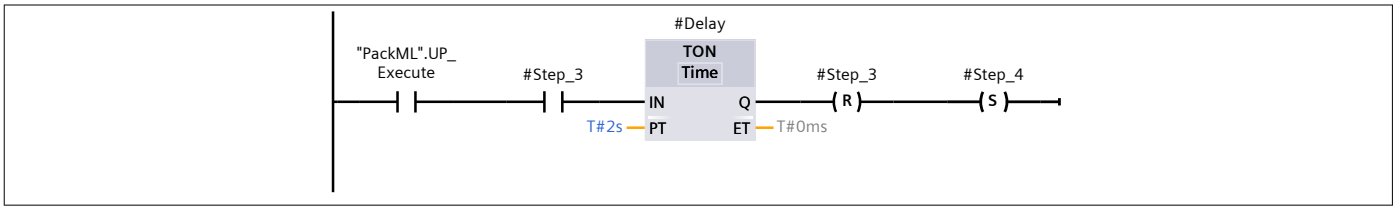
Network 5: Step_1 - Move one doen



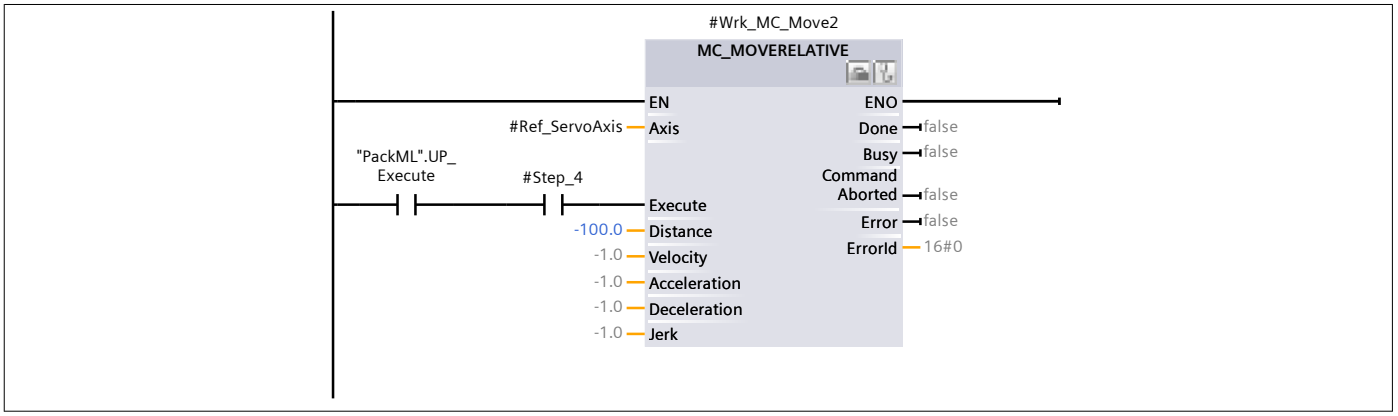
Network 6: Step_2 - Spare step



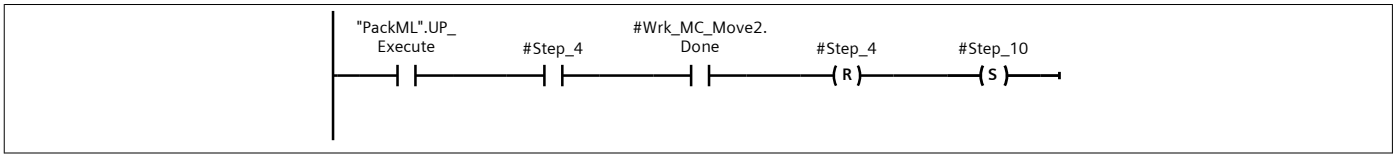
Network 7: Step_3 - Dwell 2 seconds



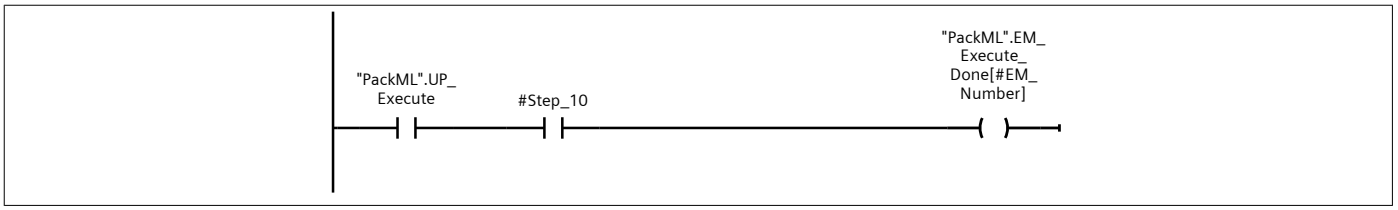
Network 8: Step_4 - Second move



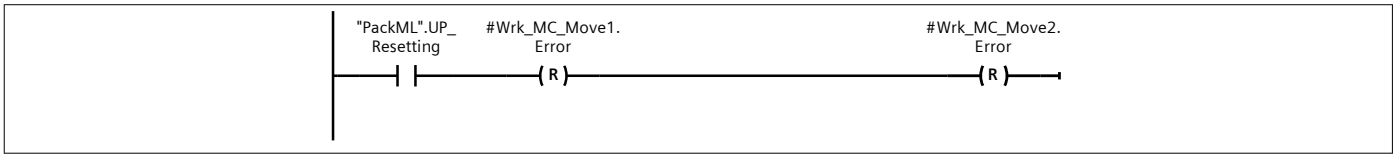
Network 9: When finished with second move, go to last step



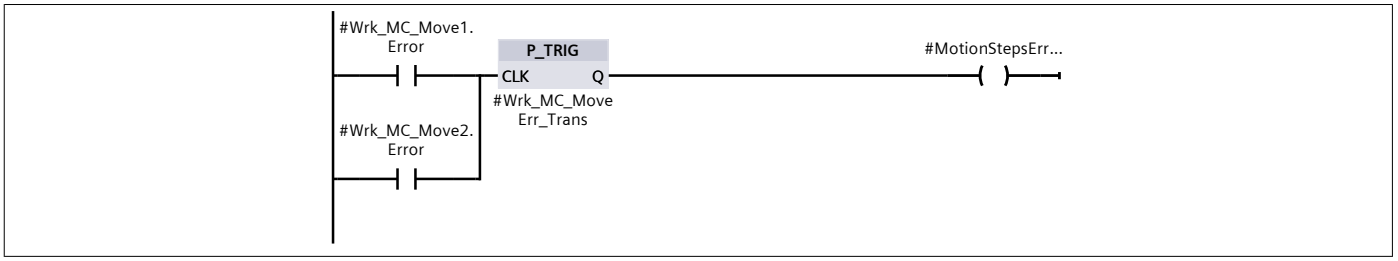
Network 10: Last step - Signal moves are complete



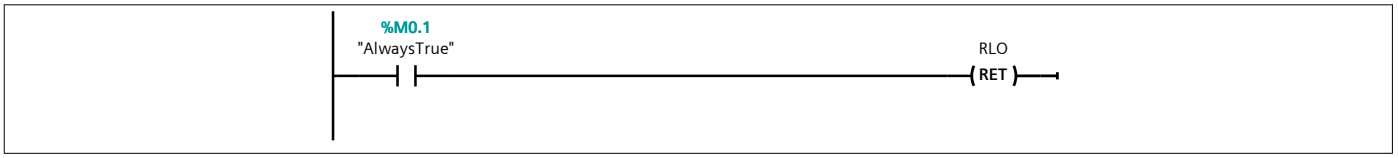
Network 11:



Network 12: Copy motion block errors to output flag



Network 13: END: Update the ENO Output. (DO NOT REMOVE. Must be last rung)



Program blocks / EM01_Axis01

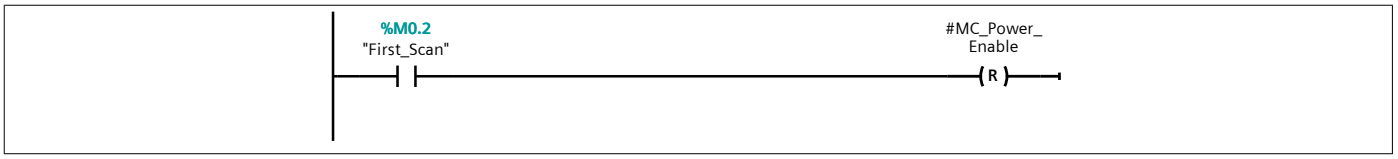
EM01_CM02_ServoAxisObject [FB203]

EM01_CM02_ServoAxisObject Properties					
General					
Name	EM01_CM02_ServoAxi-sObject	**Number**	203	**Type**	FB
Language	LAD	**Numbering**	Manual		
Information					
Title		**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

Name	Data type	Default value	Retain
▼ Input			
EM_Number	DInt	0	Non-retain
Motion_Steps_Error	Bool	false	Non-retain
Jog_Fault	Bool	false	Non-retain
No_Steps_Active	Bool	false	Non-retain
Homing_Mode	Int	0	Non-retain
Output			
▼ InOut			
Ref_ServoAxis	TO_PositioningAxis		
▼ Static			
MC_Power_Enable	Bool	false	Non-retain
Wrk_Home_Start	Bool	false	Non-retain
Wrk_Halt_PowerOff	Bool	false	Non-retain
Wrk_Halt_CaptureErr	Word	16#0	Non-retain
Wrk_MC_Power	MC_POWER		
Wrk_MC_Halt	MC_HALT		
Wrk_MC_Reset	MC_RESET		
Wrk_MC_Home	MC_HOME		
Wrk_MC_Reset2	MC_RESET		
Wrk_Dummy_Home	Bool	false	Non-retain
Reset_Tmr	IEC_TIMER		Non-retain
Wrk_MC_BlkErr_Trans	Bool	false	Non-retain
Wrk_Resetting_Trans	Bool	false	Non-retain
Wrk_MC_Reset_Err_Trans	Bool	false	Non-retain
Wrk_MC_Reset2_Err_Trans	Bool	false	Non-retain
Ref_ServoAxis_Err_Trans	Bool	false	Non-retain
Wrk_Home_InProg	Bool	false	Non-retain
Wrk_Homed	Bool	false	Non-retain
Wrk_HomeMode	Int	0	Non-retain
Wrk_ResetHome_Trans	Bool	false	Non-retain
Temp			
Constant			

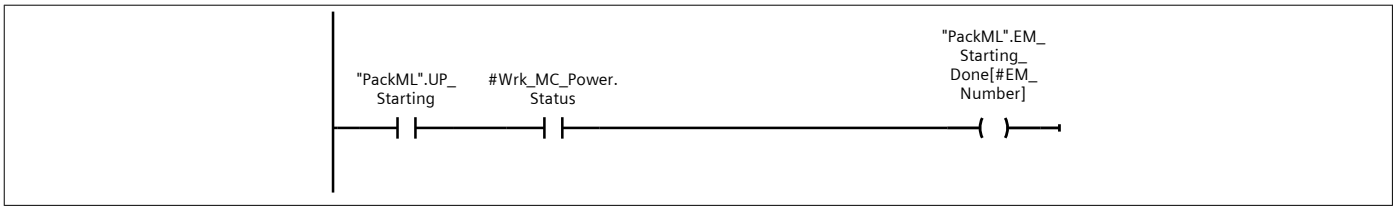
Network 1: First scan initialization

Reset power enable

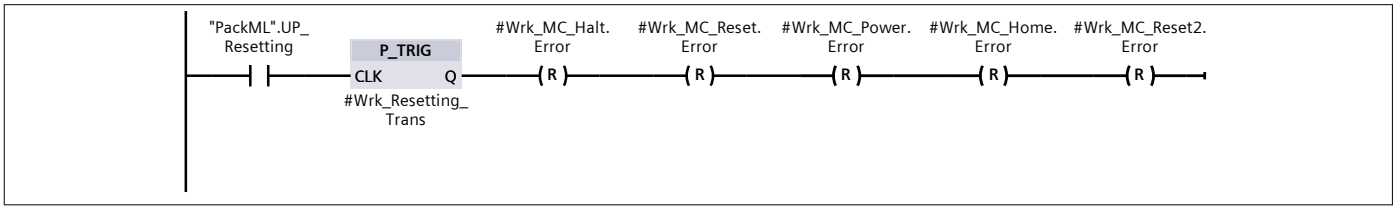


Network 2: State completion for STARTING

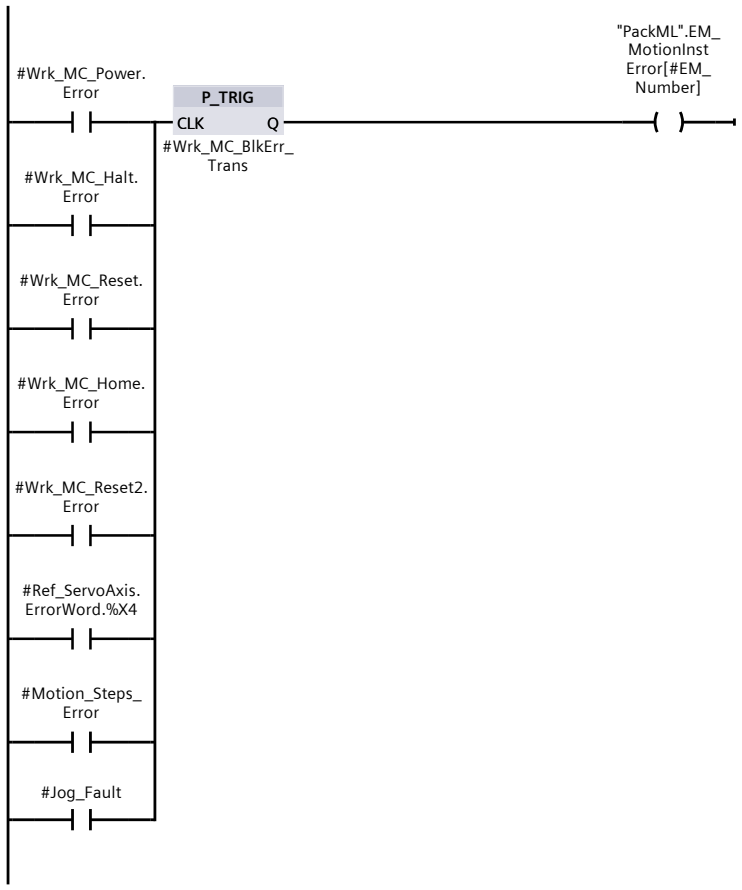
Starting - Check of power status is probably not absolutely necessary. Other starting taks, such as gearing, could go here.



Network 3: When resetting, clear motion block errors

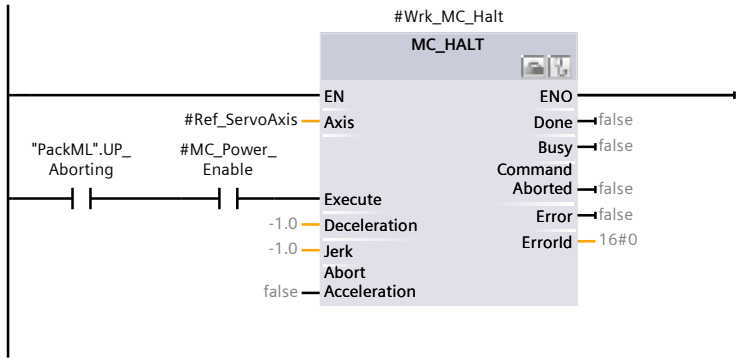


Network 4: Handle errors from motion blocks



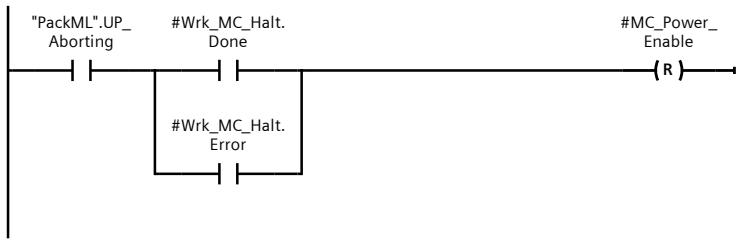
Network 5: MC_Halt block

If axis power not on, if do halt will generate unnecessary error



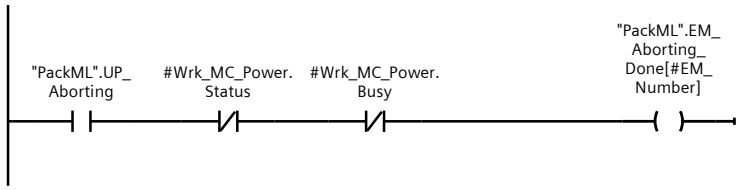
Network 6: Reset MC_Power enable as part of aborting

Resetting Enable input to MC_Power disables axis.



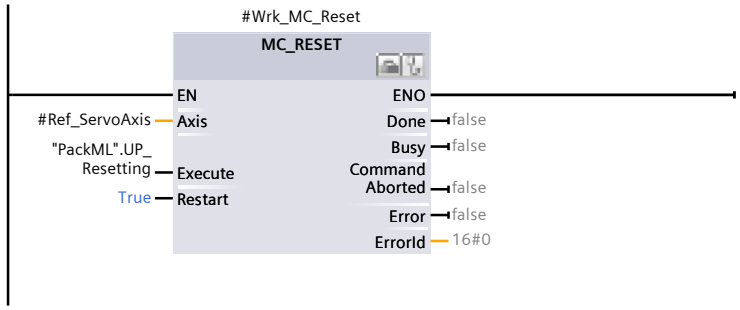
Network 7: State completion for ABORTING

Wait for status to be off before transitioning to next step.



Network 8: RESETTING - MC_Reset block

RESETTING - first reset any errors and faults

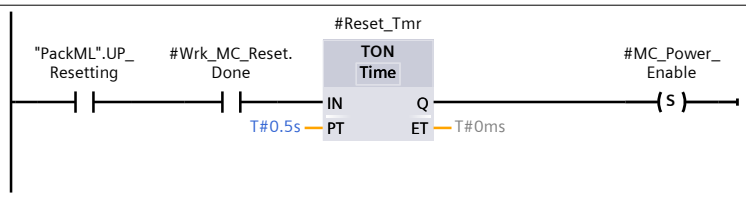


Network 9: RESETTING - Set MC_Power enable input

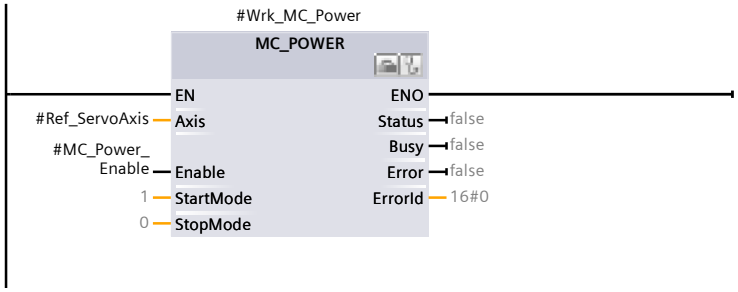
RESETTING -

When faults reset, wait 1/2 sec before setting Enable input of MC_Power. Wait for status
Next state is IDLE

Timer seems to be necessary. If no delay, MC_Power faults

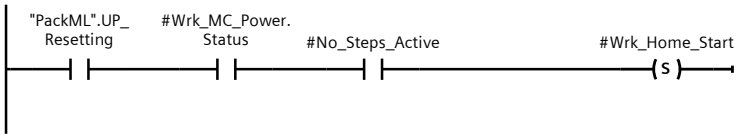


Network 10: RESETTING - MC_Power for axis



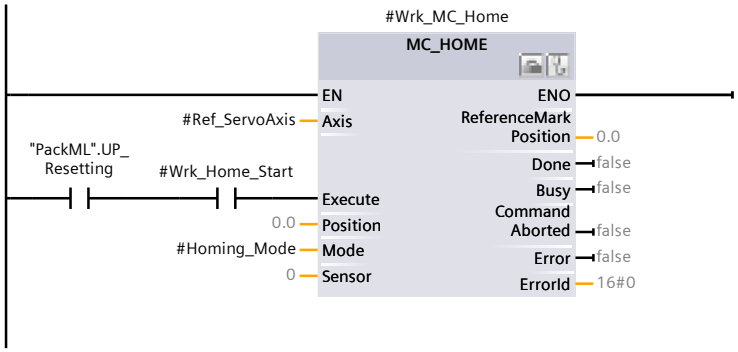
Network 11: RESETTING - ready for homing

RESETTING - Power status good and steps from motion steps are all off.



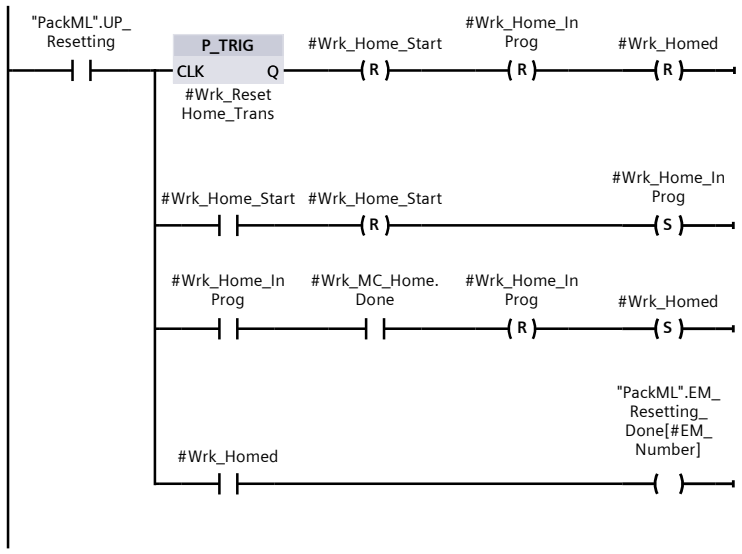
Network 12: Handle homing

Block input homing mode is the Mode input to the MC_Home block



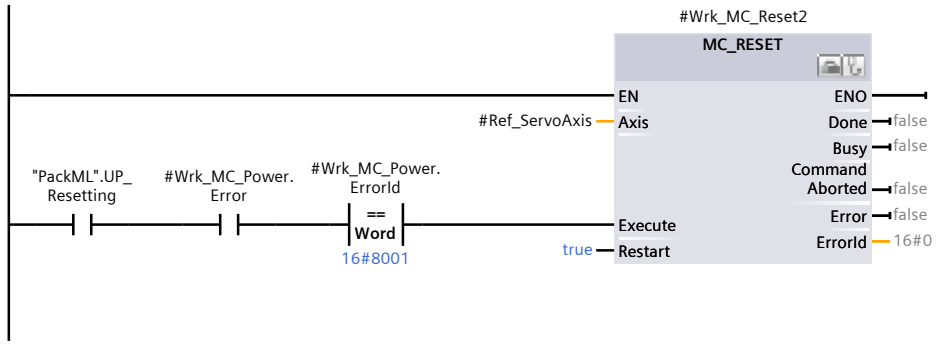
Network 13: RESETTING - state completion when homed

Initialize states. The delay after reset makes sure the initialization is complete before homing starts.

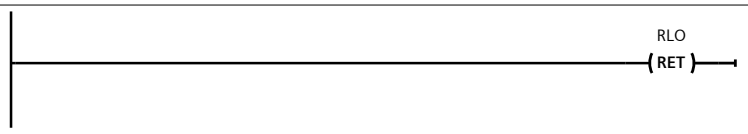


Network 14: Handle technology alarm from MC_Power

If the error is a technology alarm when resetting, clear the error in an attempt to let the MC_Power complete



Network 15: END: Update the ENO Output. (DO NOT REMOVE. Must be last rung)



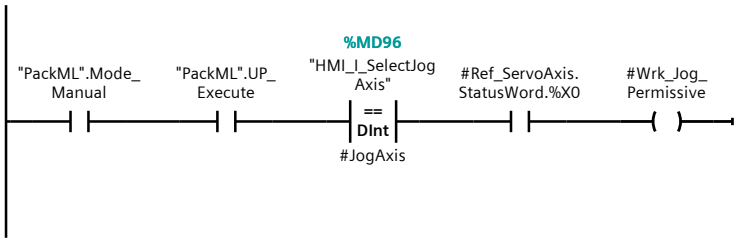
Program blocks / EM01_Axis01

EM01_CM03_ServoAxisJog [FB204]

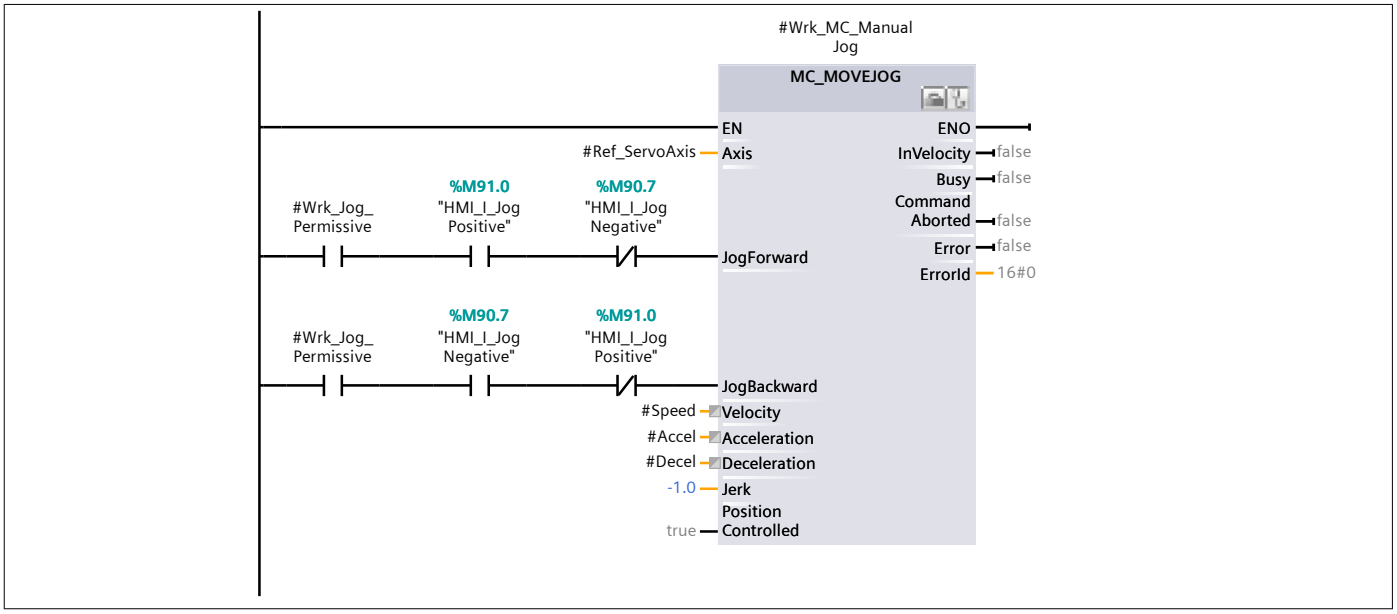
EM01_CM03_ServoAxisJog Properties					
General					
Name	EM01_CM03_ServoAxis-Jog	**Number**	204	**Type**	FB
Language	LAD	**Numbering**	Manual		
Information					
Title	Jog servo axis in manual mode	**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

Name	Data type	Default value	Retain
Input			
JogAxis	DInt	0	Non-retain
Speed	Real	0.0	Non-retain
Accel	Real	0.0	Non-retain
Decel	Real	0.0	Non-retain
Output			
JogFault	Bool	false	Non-retain
InOut			
Ref_ServoAxis	TO_PositioningAxis		
Static			
Wrk_Jog_Permissive	Bool	false	Non-retain
Wrk_MC_ManualJog	MC_MOVEJOG		
Wrk_MC_ManualJog_Err_Trans	Bool	false	Non-retain
Temp			
Constant			

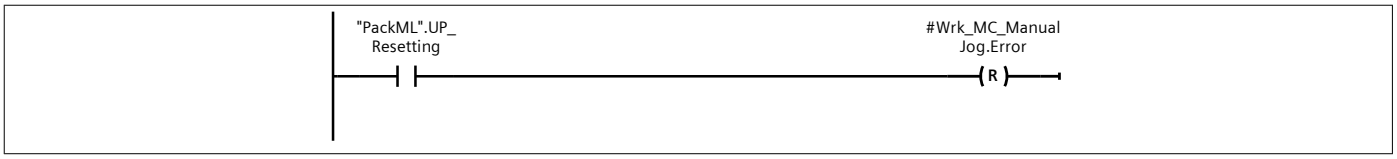
Network 1: RELEASE JOG FUNCTION (-> SELECT EM NUMBER VIA HMI)



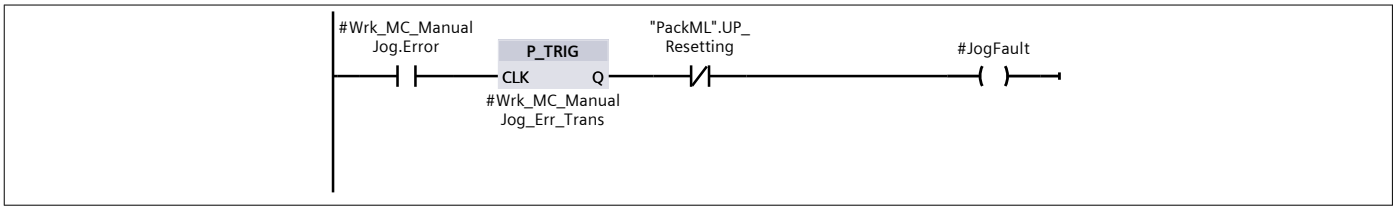
Network 2: JOG SERVO AXIS



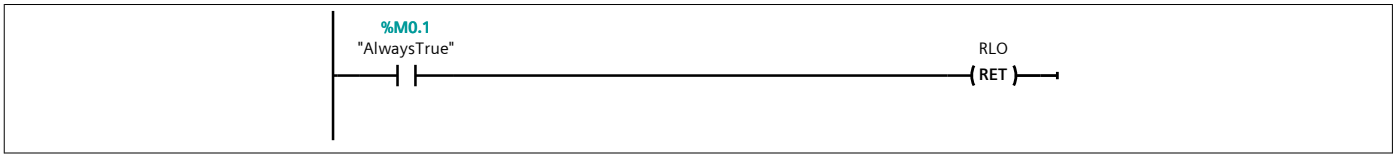
Network 3: Fault Reset



Network 4:



Network 5: END: Update the ENO Output. (DO NOT REMOVE. Must be last rung)



Program blocks / EM01_Axis01

EM01 [DB200]

EM01 Properties					
General					
Name	EM01	**Number**	200	**Type**	DB
Language	DB	**Numbering**	Manual		
Information					
Title		**Author**		**Comment**	
Family		**Version**	0.1	**User-defined ID**	

Name	Data type	Start value	Retain
Input			
Output			
InOut			
▼ Static			
EM_Number	DInt	0	False
Wrk_NoStepsActive	Bool	false	False
Wrk_MotionStepsError	Bool	false	False
Wrk_JogFault	Bool	false	False
CM00_Procedure	"EM01_CM00_Procedure"		False
CM02_ServoAxisObject	"EM01_CM02_ServoAxisObject"		False
CM03_ServoAxisJog	"EM01_CM03_ServoAxisJog"		False