

Project Documentation

File: Platform_Application_app.ecp

Date: 5/20/2019

Profile: e!COCKPIT

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1 Device: Generic_MODBUS_Master

Information

Name: ThirdParty Modbus Master
Vendor: WAGO
Categories:
Type: 32808
ID: 1007 8211
Version: 1.0.0.1
Order number: GenericModbusMaster
Description: ThirdParty Modbus Master

2 Device: Generic_MODBUS_Master_1

Information

Name: ThirdParty Modbus Master
Vendor: WAGO
Categories:
Type: 32808
ID: 1007 8211
Version: 1.0.0.1
Order number: GenericModbusMaster
Description: ThirdParty Modbus Master

3 Device: PFC100_2ETH_ECO

Users and Groups

Users:

Groups:

Access Rights

View
Modify
Execute
Add/remove children

Symbol Rights

Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
Processor Load Lower Limit	DWORD	80	80		
Processor Load Upper Limit	DWORD	90	90		
Processor Load Processor Share	DWORD	90	90		
Processor Load Should Throw ProcessorLoadWatchdog_Exception	bool	FALSE	FALSE		

Information

Name: 750-8100 PFC100 CS 2ETH ECO
Vendor: WAGO
Categories: PLCs
Type: 4096
ID: 1006 1101
Version: 5.11.1.16
Order number: 0750-8100
Description: Programmable Ethernet controller

3.1 PLC Logic: Plc Logic

3.1.1 Application: Application

3.1.1.1 Folder: FunctionBlocks

3.1.1.1.1 POU: FB_CalcAngle

```
1      FUNCTION_BLOCK FB_CalcAngle
2      VAR_INPUT
3          LatA : LREAL ;
4          LatB : LREAL ;
5          LonA : LREAL ;
6          LonB : LREAL ;
7      END_VAR
8      VAR_OUTPUT
9
10         Angle : LREAL ;
11
```

3.1.1.1.1 POU: FB_CalcAngle

```
12     END_VAR
13     VAR
14         y : LREAL ;
15         x : LREAL ;
16
17         bearing : LREAL ;
18
19     END_VAR
20
1     y := ( WagoAppMath . sin_L ( phi := LonB - LonA ) ) * WagoAppMath . cos_L ( phi :=
        LatB ) ;
2     x := WagoAppMath . cos_L ( phi := LatA ) * WagoAppMath . sin_L ( phi := LatB ) -
        WagoAppMath . sin_L ( phi := LatA ) * WagoAppMath . cos_L ( phi := LatB ) *
        WagoAppMath . cos_L ( phi := LonB - LonA ) ;
3     bearing := WagoAppMath . arcTan2 ( y := y , x := x ) ;
4     //Angle2 := WagoAppMath.radiantToAngle(lrRadiant:= bearing);
5     Angle := WagoAppMath . angleToDegree_L ( phi := bearing ) ;
6
7
```

3.1.1.1.2 POU: FB_CalcDistance

```
1     FUNCTION_BLOCK FB_CalcDistance
2     VAR_INPUT
3         LatA : LREAL ;
4         LatB : LREAL ;
5         LonA : LREAL ;
6         LonB : LREAL ;
7     END_VAR
8     VAR_OUTPUT
9         Distance : LREAL ;
10    END_VAR
11    VAR
12        dLat : LREAL ;
13        dLon : LREAL ;
14        lat1 : LREAL ;
15        lat2 : LREAL ;
16        a : LREAL ;
17        c : LREAL ;
18        dist2 : LREAL ;
19
20        x : LREAL := 0 ;
21        Radius : LREAL := 6372.795477598 ;
22
23    END_VAR
24
1     x := ( ( WagoAppMath . sin_L ( phi := LatA ) * WagoAppMath . sin_L ( phi := LatB ) )
        + ( WagoAppMath . cos_L ( phi := LatA ) * WagoAppMath . cos_L ( phi := LatB ) *
```

3.1.1.1.2 POU: FB_CalcDistance

```
WagoAppMath . cos_L ( phi := ( LonA - LonB ) ) ) ;
2 distance := Radius * WagoAppMath . arcCos ( WagoAppMath . angleToRadiant_L ( phi
:= x ) ) ;
3
4 //dLat := WagoAppMath.angleToRadiant_L(phi:= LatB - LatA);
5 //dLon := WagoAppMath.angleToRadiant_L(phi:= LonB - LonA);
6 //lat1 := WagoAppMath.angleToRadiant_L(phi:= LatA);
7 //lat2 := WagoAppMath.angleToRadiant_L(phi:= LatB);
8 //a := (WagoAppMath.sin_L(phi:= dLat)/2)*(WagoAppMath.sin_L(phi:= dLat)/2) +
(WagoAppMath.sin_L(phi:= dLon)/2)*(WagoAppMath.sin_L(phi:= dLon)/2) *
(WagoAppMath.cos_L(phi:= lat1))*(WagoAppMath.cos_L(phi:= lat2));
9 //c := 2 * (WagoAppMath.sin_L(phi:= WagoAppMath.sqrt_L(x:= a)));
10 //dist2 := Radius * c;
11
```

3.1.1.1.3 POU: FB_CheckPitchRoll

```
1 FUNCTION_BLOCK FB_CheckPitchRoll
2 VAR_INPUT
3 Draft : REAL ;
4 offsetPitch : REAL ;
5 offsetRoll : REAL ;
6 offSetDraft : REAL ;
7 gyroRoll : REAL ;
8 gyroPitch : REAL ;
9 pitchSetPoint : REAL ;
10 rollSetpoint : REAL ;
11 draftSetpoint : REAL ;
12
13 END_VAR
14 VAR_OUTPUT
15 corrDraft : BOOL ;
16 corrPitch : BOOL ;
17 corrRoll : BOOL ;
18
19 END_VAR
20 VAR
21 lcCorrRoll : BOOL ;
22 lcCorrPitch : BOOL ;
23 lcCorrDraft : BOOL ;
24 END_VAR
25
```

```
1 lcCorrRoll := FALSE ;
2 lcCorrPitch := FALSE ;
3 lcCorrDraft := FALSE ;
4 IF ( ( (Draft > draftSetpoint + offSetDraft) OR (Draft < draftSetpoint -
offSetDraft) ) ) THEN
5 lcCorrDraft := TRUE ;
6 END_IF
```

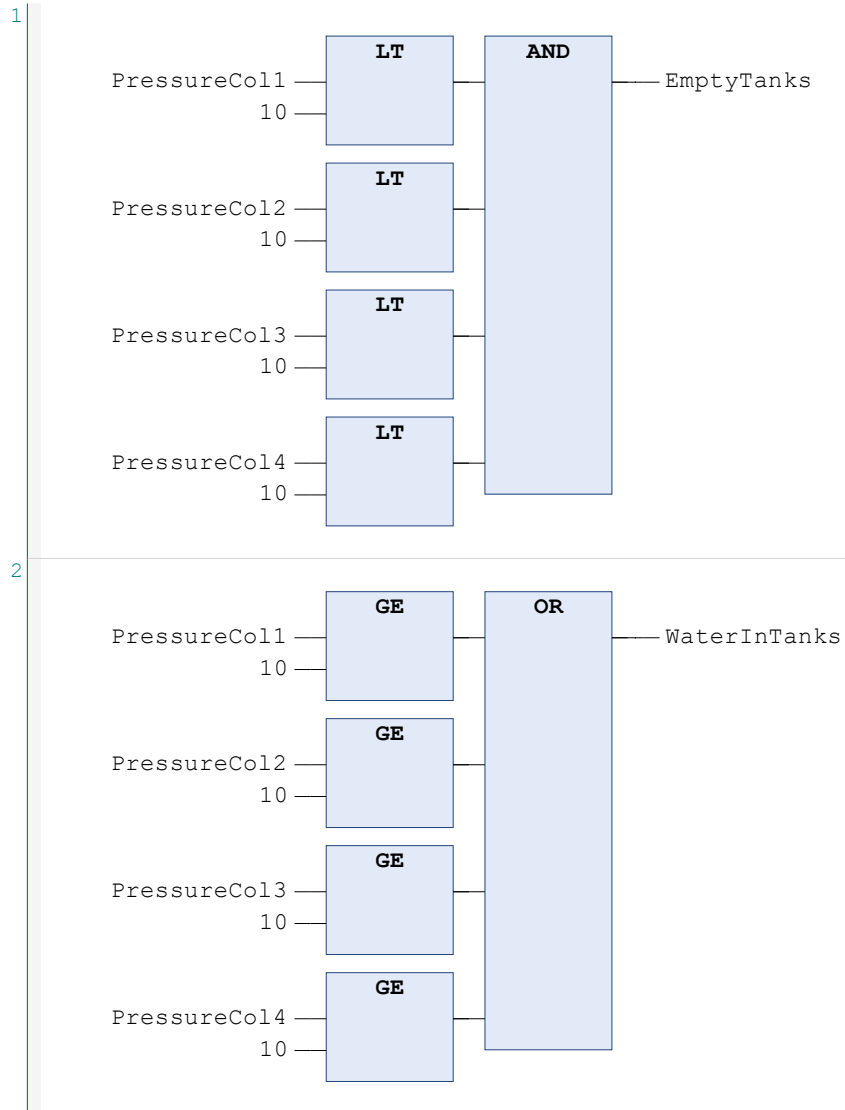
3.1.1.1.3 POU: FB_CheckPitchRoll

```
7
8  IF ( ((gyroRoll > simGVL.simSetPoint + offsetRoll) OR (gyroRoll <
9      rollSetpoint - offsetRoll)) AND NOT (lcCorrDraft OR lcCorrPitch)) THEN
10      lcCorrRoll := TRUE;
11  END_IF
12  IF ( ((gyroPitch > pitchSetPoint + offsetPitch) OR (gyroPitch <
13      pitchSetPoint - offsetPitch)) AND NOT (lcCorrDraft OR lcCorrRoll)) THEN
14      lcCorrPitch := TRUE;
15  END_IF
16  corrRoll := lcCorrRoll;
17  corrPitch := lcCorrPitch;
18  corrDraft := lcCorrDraft;
19  //IF (((simGVL.simDraftAvg > simGVL.simDraftSetPoint + 5) OR (simGVL.simDraftAvg
20      < simGVL.simDraftSetPoint - 5)) AND NOT (corrRoll OR corrPitch)) THEN
21      //      corrDraft := TRUE;
22  //END_IF
23  //IF (((simGVL.simRollAvg > simGVL.simSetPoint + 5) OR (simGVL.simRollAvg <
24      simGVL.simDraftSetPoint - 5)) AND NOT (corrDraft OR corrPitch)) THEN
25      //      corrRoll := TRUE;
26  //END_IF
27  //IF (((simGVL.simPitchAvg > simGVL.simSetPoint + 5) OR (simGVL.simPitchAvg <
28      simGVL.simDraftSetPoint - 5)) AND NOT (corrDraft OR corrRoll)) THEN
29      //      corrPitch := TRUE;
30  //END_IF
```

3.1.1.1.4 POU: FB_CheckWatertanks

```
1  FUNCTION_BLOCK FB_CheckWatertanks
2  VAR_INPUT
3      PressureCol1 : REAL;
4      PressureCol2 : REAL;
5      PressureCol3 : REAL;
6      PressureCol4 : REAL;
7  END_VAR
8
9  VAR_OUTPUT
10     WaterInTanks : BOOL;
11     EmptyTanks : BOOL;
12
13  END_VAR
14
15  VAR
16  END_VAR
17
```

3.1.1.1.4 POU: FB_CheckWatertanks



3.1.1.1.5 POU: FB_EmptyTanks

```
1  FUNCTION_BLOCK FB_EmptyTanks
2  VAR_INPUT
3      Enable : BOOL ;
4      PressureCol1 : REAL ;
5      PressureCol2 : REAL ;
6      PressureCol3 : REAL ;
7      PressureCol4 : REAL ;
8  END_VAR
9  VAR_OUTPUT
10 END_VAR
11 VAR
12 END_VAR
13
```

```
1  IF ( Enable ) THEN
2      IF ( PressureCol1 >= 10 ) THEN
3          IoConfig_Globals_Mapping . Col1Out := TRUE ;
4      ELSE
5          IoConfig_Globals_Mapping . Col1Out := FALSE ;
6      END_IF
7
8      IF ( PressureCol2 >= 10 ) THEN
9          IoConfig_Globals_Mapping . Col2Out := TRUE ;
10     ELSE
11         IoConfig_Globals_Mapping . Col2Out := FALSE ;
12     END_IF
13
14     IF ( PressureCol3 >= 10 ) THEN
15         IoConfig_Globals_Mapping . Col3Out := TRUE ;
16     ELSE
17         IoConfig_Globals_Mapping . Col3Out := FALSE ;
18     END_IF
19
20     IF ( PressureCol4 >= 10 ) THEN
21         IoConfig_Globals_Mapping . Col4Out := TRUE ;
22     ELSE
23         IoConfig_Globals_Mapping . Col4Out := FALSE ;
24     END_IF
25
26 END_IF
27
```

3.1.1.1.6 POU: FB_Encoder

```
1  FUNCTION_BLOCK FB_Encoder
2  VAR_INPUT
3      Inngang1 : BYTE ;
4      Inngang2 : BYTE ;
5      InngangZ : BOOL ;
6      underflow : BOOL ;
7      overflow : BOOL ;
8  END_VAR
9  VAR_OUTPUT
10     counter : UINT ;
11     RoundCounter : int ;
12 END_VAR
13 VAR
14     encoderValue : UINT ;
15     encoderValue0 : UINT ;
16     ///forskjell mellom encoder value og value 0
17     dx : INT ;
18     zeroIsFound : BOOL ;
19
20
21     ///positiv flanke over og underflow
22     overflowPF : BOOL ;
23     underflowPF : BOOL ;
24     ///roundcounter var
25     counterVariable : REAL ;
26     compareVar : REAL ;
27 END_VAR
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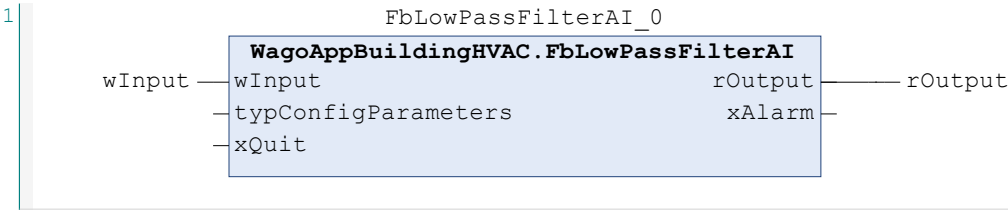
3.1.1.1.6 POU: FB_Encoder

```
19      dx := - ( encoderValue0 + ( 65535 - encoderValue ) + 1 ) ;
20
21      ELSIF overflow AND NOT overflowPF THEN
22          dx := + ( encoderValue + ( 65535 - encoderValue0 ) + 1 ) ; ;
23      ELSE
24          dx := encoderValue0 - encoderValue ;
25      END_IF
26
27
28      //if counter is going over the max lim or bellow 3 then count up and down
29      the rotation var
30      counterVariable := counter + dx + 4096 ;
31      compareVar := counterVariable / 4096 ;
32
33      IF ( compareVar >= 2 ) THEN
34          RoundCounter := RoundCounter + 1 ;
35      END_IF
36
37
38      IF ( ( counter > 0 ) AND ( compareVar <= 1 ) ) THEN
39          RoundCounter := RoundCounter - 1 ;
40
41
42      END_IF
43
44      //conter 1-4096
45      counter := ( counter + dx + 4096 ) MOD 4096 ;
46
47      END_IF
48
49      encoderValue0 := encoderValue ;
50      overflowPF := overflow ;
51      underflowPF := underflow ;
52
```

3.1.1.1.7 POU: FB_Filter

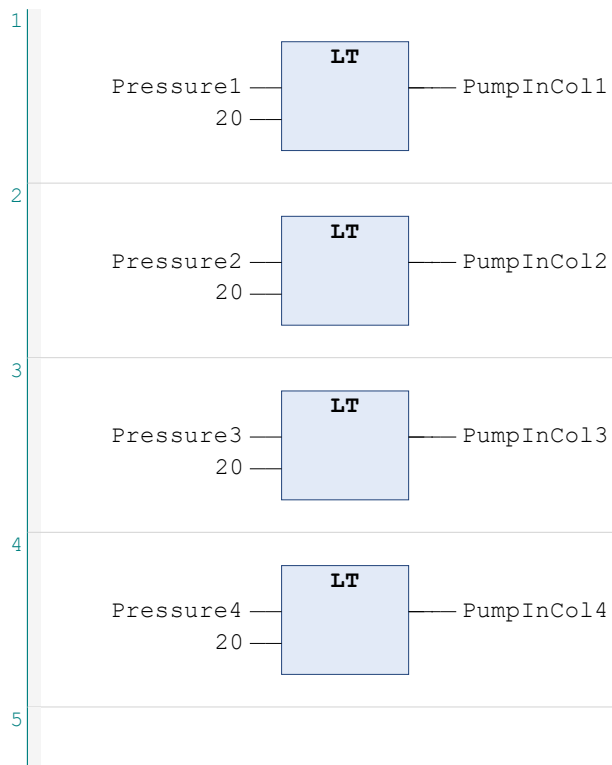
```
1      FUNCTION_BLOCK FB_Filter
2      VAR_INPUT
3          wInput : WORD ;
4      END_VAR
5      VAR_OUTPUT
6          rOutput : REAL ;
7      END_VAR
8      VAR
9          FbLowPassFilterAI_0 : WagoAppBuildingHVAC . FbLowPassFilterAI ;
10         FbLowPassFilter_0 : WagoAppBuildingHVAC . FbLowPassFilter ;
11
12      END_VAR
13
```

3.1.1.1.7 POU: FB_Filter



3.1.1.1.8 POU: FB_PumpInWater

```
1  FUNCTION_BLOCK FB_PumpInWater
2  VAR_INPUT
3      Pressure1 : REAL ;
4      Pressure2 : REAL ;
5      Pressure3 : REAL ;
6      Pressure4 : REAL ;
7  END_VAR
8  VAR_OUTPUT
9      PumpInCol1 : BOOL ;
10     PumpInCol2 : BOOL ;
11     PumpInCol3 : BOOL ;
12     PumpInCol4 : BOOL ;
13
14  END_VAR
15  VAR
16  END_VAR
17
```



3.1.1.1.9 POU: FB_Simulate_ThrusterDir

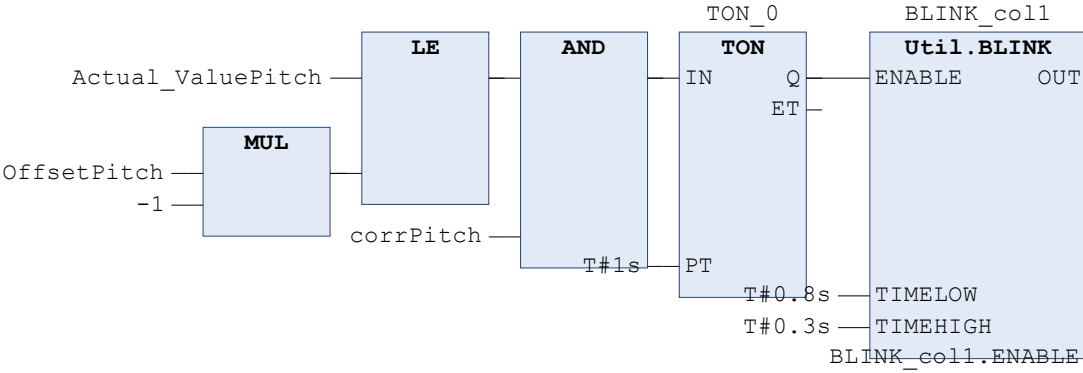
```
1  FUNCTION_BLOCK FB_Simulate_ThrusterDir
2  VAR_INPUT
3      Thruster_Value : REAL ;
4  END_VAR
5  VAR_OUTPUT
6  END_VAR
7  VAR
8  END_VAR
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3.1.1.1.10 POU: FB_Stabilization_Pitch

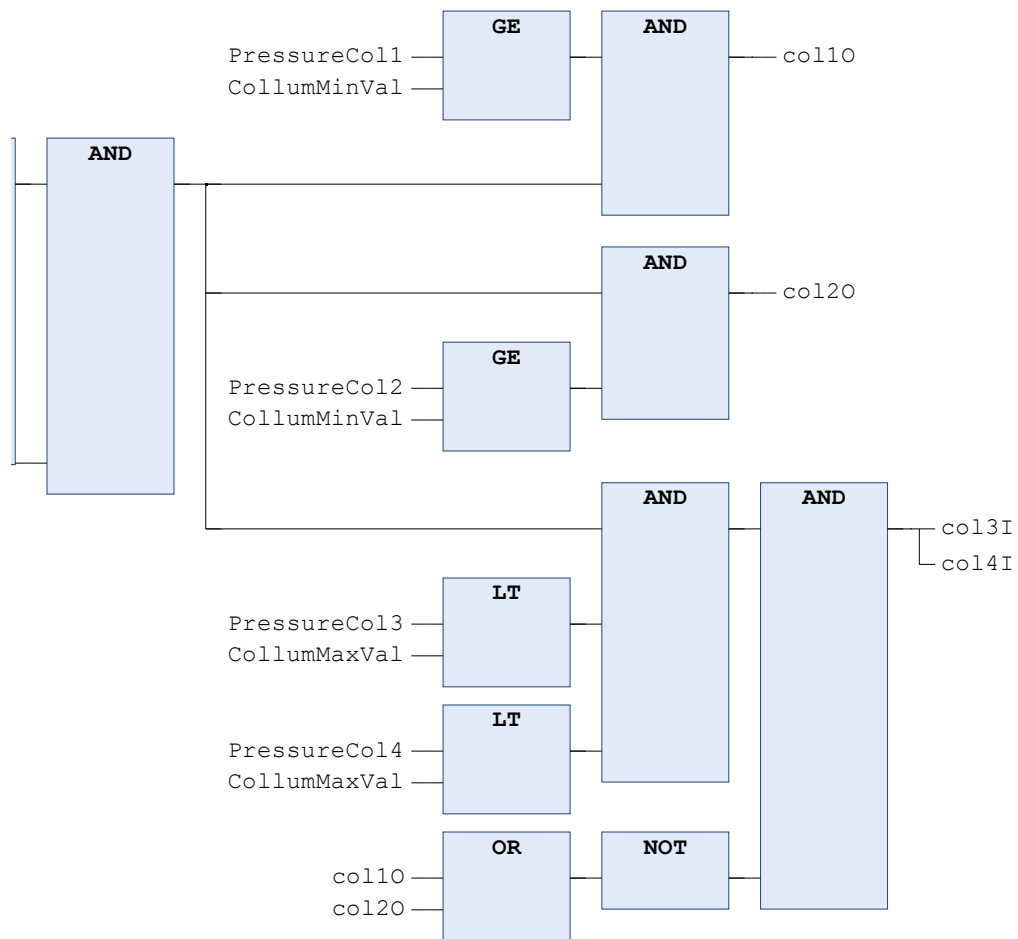
```
1  FUNCTION_BLOCK FB_Stabilization_Pitch
2  VAR_INPUT
3      corrPitch : BOOL ;
4      Actual_ValuePitch : REAL ;
5      CollumMaxVal : REAL ;
6      CollumMinVal : REAL ;
7      OffsetPitch : REAL ;
8      PressureCol1 : REAL ;
9      PressureCol2 : REAL ;
10     PressureCol3 : REAL ;
11     PressureCol4 : REAL ;
12
13  END_VAR
14
15
16  VAR_OUTPUT
17     col10 : BOOL ;
18     col1I : BOOL ;
19     col20 : BOOL ;
20     col2I : BOOL ;
21     col30 : BOOL ;
22     col3I : BOOL ;
23     col40 : BOOL ;
```

```
24     col4I : BOOL ;
25     END_VAR
26
27
28     VAR
29         OffsetMinus : REAL ;
30         OffsetPlus : REAL ;
31         TON_0 : TON ;
32         TON_1 : TON ;
33         JobDone_1 : BOOL ;
34         JobDone_2 : BOOL ;
35         BLINK_col1 : Util . BLINK ;
36         BLINK_col2 : Util . BLINK ;
37     END_VAR
38
```

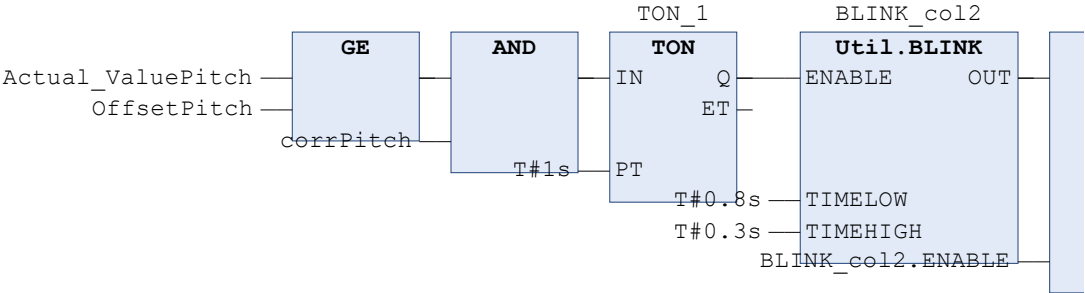
1



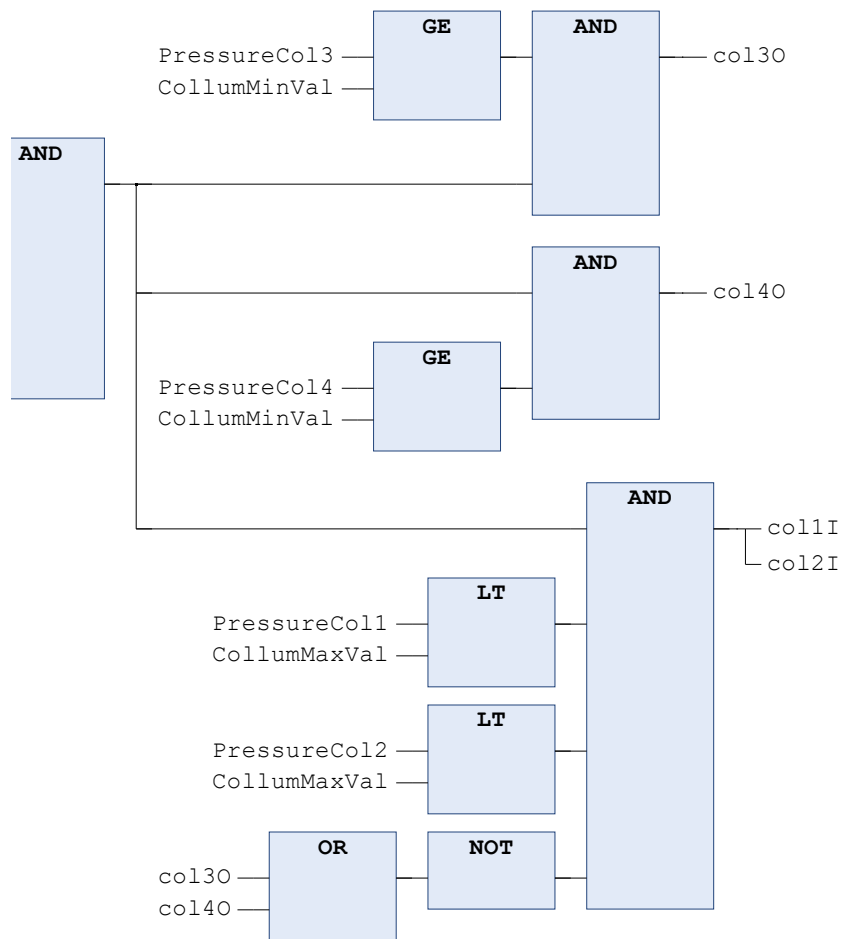
3.1.1.1.10 POU: FB_Stabilization_Pitch



2



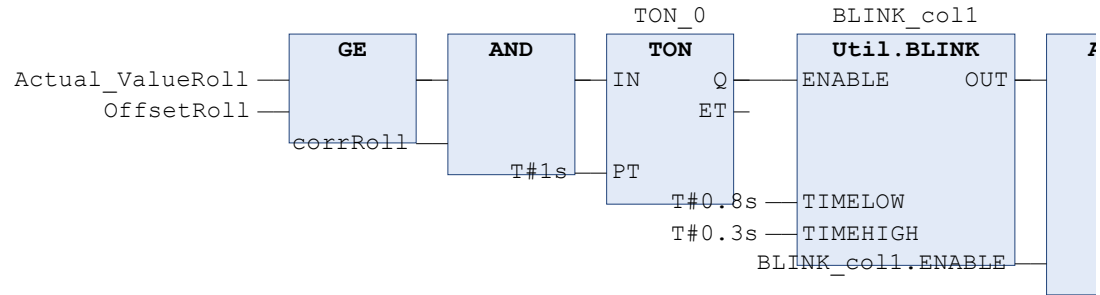
3.1.1.1.10 POU: FB_Stabilization_Pitch

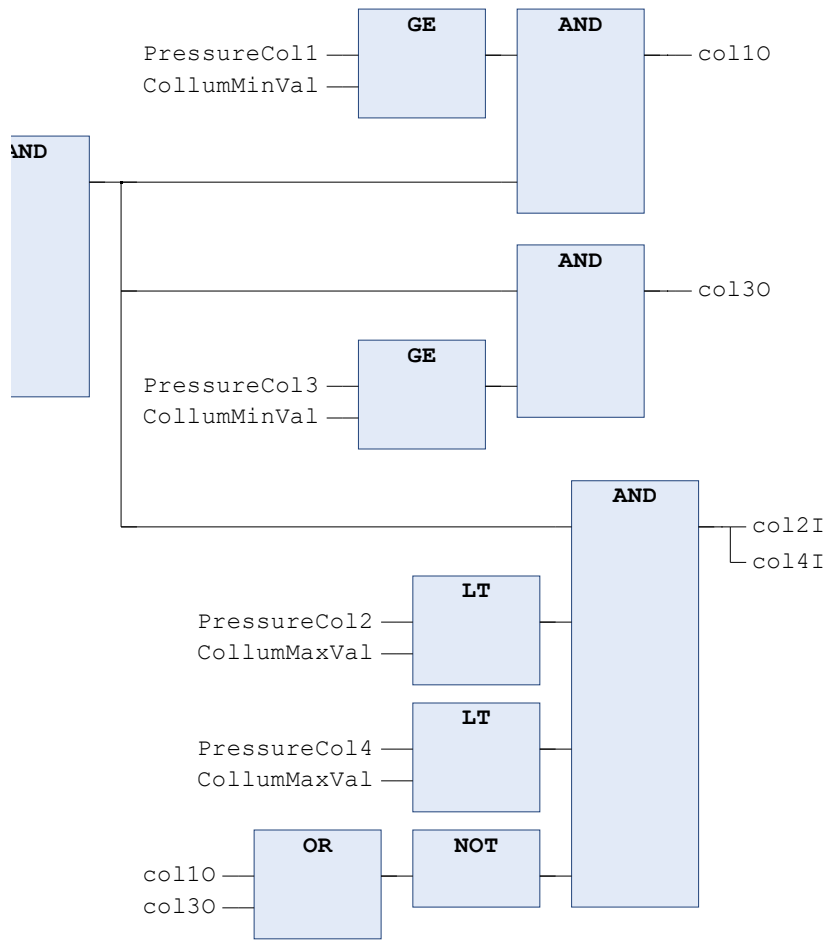


3.1.1.1.11 POU: FB_Stabilization_Roll_1

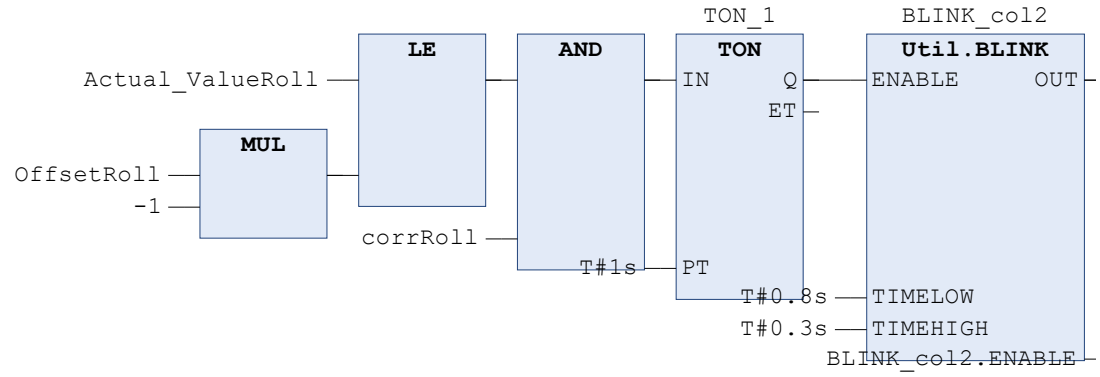
```
1  FUNCTION_BLOCK FB_Stabilization_Roll_1
2  VAR_INPUT
3      corrRoll : BOOL ;
4      Actual_ValueRoll : REAL ;
5      CollumMaxVal : REAL ;
6      CollumMinVal : REAL ;
7      OffsetRoll : REAL ;
8      PressureCol1 : REAL ;
9      PressureCol2 : REAL ;
10     PressureCol3 : REAL ;
11     PressureCol4 : REAL ;
12 END_VAR
13
14
15 VAR_OUTPUT
16 col10 : BOOL ;
17 col1I : BOOL ;
18 col20 : BOOL ;
19 col2I : BOOL ;
20 col30 : BOOL ;
21 col3I : BOOL ;
22 col40 : BOOL ;
23 col4I : BOOL ;
24 END_VAR
25
26
27 VAR
28     OffsetMinus : REAL ;
29     OffsetPlus : REAL ;
30     TON_0 : TON ;
31     TON_1 : TON ;
32     JobDone_1 : BOOL ;
33     blink1En : BOOL ;
34     blink3En : BOOL ;
35     blink2En : BOOL ;
36     blink4En : BOOL ;
37     BLINK_col1 : Util . BLINK ;
38     BLINK_col2 : Util . BLINK ;
39
40 END_VAR
41
```

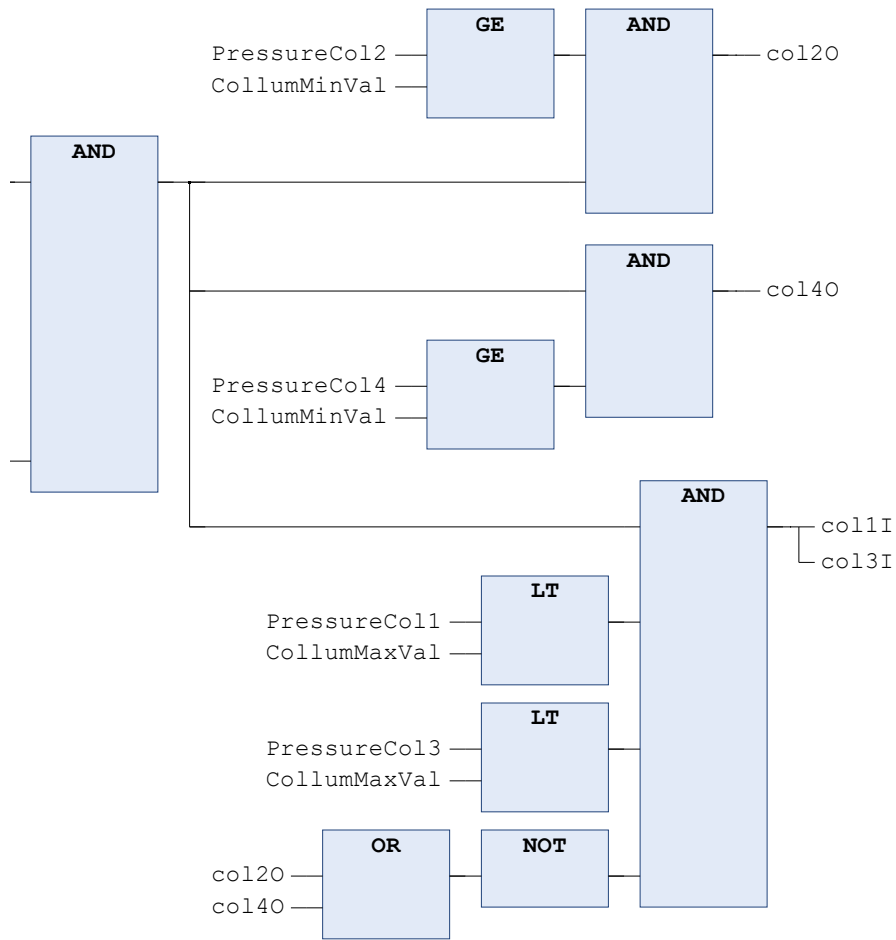
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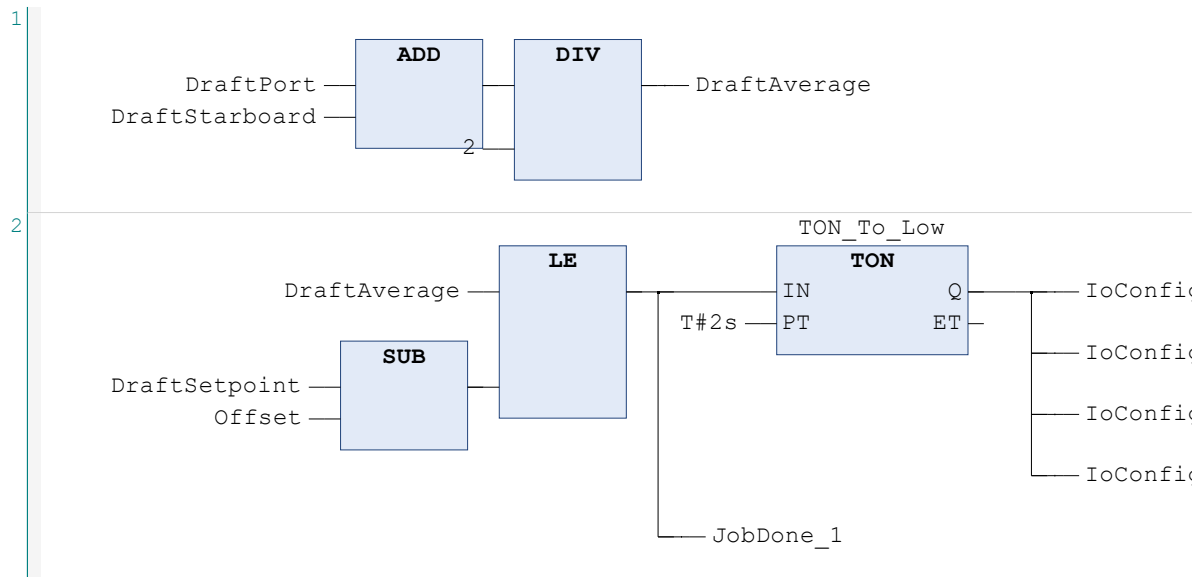


3.1.1.1.12 POU: FB_Stabilization_Draft

```

1  FUNCTION_BLOCK FB_Stabilization_Draft
2  VAR_INPUT
3      DraftPort : REAL ;
4      DraftStarboard : REAL ;
5      DraftSetpoint : REAL ;
6      Offset : REAL ;
7  END_VAR
8
9
10 VAR_OUTPUT
11
12     JobDone : BOOL ;
13
14 END_VAR
15
16 VAR
17
18     DraftAverage : REAL ;
19     TON_To_Low : TON ;
20     TON_To_High : TON ;
21     ColumnEmpty : BOOL ;
22     JobDone_1 : BOOL ;
23     JobDone_2 : BOOL ;
24 END_VAR
25

```



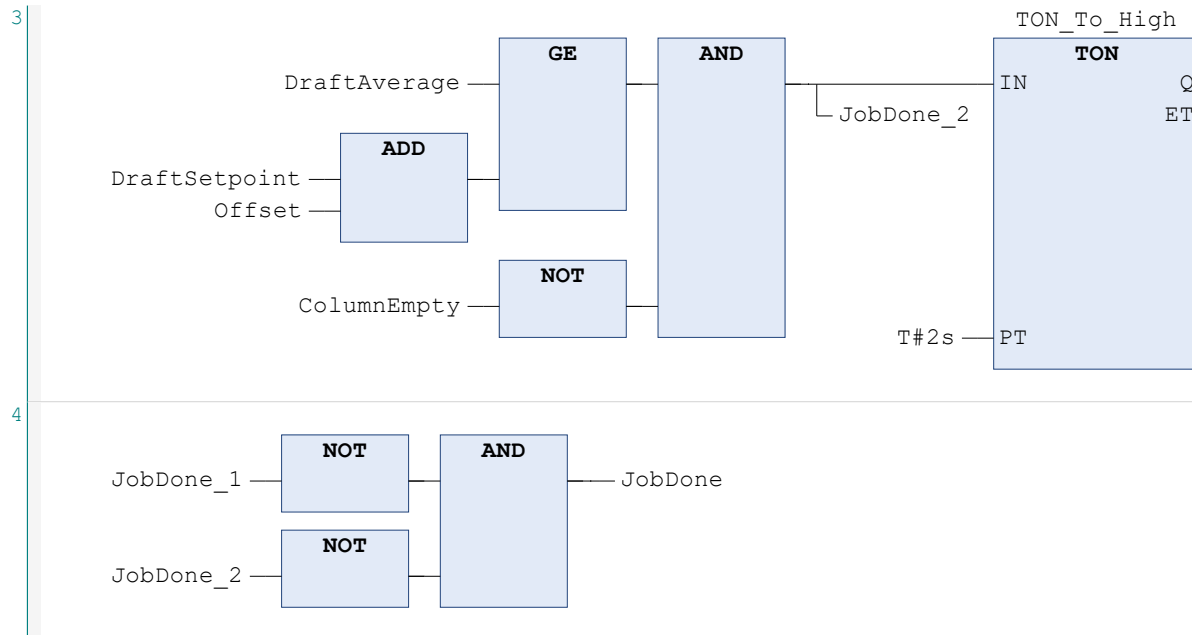
g_Globals_Mapping.Col1Out

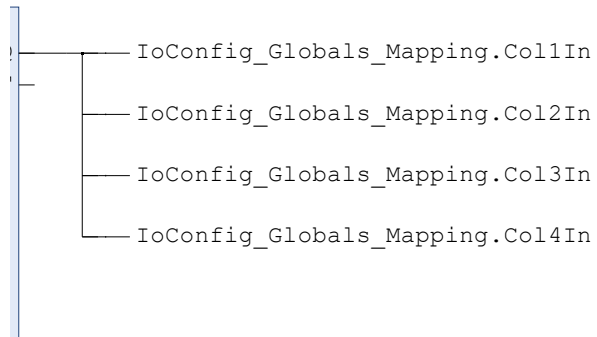
g_Globals_Mapping.Col2Out

g_Globals_Mapping.Col3Out

g_Globals_Mapping.Col4Out

3.1.1.1.12 POU: FB_Stablilization_Draft

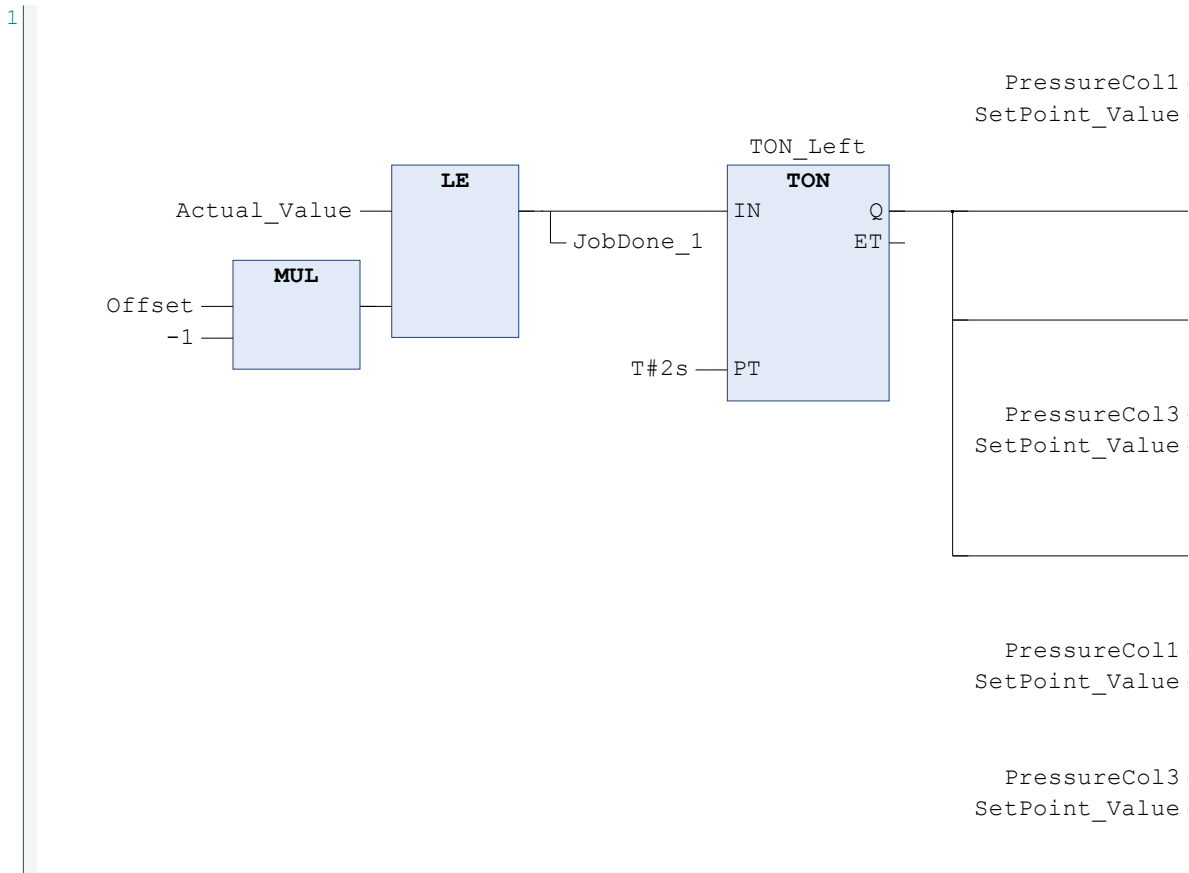




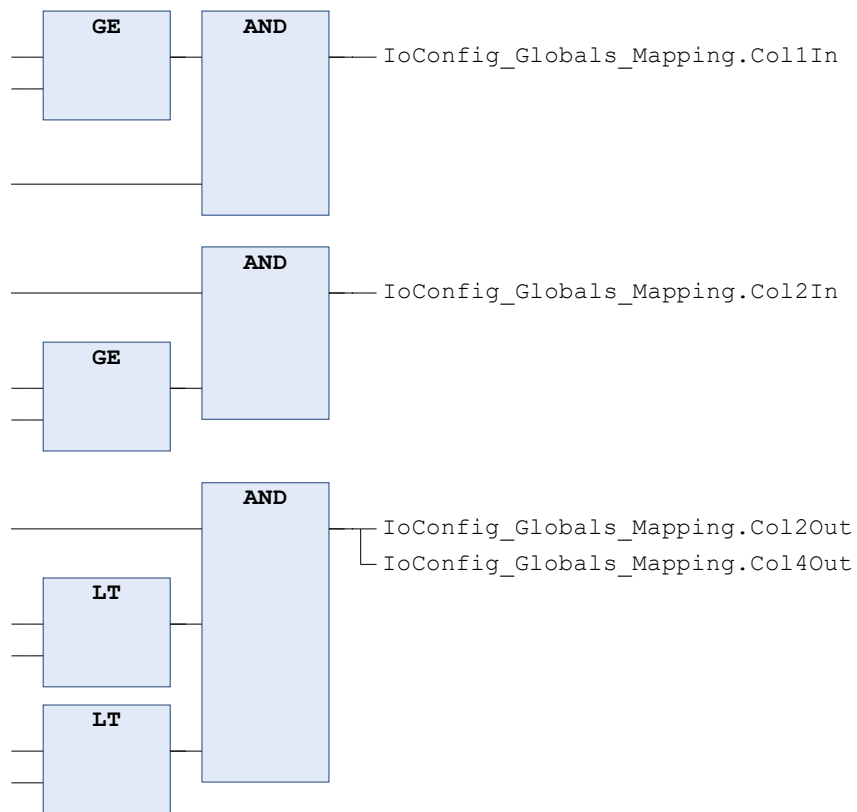
3.1.1.1.13 POU: FB_Stablilization_Roll

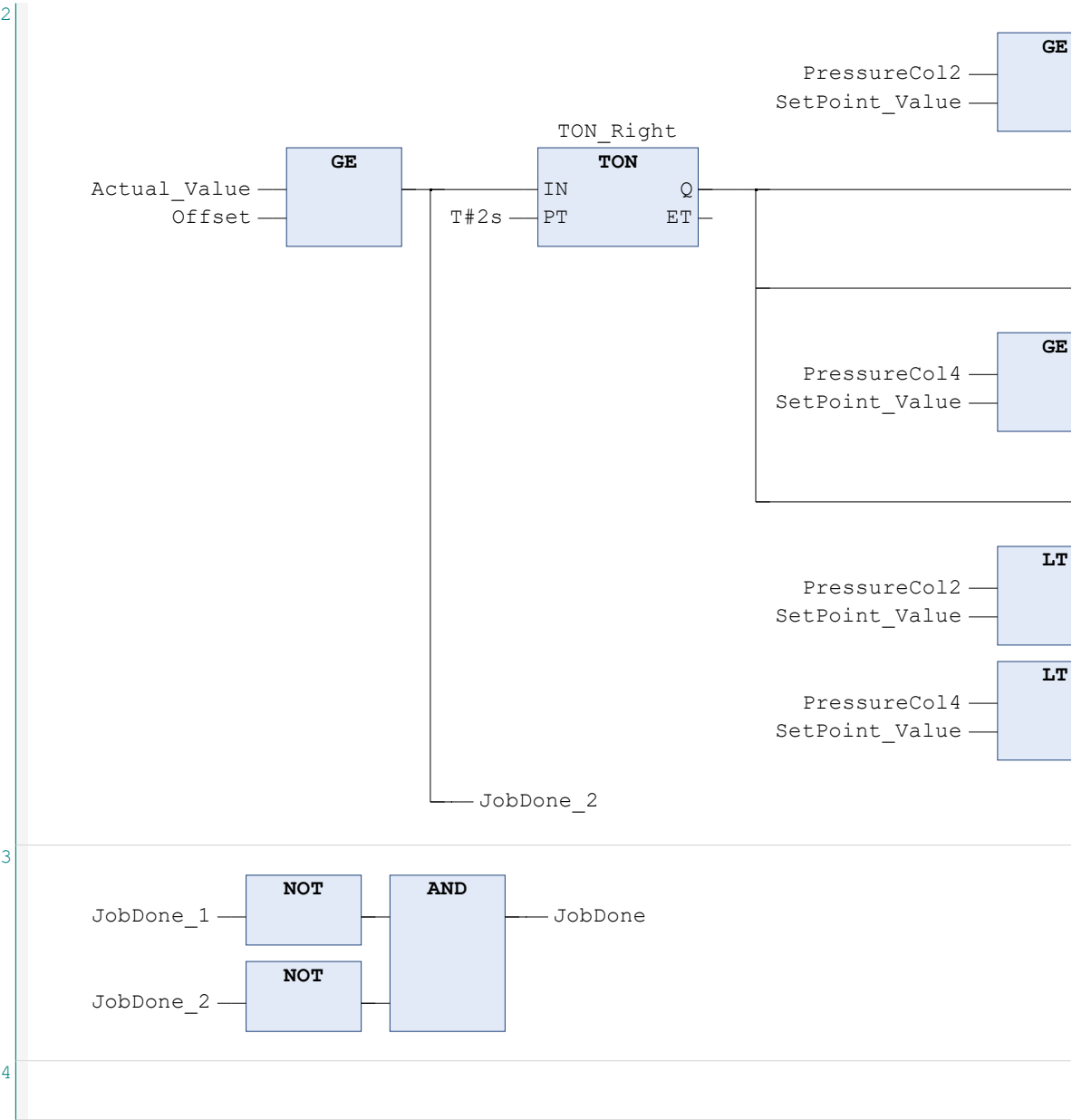
```
1      FUNCTION_BLOCK FB_Stablilization_Roll
2      VAR_INPUT
3          Actual_Value : REAL ;
4          SetPoint_Value : REAL ;
5          Offset : REAL ;
6          PressureCol1 : REAL ;
7          PressureCol2 : REAL ;
8          PressureCol3 : REAL ;
9          PressureCol4 : REAL ;
10     END_VAR
11     VAR_OUTPUT
12         JobDone : BOOL ;
13     END_VAR
14     VAR
15         OffsetMinus : REAL ;
16         OffsetPlus : REAL ;
17         JobDone_1 : BOOL ;
18         JobDone_2 : BOOL ;
19         TON_Left : TON ;
20         TON_Right : TON ;
21     END_VAR
22
```

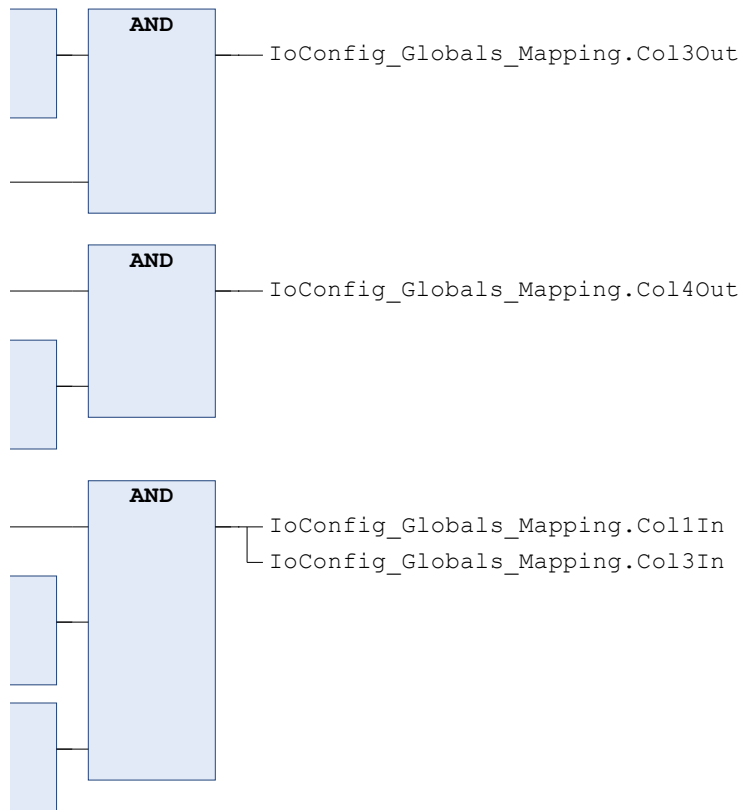
3.1.1.1.13 POU: FB_Stabilization_Roll



3.1.1.1.13 POU: FB_Stabilization_Roll







3.1.1.1.14 POU: FB_ThrusterScaling

```
1  FUNCTION_BLOCK FB_ThrusterScaling
2  VAR_INPUT
3      Enable : BOOL ;
4      Forward : BOOL ;
5      Backward : BOOL ;
6      LeftPivot : BOOL ;
7      RightPivot : BOOL ;
8      Left : BOOL ;
9      Right : BOOL ;
10     ThrusterValue : REAL ;
11
12  END_VAR
13  VAR_OUTPUT
14     Forward_Out : REAL ;
15     Backward_Out : REAL ;
16     LeftPivot_Out : REAL ;
17     RightPivot_Out : REAL ;
18     Left_Out : REAL ;
19     Right_Out : REAL ;
20
21
22  END_VAR
23  VAR
24     Forward_Lin_1 : Util . LIN_TRAFO ;
25     Forward_Lin_2 : Util . LIN_TRAFO ;
26     Backward_Lin_1 : Util . LIN_TRAFO ;
27     Backward_Lin_2 : Util . LIN_TRAFO ;
28
29     LeftPivot_Lin_1 : Util . LIN_TRAFO ;
30     LeftPivot_Lin_2 : Util . LIN_TRAFO ;
31     RightPivot_Lin_1 : Util . LIN_TRAFO ;
32     RightPivot_Lin_2 : Util . LIN_TRAFO ;
33
34     Left_Lin_1 : Util . LIN_TRAFO ;
35     Left_Lin_2 : Util . LIN_TRAFO ;
36     Right_Lin_1 : Util . LIN_TRAFO ;
37     Right_Lin_2 : Util . LIN_TRAFO ;
38
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40  END_VAR
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```

```
6         IN_MIN := 0 ,
7         IN_MAX := 100 ,
8         OUT_MIN := 5500 ,
9         OUT_MAX := 0 ,
10        OUT => Forward_Out ,
11        ERROR => ) ;
12
13        Backward_Lin_2 (
14        IN := ThrusterValue ,
15        IN_MIN := 0 ,
16        IN_MAX := 100 ,
17        OUT_MIN := 5500 ,
18        OUT_MAX := 0 ,
19        OUT => Backward_Out ,
20        ERROR => ) ;
21    END_IF
22
23
24    IF ( Backward ) THEN
25        Backward_Lin_1 (
26        IN := ThrusterValue ,
27        IN_MIN := 0 ,
28        IN_MAX := 100 ,
29        OUT_MIN := 5500 ,
30        OUT_MAX := 10000 ,
31        OUT => Backward_Out ,
32        ERROR => ) ;
33
34        Forward_Lin_2 (
35        IN := ThrusterValue ,
36        IN_MIN := 0 ,
37        IN_MAX := 100 ,
38        OUT_MIN := 5500 ,
39        OUT_MAX := 10000 ,
40        OUT => Forward_Out ,
41        ERROR => ) ;
42    END_IF
43
44
45    IF ( LeftPivot ) THEN
46        LeftPivot_Lin_1 (
47        IN := ThrusterValue ,
48        IN_MIN := 0 ,
49        IN_MAX := 100 ,
50        OUT_MIN := 5500 ,
51        OUT_MAX := 0 ,
52        OUT => LeftPivot_Out ,
53        ERROR => ) ;
54
55        RightPivot_Lin_2 (
56        IN := ThrusterValue ,
```

```
57         IN_MIN := 0 ,
58         IN_MAX := 100 ,
59         OUT_MIN := 5500 ,
60         OUT_MAX := 0 ,
61         OUT => RightPivot_Out ,
62         ERROR => ) ;
63     END_IF
64
65
66     IF ( RightPivot ) THEN
67         RightPivot_Lin_1 (
68             IN := ThrusterValue ,
69             IN_MIN := 0 ,
70             IN_MAX := 100 ,
71             OUT_MIN := 5500 ,
72             OUT_MAX := 10000 ,
73             OUT => RightPivot_Out ,
74             ERROR => ) ;
75
76         LeftPivot_Lin_2 (
77             IN := ThrusterValue ,
78             IN_MIN := 0 ,
79             IN_MAX := 100 ,
80             OUT_MIN := 5500 ,
81             OUT_MAX := 10000 ,
82             OUT => LeftPivot_Out ,
83             ERROR => ) ;
84     END_IF
85
86     IF ( Left ) THEN
87         Left_Lin_1 (
88             IN := ThrusterValue ,
89             IN_MIN := 0 ,
90             IN_MAX := 100 ,
91             OUT_MIN := 5500 ,
92             OUT_MAX := 0 ,
93             OUT => Left_Out ,
94             ERROR => ) ;
95
96         Right_Lin_2 (
97             IN := ThrusterValue ,
98             IN_MIN := 0 ,
99             IN_MAX := 100 ,
100            OUT_MIN := 5500 ,
101            OUT_MAX := 10000 ,
102            OUT => Right_Out ,
103            ERROR => ) ;
104     END_IF
105
106
107     IF ( Right ) THEN
```

```
108         Right_Lin_1 (
109             IN := ThrusterValue ,
110             IN_MIN := 0 ,
111             IN_MAX := 100 ,
112             OUT_MIN := 5500 ,
113             OUT_MAX := 0 ,
114             OUT => Right_Out ,
115             ERROR => ) ;
116
117         Left_Lin_2 (
118             IN := ThrusterValue ,
119             IN_MIN := 0 ,
120             IN_MAX := 100 ,
121             OUT_MIN := 5500 ,
122             OUT_MAX := 10000 ,
123             OUT => Left_Out ,
124             ERROR => ) ;
125     END_IF
126
127 END_IF
128
```

3.1.1.1.15 POU: FB_Thruster_Values

```
1  FUNCTION_BLOCK FB_Thruster_Values
2  VAR_INPUT
3      Enable : BOOL ;
4      ThrusterValue : REAL ;
5  END_VAR
6  VAR_OUTPUT
7      OutputThrust : REAL ;
8  END_VAR
9  VAR
10 END_VAR
11
```

```
1  IF ( Enable ) THEN
2      OutputThrust := ThrusterValue ;
3  ELSE
4      OutputThrust := 5500 ;
5  END_IF
6
```

3.1.1.1.16 POU: F_RotationError

```
1  FUNCTION F_RotationError : INT
2  VAR_INPUT
3      Setpoint_Angle : INT ;
4      Current_Angle : INT ;
5  END_VAR
6  VAR
7      max_Value : INT := 360 ;
8      rev : INT ;
9      fw : INT ;
10     angle : INT ;
11 END_VAR
12
13
14
15
16
17
18
19
20
21
22
1  angle := Current_Angle ;
2
3  IF Setpoint_Angle > angle THEN
4      rev := angle + max_Value - Setpoint_Angle ;
5  ELSE
6      rev := angle - Setpoint_Angle ;
7  END_IF
8
9  IF Setpoint_Angle < angle THEN
10     fw := max_Value - angle + Setpoint_Angle ;
11 ELSE
12     fw := Setpoint_Angle - angle ;
13 END_IF
14
15 IF fw <= rev THEN
16
17     F_RotationError := - fw ;
18 ELSE
19     F_RotationError := rev ;
20 END_IF
21 RETURN ;
22
```

3.1.1.2 Folder: Global Variables

3.1.1.2.1 Global Variable List: Global_Variables

```
1      {attribute 'qualified_only'}
2      VAR_GLOBAL
3
4
5          GUIIsDisconnected : BOOL ;
6          RPIIsDisconnected : BOOL ;
7
8
9          PressureCol1 : REAL ;
10         PressureCol2 : REAL ;
11         PressureCol3 : REAL ;
12         PressureCol4 : REAL ;
13         PressurePS : REAL ;
14         PressureSB : REAL ;
15
16
17         // declared by MODBUS-Configurator
18         GPS_Speed : REAL ;
19
20         // declared by MODBUS-Configurator
21         GPS_NumbersOfSatellites : INT ;
22
23         // declared by MODBUS-Configurator
24         GPS_Enabled : BOOL ;
25
26         // declared by MODBUS-Configurator
27         GPS_Latitude : LREAL ;
28
29         // declared by MODBUS-Configurator
30         GPS_Longitude : LREAL ;
31
32         // declared by MODBUS-Configurator
33         GPS_Heading : LREAL ;
34
35         // declared by MODBUS-Configurator
36         ConnectionCheck : BOOL ;
37
38         // declared by MODBUS-Configurator
39         Gyro_Pitch : REAL ;
40
41         // declared by MODBUS-Configurator
42         Gyro_Roll : REAL ;
43
44         // declared by MODBUS-Configurator
45         Gyro_Yaw : REAL ;
46
47         // declared by MODBUS-Configurator
48         FwdMotion : BOOL ;
```

```
49
50      // declared by MODBUS-Configurator
51      BackMotion : BOOL ;
52
53      // declared by MODBUS-Configurator
54      RightMotion : BOOL ;
55
56      // declared by MODBUS-Configurator
57      LeftMotion : BOOL ;
58
59      // declared by MODBUS-Configurator
60      ClockWMotion : BOOL ;
61
62      // declared by MODBUS-Configurator
63      CounterClockMotion : BOOL ;
64
65      // declared by MODBUS-Configurator
66      EnableLight : BOOL ;
67
68      // declared by MODBUS-Configurator
69      EnableFlute : BOOL ;
70
71      // declared by MODBUS-Configurator
72      PlatformEnable : BOOL ;
73
74      // declared by MODBUS-Configurator
75      EnableAuto : BOOL ;
76
77      // declared by MODBUS-Configurator
78      EnableManual : BOOL ;
79
80      // declared by MODBUS-Configurator
81      Enable_DP : BOOL ;
82
83      // declared by MODBUS-Configurator
84      WinchUp : BOOL ;
85
86      // declared by MODBUS-Configurator
87      WinchDown : BOOL ;
88
89      // declared by MODBUS-Configurator
90      Winch_Lock_On : BOOL ;
91
92      // declared by MODBUS-Configurator
93      Winch_Lock_Off : BOOL ;
94
95      // declared by MODBUS-Configurator
96      Start_Pump : BOOL ;
97
98      // declared by MODBUS-Configurator
99      ThrusterSpeed : INT ;
```


3.1.1.2.1 Global Variable List: Global_Variables

```
100
101      // declared by MODBUS-Configurator
102      WinchSpeed : INT ;
103
104      // declared by MODBUS-Configurator
105      GUI_Latitude : REAL ;
106
107      // declared by MODBUS-Configurator
108      GUI_Longitude : REAL ;
109
110      // declared by MODBUS-Configurator
111      GUI_ConCheck : BOOL ;
112
113
114      // declared by MODBUS-Configurator
115      platLat : REAL ;
116
117      // declared by MODBUS-Configurator
118      PlatLong : REAL ;
119
120      // declared by MODBUS-Configurator
121      platYaw : REAL ;
122
123      // declared by MODBUS-Configurator
124      platRoll : REAL ;
125
126      // declared by MODBUS-Configurator
127      PLC_Run : BOOL ;
128
129      // declared by MODBUS-Configurator Pitch
130      platHeading : REAL ;
131
132      // declared by MODBUS-Configurator
133      platSpeed : REAL ;
134
135      // declared by MODBUS-Configurator
136      platROVLocked : BOOL ;
137
138      // declared by MODBUS-Configurator
139      platROVUpperPos : BOOL ;
140
141      // declared by MODBUS-Configurator
142      platDP_ModeEnabled : BOOL ;
143
144      // declared by MODBUS-Configurator
145      platAutopilot_Enabled : BOOL ;
146
147      // declared by MODBUS-Configurator
148      platManual_ModeEnabled : BOOL ;
149
150
```

3.1.1.2.1 Global Variable List: Global_Variables

```
151      // declared by MODBUS-Configurator
152      ROVTemp : REAL ;
153
154      // declared by MODBUS-Configurator
155      ROVDepth : REAL ;
156
157      // declared by MODBUS-Configurator
158      ROVWaterTemp : REAL ;
159
160      // declared by MODBUS-Configurator
161      ROVOxygenWater : REAL ;
162
163      // declared by MODBUS-Configurator
164      ROVHeading : REAL ;
165
166      END_VAR
167
```

3.1.1.2.2 Global Variable List: simGVL

```
1      {attribute 'qualified_only'}
2      VAR_GLOBAL
3          // Thruster Variables
4          simThrustValue : REAL ;
5          simForward : BOOL ;
6          simBackward : BOOL ;
7          simLeftPivot : BOOL ;
8          simRightPivot : BOOL ;
9
10         simLeft : BOOL ;
11         simRight : BOOL ;
12
13         // Stabilization Variables
14         simActual : REAL ;
15         simSetPoint : REAL ;
16         simOffset : REAL := 5 ;
17
18         // Pitch/Roll
19         simPitchAvg : REAL ;
20         simRollAvg : REAL ;
21
22         // Tanks
23         simBtnEmptyTanks : BOOL ;
24         simEmptyTanksLamp : BOOL ;
25
26         // Pressure
27         simCol1Pressure : REAL ;
28         simCol2Pressure : REAL ;
29         simPortPressure : REAL ;
30         simStarboardPressure : REAL ;
31         simCol3Pressure : REAL ;
```

```
32     simCol4Pressure :    REAL ;
33
34     // Draft
35     simDraftPort :    REAL ;
36     simDraftStarboard :    REAL ;
37     simDraftAvg :    REAL ;
38     simDraftSetPoint :    REAL := 0 ;
39
40
41     // Plaform
42     simLanterns :    BOOL ;
43     simHorn :    BOOL ;
44     simKillSwitch_SMC :    BOOL ;
45
46     // simBtn
47     simBtnBool :    BOOL ;
48     simSimPressure :    BOOL ;
49     simBtnNext :    BOOL ;
50
51     // Dockinghead
52     simEnableDH :    BOOL ;
53     simDH_InPosFeedback :    BOOL ;
54     simDH_OpenFeedback :    BOOL ;
55     simDH_ClosedFeedback :    BOOL ;
56     simDH_Open :    BOOL ;
57     simDH_Close :    BOOL ;
58
59     // Winch
60     simWinchIn :    BOOL ;
61     simWinchOut :    BOOL ;
62     simWinchSpeed :    INT ;
63     simEnableWinch :    BOOL ;
64     simMOut :    DINT ;
65
66     // AutoPilot
67     simAutopilotON :    BOOL ;
68     simAngle :    REAL ;
69
70     simGPSLatitude :    LREAL := 62.458642 ; //Y
71     simGPSLongitude :    LREAL := 6.204729 ; //X
72     simGyroHeading :    LREAL ;
73     simWaypointXLon :    LREAL := 6.211937 ; //Long
74     simWaypointYLat :    LREAL := 62.459837 ; // Lat
75
76
77     simAngleCalc :    INT ;
78
79     simActualValue :    INT ;
80
81     simThrusterPIDTurn :    REAL ;
82
```

```
83      simThrusterPIDDistance : REAL ;
84
85      simThrustRight : BOOL ;
86      simThrustLeft : BOOL ;
87      simActualValueDist : REAL ;
88
89
90
91
92
93      END_VAR
94
```

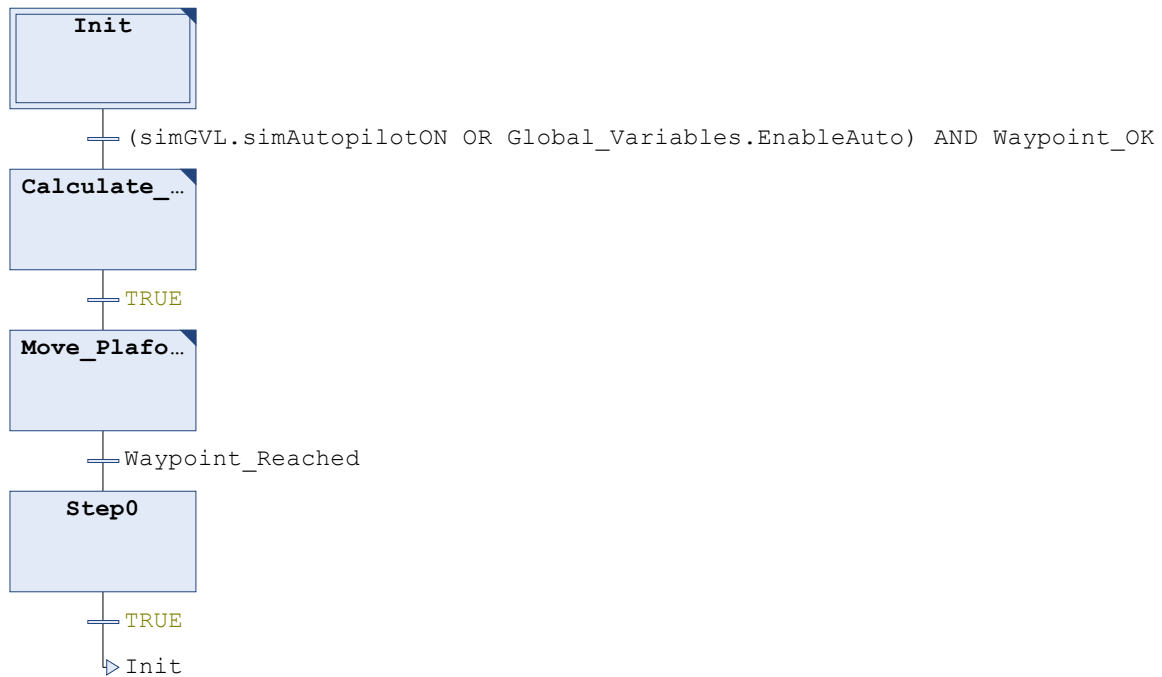
3.1.1.3 Folder: POU

3.1.1.3.1 POU: POU_Autopilot

```
1  PROGRAM POU_Autopilot
2  VAR
3      // Init
4      Autopilot_On : BOOL ;
5      Waypoint_OK : BOOL ;
6
7      // Calculate Variables
8      y : LREAL ;
9      x : LREAL ;
10     bearing : LREAL ;
11     angle : LREAL ;
12
13     xEnable
14         //ThrusterValueCorr: REAL;
15
16         // Move Plaform Variables
17         : BOOL ;
18     PID_Direction : WagoAppBuildingHVAC . FbPIDController ;
19     deadZone : REAL ;
20     P : REAL := 10 ;
21     I : REAL ;
22     D : REAL ;
23
24     presentON : BOOL := TRUE ;
25     presentOFF : BOOL := TRUE ;
26     rY : REAL ;
27
28     Waypoint_Reached : BOOL ;
29
30
31
32     //Simulator variables
```

3.1.1.3.1 POU: POU_Autopilot

```
33         FB_Simulate_ThrusterDir_0 : FB_Simulate_ThrusterDir ;  
34  
35  
36     END_VAR  
37
```



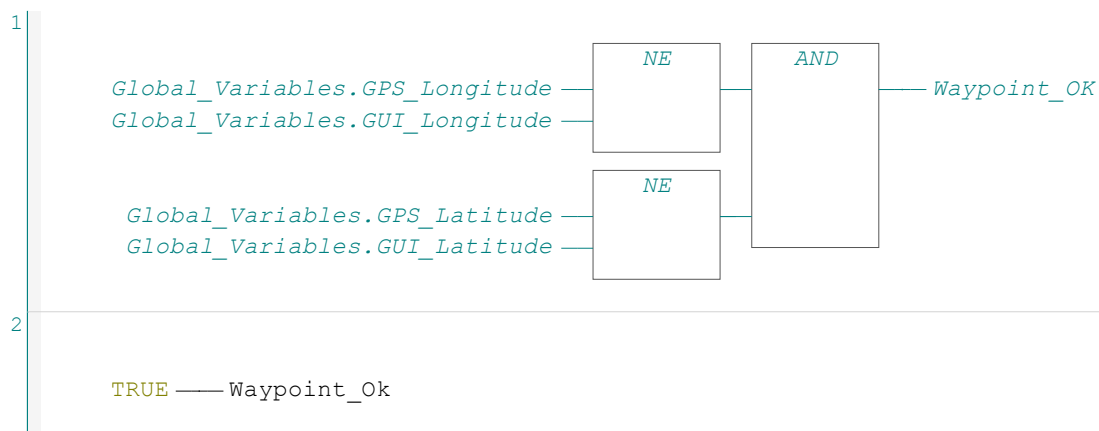
3.1.1.3.1.1 Action: Calculate_Angle_active

```
1  y := ( WagoAppMath . sin_L ( phi := simGVL . simWaypointXLon - simGVL .
    simGPSLongitude ) ) * WagoAppMath . cos_L ( phi := simGVL . simWaypointYLat ) ;
2  x := WagoAppMath . cos_L ( phi := Global_Variables . GPS_Latitude ) * WagoAppMath
    . sin_L ( phi := simGVL . simWaypointYLat ) - WagoAppMath . sin_L ( phi :=
    Global_Variables . GPS_Latitude ) * WagoAppMath . cos_L ( phi := simGVL .
    simWaypointYLat ) * WagoAppMath . cos_L ( phi := simGVL . simWaypointXLon -
    Global_Variables . GPS_Longitude ) ;
3  bearing := WagoAppMath . arcTan2 ( y := y , x := x ) ;
4  //Angle2 := WagoAppMath . radiantToAngle ( lrRadiant := bearing ) ;
5  Angle := WagoAppMath . angleToDegree_L ( phi := bearing ) ;
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34  //GPS_Latitude y
35  //GPS_Longitude x
36  //Gyro_Yaw
37  // Waypoint_Latitude
38  // Waypoint_Longitude
39
40
41  //dy := GPS_Latitude - Waypoint_Latitude;
42  //dx := GPS_Longitude - Waypoint_Longitude;
```

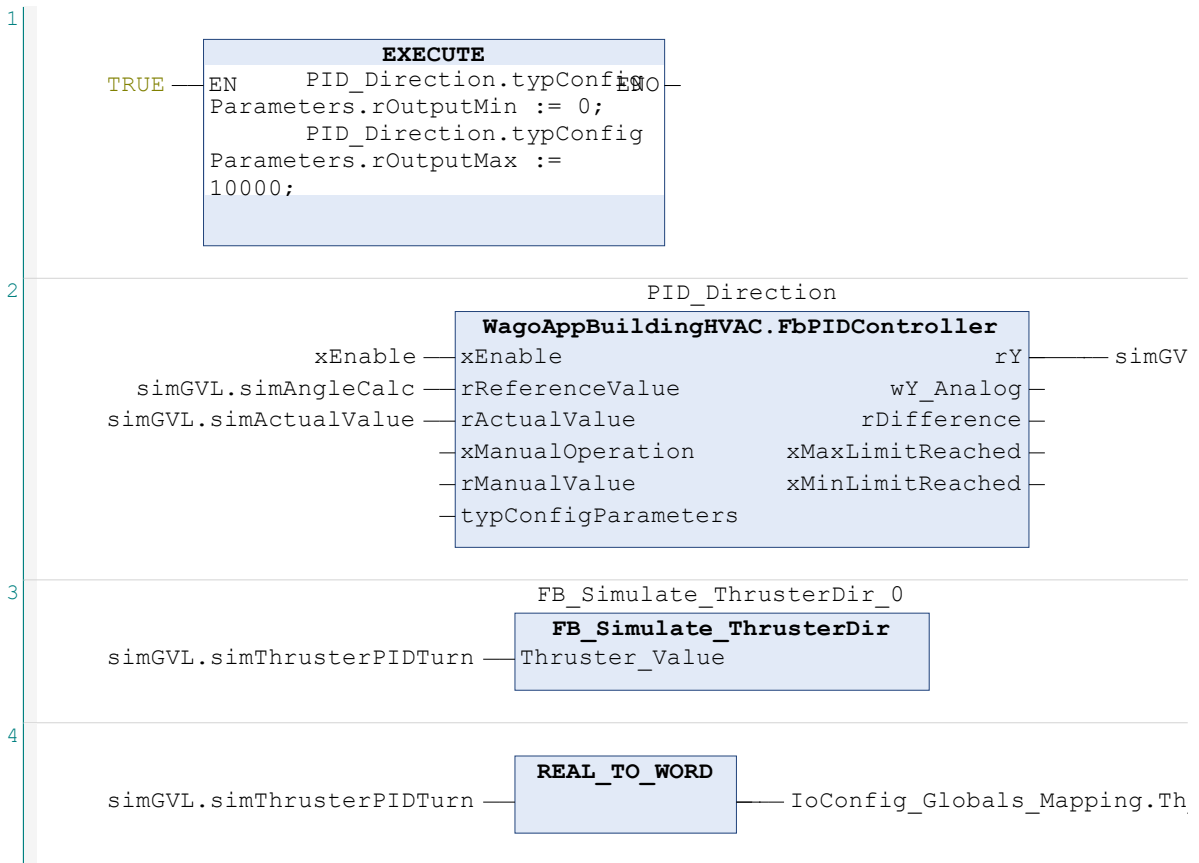
3.1.1.3.1.1 Action: Calculate_Angle_active

```
43
44 //Longitude := (simGVL.simWaypointX - Global_Variables.GPS_Longitude);
45 //Latitude := (simGVL.simWaypointY - Global_Variables.GPS_Latitude);
46
47
48 ///////////////////////////////////////////////////
49 //Longitude := (simGVL.simWaypointX - simGVL.simGPSLongitude);
50 //Latitude := (simGVL.simWaypointY - simGVL.simGPSLatitude);
51 //absLongitude := WagoAppMath.abs_L(x:= Longitude);
52 //absLatitude := WagoAppMath.abs_L(x:= Latitude);
53 //angle_to_Waypoint := WagoAppMath.arctan2(y:= absLongitude, x:=absLatitude );
54 //angle := WagoAppMath.angleToDegree_L(phi:= angle_to_Waypoint);
55 //absAngle := WagoAppMath.abs_L(x:= angle);
56 // Check where waypoint is located;
57 //IF (Latitude >= 0 AND Longitude >= 0) THEN
58 //    Final_Angle := absAngle + 0;
59 //    simGVL.simAngle := absAngle + 0;
60 //END_IF
61 //IF (Latitude < 0 AND Longitude >= 0) THEN
62 //    Final_Angle := absAngle + 90;
63 //    simGVL.simAngle := absAngle + 90;
64 //END_IF
65 //IF (Latitude < 0 AND Longitude < 0) THEN
66 //    Final_Angle := absAngle + 180;
67 //    simGVL.simAngle := absAngle + 180;
68 //END_IF
69 //IF (Latitude >= 0 AND Longitude < 0) THEN
70 //    Final_Angle := absAngle + 270;
71 //    simGVL.simAngle := absAngle + 270;
72 //END_IF
73 ///////////////////////////////////////////////////
74
```

3.1.1.3.1.2 Action: Init_active



3.1.1.3.1.3 Action: Move_Plaform_active

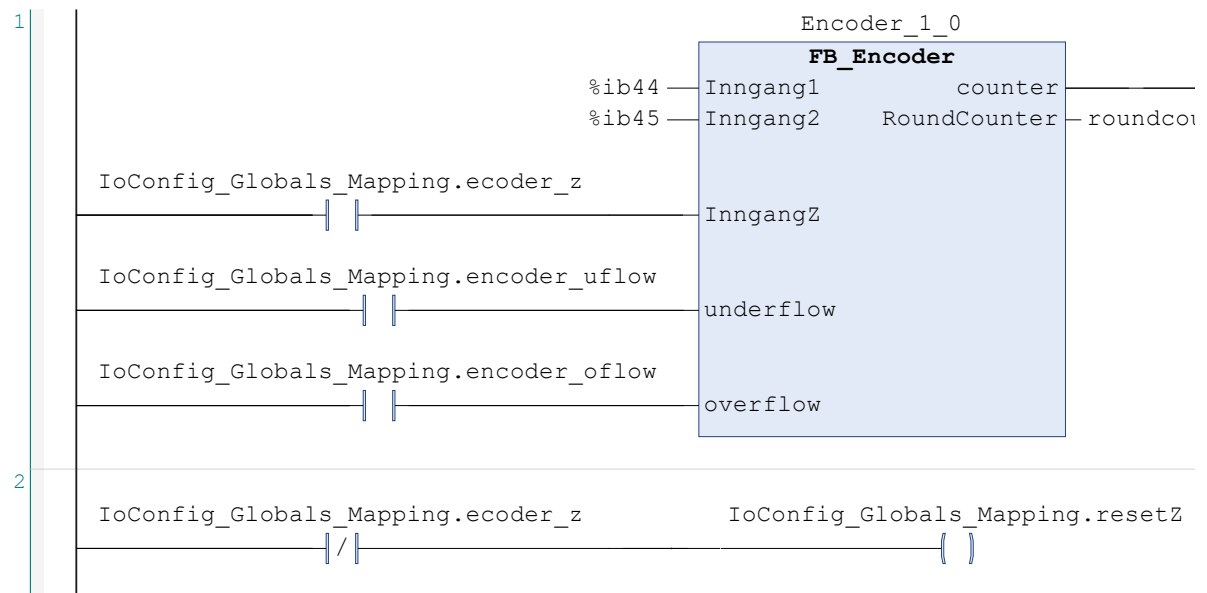


L.simThrusterPIDTurn

_PS

3.1.1.3.2 POU: POU_Encoder_Winch

```
1  PROGRAM POU_Encoder_Winch
2  VAR
3      Encoder_1_0 : FB_Encoder ;
4      roundcounter : INT ;
5      counter : UINT ;
6
7  END_VAR
8
```



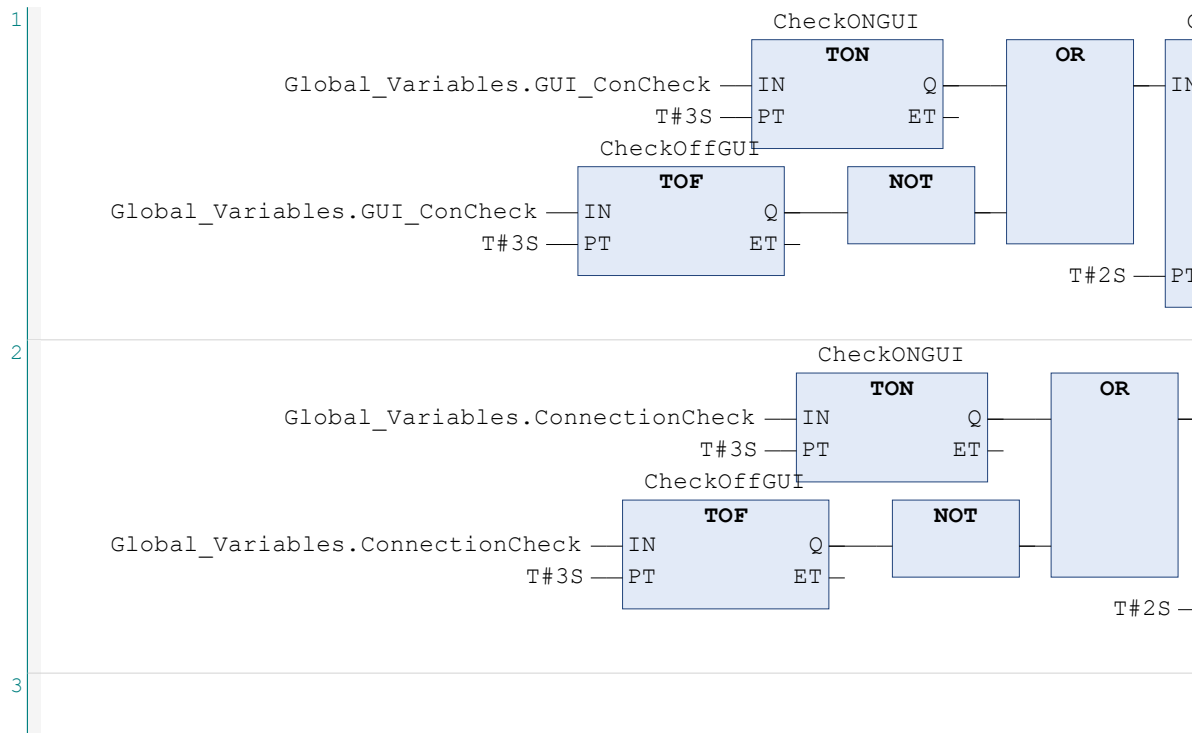
_____ counter
unter

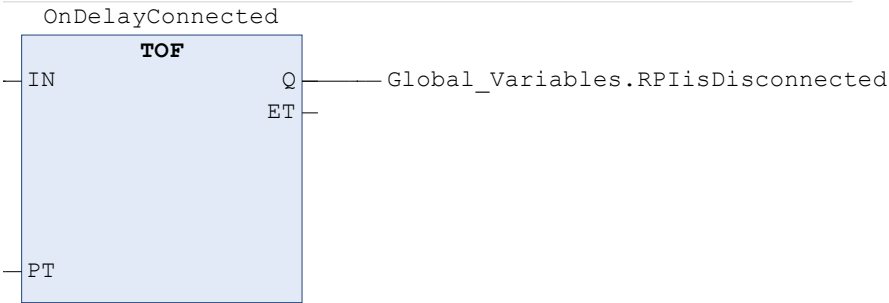
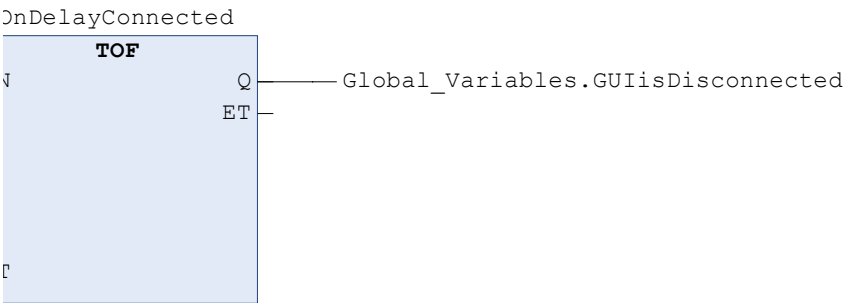
3.1.1.3.3 POU: POU_Platform_General

```

1  PROGRAM POU_Platform_General
2  VAR
3      CheckONGUI : TON ;
4      CheckOffGUI : TOF ;
5      OnDelayConnected : TOF ;
6
7      Lat : REAL ;
8      Long : REAL ;
9
10     current : WORD ;
11
12     ROVDepth : REAL ;
13     ROVOxygenWater : REAL ;
14     ROVTemp : REAL ;
15     ROVWaterTemp : REAL ;
16     ROVHeading : REAL ;
17 END_VAR
18

```





3.1.1.3.3 POU: POU_Platform_General



3.1.1.3.3 POU: POU_Platform_General

16

Global_Variables.GUI_Latitude — *Lat*

17

Global_Variables.GUI_Longitude — *Long*

18

Global_Variables.Gyro_Pitch — *Global_Variables.platHeading*

19

Global_Variables.Gyro_Roll — *Global_Variables.platRoll*

20

Global_Variables.Gyro_Yaw — *Global_Variables.platYaw*

21

Global_Variables.GPS_Speed — *Global_Variables.platSpeed*

22

IoConfig_Globals.Mapping.Current_Logg — *current*

23

Global_Variables.ROVDepth — *ROVDepth*

24

Global_Variables.ROVOxygenWater — *ROVOxygenWater*

25

Global_Variables.ROVTemp — *ROVTemp*

26

Global_Variables.ROVWaterTemp — *ROVWaterTemp*

27

Global_Variables.ROVHeading — ROVHeading

3.1.1.3.4 POU: POU_Stablilization

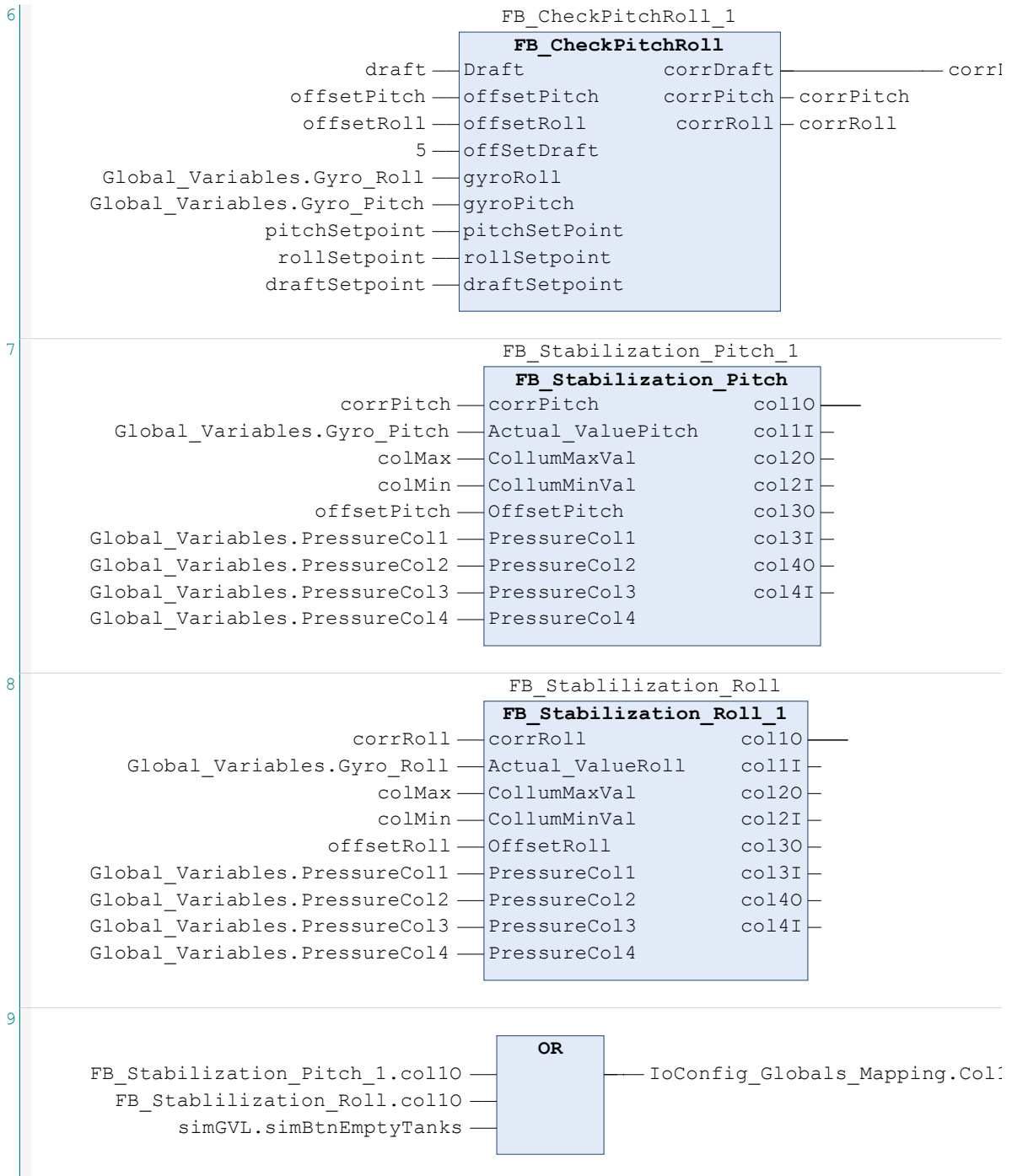
```
1      PROGRAM POU_Stablilization
2      VAR
3
4          draft : REAL ;
5          xEnable : BOOL ;
6          xEnablePitch : BOOL ;
7          xEnableRoll : BOOL ;
8          xEnableDraft : BOOL ;
9
10         WaterInTank : BOOL ;
11         EmptyTanks : BOOL ;
12
13         corrDraft : BOOL ;
14         corrRoll : BOOL ;
15         corrPitch : BOOL ;
16
17         JobDonePitch : BOOL ;
18         JobDoneRoll : BOOL ;
19         JobDoneDraft : BOOL ;
20
21         FB_CheckPitchRoll_1 : FB_CheckPitchRoll ;
22         FB_EmptyTanks_1 : FB_EmptyTanks ;
23         FB_CheckWatertanks_1 : FB_CheckWatertanks ;
24         FB_Stabilization_Pitch_1 : FB_Stabilization_Pitch ;
25         FB_Stablilization_Roll : FB_Stabilization_Roll_1 ;
26         FB_Stablilization_Draft_1 : FB_Stablilization_Draft ;
27         FB_PumpInWater_0 : FB_PumpInWater ;
28
29
30
31         offset_Setpoint : INT ;
32         offset_SetpointMinus : INT ;
33         pitchSetpoint : REAL := 0 ;
34         rollSetpoint : REAL := 0 ;
35         draftSetpoint : REAL := 0 ;
36
37         offsetRoll : REAL := 5 ;
38         offsetPitch : REAL := 5 ;
39
40         colMin : REAL := 5 ;
41         colMax : REAL := 40 ;
42
43         timeSet : INT ;
44     END_VAR
45
```

3.1.1.3.4 POU: POU_Stablilization



-WaterInTank

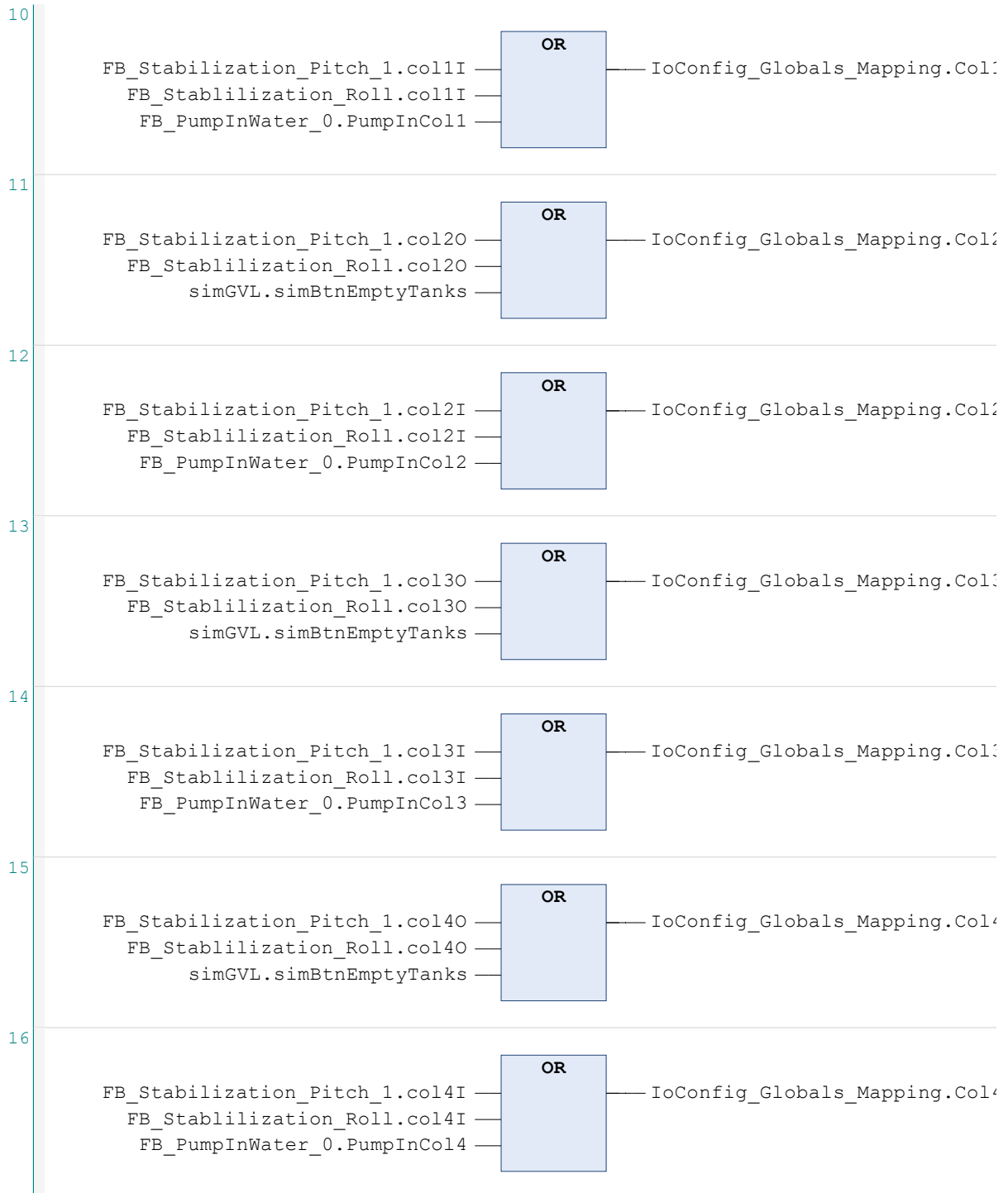
3.1.1.3.4 POU: POU_Stablilization



Draft

lOut

3.1.1.3.4 POU: POU_Stablilization



3.1.1.3.4 POU: POU_Stablilization

1In

2Out

2In

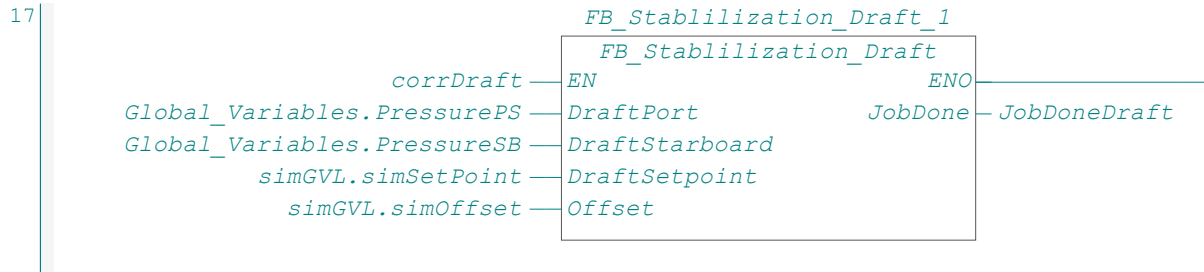
3Out

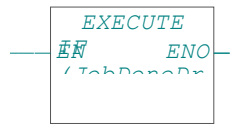
3In

4Out

4In

3.1.1.3.4 POU: POU_Stablilization



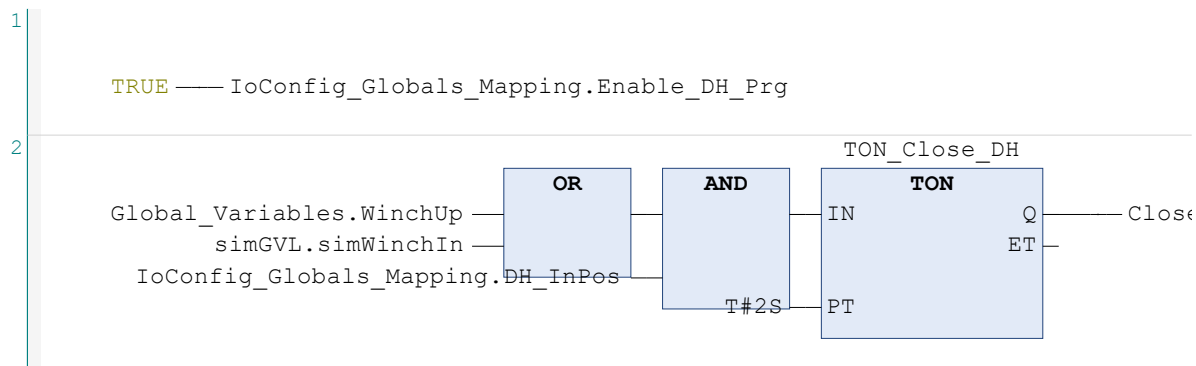


3.1.1.3.5 POU: POU_Stepper_DH

```

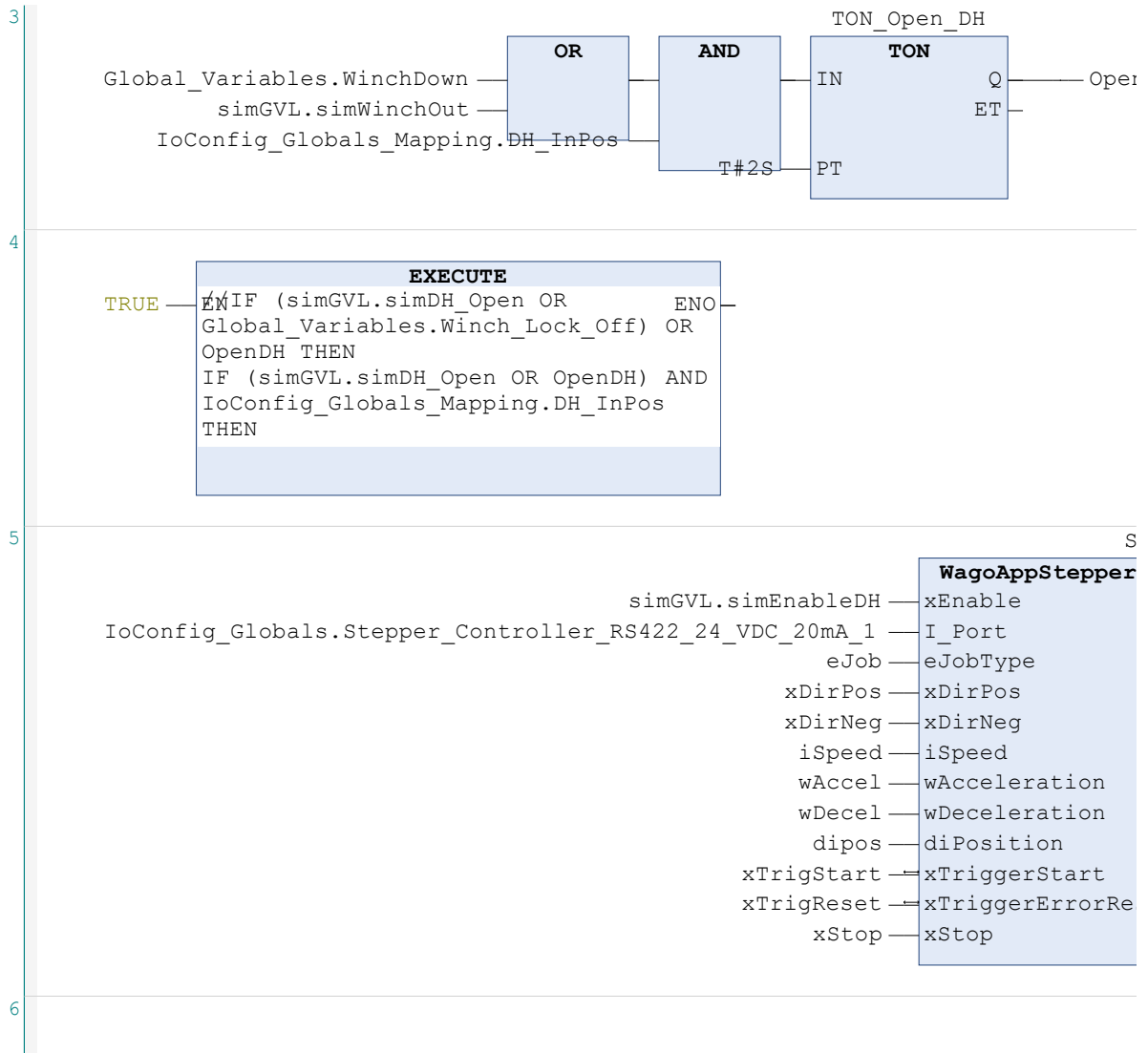
1  PROGRAM POU_Stepper_DH
2  VAR
3      Stepper_DH : WagoAppStepper . FbStepperControlBasic ;
4      FbMoveVelocity_Test : WagoAppStepper . FbMoveVelocity ;
5      eJobType : WagoAppStepper . FbMoveAbsolute ;
6      eJob : eMode := EMODE . MoveAbsolute ;
7      TON_Close_DH : TON ;
8      TON_Open_DH : TON ;
9
10
11     xEnable : BOOL ;
12     xDirPos : BOOL ;
13     xDirNeg : BOOL ;
14     iSpeed : INT := 10000 ;
15     wAccel : WORD := 32767 ;
16     wDecel : WORD := 32767 ;
17     diPos : DINT ;
18     xTrigStart : BOOL ;
19     xTrigReset : BOOL ;
20     xStop : BOOL ;
21
22     CloseDH : BOOL ;
23     OpenDH : BOOL ;
24     test : BOOL ;
25
26     pppp : DINT ;
27     openVar : DINT ;
28 END_VAR
29

```

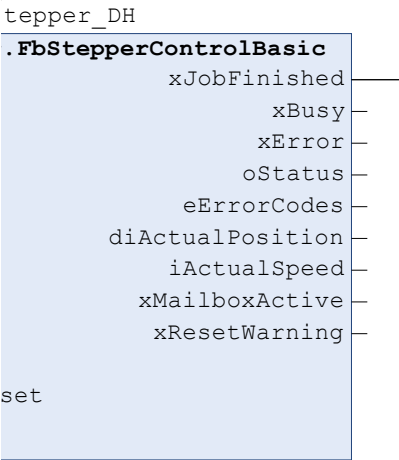


⇒DH

3.1.1.3.5 POU: POU_Stepper_DH



nDH

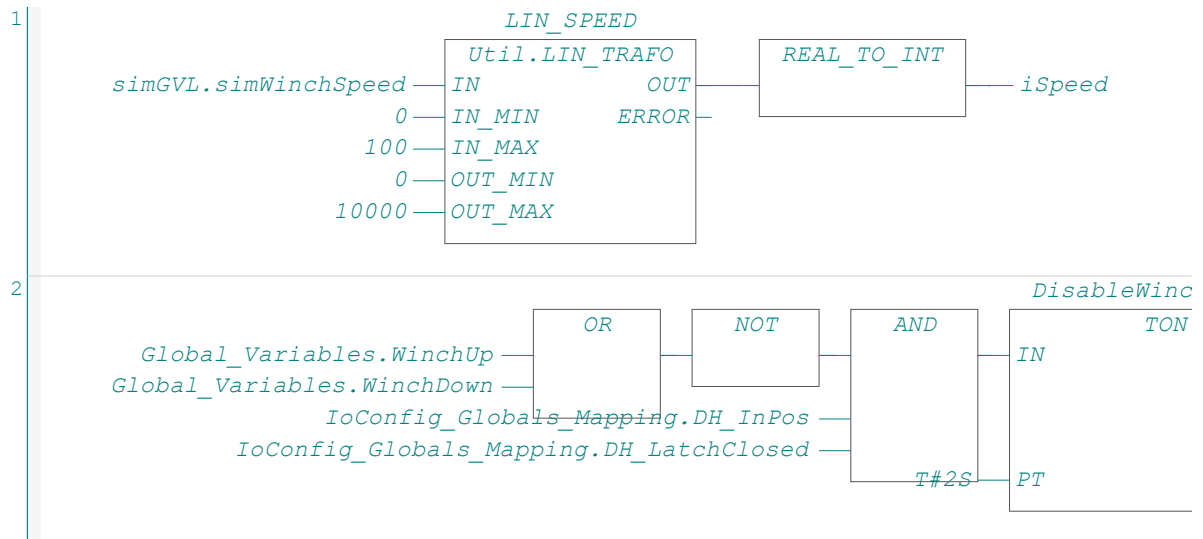


3.1.1.3.6 POU: POU_Stepper_Winch

```

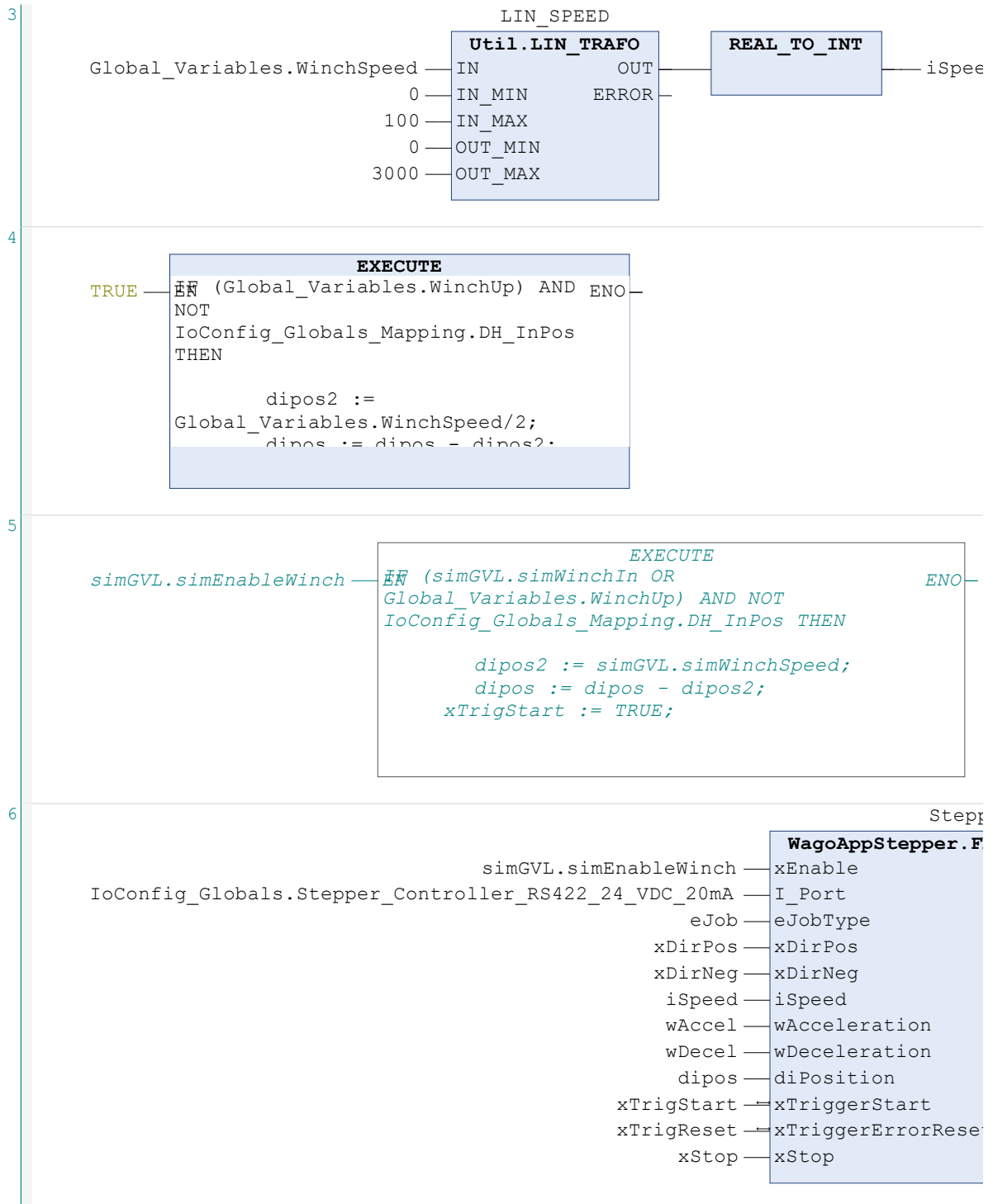
1  PROGRAM POU_Stepper_Winch
2  VAR
3      Stepper_Winch : WagoAppStepper . FbStepperControlBasic ;
4      eJobType : WagoAppStepper . FbMoveAbsolute ;
5      eJob : eMode := EMODE . MoveAbsolute ;
6      LIN_SPEED : Util . LIN_TRAFO ;
7
8      DisableWinch_Delay : TON ;
9      test : BOOL ;
10
11     xDirPos : BOOL ;
12     xDirNeg : BOOL ;
13     iSpeed : INT ;
14     wAccel : WORD := 32767 ;
15     wDecel : WORD := 32767 ;
16     dipos : DINT ;
17     dipos2 : DINT ;
18     minValue : DINT ;
19     xTrigStart : BOOL ;
20     xTrigReset : BOOL ;
21     xStop : BOOL ;
22     xLampPayIn : BOOL ;
23     xLampPayOut : BOOL ;
24 END_VAR
25

```





3.1.1.3.6 POU: POU_Stepper_Winch



ad

per_Winch

bStepperControlBasic

- xJobFinished
- xBusy
- xError
- oStatus
- eErrorCodes
- diActualPosition
- iActualSpeed
- xMailboxActive
- xResetWarning

t

3.1.1.3.7 POU: POU_TestPumps

```
1  PROGRAM POU_TestPumps
2  VAR
3      Col1In_Sim : BOOL ;
4      Col1Out_Sim : BOOL ;
5      Col2In_Sim : BOOL ;
6      Col2Out_Sim : BOOL ;
7      Col3In_Sim : BOOL ;
8      Col3Out_Sim : BOOL ;
9      Col4In_Sim : BOOL ;
10     Col4Out_Sim : BOOL ;
11  END_VAR
12
```

```
1
   Col1In_Sim —— IoConfig_Globals_Mapping.Col1In
2
   Col1Out_Sim —— IoConfig_Globals_Mapping.Col1Out
3
   Col2In_Sim —— IoConfig_Globals_Mapping.Col2In
4
   Col2Out_Sim —— IoConfig_Globals_Mapping.Col2Out
5
   Col3In_Sim —— IoConfig_Globals_Mapping.Col3In
6
   Col3Out_Sim —— IoConfig_Globals_Mapping.Col3Out
7
   Col4In_Sim —— IoConfig_Globals_Mapping.Col4In
```

8

Col4Out_Sim — IoConfig_Globals_Mapping.Col4Out

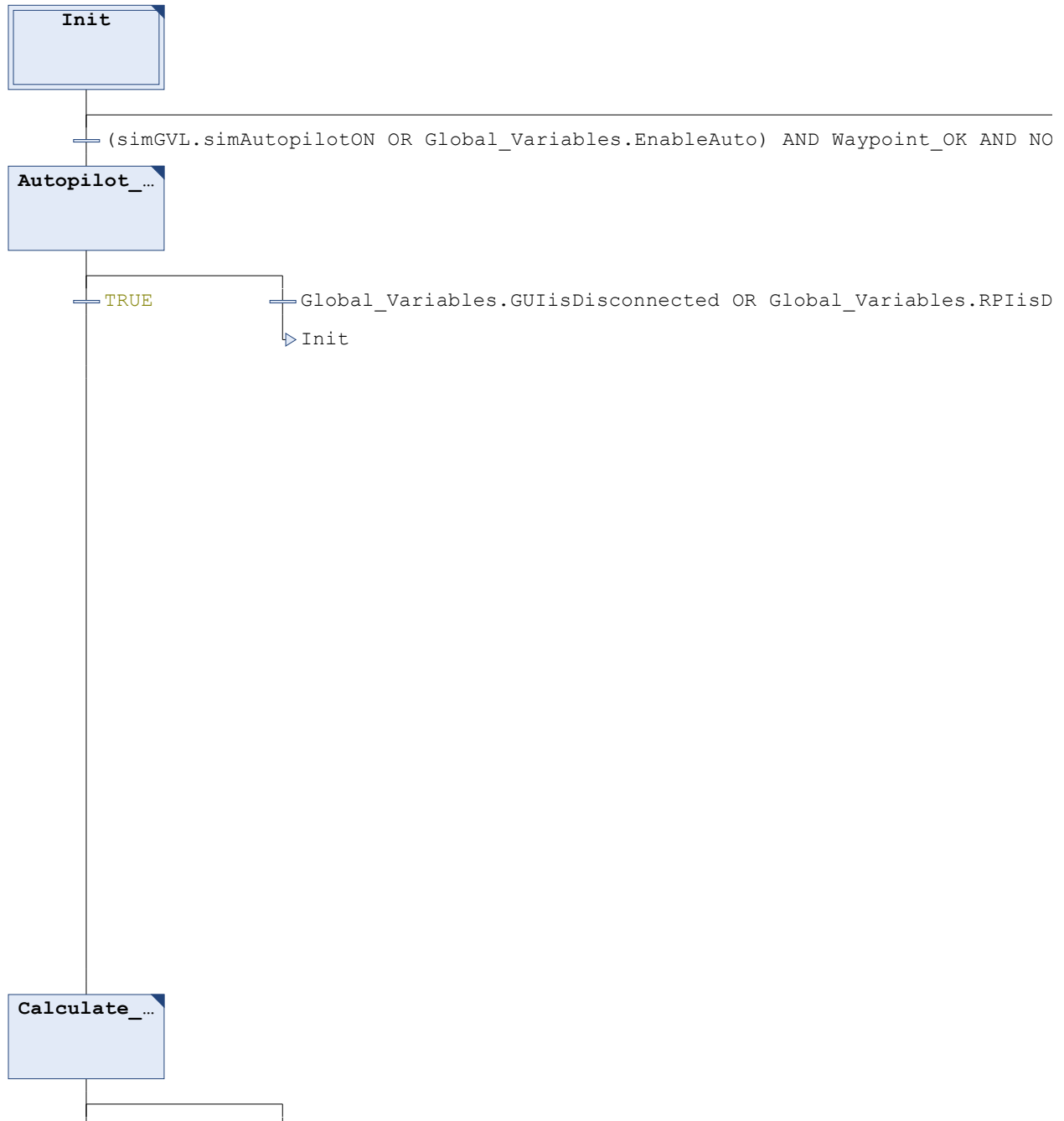
3.1.1.3.8 POU: POU_ThrusterControl

```
1  PROGRAM POU_ThrusterControl
2  VAR
3      X2_Dir : REAL ;
4
5      P_distX : REAL := 100 ;
6      I_distX : REAL ;
7      D_distX : REAL ;
8
9      P_distX2 : REAL := 100 ;
10     I_distX2 : REAL ;
11     D_distX2 : REAL ;
12
13     P_distY : REAL := 100 ;
14     I_distY : REAL ;
15     D_distY : REAL ;
16     ThPS_DP : Util.LIN_TRAFO ;
17
18     DirInvertX2 : BOOL := TRUE ;
19     DirInvertX : BOOL ;
20     DirInvertY : BOOL ;
21     DirInvert : BOOL ;
22     // Init
23     Autopilot_On : BOOL ;
24     Waypoint_OK : BOOL ;
25
26     // Calculate Angle Variables
27     angle_AutopilotCalculated : LREAL ;
28     Setpoint_Angle_Autopilot : INT ;
29     RotationPID : INT ;
30
31     // Autopilot Variables Angle
32     PID_Angle_Autopilot : WagoAppBuildingHVAC.FbPIDController ;
33     LIN_TRAFO_Map_Angle : LIN_TRAFO ;
34     TimerCalcNewAngle_Autopilot : TON ;
35     P_Ang_Autopilot : REAL := 100 ;
36     I_Ang_Autopilot : REAL ;
37     D_Ang_Autopilot : REAL ;
38     presentON : BOOL := TRUE ;
39     presentOFF : BOOL := TRUE ;
40     SetTimerCalcNewAngle_Autopilot : BOOL ;
41     CalcNewAng : BOOL ;
42     TurnForce_Autopilot : REAL ;
43
44
45     // Move Plaform Variables Distance Autopilot
46     PID_Distance_Autopilot : WagoAppBuildingHVAC.FbPIDController ;
47     P_dist : REAL := 2000 ;
48     I_dist : REAL ;
```

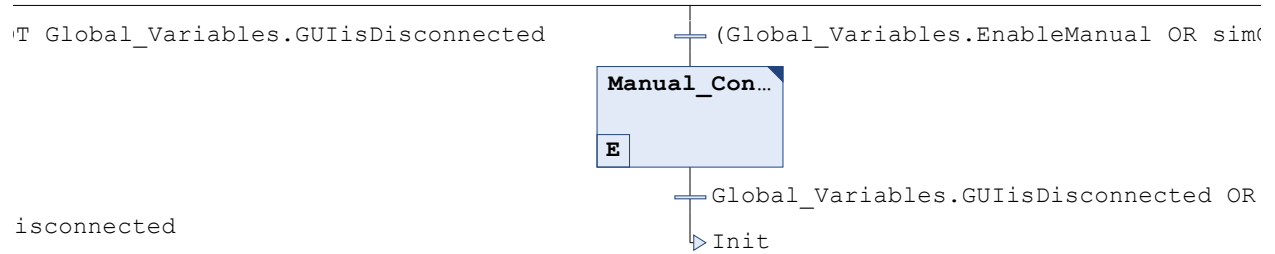
```
49      D_dist : REAL ;
50      deadsone_dist : REAL ;
51      ref : REAL ;
52      SpeedValue_Autopilot : REAL ;
53
54      //Simulator variables
55      FB_Simulate_ThrusterDir_0 : FB_Simulate_ThrusterDir ;
56
57      //Manual Control
58      Forward_Out : REAL ;
59      Backward_Out : REAL ;
60      LeftPivot_Out : REAL ;
61      RightPivot_Out : REAL ;
62      Left_Out : REAL ;
63      Right_Out : REAL ;
64      PS_Value : REAL ;
65      SB_Value : REAL ;
66      FB_ThrusterControl_1 : FB_ThrusterScaling ;
67      FB_Thruster_Values_Forward : FB_Thruster_Values ;
68      FB_Thruster_Values_Backward : FB_Thruster_Values ;
69      FB_Thruster_Values_LeftPivot : FB_Thruster_Values ;
70      FB_Thruster_Values_RightPivot : FB_Thruster_Values ;
71      FB_Thruster_Values_Left : FB_Thruster_Values ;
72      FB_Thruster_Values_Right : FB_Thruster_Values ;
73      Thruster_Speed : REAL ;
74
75      // Distance Variables
76      Radius : LREAL := 6372.795477598 ;
77      distance : LREAL ;
78      FB_CalcAng : FB_CalcAngle ;
79      FB_Dist : FB_CalcDistance ;
80
81      // DP mode Variables
82      X_Dir : REAL ;
83      Y_Dir : REAL ;
84      PID_Heading : WagoAppBuildingHVAC . FbPIDController ;
85      PID_X_Dir : WagoAppBuildingHVAC . FbPIDController ;
86      PID_X2_Dir : WagoAppBuildingHVAC . FbPIDController ;
87      PID_Y_Dir : WagoAppBuildingHVAC . FbPIDController ;
88      TON_Heading_DP_OK : TON ;
89      TON_Heading_Check : TON ;
90      XLat_Coordinate : REAL ;
91      YLong_Coordinate : REAL ;
92      Heading_OK : BOOL ;
93      RotationPID_DP : INT ;
94      TurnValue_DP : REAL ;
95      Adjust_Heading : BOOL ;
96      RotationCheck_DP : INT ;
97      Longitude_DP : REAL ;
98      Latitude_DP : REAL ;
99
```



```
100     END_VAR
101
```



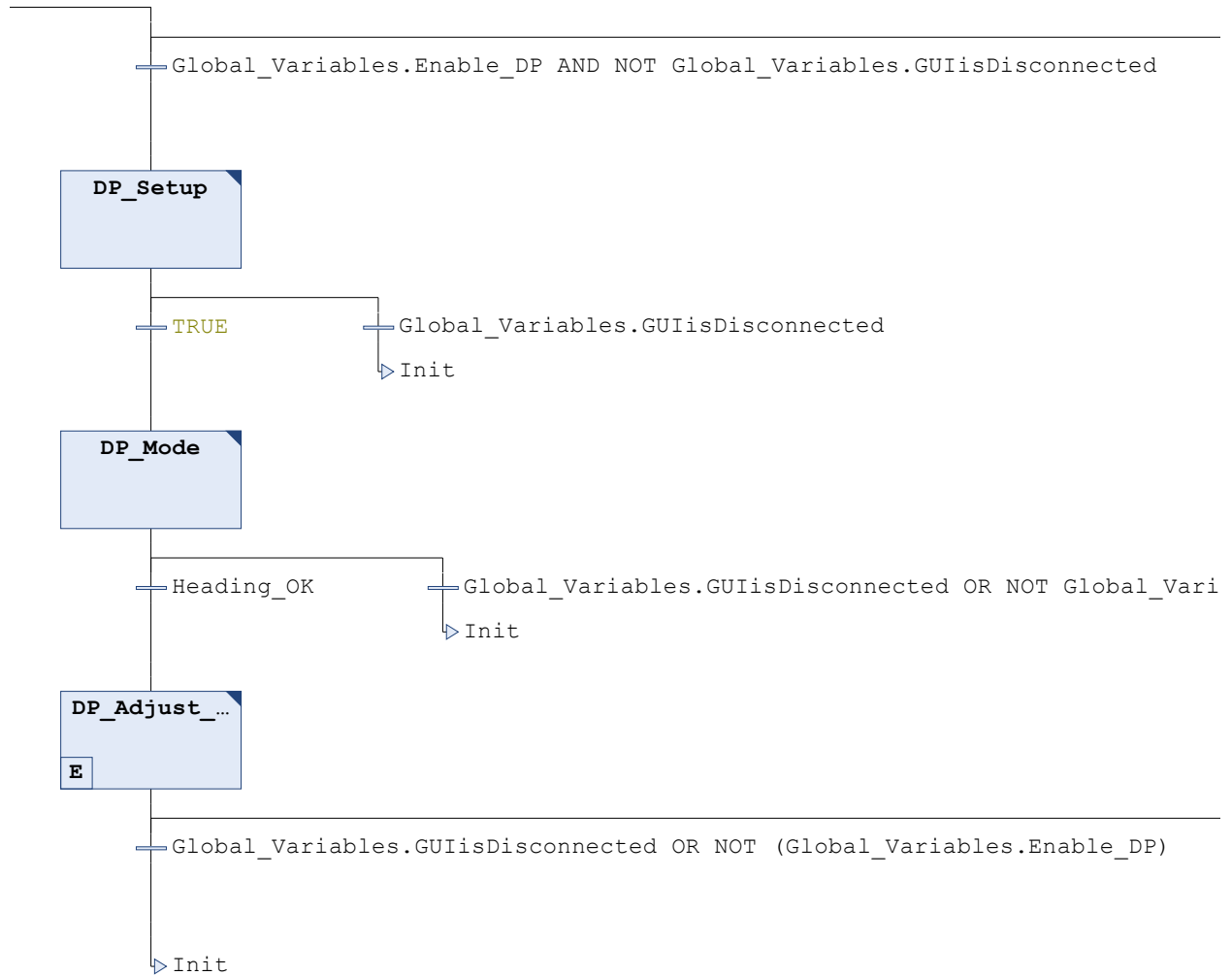
3.1.1.3.8 POU: POU_ThrusterControl

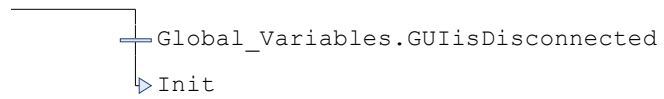


3.1.1.3.8 POU: POU_ThrusterControl

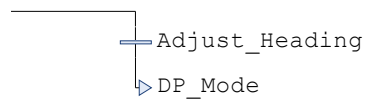
`SVL.simBtnBool) AND NOT (simGVL.simAutopilotON OR Global_Variables.GUIIsDisconnected)`

`NOT (Global_Variables.EnableManual)`

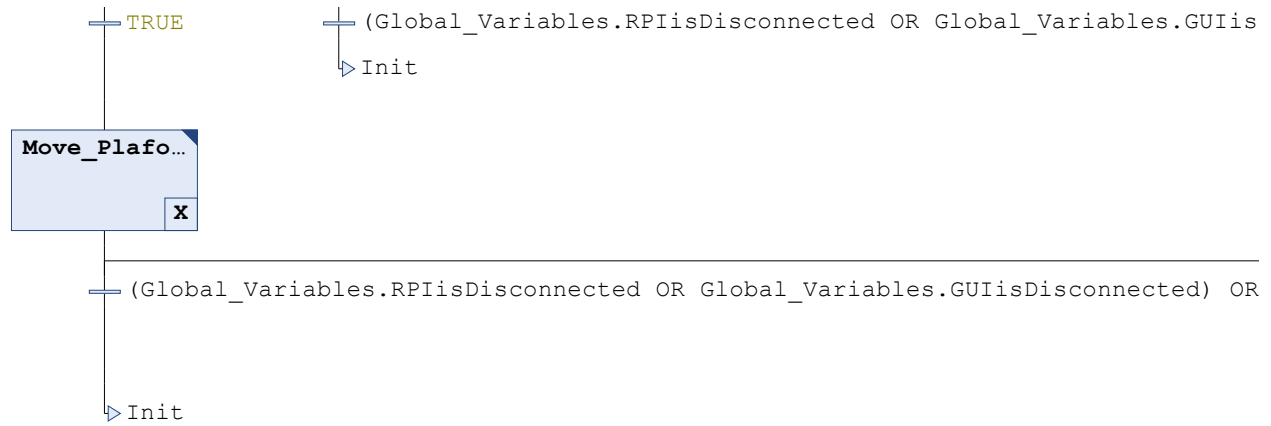




`ables.Enable_DP`

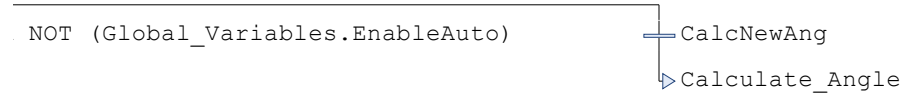


3.1.1.3.8 POU: POU_ThrusterControl

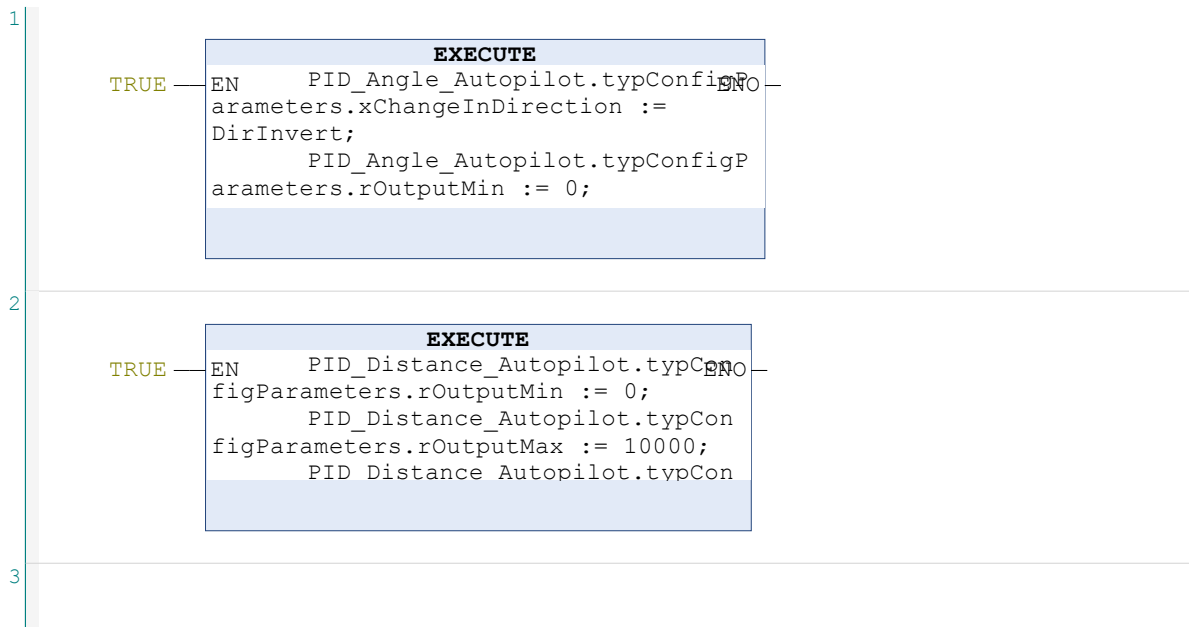


3.1.1.3.8 POU: POU_ThrusterControl

Disconnected) OR NOT (Global_Variables.EnableAuto)



3.1.1.3.8.1 Action: Autopilot_Setup_active



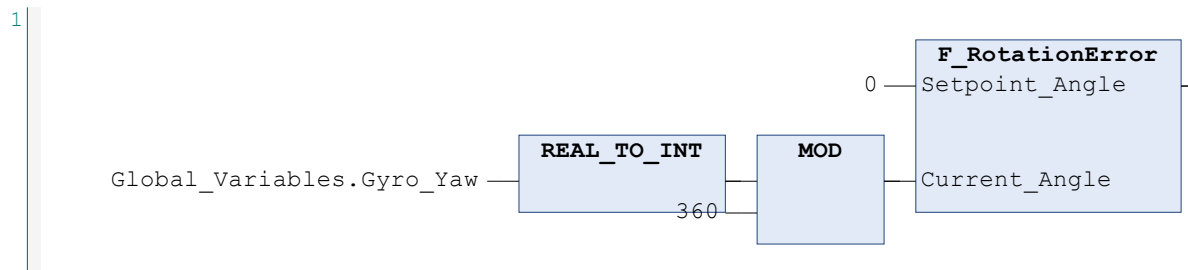
3.1.1.3.8.2 Action: Calculate_Angle_active

```

1      //y := (WagoAppMath.sin_L(phi:= simGVL.simWaypointXLon -
      simGVL.simGPSLongitude)) * WagoAppMath.cos_L(phi:= simGVL.simWaypointYLat);
2      //x := WagoAppMath.cos_L(phi:= Global_Variables.GPS_Latitude) *
      WagoAppMath.sin_L(phi:= simGVL.simWaypointYLat) - WagoAppMath.sin_L(phi:=
      Global_Variables.GPS_Latitude) * WagoAppMath.cos_L(phi:= simGVL.simWaypointYLat)
      * WagoAppMath.cos_L(phi:= simGVL.simWaypointXLon -
      Global_Variables.GPS_Longitude);
3      //bearing := WagoAppMath.arcTan2(y:=y , x:= x);
4      //Angle2 := WagoAppMath.radianToAngle(lrRadian:= bearing);
5      //Angle := WagoAppMath.angleToDegree_L(phi:= bearing);
6      SetTimerCalcNewAngle_Autopilot := FALSE;
7      FB_CalcAng (
8          LatA := Global_Variables . GPS_Latitude ,
9          LatB := Global_Variables . GUI_Latitude ,
10         LonA := Global_Variables . GPS_Longitude ,
11         LonB := Global_Variables . GUI_Longitude ,
12         Angle => angle_AutopilotCalculated ) ;
13
14      // Distance
15      FB_Dist (
16         LatA := Global_Variables . GPS_Latitude ,
17         LatB := Global_Variables . GUI_Latitude ,
18         LonA := Global_Variables . GPS_Longitude ,
19         LonB := Global_Variables . GUI_Longitude ,
20         Distance => distance ) ;
21
22
23

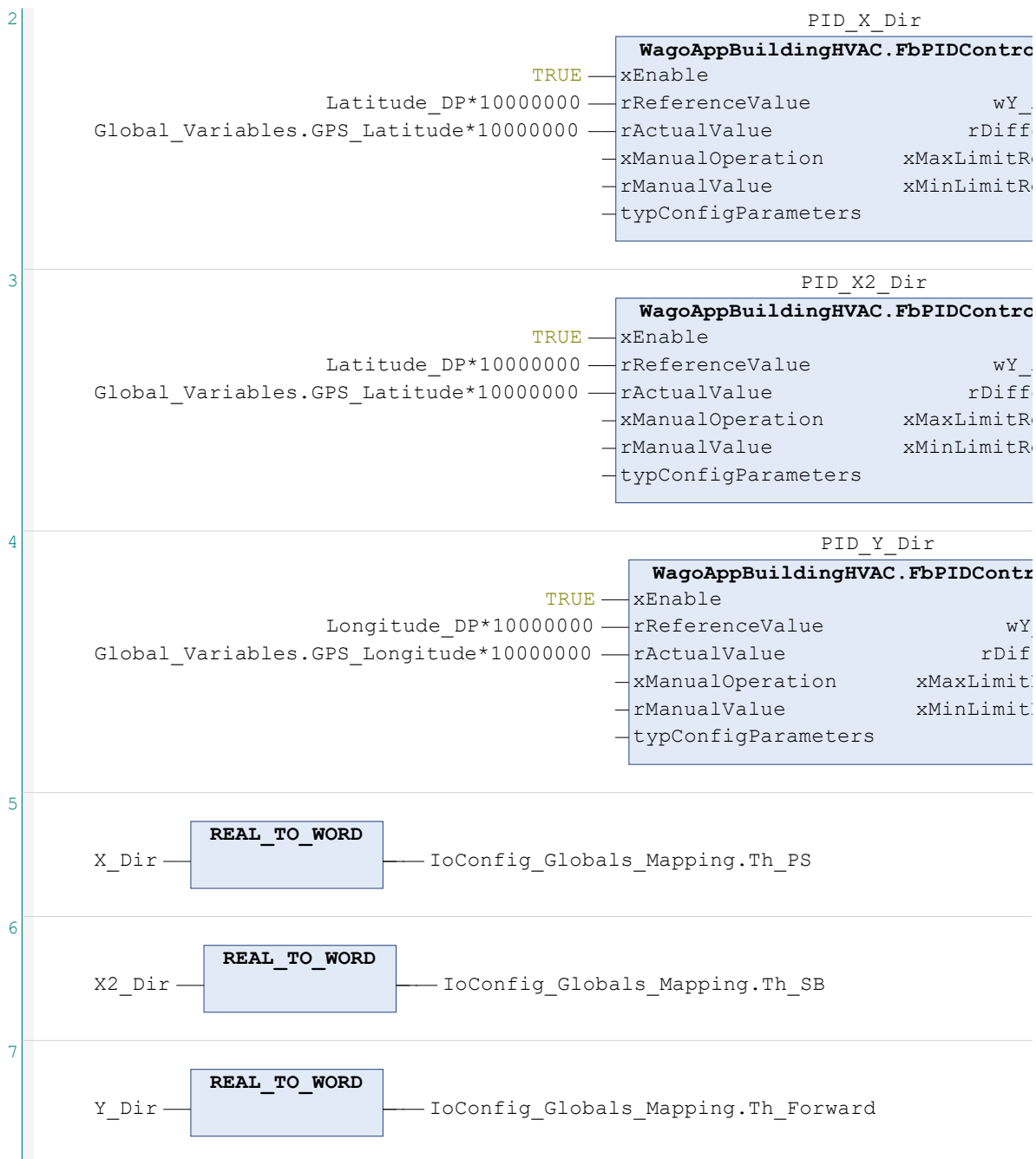
```

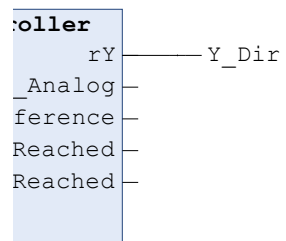
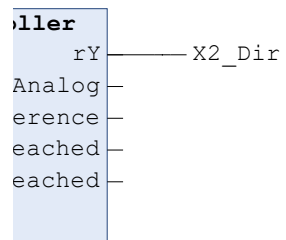
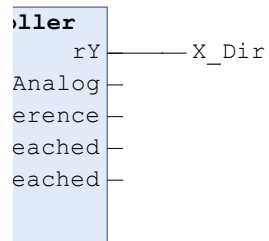
3.1.1.3.8.3 Action: DP_Adjust_XY_active



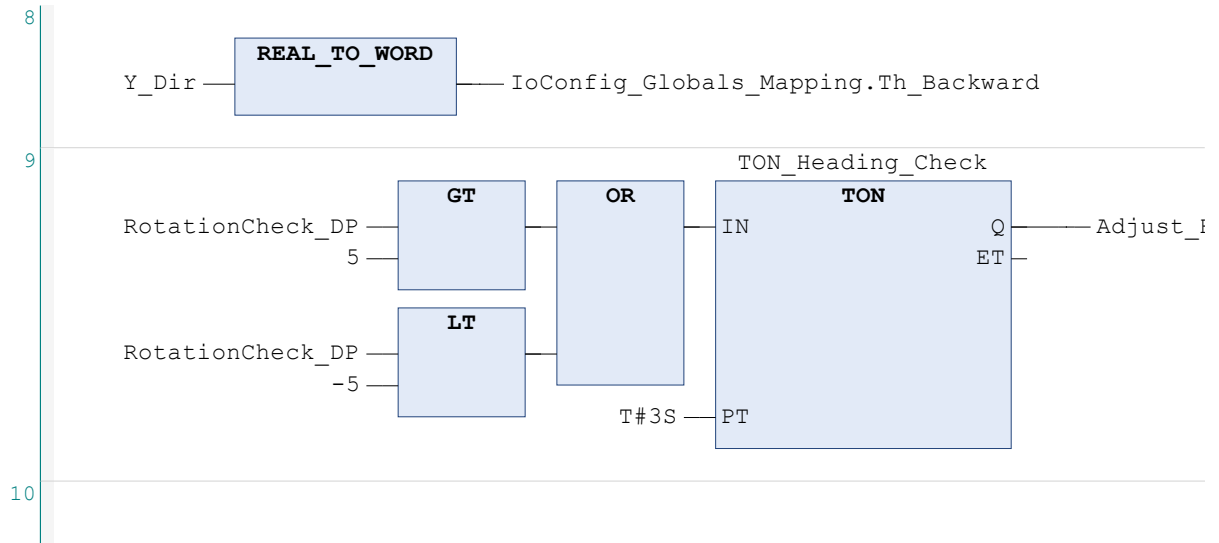
— RotationCheck_DP

3.1.1.3.8.3 Action: DP_Adjust_XY_active





3.1.1.3.8.3 Action: DP_Adjust_XY_active



Heading

3.1.1.3.8.4 Action: DP_Adjust_XY_entry

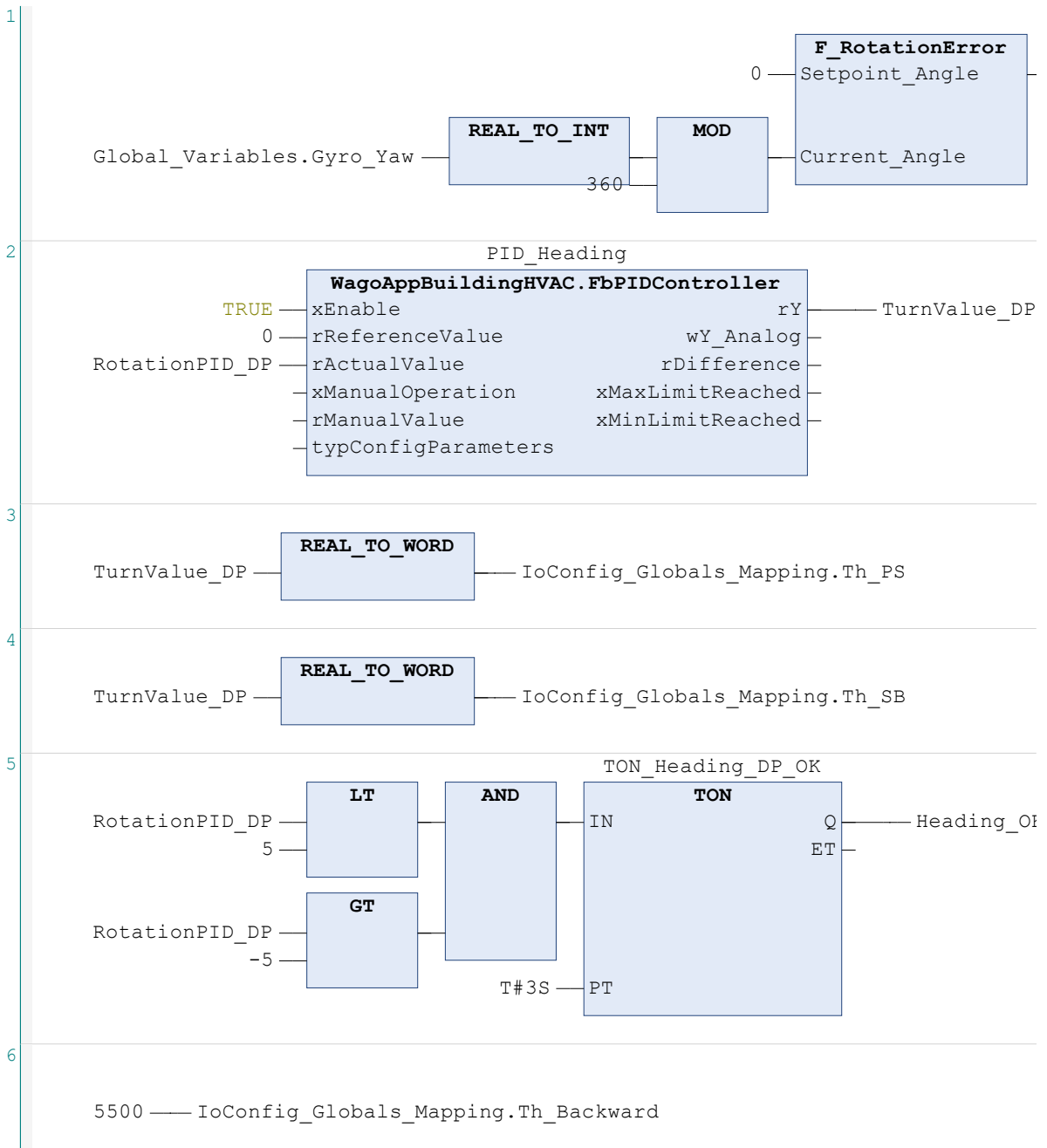
1

Global_Variables.GPS_Longitude — XLat_Coordinate

2

Global_Variables.GPS_Latitude — YLong_Coordinate

3.1.1.3.8.5 Action: DP_Mode_AdjustHeadingactive



—RotationPID_DP

κ

7

5500 — IoConfig_Globals_Mapping.Th_Forward

3.1.1.3.8.6 Action: DP_Setup_active



3.1.1.3.8.6 Action: DP_Setup_active

8

Global_Variables.GPS_Longitude —— Longitude_DP

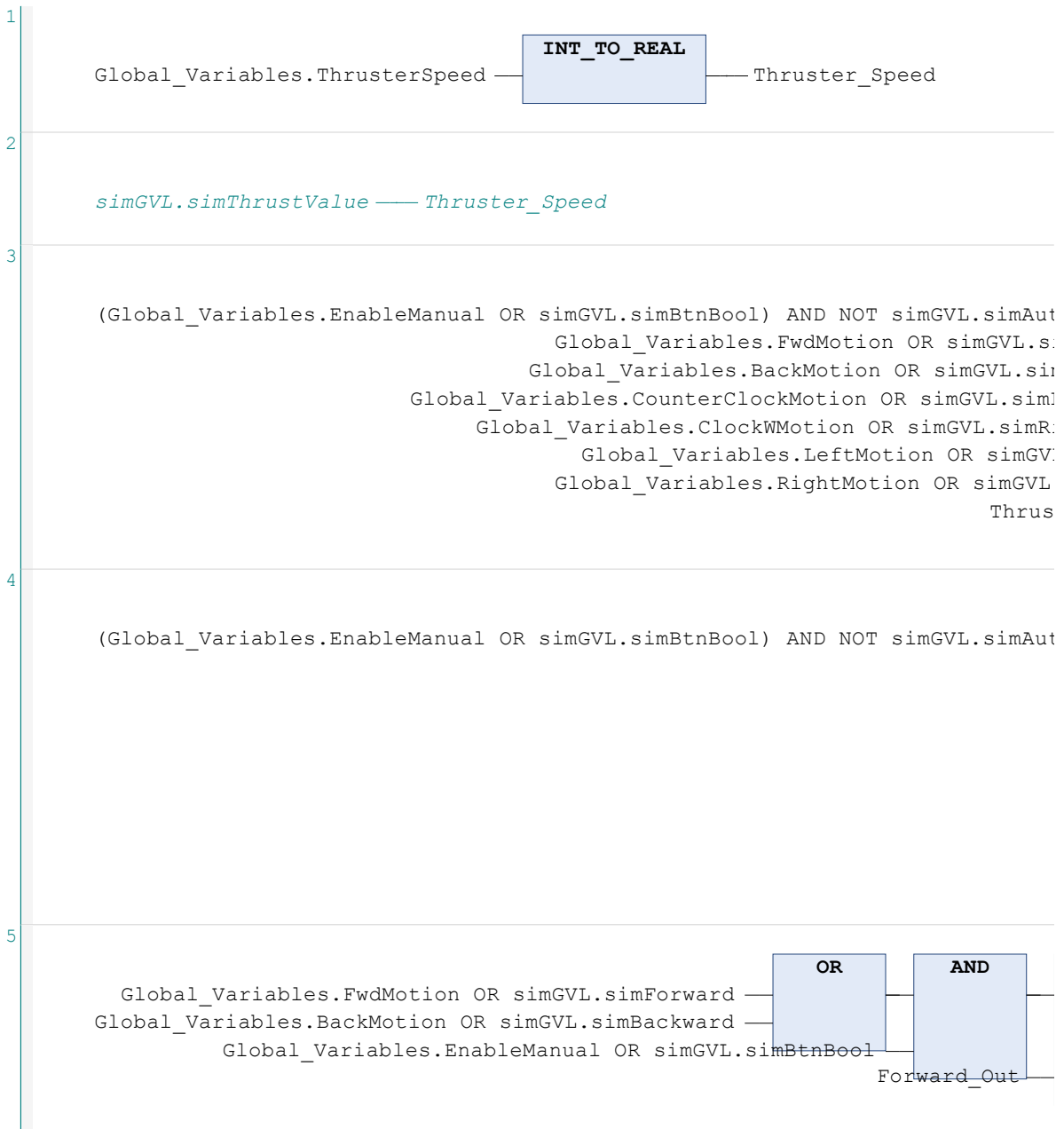
9

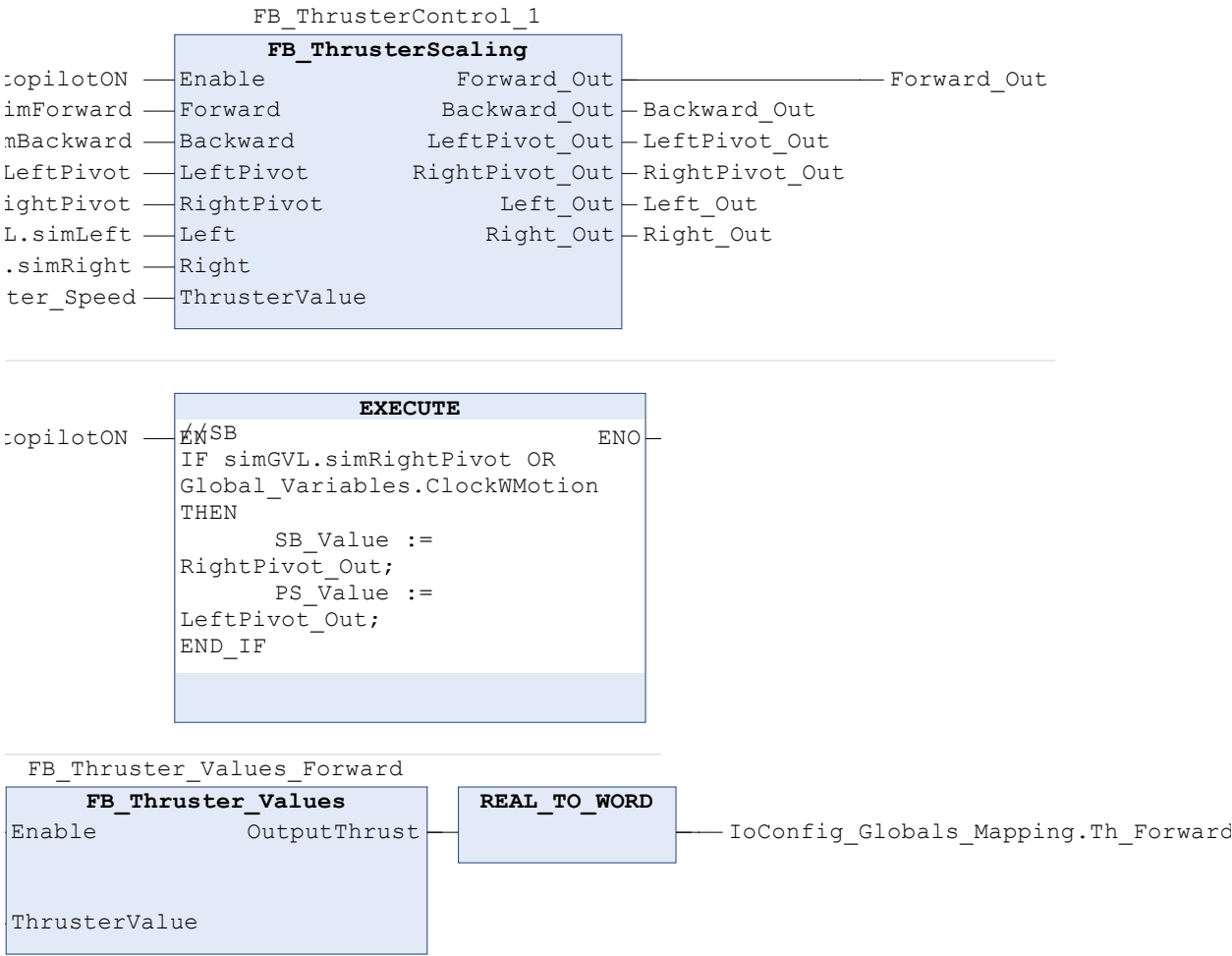
Global_Variables.GPS_Latitude —— Latitude_DP

3.1.1.3.8.7 Action: Init_active



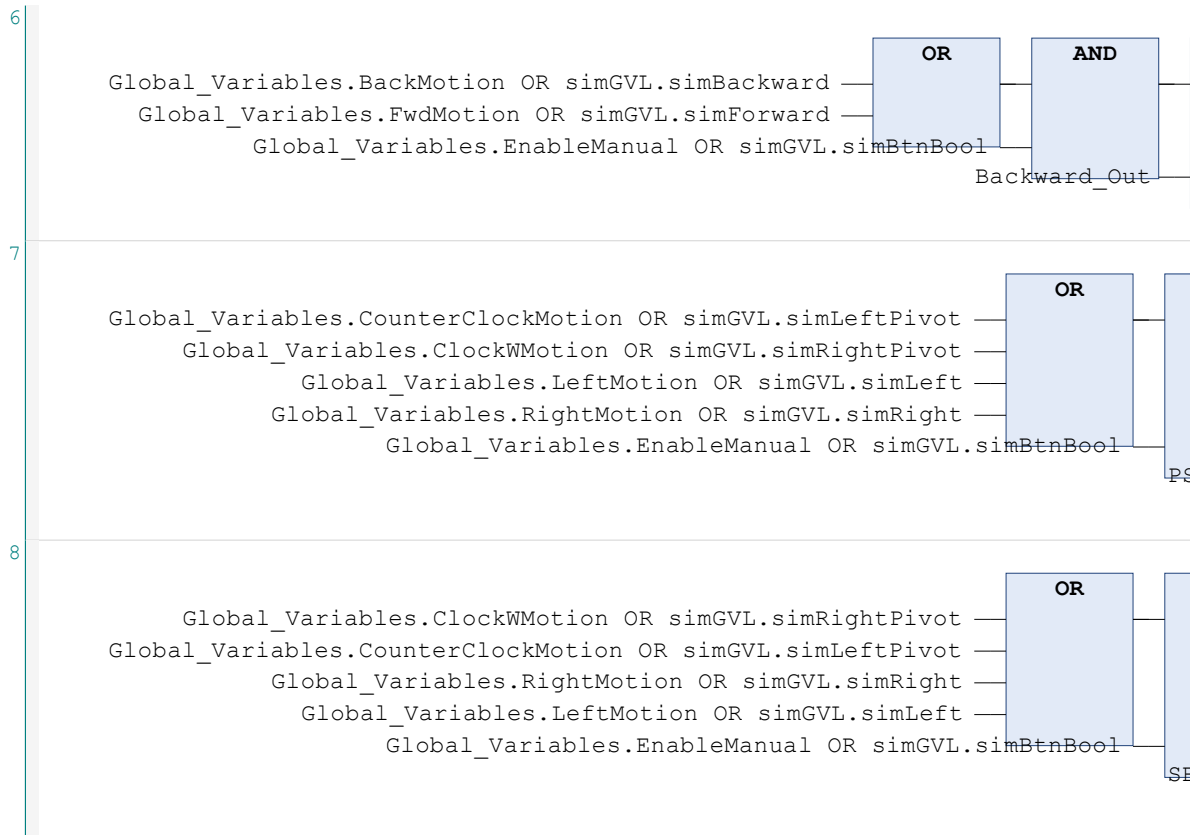
3.1.1.3.8.8 Action: Manual_Control_active

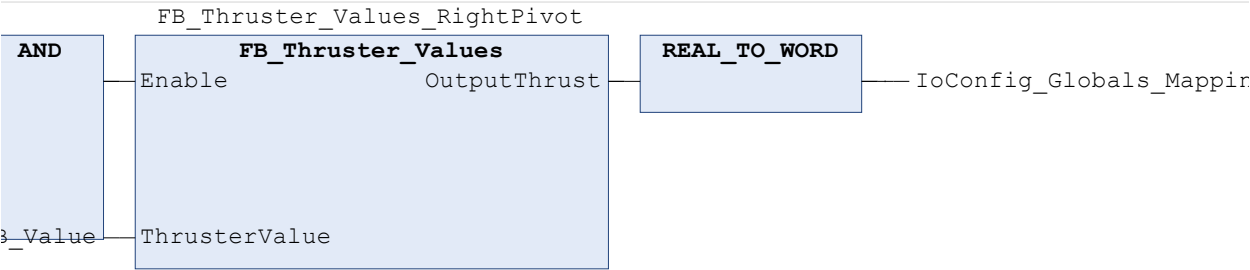
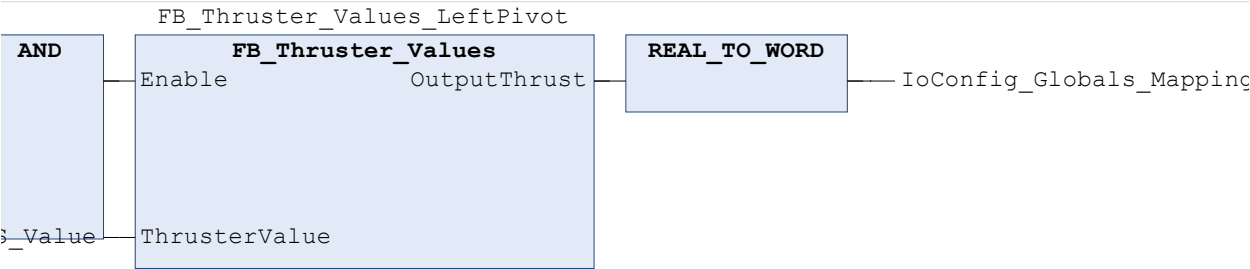
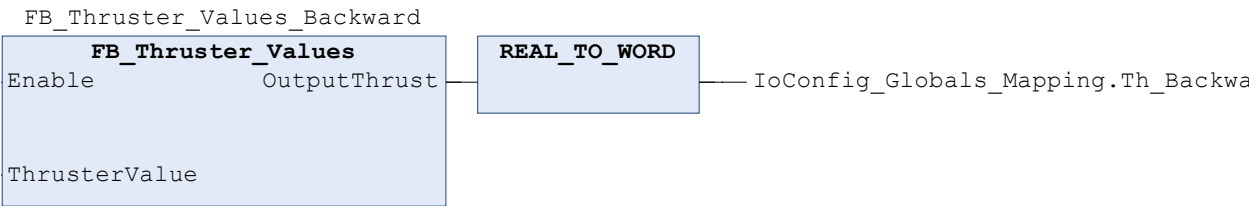




l

3.1.1.3.8.8 Action: Manual_Control_active





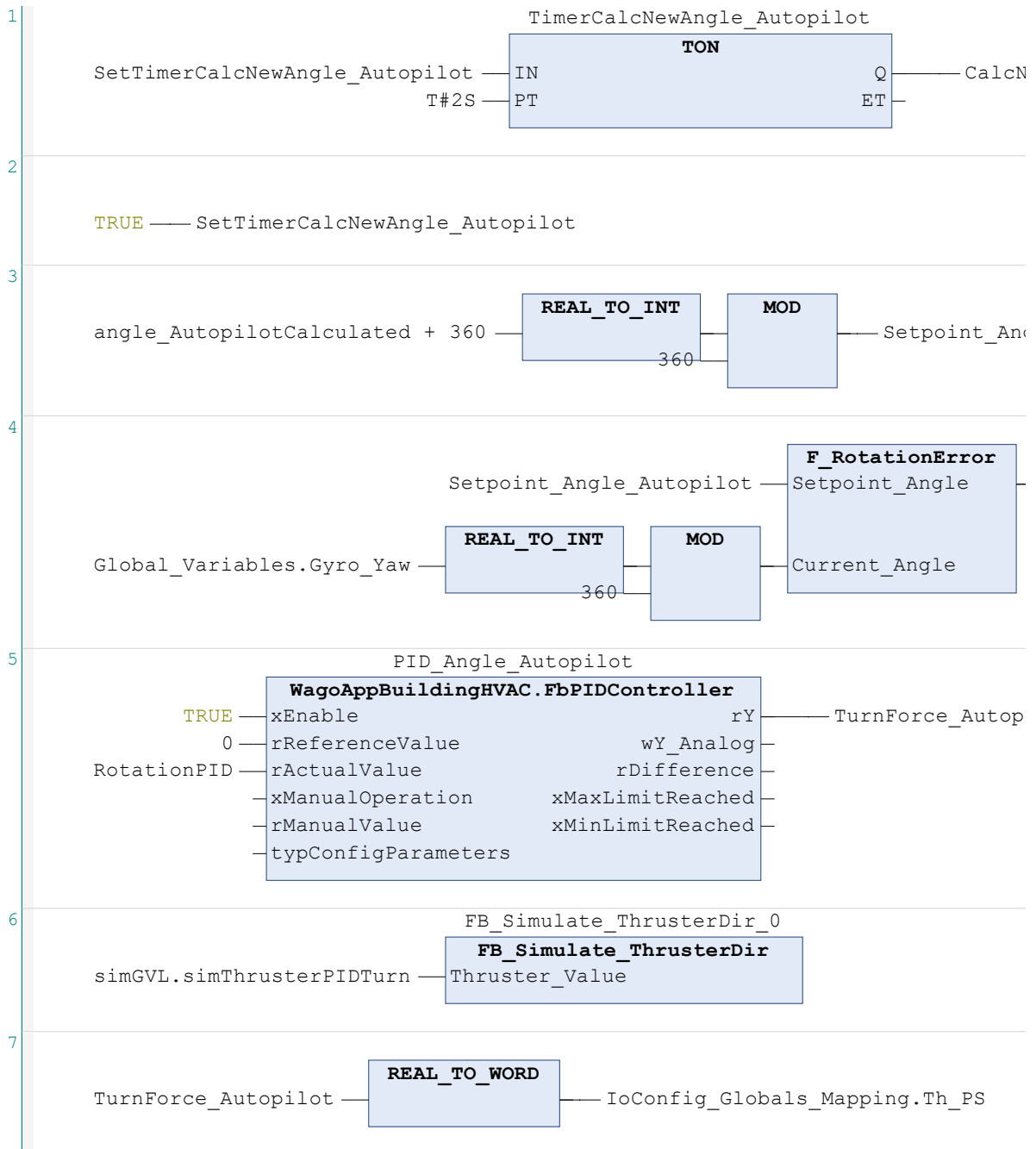
rd

f.Th_PS

ig.Th_SB

3.1.1.3.8.9 Action: Manual_Control_entry

3.1.1.3.8.10 Action: Move_Platform_active



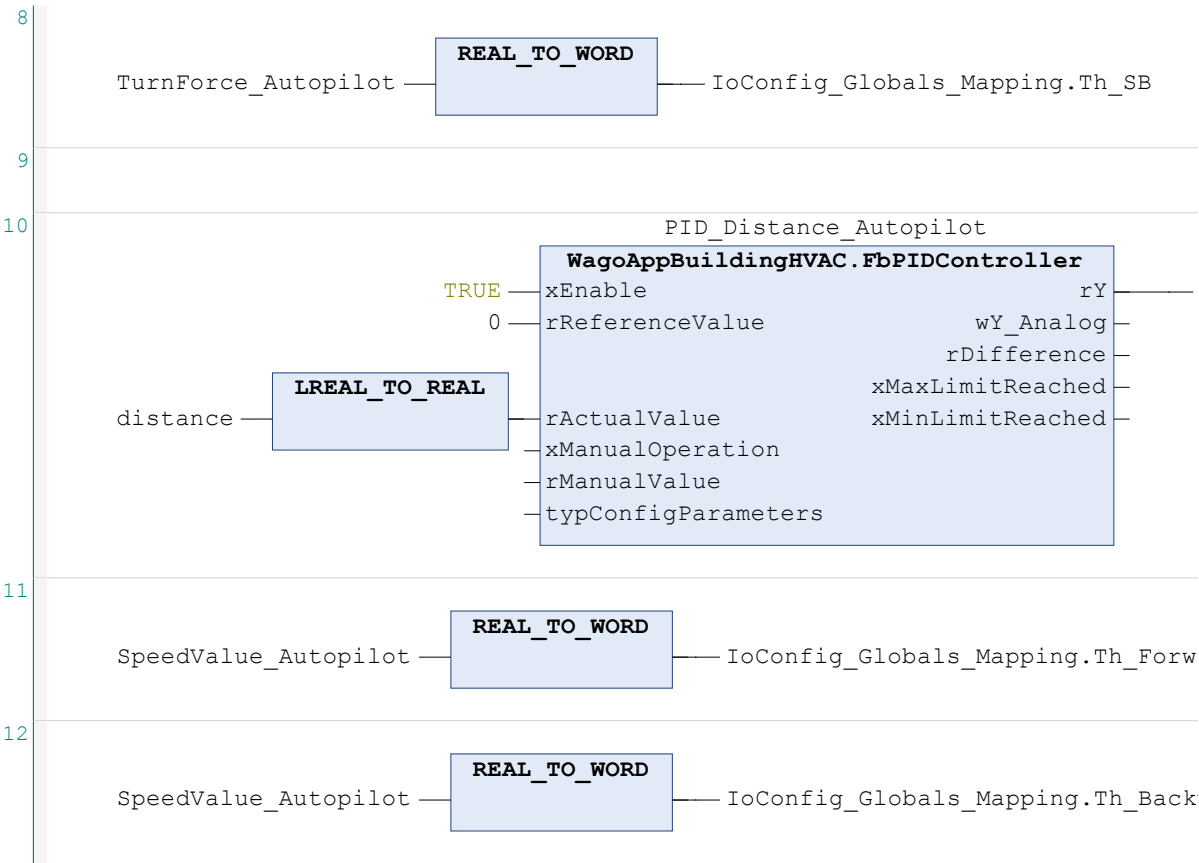
lewAng

gle_Autopilot

— RotationPID

ilot

3.1.1.3.8.10 Action: Move_Platform_active



SpeedValue_Autopilot

ard

ward

3.1.1.3.8.11 Action: Move_Plaform_exit

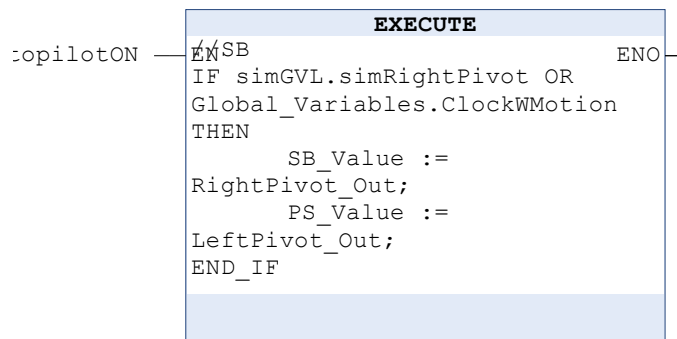
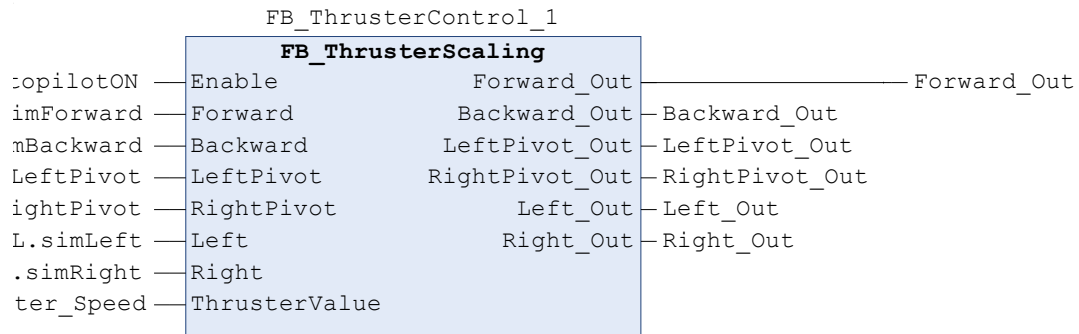
```
1      SetTimerCalcNewAngle_Autopilot := FALSE ;  
2
```

3.1.1.3.9 POU: POU_ThrusterController_Manual

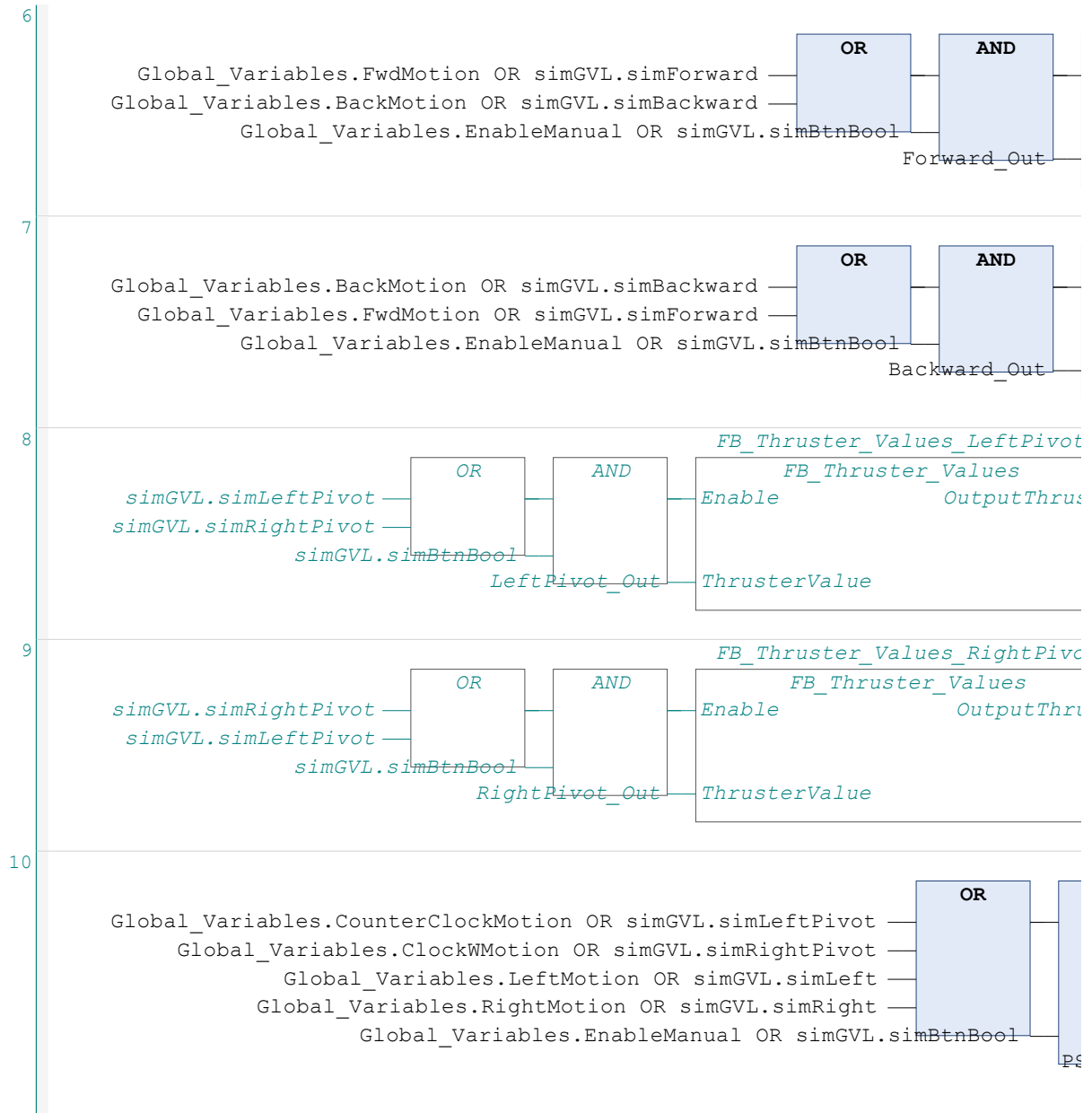
```
1      PROGRAM POU_ThrusterController_Manual  
2      VAR  
3  
4          TestGraph : INT ;  
5          TestGraphSecond : INT ;  
6  
7  
8          Forward_Out : REAL ;  
9          Backward_Out : REAL ;  
10         LeftPivot_Out : REAL ;  
11         RightPivot_Out : REAL ;  
12         Left_Out : REAL ;  
13         Right_Out : REAL ;  
14  
15         PS_Value : REAL ;  
16         SB_Value : REAL ;  
17  
18         FB_ThrusterControl_1 : FB_ThrusterScaling ;  
19         FB_Thruster_Values_Forward : FB_Thruster_Values ;  
20         FB_Thruster_Values_Backward : FB_Thruster_Values ;  
21  
22         FB_Thruster_Values_LeftPivot : FB_Thruster_Values ;  
23         FB_Thruster_Values_RightPivot : FB_Thruster_Values ;  
24  
25         FB_Thruster_Values_Left : FB_Thruster_Values ;  
26         FB_Thruster_Values_Right : FB_Thruster_Values ;  
27  
28         Thruster_Speed : REAL ;  
29     END_VAR  
30     //IF (Enable = TRUE) THEN  
31     //         OutputThrust := ThrusterValue;  
32     //         ELSE  
33     //             OutputThrust := 0;  
34     //END_IF  
35
```



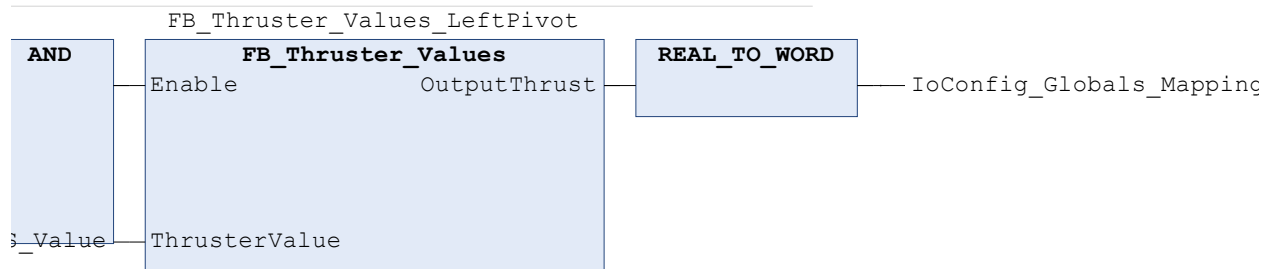
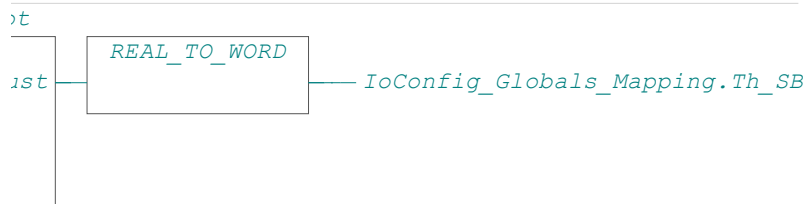
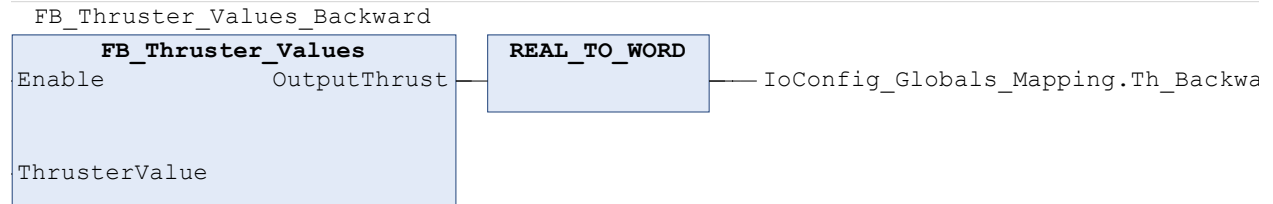
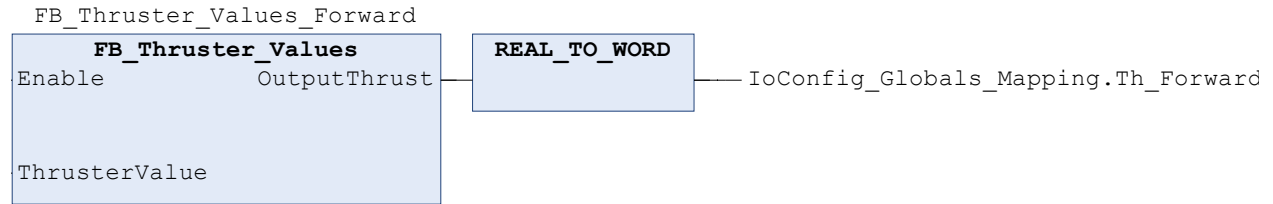
ENO
ble



3.1.1.3.9 POU: POU_ThrusterController_Manual



3.1.1.3.9 POU: POU_ThrusterController_Manual



l

—

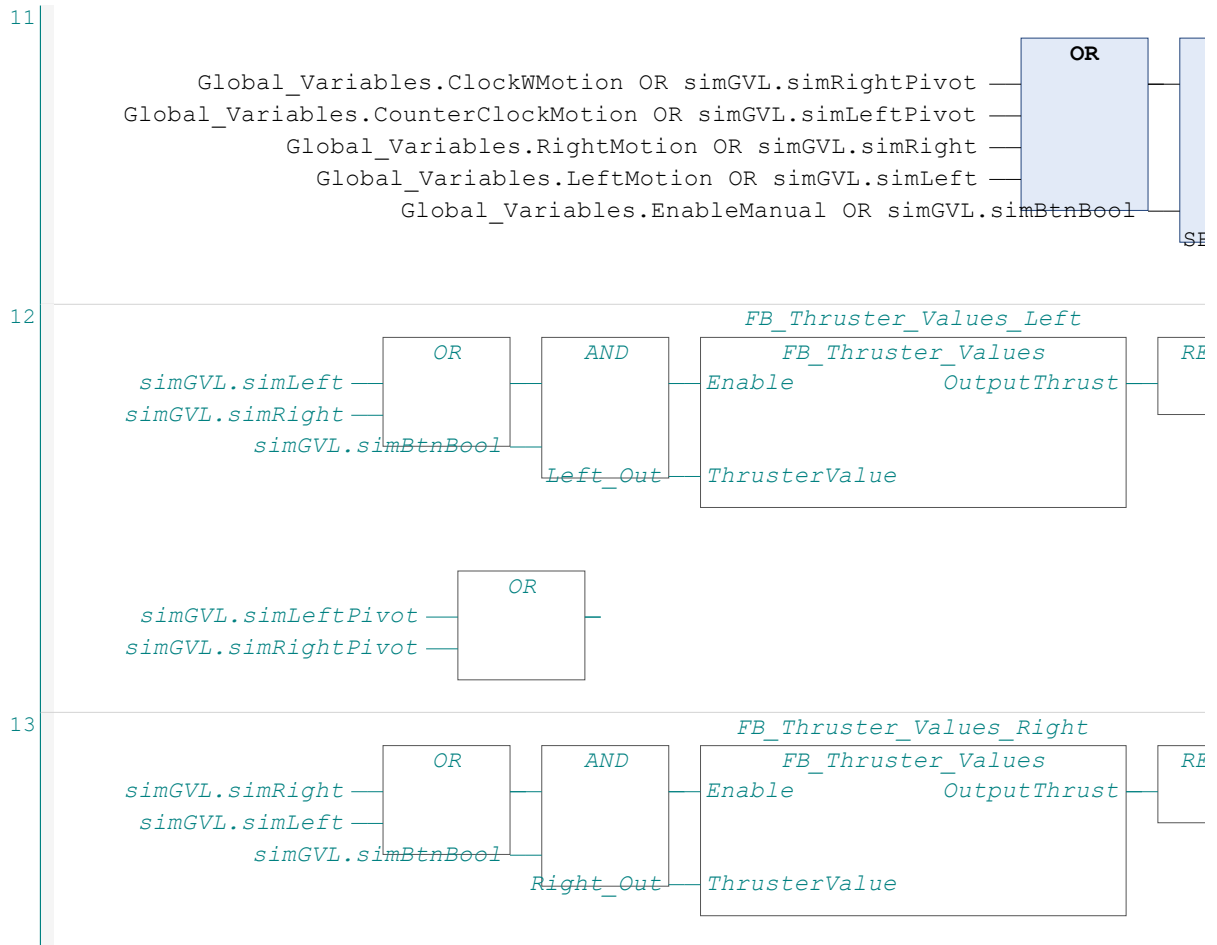
ird

—

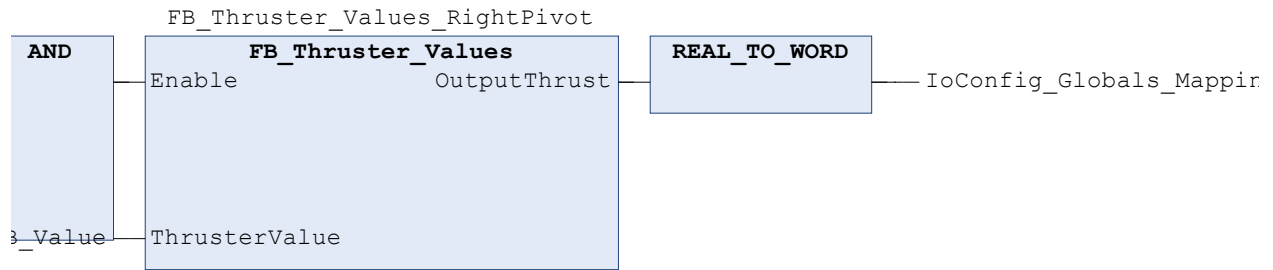
f.Th_PS

—

3.1.1.3.9 POU: POU_ThrusterController_Manual



3.1.1.3.9 POU: POU_ThrusterController_Manual



ig.Th_SB

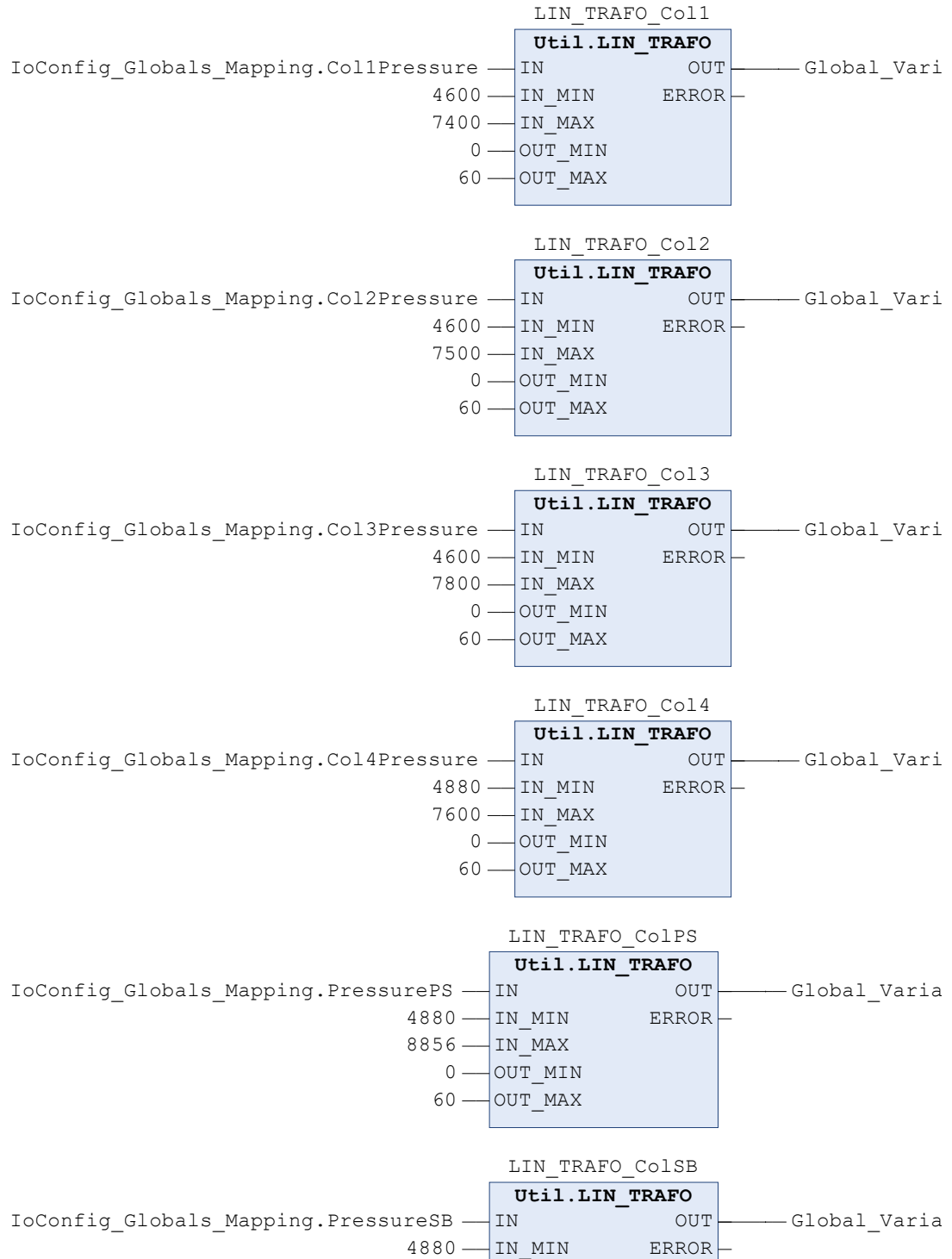
3.1.1.4 Folder: Scaling

3.1.1.4.1 POU: FB_PressureScaling

```
1      PROGRAM FB_PressureScaling
2      VAR
3
4          LIN_TRAFO_Col1 : Util . LIN_TRAFO ;
5          LIN_TRAFO_Col2 : Util . LIN_TRAFO ;
6          LIN_TRAFO_Col3 : Util . LIN_TRAFO ;
7          LIN_TRAFO_Col4 : Util . LIN_TRAFO ;
8          LIN_TRAFO_ColPS : Util . LIN_TRAFO ;
9          LIN_TRAFO_ColSB : Util . LIN_TRAFO ;
10
11         LIN_TRAFO_ColFilter : Util . LIN_TRAFO ;
12
13         FbLowPassFilter_0 : WagoAppBuildingHVAC . FbLowPassFilterAI ;
14         FbLowPassFilter_1 : WagoAppBuildingHVAC . FbLowPassFilterAI ;
15
16         FB_Filter_0 : FB_Filter ;
17
18         rOutput : REAL ;
19     END_VAR
20
```

3.1.1.4.1 POU: FB_PressureScaling

1



ables.PressureCol1

ables.PressureCol2

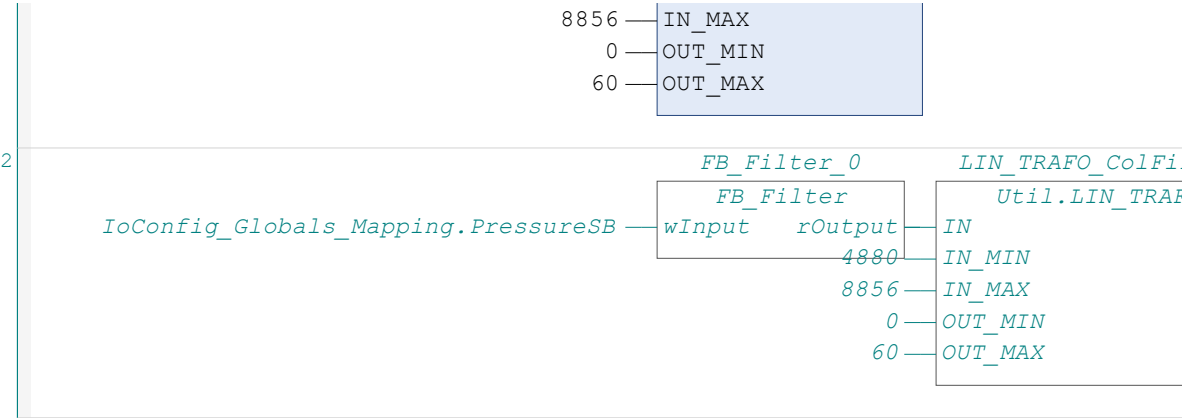
ables.PressureCol3

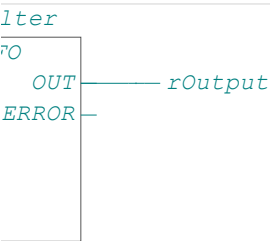
ables.PressureCol4

bles.PressurePS

bles.PressureSB

3.1.1.4.1 POU: FB_PressureScaling





3.1.1.5 POU: PLC_PRG

```
1  PROGRAM PLC_PRG
2  VAR
3  END_VAR
4
```

3.1.1.6 POU: POU_Test

```
1  PROGRAM POU_Test
2  VAR
3
4  END_VAR
5
```

3.1.1.7 POU: POU_Test_PID

```
1  PROGRAM POU_Test_PID
2  VAR
3  FB_CheckPitchRoll_1 : FB_CheckPitchRoll ;
4      draft : REAL ;
5
6
7  END_VAR
8
```

3.1.1.8 Task Configuration: Task configuration

Max. number of tasks: 15
Max. number of cyclic tasks: 15
Max. number of freewheeling tasks: 15
Max. number of event tasks: 15
Max. number of external event tasks: 8
Max. number of status tasks: 15

System Events:

3.1.1.8.1 Task: PLC_Task

Priority: 15
Type: Cyclic
Interval: 50 Unit: ms
Watchdog: Inactive
POUs: FB_PressureScaling
POU_Platform_General
POU_ThrusterControl
POU_TestPumps

3.1.1.8.1.1 Program call: FB_PressureScaling

3.1.1.8.1.2 Program call: POU_Platform_General

3.1.1.8.1.3 Program call: POU_ThrusterControl

3.1.1.8.1.4 Program call: POU_TestPumps

3.1.1.8.2 Task: Task_Winch

Priority: 15
Type: Cyclic
Interval: t#50ms Unit: ms
Watchdog: Inactive
POUs:

3.1.1.8.3 Task: TrendRecordingTask

Priority: 15

Type: Cyclic

Interval: 100 Unit: ms

Watchdog: Inactive

POUs: VisuTrendStorageAccess.GlobalInstances.g_TrendRecordingManager.CyclicCall

3.1.1.8.3.1 Program call: VisuTrendStorageAccess.GlobalInstances.g_TrendRecordingManager.CyclicCall

3.1.1.9 Trace: Trace_ROV

Settings:

Record 'Trace_ROV':

Trigger variable:

Trigger edge: None

Post trigger (samples): 51

Trigger value:

Task: PLC_Task

Measure in every: 1-th cycle

Record condition:

Buffer size: 41

Comment:

POU for visualisation: False

Variables: POU_Platform_General.ROVDepth
POU_Platform_General.ROVOxygenWater
POU_Platform_General.ROVTemp
POU_Platform_General.ROVWaterTemp
POU_Platform_General.ROVHeading
POU_Platform_General.current

3.1.1.10 Trace: Trace_Stabilization

Settings:

Record 'Trace_Stabilization':

Trigger variable:

Trigger edge: None

Post trigger (samples): 51

Trigger value:

Task: PLC_Task

Measure in every: 1-th cycle

Record condition:

Buffer size: 41

Comment:

POU for visualisation: False

Variables: IoConfig_Globals_Mapping.Col1In
IoConfig_Globals_Mapping.Col1Out
IoConfig_Globals_Mapping.Col2In
IoConfig_Globals_Mapping.Col2Out
IoConfig_Globals_Mapping.Col3In
IoConfig_Globals_Mapping.Col3Out
IoConfig_Globals_Mapping.Col4In
IoConfig_Globals_Mapping.Col4Out
Global_Variables.Gyro_Pitch
Global_Variables.Gyro_Roll
POU_Stabilization.corrPitch
POU_Stabilization.corrRoll
Global_Variables.PressurePS
Global_Variables.PressureSB
Global_Variables.PressureCol1
Global_Variables.PressureCol2
Global_Variables.PressureCol3
Global_Variables.PressureCol4

3.1.1.11 Trace: Trace_USV

Settings:

Record 'Trace_USV':

Trigger variable:

Trigger edge: None

Post trigger (samples): 51

Trigger value:

Task: PLC_Task

Measure in every: 1-th cycle

Record condition:

Buffer size: 41

Comment:

POU for visualisation: False

Variables: IoConfig_Globals_Mapping.Th_Forward
IoConfig_Globals_Mapping.Th_Backward
IoConfig_Globals_Mapping.Th_PS
IoConfig_Globals_Mapping.Th_SB
Global_Variables.GPS_Heading
Global_Variables.GPS_Latitude
Global_Variables.GPS_Longitude
Global_Variables.GPS_Speed
Global_Variables.GUI_Latitude
Global_Variables.GUI_Longitude
Global_Variables.Gyro_Pitch
Global_Variables.Gyro_Roll
Global_Variables.Gyro_Yaw
IoConfig_Globals_Mapping.Current_Logg
POU_ThrusterControl.Setpoint_Angle_Autopilot
POU_ThrusterControl.distance
POU_ThrusterControl.SpeedValue_Autopilot
POU_ThrusterControl.Latitude_DP
POU_ThrusterControl.Longitude_DP

3.2 Device: Kbus

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
k-bus cycle time	UINT	10	10		cycle time in [ms]
k-bus event control 1					cycle offset and cycle number
offset	USINT	0	0		offset in number of cycles
cycle number	USINT	2	2		cycle number (disable event with zero)
k-bus event control 2					cycle offset and cycle number
offset	USINT	1	1		offset in number of cycles
cycle number	USINT	4	4		cycle number (disable event with zero)
k-bus event control 3					cycle offset and cycle number
offset	USINT	3	3		offset in number of cycles
cycle number	USINT	8	8		cycle number (disable event with zero)
k-bus event control 4					cycle offset and cycle number
offset	USINT	7	7		offset in number of cycles
cycle number	USINT	16	16		cycle number (disable event with zero)
program start interlock	BOOL	False	TRUE		locks on configuration error

Information

Name: Kbus
Vendor: WAGO
Categories:
Type: 32778
ID: Wago 750-Series Local Bus Interface

3.2 Device: Kbus

Version: 1.4.0.2
Description: WAGO Kbus Interface

3.2.1 Device: Power_Supply_24_VDC

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	0	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Passive module	BOOL	1	1		Mark module as passive
Module compare value	STRING	'0000025AUUUUUUUUU'	'0000025AUUUUUUUUU'		Desired value
Module attitude	STRING	0750-0602	0750-0602		Module attitude

Information

Name: 0750-0602
Vendor: WAGO
Categories:
Type: 32776
ID: 07500602
Version: 0.0.0.9
Order number: 0750-0602
Description: Power Supply 24 VDC

3.2.2 Device: _8DI_24_VDC_3ms

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	1	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'UUUUU8801UUUUUUUUU'	'UUUUU8801UUUUUUUUU'		Desired value
Module attitude	STRING	0750-0430	0750-0430		Module attitude

Information

Name: 0750-0430
Vendor: WAGO
Categories:
Type: 32776
ID: 07500430

3.2.2 Device: _8DI_24_VDC_3ms

Version: 0.0.0.14
Order number: 0750-0430
Description: 8DI 24 VDC 3ms

3.2.3 Device: _8DO_24_VDC_0_5A

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	2	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'UUUUU8802UUUUUUUUU'	'UUUUU8802UUUUUUUUU'		Desired value
Module attitude	STRING	0750-0530	0750-0530		Module attitude

Information

Name: 0750-0530
Vendor: WAGO
Categories:
Type: 32776
ID: 07500530
Version: 0.0.0.15
Order number: 0750-0530
Description: 8DO 24 VDC 0.5A

3.2.4 Device: _8DO_24_VDC_0_5A_1

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	3	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'UUUUU8802UUUUUUUUU'	'UUUUU8802UUUUUUUUU'		Desired value
Module attitude	STRING	0750-0530	0750-0530		Module attitude

Information

Name: 0750-0530
Vendor: WAGO
Categories:
Type: 32776
ID: 07500530

3.2.4 Device: _8DO_24_VDC_0_5A_1

Version: 0.0.0.15
Order number: 0750-0530
Description: 8DO 24 VDC 0.5A

3.2.5 Device: _4AI_10_VDC_SE

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	4	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'000001C9UUUUUUUUU'	'000001C9UUUUUUUUU'		Desired value
Module attitude	STRING	0750-0457	0750-0457		Module attitude

Information

Name: 0750-0457
Vendor: WAGO
Categories:
Type: 32776
ID: 07500457
Version: 0.0.0.9
Order number: 0750-0457
Description: 4AI ±10 VDC SE

3.2.6 Device: _4AI_10_VDC_SE_1

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	5	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'000001C9UUUUUUUUU'	'000001C9UUUUUUUUU'		Desired value
Module attitude	STRING	0750-0457	0750-0457		Module attitude

Information

Name: 0750-0457
Vendor: WAGO
Categories:
Type: 32776
ID: 07500457

3.2.6 Device: _4AI_10_VDC_SE_1

Version: 0.0.0.9
Order number: 0750-0457
Description: 4AI \pm 10 VDC SE

3.2.7 Device: _4AO_0_10_VDC

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	6	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'0000022FUUUUUUUUU'	'0000022FUUUUUUUUU'		Desired value
Module attitude	STRING	0750-0559	0750-0559		Module attitude

Information

Name: 0750-0559
Vendor: WAGO
Categories:
Type: 32776
ID: 07500559
Version: 0.0.0.13
Order number: 0750-0559
Description: 4AO 0-10 VDC

3.2.8 Device: Stepper_Controller_RS422_24_VDC_20mA

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	7	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'0000029EUUUUUUUUU'	'0000029EUUUUUUUUU'		Desired value
Module attitude	STRING	0750-0670	0750-0670		Module attitude

Information

Name: 0750-0670
Vendor: WAGO
Categories:
Type: 32776
ID: 07500670

3.2.8 Device: Stepper_Controller_RS422_24_VDC_20mA

Version: 0.0.0.10
Order number: 0750-0670
Description: Stepper Controller RS422/24 VDC 20mA

3.2.9 Device: Stepper_Controller_RS422_24_VDC_20mA_1

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	8	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'0000029EUUUUUUUUU'	'0000029EUUUUUUUUU'		Desired value
Module attitude	STRING	0750-0670	0750-0670		Module attitude

Information

Name: 0750-0670
Vendor: WAGO
Categories:
Type: 32776
ID: 07500670
Version: 0.0.0.10
Order number: 0750-0670
Description: Stepper Controller RS422/24 VDC 20mA

3.2.10 Device: Inc_Encoder_24_VDC_SE_32bits

K-BUS Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
K-BUS module slot index	BYTE	9	0		K-BUS slot index of the module (1 indexed)
Optional module	BOOL	0	0		Mark module as optional
Module compare value	STRING	'0000027D00000002'	'0000027D00000002'		Desired value
Module attitude	STRING	0750-0637/0000-0002	0750-0637/0000-0002		Module attitude

Information

Name: 0750-0637/0000-0002
Vendor: WAGO
Categories:
Type: 32776
ID: 0750063700000002

Version: 0.0.0.12
Order number: 0750-0637/0000-0002
Description: Inc. Encoder 24 VDC SE 32bits

3.3 Connector: MODBUS

MODBUS I/O Mapping

3.3.1 Device: MODBUS

Information

Name: MODBUS
Vendor: WAGO
Categories:
Type: 32777
ID: 1006 0001
Version: 1.1.1.15
Order number: n/a
Description: This device implements master and slave functionality for MODBUS.

3.3.1.1 Device: LocalDeviceModbus

MODBUS Slave Parameters

Parameters:

Name:	Type:	Value:	Default Value:	Unit:	Description:
OffsetMap	DWORD	16			
OffsetMap	DWORD	0			
OffsetMap	DWORD	64			
OffsetMap	DWORD	128			
OffsetMap	DWORD	192			
OffsetMap	DWORD	400			
OffsetMap	DWORD	256			
OffsetMap	DWORD	320			
OffsetMap	DWORD	400			
OffsetMap	DWORD	32			
OffsetMap	DWORD	448			
OffsetMap	DWORD	0			
OffsetMap	DWORD	1			
OffsetMap	DWORD	2			
OffsetMap	DWORD	3			
OffsetMap	DWORD	4			
OffsetMap	DWORD	5			
OffsetMap	DWORD	6			
OffsetMap	DWORD	7			
OffsetMap	DWORD	8			
OffsetMap	DWORD	9			
OffsetMap	DWORD	10			

3.3.1.1 Device: LocalDeviceModbus

OffsetMap	DWORD	12		
OffsetMap	DWORD	13		
OffsetMap	DWORD	14		
OffsetMap	DWORD	15		
OffsetMap	DWORD	288		
OffsetMap	DWORD	640		
OffsetMap	DWORD	672		
OffsetMap	DWORD	704		
OffsetMap	DWORD	768		
OffsetMap	DWORD	289		
OffsetMap	DWORD	64		
OffsetMap	DWORD	128		
OffsetMap	DWORD	224		
OffsetMap	DWORD	192		
OffsetMap	DWORD	384		
OffsetMap	DWORD	400		
OffsetMap	DWORD	416		
OffsetMap	DWORD	387		
OffsetMap	DWORD	388		
OffsetMap	DWORD	290		
OffsetMap	DWORD	11		
OffsetMap	DWORD	352		
OffsetMap	DWORD	448		
OffsetMap	DWORD	480		
OffsetMap	DWORD	512		
OffsetMap	DWORD	544		
Node ID	UINT	1	1	Used as slave address in RTU and as unit identifier in TCP/UDP
PLC stop behaviour	UDINT	0	2	
Fieldbus error behaviour	UDINT	0	2	
Response Delay	UINT	0	0	Used to delay responses in order to avoid high system load.
Watchdog settings				
Timeout	UINT	0	0	ms Watchdog reset timeout.
Mode	UDINT	0	0	Selects modbus operation mode.
Explicit Trigger	UDINT	0	0	Enables explicit trigger on command WATCHDOG_START for simple mode.
Trigger on Status	UDINT	0	0	Enables trigger additionally on status register read for simple mode.
TCP connection reset	UDINT	0	0	Enables release of all established Modbus TCP connections when watchdog expires.

MODBUS Slave I/O Mapping

Input Parameters:

Mapping:	Channel:	Type:	Address:	Unit:	Description:
Application.Global_Variables.GPS_NumbersOfSatelites		INT			
Application.Global_Variables.GPS_Enabled		BOOL			
Application.Global_Variables.GPS_Latitude		LREAL			
Application.Global_Variables.GPS_Longitude		LREAL			

3.3.1.1 Device: LocalDeviceModbus

Application.Global_Variables.GPS_Heading	LREAL
Application.Global_Variables.ConnectionCheck	BOOL
Application.Global_Variables.Gyro_Pitch	REAL
Application.Global_Variables.Gyro_Roll	REAL
Application.Global_Variables.Gyro_Yaw	REAL
Application.Global_Variables.GPS_Speed	REAL
Application.Global_Variables.FwdMotion	BOOL
Application.Global_Variables.BackMotion	BOOL
Application.Global_Variables.RightMotion	BOOL
Application.Global_Variables.LeftMotion	BOOL
Application.Global_Variables.ClockWMotion	BOOL
Application.Global_Variables.EnableLight	BOOL
Application.Global_Variables.EnableFlute	BOOL
Application.Global_Variables.PlatformEnable	BOOL
Application.Global_Variables.EnableAuto	BOOL
Application.Global_Variables.EnableManual	BOOL
Application.Global_Variables.WinchUp	BOOL
Application.Global_Variables.WinchDown	BOOL
Application.Global_Variables.Winch_Lock_On	BOOL
Application.Global_Variables.Winch_Lock_Off	BOOL
Application.Global_Variables.Start_Pump	BOOL
Application.Global_Variables.ThrusterSpeed	INT
Application.Global_Variables.WinchSpeed	INT
Application.Global_Variables.GUI_Latitude	REAL
Application.Global_Variables.GUI_Longitude	REAL
Application.Global_Variables.CounterClockMotion	BOOL
Application.Global_Variables.GUI_ConCheck	BOOL
Application.Global_Variables.Enable_DP	BOOL
Application.Global_Variables.ROVTemp	REAL
Application.Global_Variables.ROVDepth	REAL
Application.Global_Variables.ROVWaterTemp	REAL
Application.Global_Variables.ROVOxygenWater	REAL
Application.Global_Variables.ROVHeading	REAL

Output Parameters:

Mapping:	Channel:	Type:	Address:	Unit:	Description:
Application.Global_Variables.platLat		REAL			
Application.Global_Variables.PlatLong		REAL			
Application.Global_Variables.platYaw		REAL			
Application.Global_Variables.platRoll		REAL			
Application.Global_Variables.platHeading		REAL			
Application.Global_Variables.platSpeed		REAL			
Application.Global_Variables.platROVLocked		BOOL			
Application.Global_Variables.platROVUpperPos		BOOL			
Application.Global_Variables.platDP_ModeEnabled		BOOL			
Application.Global_Variables.platAutopilot_Enabled		BOOL			
Application.Global_Variables.platManual_ModeEnabled		BOOL			

Information

Name: MODBUS Slave
Vendor: WAGO

Categories:

Type: 32777

ID: 1006 0001

Module ID: Slave

Version: 1.1.1.15

Order number: n/a

Description: A MODBUS Slave responds as server to requests from a set of masters.

3.3.1.1.1 Device: TcpSettings

MODBUS Slave Parameters**Parameters:**

Name:	Type:	Value:	Default Value:	Unit:	Description:
TCP Port	UINT	502	502		An TCP Server port to accept connections from a set of masters.
TCP connection watchdog	UINT	200	2000	10ms	The server resets a client connection if no valid request received within this time.
Type of Service settings					
Low Delay	UDINT	1	1		
High Throughput	UDINT	0	0		
High Reliability	UDINT	0	0		
TCP keepalive settings					
Enabled	UDINT	0	0		Activates TCP keepalive for Modbus connections.
Idle Time	UINT	7200	7200	Seconds	Time until keepalive probe starts.
Interval	UINT	1	1	Seconds	Interval between keepalive probes.
Count	UINT	10	10		Number of keepalive probes.

Information

Name: Modbus TCP Slave

Vendor: WAGO

Categories:

Type: 32777

ID: 1006 0001

Module ID: TCP Slave

Version: 1.1.1.15

Order number: n/a

Description: Modbus TCP Slave

3.4 Connector: Serial