EtherCAT Device State Change FB Documentation

Version 1.0.0

Installation

Use Tc2_EtherCAT Library

Main Function Block Declarations

```
FUNCTION_BLOCK FB_SetSlaveState

VAR_INPUT
    sAMSNet     AT %I*    : AMSNETID;   // Linked to EtherCAT master
    nSlaveAddr  AT %I*    : UINT;       //  Linked to PortID of slave device
END_VAR

VAR_OUTPUT
    CurrState           : ST_EcSlaveState;
END_VAR
VAR
    fbSetECSlaveState   : Tc2_EtherCAT.FB_EcSetSlaveState;
    fbGetECSlaveState   : Tc2_EtherCAT.FB_EcGetSlaveState;
    nState              : UINT;
    sNetId              : T_AmsNetId; // Must have a value

END_VAR
```

Methods

SetState

Description

Sets Slave to the requested state of slaves state machine. Call the SetState Method with the state to goto.

Value	State
1	INIT
2	PREOP
3	BOOTSTRAP
4	SAFEOP
8	OP

Declarations

```
METHOD SetState : BOOL
VAR_INPUT
    reqState    : WORD; // Holds the state the device will be set to
    tTimeout    : TIME := T#10S; // Timeout time for ECSetSlaveState FB
END_VAR
```

Code

```
SetState := FALSE;
CASE nState OF
0:
   sNetID := F_CreateAmsNetId( sAMSNet ); // Convert linked EtherCAT Master AMS address and cor
   nState := 1;

1:
   // Set the slave to the state requested to goto
   fbSetECSlaveState(
        sNetId:= sNetId,
        nSlaveAddr:= nSlaveAddr, // Linked port
        bExecute:= TRUE ,
        tTimeout:= tTimeout ,
        reqState:= reqState); // State requested to goto
    nState := nState + 1; // Goto next state
2:

  fbSetECSlaveState( bExecute := FALSE); // Reset the execute flag of set slave state
  // Check the set slave state has completed without errors
  IF (NOT fbSetECSlaveState.bBusy) AND (NOT fbSetECSlaveState.bError) THEN
         // Get slave current state so we can check it changed to the requested state
         fbGetECSlaveState(
                sNetId:= sNetId ,
                nSlaveAddr:= nSlaveAddr,
                bExecute:= TRUE,
                tTimeout:= tTimeout);
                nState := 3; // Goto next state
  END_IF

3:
        fbGetECSlaveState(bExecute := FALSE, state=> CurrState ); // Reset the execute flag of
        // Check get slave state has completed without errors
        IF (NOT fbGetECSlaveState.bBusy) AND (NOT fbGetECSlaveState.bError) THEN
                nState := 4; // Move on
        END_IF
4:
        // Compare requested state with actual state
        CASE (reqState) OF
```

```
                1:
                    IF CurrState.deviceState = Tc2_EtherCAT.EC_DEVICE_STATE_INIT THEN
                        nState := 5; // Move to completed state
                    END_IF;
                2:
                    IF CurrState.deviceState = Tc2_EtherCAT.EC_DEVICE_STATE_PREOP THEN
                        nState := 5; // Move to completed state
                    END_IF;
        4:
                    IF CurrState.deviceState = Tc2_EtherCAT.EC_DEVICE_STATE_SAFEOP THEN
                        nState := 5; // Move to completed state
                    END_IF;
                8:
                    IF CurrState.deviceState = Tc2_EtherCAT.EC_DEVICE_STATE_OP THEN
                        nState := 5; // Move to completed state
                    END_IF;
        END_CASE
5:
   // All complete so reset flags
   SetState := TRUE;
   nState := 0;

100:
   ;                    // Error handling..
END_CASE
```

Usage Example

Declarations

```
    fbSetSlaveState : FB_SetSlaveState;
```

Code

```
//Set to Init
IF fbSetSlaveState.SetState(1,T#1S) THEN
    ;
END_IF
```

GetState

Description

Gets Slave current state.

Declarations

```
METHOD SetState : BOOL
VAR_INPUT
    tTimeout    : TIME := T#10S; // Timeout time for ECSetSlaveState FB
END_VAR
```

Code

```
GetState := FALSE;
CASE nState OF
0:
    sNetID := F_CreateAmsNetId( sAMSNet ); // Convert linked EtherCAT Master AMS address and co
    nState := 1;

1:

    // Get slave current state so we can check it changed to the requested state
    fbGetECSlaveState(
        sNetId:= sNetId ,
        nSlaveAddr:= nSlaveAddr,
        bExecute:= TRUE,
        tTimeout:= tTimeout);
    nState := 2; // Goto next state

2:
    fbGetECSlaveState(bExecute := FALSE, state=> _CurrentState ); // Reset the execute flag of
    // Check get slave state has completed without errors
    IF (NOT fbGetECSlaveState.bBusy) AND (NOT fbGetECSlaveState.bError) THEN
        nState := 3; // Move on
    END_IF
3:
    // All complete so reset flags
    GetState := TRUE;
    nState := 0;

100:
   ;                    // Error handling..
END_CASE
```

Usage Example

Declarations

```
    fbSetSlaveState : FB_SetSlaveState;
```

Code

```
IF fbGetSlaveState.GetState(T#2S) THEN
    ;
END_IF
```

ResetStateToOp

Description

Takes Slave to Init and back to Op.

Declarations

```
METHOD ResetStateToOp : BOOL
VAR_INPUT
    tTimeout    : TIME := T#10S; // Timeout time for ECSetSlaveState FB
END_VAR
```

Code

```
ResetStateToOp := FALSE;
CASE nState OF
0:
   sNetID := F_CreateAmsNetId( sAMSNet ); // Convert linked EtherCAT Master AMS address and cor
   nState := 1;

1:
   // Set the slave to the state requested to goto
   fbSetECSlaveState(
        sNetId:= sNetId,
        nSlaveAddr:= nSlaveAddr, // Linked port
        bExecute:= TRUE ,
        tTimeout:= tTimeout ,
        reqState:= 1); // State requested to init
    nState := nState + 1; // Goto next state
2:

  fbSetECSlaveState( bExecute := FALSE); // Reset the execute flag of set slave state
```

```
  // Check the set slave state has completed without errors
  IF (NOT fbSetECSlaveState.bBusy) AND (NOT fbSetECSlaveState.bError) THEN
         // Get slave current state so we can check it changed to the requested state
         fbGetECSlaveState(
                sNetId:= sNetId ,
                nSlaveAddr:= nSlaveAddr,
                bExecute:= TRUE,
                tTimeout:= tTimeout);
                nState := 3; // Goto next state
  END_IF

  IF fbSetECSlaveState.bError THEN
          nState := 100;
  END_IF

3:
        fbGetECSlaveState(bExecute := FALSE, state=> _CurrentState ); // Reset the execute flag
        // Check get slave state has completed without errors
        IF (NOT fbGetECSlaveState.bBusy) AND (NOT fbGetECSlaveState.bError) THEN
                nState := 4; // Move on
        END_IF

4:
        // Make sure in correct state
        IF _CurrentState.deviceState = Tc2_EtherCAT.EC_DEVICE_STATE_INIT THEN
            nState := 5; // Move to completed state
        END_IF;

5:
        // Set the slave to the state requested to goto
   fbSetECSlaveState(
        sNetId:= sNetId,
        nSlaveAddr:= nSlaveAddr, // Linked port
        bExecute:= TRUE ,
        tTimeout:= tTimeout ,
        reqState:= 8); // State requested to OP
    nState := nState + 1; // Goto next state

6:
        fbSetECSlaveState( bExecute := FALSE); // Reset the execute flag of set slave state
        // Check the set slave state has completed without errors
        IF (NOT fbSetECSlaveState.bBusy) AND (NOT fbSetECSlaveState.bError) THEN
                // Get slave current state so we can check it changed to the requested state
                fbGetECSlaveState(
                        sNetId:= sNetId ,
                        nSlaveAddr:= nSlaveAddr,
                        bExecute:= TRUE,
                        tTimeout:= tTimeout);
                        nState := 7; // Goto next state
        END_IF

        IF fbSetECSlaveState.bError THEN
                nState := 100;
```

```
        END_IF

7:
        fbGetECSlaveState(bExecute := FALSE, state=> _CurrentState ); // Reset the execute flag
        // Check get slave state has completed without errors
        IF (NOT fbGetECSlaveState.bBusy) AND (NOT fbGetECSlaveState.bError) THEN
                nState := 8; // Move on
        END_IF

8:
        // Compare requested state with actual state
        IF _CurrentState.deviceState = Tc2_EtherCAT.EC_DEVICE_STATE_OP THEN
            nState := 9; // Move to completed state
        END_IF;

9:
   // All complete so reset flags
   ResetStateToOp := TRUE;
   nState := 0;

100:
   ;                    // Error handling..
END_CASE
```

Usage Example

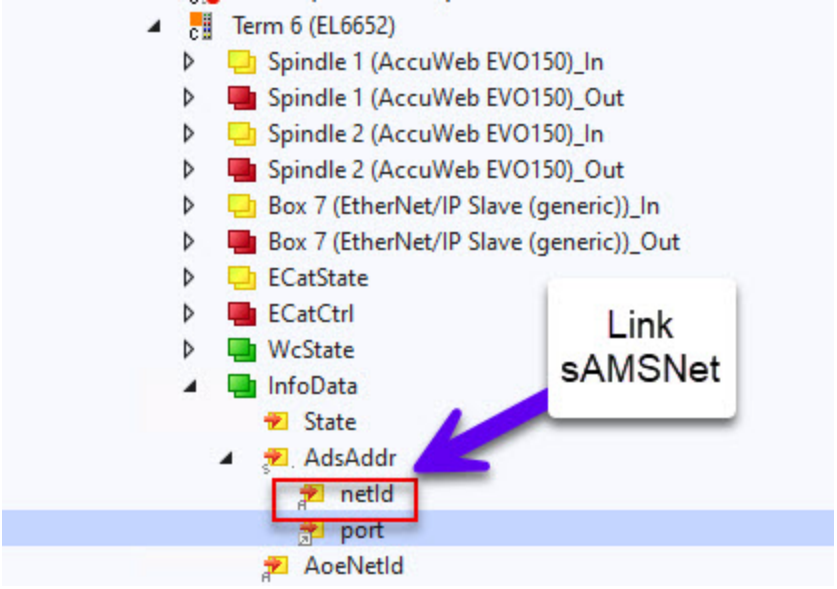
Declarations

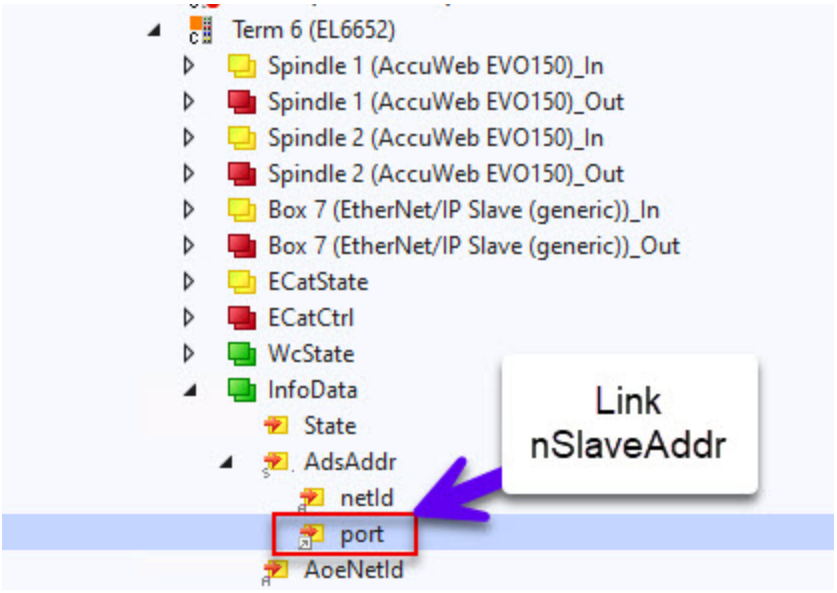
```
    fbSetSlaveState : FB_SetSlaveState;
    _bResetToOP     : bool;
```

Code

```
IF _bResetToOP THEN
        IF fbSetSlaveState.ResetStateToOp(T#3S) THEN
                _bResetToOP := FALSE;
        END_IF
END_IF;
```

Variable Linking


Term 6 (EL6652)
Spindle 1 (AccuWeb EVO150)_In
Spindle 1 (AccuWeb EVO150)_Out
Spindle 2 (AccuWeb EVO150)_In
Spindle 2 (AccuWeb EVO150)_Out
Box 7 (EtherNet/IP Slave (generic))_In
Box 7 (EtherNet/IP Slave (generic))_Out
ECatState
ECatCtrl
WcState
InfoData
State
AdsAddr
netId
port
AoeNetId
Link
sAMSNet


Term 6 (EL6652)
Spindle 1 (AccuWeb EVO150)_In
Spindle 1 (AccuWeb EVO150)_Out
Spindle 2 (AccuWeb EVO150)_In
Spindle 2 (AccuWeb EVO150)_Out
Box 7 (EtherNet/IP Slave (generic))_In
Box 7 (EtherNet/IP Slave (generic))_Out
ECatState
ECatCtrl
WcState
InfoData
State
AdsAddr
netId
port
AoeNetId
Link
nSlaveAddr

Properties

CurrentState

Description

Holds the current state after a GetState or SetState Method is run

Get only is implemented..