Testing S7-1200 PLC and AKD2G Profinet with Siemens Telegram 9 Function Block

Download the Siemens TG9 FB (PD_TEL9_DrivePos) from the web. It will be in the format of a compressed library.

Open the compressed library in TIA Portal. It will be extracted and added to the global libraries.

Drag the FB from the library to the Program Blocks in the tree or directly to the ladder.
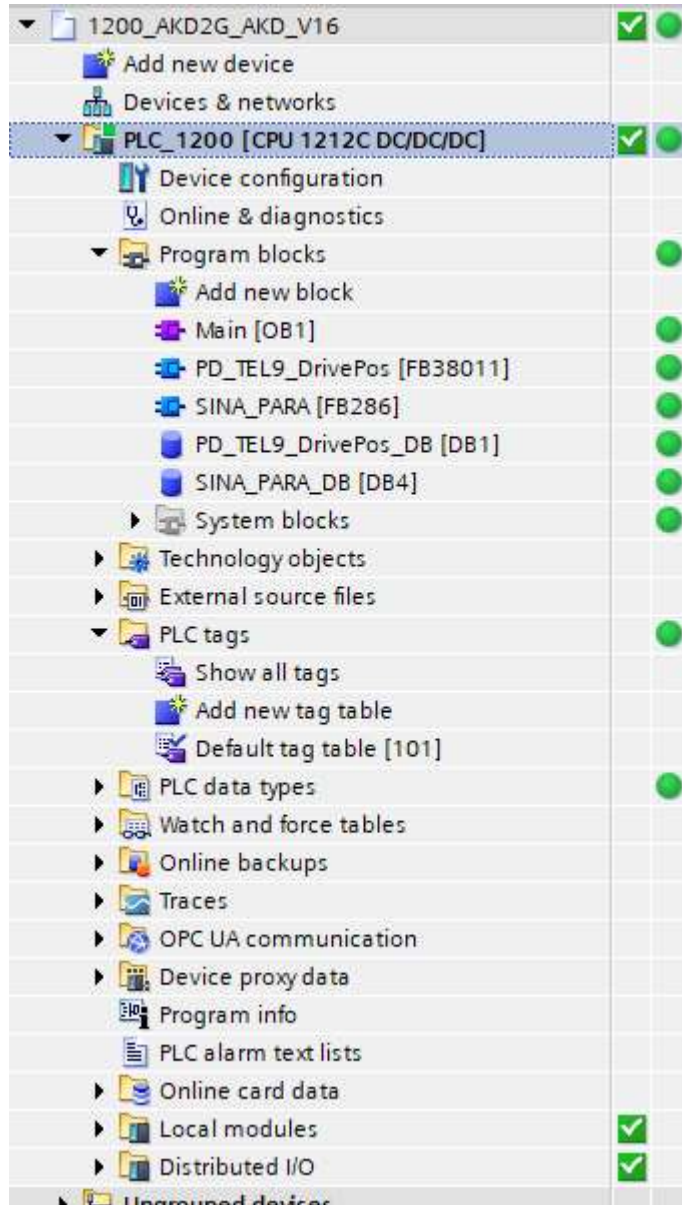
When putting the FB in the ladder, TIA will prompt to create a corresponding data block. Use the default suggested type and name.

The function block looks like the following after creating tags for the inputs and outputs. I created all tags as "Global Memory".

Configure FB for submodule (AKD2G telegram 9).

288
"AKD2G-
SPP~ProfiDrive_
Module_
1~ProfiDrive_
Standard_
Telegra,,," — hardwareId

288
"AKD2G-
SPP~ProfiDrive_Mod
ule_1~ProfiDrive_St
andard_Telegra,,," — hardwareId

"AKD2G-SPP~Head"	Hw_SubModule	
"AKD2G-SPP~PN-IO"	Hw_Interface	
"AKD2G-SPP~PN-IO~Port_1"	Hw_Interface	
"AKD2G-SPP~PN-IO~Port_2"	Hw_Interface	
"AKD2G-SPP~ProfiDrive_Module_1"	Hw_SubModule	
"AKD2G-SPP~ProfiDrive_Module_1~Parameter_Access_Point"	Hw_SubModule	
"AKD2G-SPP~ProfiDrive_Module_1~ProfiDrive_Standard_Telegra,,,"	Hw_SubModule	
"AKD2G-SPP~ProfiDrive_Module_1~Supplementary_Data__2_2"	Hw_SubModule	

1200_AKD2G_AKD_V16 ▶ Ungrouped devices ▶ AKD2G-SPP [AKD2G-SPP]

Topology view | Network

AKD2G-SPP [AKD2G-SPP]

Device overview

...	Module	Rack	Slot	I address	Q address
	▼ AKD2G-SPP	0	0		
	▶ PN-IO	0	0 X1		
	▼ ProfiDrive Module_1	0	1		
	Parameter Access Point	0	1 1		
	ProfiDrive Standard Telegram 9, 10/5	0	1 2	68...77	64...83
	Supplementary Data, 2/2	0	1 3	78...81	84...87
		0	2		

DP-NORM

100%

AKD2G-SPP [AKD2G-SPP]

Properties | Info

General | IO tags | System constants | Texts

Show hardware system constant

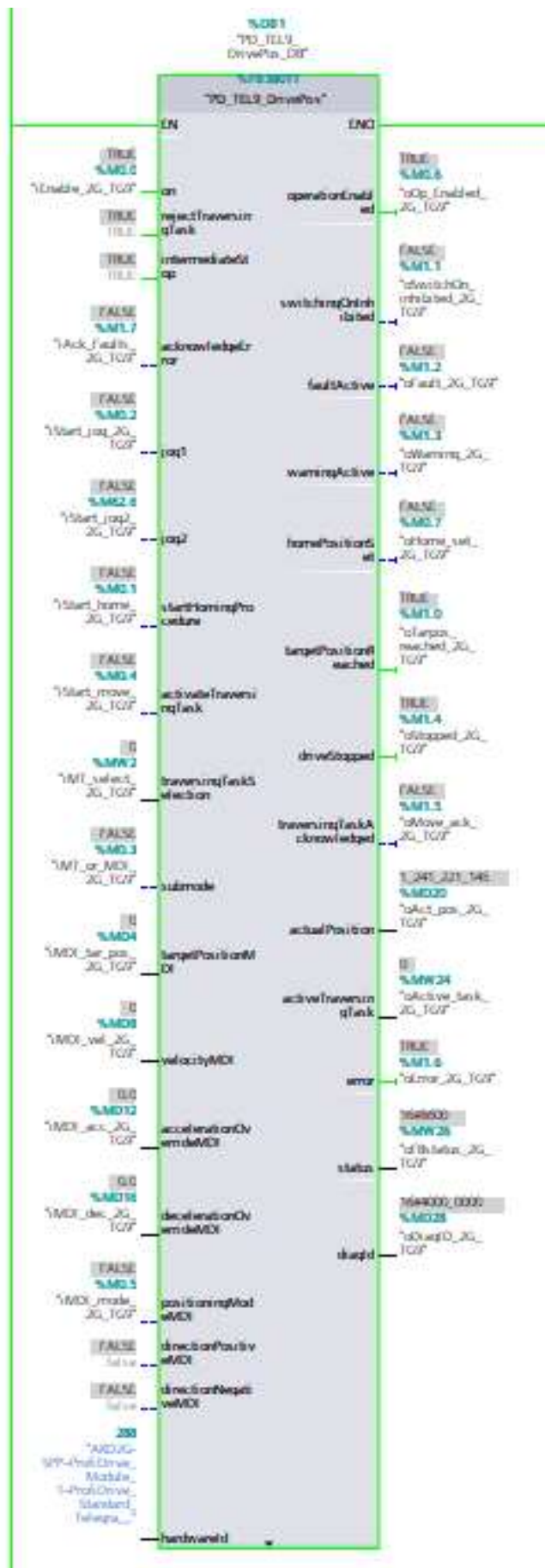|	Name	Type	Hardware identifier	Used by	Comment
	AKD2G-SPP~PN-IO~Port_1	Hw_Interface	274	PLC_1200	
	AKD2G-SPP~PN-IO~Port_2	Hw_Interface	275	PLC_1200	
	AKD2G-SPP~PN-IO	Hw_Interface	273	PLC_1200	
	AKD2G-SPP~Proxy	Hw_SubModule	272	PLC_1200	
	AKD2G-SPP~Head	Hw_SubModule	276	PLC_1200	
	AKD2G-SPP~ProfiDrive_Module_1	Hw_SubModule	277	PLC_1200	
	AKD2G-SPP~ProfiDrive_Module_1~Parameter_Access_Point	Hw_SubModule	278	PLC_1200	
	AKD2G-SPP~ProfiDrive_Module_1~ProfiDrive_Standard_Telegra,,,	Hw_SubModule	288	PLC_1200	
	AKD2G-SPP~ProfiDrive_Module_1~Supplementary_Data__2_2	Hw_SubModule	279	PLC_1200	

```
                              %DB1
                           "PD_TEL9_
                          DrivePos_DB"

                           %FB38011
                         "PD_TEL9_DrivePos"

                    EN                      ENO

      TRUE
      %M0.0
  "Enable_2G_TGF"      on          operationEnabl        TRUE
                                         ed            %M0.6
      TRUE          rejectTraversin                   "oOp_Enabled_
      TRUE              gTask                            2G_TGF"

      TRUE          intermediateSt
      TRUE              op           switchingOnInh       FALSE
                                         ibited          %M1.1
                                                       "oSwitchOn_
      FALSE         acknowledgeEr                       inhibited_2G_
      %M1.7             ror                                 TGF"
  "Ack_Fault_
    2G_TGF"                            faultActive          FALSE
                                                            %M1.2
      FALSE                                             "oFault_2G_TGF"
      %M0.2
  "Start_req_2G_        jog1                                FALSE
     TGF"                             warningActive         %M1.3
                                                        "oWarning_2G_
      FALSE                                                TGF"
      %M2.0
  "Start_req2_          jog2          homePositionS         FALSE
    2G_TGF"                                et             %M0.7
                                                       "oHome_set_
      FALSE                                              2G_TGF"
      %M0.1
  "Start_home_      startHomingPro
    2G_TGF"            cedure         targetPositionR        TRUE
                                          eached           %M1.0
                                                       "oTarpos_
      FALSE                                              reached_2G_
      %M0.4                                                 TGF"
  "Start_move_      activateTraversi
    2G_TGF"             ngTask        driveStopped          TRUE
                                                            %M1.4
      0                                                 "oStopped_2G_
      %MW2                                                  TGF"
  "MT_select_       traversingTaskS
    2G_TGF"            election       traversingTaskA       FALSE
                                        cknowledged         %M1.3
      FALSE                                              "oMove_ack_
      %M0.3                                               2G_TGF"
  "MT_or_MDI_
    2G_TGF"          submode          actualPosition      1_241_221_148
                                                            %MD20
      0                                                 "oAct_pos_2G_
      %MD4          targetPositionM                       TGF"
  "MDI_tar_pos_         DI            activeTraversin       0
    2G_TGF"                              gTask            %MW24
                                                       "oActive_task_
      0                                                  2G_TGF"
      %MD8
  "MDI_vel_2G_       velocityMDI      error               TRUE
     TGF"                                                   %M1.6
                                                       "oError_2G_TGF"
      0.0
      %MD12          accelerationOv
  "MDI_acc_2G_         errideMDI      status             16#8000
     TGF"                                                   %MW26
                                                       "oETBstatus_2G_
      0.0                                                 TGF"
      %MD16          decelerationOv
  "MDI_dec_2G_         errideMDI      diagId            16#4000_0000
     TGF"                                                   %MD28
                                                       "oDiagID_2G_
      FALSE                                               TGF"
      %M0.5
  "MDI_mode_        positioningMod
    2G_TGF"             eMDI

      FALSE         directionPositiv
      false              eMDI

      FALSE         directionNegati
      false              veMDI

      268
  "AXD2G-
  SPP-ProfiDrive_
    Module_
  1-ProfiDrive_
    Standard_
    Telegra_"

                    hardwareId
```

Define tag

Name	Section	Address	Data type	PLC tag table	Comment
iStart_jog2_2G_TG9	Global Memory ▾	%M62...	Bool ▾	Default tag table ▾	

Define   Cancel

Tag table:

PLC tags

		Name	Tag table	Data type	Address	Retain	Acces...	Writa...	Visibl...
1		iEnable_2G_TG9	Default tag table	Bool	%M0.0	☐	☑	☑	☑
2		iStart_home_2G_TG9	Default tag table	Bool	%M0.1	☐	☑	☑	☑
3		iStart_jog_2G_TG9	Default tag table	Bool	%M0.2	☐	☑	☑	☑
4		iMT_or_MDI_2G_TG9	Default tag table	Bool	%M0.3	☐	☑	☑	☑
5		iMT_select_2G_TG9	Default tag table	UInt	%MW2	☐	☑	☑	☑
6		iStart_move_2G_TG9	Default tag table	Bool	%M0.4	☐	☑	☑	☑
7		iMDI_tar_pos_2G_TG9	Default tag table	DInt	%MD4	☐	☑	☑	☑
8		iMDI_vel_2G_TG9	Default tag table	DInt	%MD8	☐	☑	☑	☑
9		iMDI_acc_2G_TG9	Default tag table	Real	%MD12	☐	☑	☑	☑
10		iMDI_dec_2G_TG9	Default tag table	Real	%MD16	☐	☑	☑	☑
11		iMDI_mode_2G_TG9	Default tag table	Bool	%M0.5	☐	☑	☑	☑
12		oOp_Enabled_2G_TG9	Default tag table	Bool	%M0.6	☐	☑	☑	☑
13		oHome_set_2G_TG9	Default tag table	Bool	%M0.7	☐	☑	☑	☑
14		oTarpos_reached_2G_TG9	Default tag table	Bool	%M1.0	☐	☑	☑	☑
15		oSwitchOn_inhibited_2G_TG9	Default tag table	Bool	%M1.1	☐	☑	☑	☑
16		oFault_2G_TG9	Default tag table	Bool	%M1.2	☐	☑	☑	☑
17		oWarning_2G_TG9	Default tag table	Bool	%M1.3	☐	☑	☑	☑
18		oStopped_2G_TG9	Default tag table	Bool	%M1.4	☐	☑	☑	☑
19		oMove_ack_2G_TG9	Default tag table	Bool	%M1.5	☐	☑	☑	☑
20		oAct_pos_2G_TG9	Default tag table	DInt	%MD20	☐	☑	☑	☑
21		oActive_task_2G_TG9	Default tag table	UInt	%MW24	☐	☑	☑	☑
22		oError_2G_TG9	Default tag table	Bool	%M1.6	☐	☑	☑	☑
23		oFBstatus_2G_TG9	Default tag table	Word	%MW26	☐	☑	☑	☑
24		oDiagID_2G_TG9	Default tag table	DWord	%MD28	☐	☑	☑	☑
25		iAck_Faults_2G_TG9	Default tag table	Bool	%M1.7	☐	☑	☑	☑
26		iStart_PNU_RW_1G	Default tag table	Bool	%M62.0	☐	☑	☑	☑
27		iRead_Write_1G	Default tag table	Bool	%M62.1	☐	☑	☑	☑
28		iNumberOfParams	Default tag table	Int	%MW64	☐	☑	☑	☑
29		PNU_FB_Switch	Default tag table	Bool	%M62.2	☐	☑	☑	☑
30		1G_TG9_Switch	Default tag table	Bool	%M62.3	☐	☑	☑	☑
31		1G_sample_TG9_switch	Default tag table	Bool	%M62.4	☐	☑	☑	☑
32		iMoveType_1G_TG9	Default tag table	Word	%MW66	☐	☑	☑	☑
33		iMDI_acc_1G_w	Default tag table	Word	%MW68	☐	☑	☑	☑
34		iMDI_dec_1G_w	Default tag table	Word	%MW70	☐	☑	☑	☑
35		oPNTG9_status	Default tag table	DWord	%MD72	☐	☑	☑	☑
36		oMoving_1G_TG9	Default tag table	Bool	%M62.5	☐	☑	☑	☑
37		iStart_jog2_2G_TG9	Default tag table	Bool	%M62.6	☐	☑	☑	☑

Testing FB functionality

FB Inputs:

on: enable drive

rejectTraversingTask: stop/cancel, 1=allow move, 0=stop/terminate move

intermediateStop: stop/pause, 1=allow/continue, 0=stop/pause

acknowledgeError: clear faults

jog1: starts jog in position mode using AXIS#.PROFINET.JOG1V (drive units), 1=start, 0=stop

jog2: starts jog in position mode using AXIS#.PROFINET.JOG2V (drive units), 1=start, 0=stop

If jog1 is running and then jog2 is activated, jog2 will not execute until jog1 is deactivated. Once jog1 is deactivated, the motor will ramp to the jog2 speed without stopping first. And the same for jog2 to jog1.

startHomingProcedure: start homing procedure

(Homing will not execute while a task in in progress.)

traversingTaskSelection: select motion task #, (MT0 is useable)

activateTraversingTask: start motion task, (setting back to zero doesn't stop the move)

submode: selects between 0=motion task and 1=MDI

targetPositionMDI: position of MDI, in Profinet units based on feed and gear ratio

velocityMDI: velocity of MDI, scaled in drive units

accellerationOverrideMDI: MDI accel in % of reference

decelerationOverrideMDI: MDI accel in % of reference

1.0 = 1.0% of 65536 rpm/s = 655 rpm/s

10,000 rpm/s = 15.2% of 65536

If zero, uses some default value.

positioningModeMDI: 0=relative, 1=absolute

directionPositiveMDI: Supposed to set the modulo direction. It either doesn't work, or modulo is not active in the PLC. There is no FB input to turn on modulo.

directionNegativeMDI: same as positive.

MDI move profile does not show up in Motion Task 0.

FB Outputs:

operationEnabled: True when the drive is enabled (operation enabled state)

(the state is 41-Positioning-Idle)

switchingOnInhibited: True when the drive is hardware disabled or faulted (state: 1-Switch On Inhibited)

faultActive: True when the drive (axis) is faulted

warningActive: True when the drive (axis) has a warning

homePositionSet: True when the axis has been homed

targetPositionReached: True when the move is complete (ZSW1 bit 10)

(I don't know if this is related to AXIS1.SETTLE.P. Changing the value doesn't affect when the bit goes high.)

driveStopped: True when axis is stopped (idle), False when moving

traversingTaskAcknowledged: True when drive executes a motion task or MDI move

actualPosition: position feedback in Profinet scaling

activeTraversingTask: Motion Task # being executed, or 32768 for MDI

error: True when a function block error exists

status: error status of the function block

diagid: contains error code from cyclic data transfer functions

(Continually getting FB error status 0x8600 (Error while writing the telegram data). But it writes everything just fine. It all seems to work even while the error is active.)