JVL IO-Link Library Manual

Siemens S7-1200 & S7-1500 PLC Function Block Library for the control of JVL Motors with IO-Link

V1.0 01/2025

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1 Note

Please note that this library has been tested with MacTalk V1.91.01.46.

2 Configuration

2.1 Requirements

TIA Portal V16 or higher.

TIA Portal project containing an S7-1200 or S7-1500 PLC.

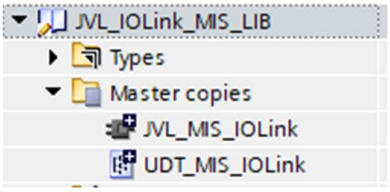
MacTalk project for the JVL motor configuration.

2.2 Import Library

To import the JVL IO-Link Function Block library into TIA Portal, right-click in the Global Libraries section of the Library sidebar in TIA Portal, and select 'Retrieve Library…'. Select the library archive (.zal16 file) then choose the destination to save the extracted library files.

When opened with later versions of TIA Portal the library will be updated to the required version automatically.

2.2.1 Add Library Components



2.2.1.1 User data Types (UDTs)

The UDTs are required for the function blocks to be compiled. In the Master Copies folder within the library, drag the 'UDT_MIS_IOLink' group into the PLC's 'PLC data types' folder.

2.2.1.2 Device Specific Function Blocks

Drag the 'JVL_MIS_IOLink' group into the PLC's 'Program blocks' folder.

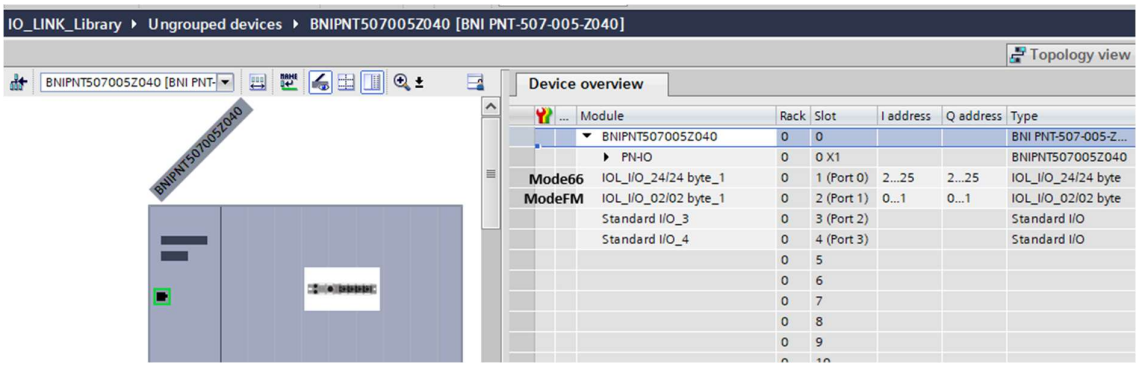
2.2.1.3 External Source Files

You can also add the IOLink_LIB.scl in the External Source Files and "Generate blocks from source".

2.3 Device Configuration

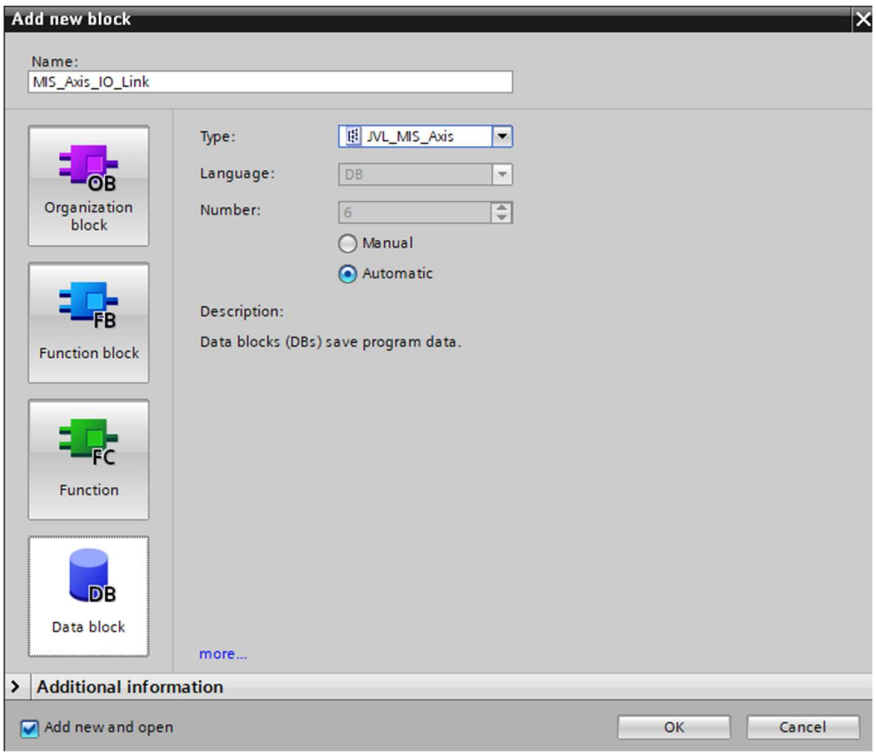
2.3.1 Mode66 and ModeFM

It is possible to choose between 2 IO-Link Modes. In Mode66 you exchange 24 read and write bytes and in ModeFM you exchange 2 bytes.



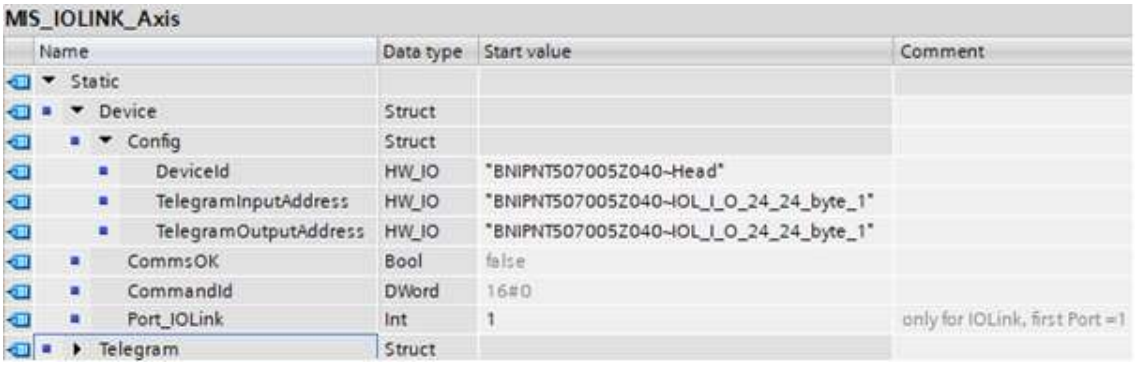
2.3.2 Data Blocks Mode66

For each JVL device/axis, a data block must be created of the correct type. A data block can be created using the 'Add new block' command, located under the 'Program blocks' PLC folder. For MIS devices, create a data block of type JVL_MIS_Axis.



2.3.2.1 Data block Configuration

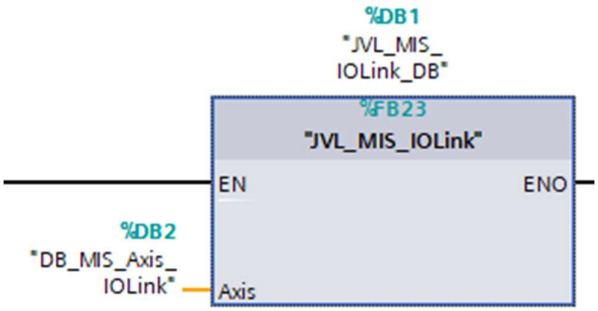
Each of the axis data blocks must be configured, in order to link the data block to its corresponding JVL motor. The Device > Config section within the data block contains parameters which must be set.



Name	Description
DeviceId	Used to define the main address of the unit, used to perform ISDU parameter reads and writes.
TelegramInputAddress	Hardware address of 24 bytes exchange
TelegramOutputAddress	Hardware address of 24 bytes exchange
CommsOk	Communication is ok
CommandId	ID for a called Functionblock
Port_IOLink	For Port 0 = 1, Port 1 = 2….., only for IO-Link

The device ID and telegram input and output address values can be found in the PLC Tags > Show All Tags > System Constants section.

These data blocks will be used as the Axis InOut on all the motion function blocks in this library. For example:



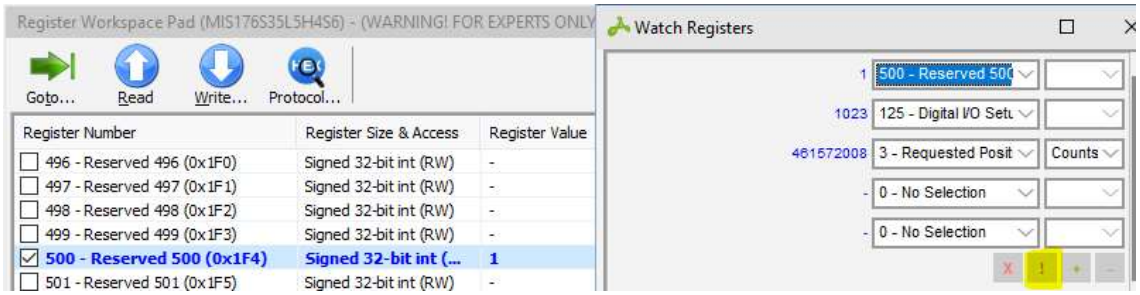
When you call these function blocks in Main[OB1] then you can control these motors by the instance Datablock JVL_MIS_IOLink_DB.

JVL_MIS_IOLink_DB

Name	Data type
Input	
Output	
InOut	
Axis	"JVL_MIS_Axis"
Static	
Disable	"JVL_MIS_Disable"
Halt	"JVL_MIS_Halt"
Velocity	"JVL_MIS_Velocity"
Position	"JVL_MIS_Position"
Jog	"JVL_MIS_Jog"
HomeSimple	"JVL_MIS_Home_IO...
Reset	"JVL_MIS_Reset"
ActualPosition	DInt
ActualTorque	DInt
FollowError	DInt
InputStatus	SInt
RequestedTorque	DInt

2.4 MacTalk Configuration Mode66

In the MacTalk project for your JVL device you have to set register 500 = 1 (in Watch Registers) to choose Mode 66 (24 bytes read/write exchange).

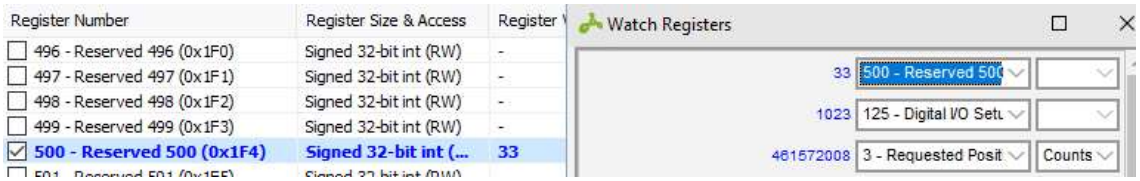


See also description in IOLINK_Rev0_2.pdf.

> Once configured, please remember to click the "Save in Motor" button in order to save configuration in the drive.

2.5 MacTalk Configuration ModeFM

In the MacTalk project for your JVL device you have to set register 500 = 33 (in Watch Registers) to choose ModeFM (2 bytes read/write exchange).



See also description in IOLINK_Rev0_2.pdf.

> Once configured, please remember to click the "Save in Motor" button in order to save configuration in the drive.

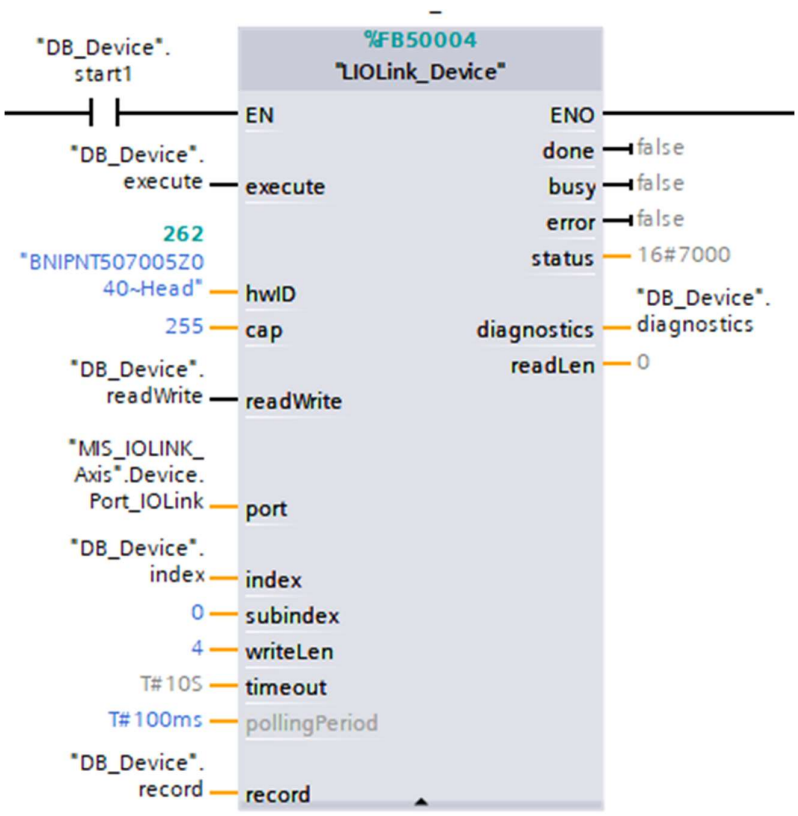
3 Acyclic Communication

3.1 LIOLink_Device

3.1.1 Description

Read or write an ISDU-parameter.

This function block performs acyclic read/write of ISDU registers. Acyclic operations take multiple PLC cycles to complete.



3.1.2 Inputs

Input	Data Type	Description
Execute	Bool	
hwID	HW_IO	Hardware address for the acyclic communication
Cap	Int	Depends on IO-Link Master, Balluff=255
readWrite	Bool	Read=false, write = true
Port	Int	Port on IO-Link Master, starts with 1 (Port 0)
Index	Int	ISDU Parameter, also write to MIS registers = register number + 256
subindex	Int	0
writeLen	Int	4, 4 bytes Registers
Timeout	Time	10s, Time after which the request is aborded
pollingPeriod	Time	100ms, period of polling

3.1.3 Outputs

Output	Data Type	Description
Done	Bool	Successfully completed
Busy	Bool	Reading or writing
Error	Bool	Error occurred
Status	Word	Status of FB
diagnostics	LIOLink_typeDiagnostics	Diagnostic information
readLen	Int	Length of read data record, number of bytes, 4 bytes

3.1.4 InOut

InOut	Data Type	Description
record	Array[0..3] of byte	Record Data for reading and writing, 4 byte Array, Bytes must be swapped,

3.1.5 ISDU Parameter

ISDU Parameter	Description
69	requested Velocity
70	requested Acceleration
71	requested Torque
102	Homing Position (rw)
104	Homing Velocity (rw)
105	Homing Torque (Mechanical homing) (rw)
106	Homing Method
196	Homing sensor input selection IO1..4 [0..4] (rw)
86	Max. allowed follow err (rw)
92	Min. allowed Position/Modulus size (rw)
94	Max. allowed Position/Modulus size (rw)
96	Error deceleration (rw)
277	Min. Torque applied (rw)
190	Modulus operation setup [0=disabled, 1=Singletun CW, 2=Singleturn CCW, 3=Multiturn CW, 4=Multiturn CCW] (rw)
243	Brake output selction IO1..4 (rw)
189	IO1..4 Configuration [bit0..4: active level, bit8..11: Input/Output] (rw)
99	Errorcode (ro)
100	Warningcode (ro)
161	P+ Supply voltage (ro)
310	Temperature (ro)

3.1.6 Motion Vectors

113	P1
129	V1
137	ACC1
115	P2
130	V2
138	ACC2
117	P3
131	V3
139	ACC3
119	P4
132	V4
140	ACC4

4 IO-Link Function Blocks in Mode66

4.1 JVL_MIS_Disable

4.1.1 Description

Place the drive in passive mode, removing all torque from the motor.

If the motor is running then it stops with the configured deceleration of the command that is in progress.

> Caution, this can result in a long stopping distance if the configured deceleration is low. It is recommended that JVL_MIS_Halt is used with suitable deceleration before then executing JVL_MIS_Disable.

4.1.2 Inputs/InOut

Input	Data Type
Execute	Bool
Axis	JVL_MIS_AXIS

4.1.2.1 Execute

A rising edge is required to start the motion command. If the input is given a rising edge whilst a motion command is currently running, then the current motion command is overriden/aborted. The input is not required to remain TRUE for the duration of the motion command.

4.1.2.2 Axis

The axis input should be linked to a data block of type JVL_MIS_Axis. This data block provides axis references to the unit and to its telegram slots.

4.1.3 Outputs

Output	Data Type
Busy	Bool
Done	Bool
Command Aborted	Bool
Error	Bool

4.1.3.1 Busy

Busy is TRUE whenever the motion command is running and the Error output is FALSE.

4.1.3.2 Done

Done is TRUE when the motor has been successfully disabled.

4.1.3.3 Command Aborted

The command was interrupted by the execution of another command.

4.1.3.4 Error

Error is TRUE if there is an error in the drive while the motion command is running, given by the Error signal in the Error word (register 35 Error bit 0).

4.2 JVL_MIS_Halt

4.2.1 Description

Brings the motor to a standstill with defined deceleration.

4.2.2 Inputs/InOut

Input	Data Type	Units
Execute	Bool	
Deceleration	LReal	RPM/s
Axis	JVL_MIS_AXIS	

4.2.2.1 Execute

A rising edge is required to start the motion command.
If the input is given a rising edge whilst a motion command is currently running, then the current motion command is overridden/aborted.
The input is not required to remain TRUE for the duration of the motion command.
Setting the value of Execute to FALSE during the motion command will not stop the motion command.

4.2.2.2 Deceleration

The target deceleration in RPM/s.

4.2.2.3 Axis

The axis input should be linked to a data block of type JVL_MIS_Axis. This data block provides axis references to the unit and to its telegram slots.

4.2.3 Outputs

Output	Data Type
Busy	Bool
Done	Bool
Command Aborted	Bool
Error	Bool

4.2.3.1 Busy

Busy is TRUE whenever the motion command is running (both when the motor is accelerating and when 'At Velocty') and the Error output is FALSE.

4.2.3.2 Done

Done is TRUE when the motor has come to a standstill.

4.2.3.3 Command Aborted

The command was interrupted by the execution of another command.

4.2.3.4 Error

Error is TRUE if there is an error in the drive while the motion command is running, given by the Error signal in the Error word (register 35 Error bit 0).

4.3 JVL_MIS_Home_IOLink_Simple

4.3.1 Description

Homes or references the motor position. When you are not able to use the acyclic communication with the FB LIOLink_Device.

4.3.2

4.3.3 Inputs

Input	Data Type	Units
Execute	Bool	
Mode	Int	
Acceleration	LReal	RPM/s
Deceleration	LReal	RPM/s

4.3.3.1 Execute

A rising edge is required to start the motion command.
If the input is given a rising edge whilst a motion command is currently running, then the current motion command is overriden/aborted.
The input is not required to remain TRUE for the duration of the motion command.
Setting the value of Execute to FALSE during the motion command will not stop the motion command.

4.3.3.2 Mode

Set the homing method.

Value	Name
0	Set Home Position
1	Home to Sensor
2	Home to Endstop

0 - Set Home Position
The current motor actual position is set to the value of the Position input. The motor does not move. If the motor is running then it is stopped.

1 - Home to Sensor

The motor runs until it reaches the home sensor and then stops. The position of the motor is set relative to the point at which the home sensor was triggered. The exact homing operation is configured in MacTalk.

2 - Home to Endstop

The motor runs until the torque limit is reached. The position of the motor is set relative to the point at which the torque limit was reached.

4.3.3.3 Acceleration

The target acceleration in RPM/s.

Only effective in homing modes 1 and 2.

4.3.3.4 Deceleration

The target acceleration in RPM/s.

Only effective in homing modes 1 and 2.

4.3.3.5 Axis

The axis input should be linked to a data block of type JVL_MIS_Axis. This data block provides axis references to the unit and to its telegram slots.

4.3.4 Outputs

Output	Data Type
Busy	Bool
Done	Bool
Command Aborted	Bool
Error	Bool

4.3.4.1 Busy

Busy is TRUE whenever the motion command is running and the Error output is FALSE.

4.3.4.2 Done

Done is TRUE when the homing sequence has completed and the axis has been successfully referenced.

4.3.4.3 Command Aborted

The command was interrupted by the execution of another command.

4.3.4.4 Error

Error is TRUE if there is an error in the drive while the motion command is running, given by the Error signal in the Error word (register 35 Error bit 0).

4.4 JVL_MIS_Jog

4.4.1 Description

Run the motor at the specified velocity. The axis is stopped when the control inputs JogForwards and JogBackwards are reset.

4.4.2 Inputs/InOut

Input	Data Type	Units
JogForwards	Bool	
JogBackwards	Bool	
Velocity	LReal	RPM
Acceleration	LReal	RPM/s
Deceleration	LReal	RPM/s
Axis	JVL_MIS_AXIS	

4.4.2.1 JogForwards

When TRUE, the axis runs in the positive direction at the speed set in the Velocity input.

4.4.2.2 JogBackwards

When TRUE, the axis runs in the negative direction at the speed set in the Velocity input.

> Note: If JogForwards and JogBackwards are both set TRUE, the axis will come to a standstill.

4.4.2.3 Velocity

The target velocity in RPM. Giving a negative value will NOT reverse the motor direction.

4.4.2.4 Acceleration

The target acceleration in RPM/s.

4.4.2.5 Deceleration

The target deceleration in RPM/s. If set to 0, the value in Acceleration is used instead.

4.4.2.6 Axis

The axis input should be linked to a data block of type JVL_MIS_Axis. This data block provides axis references to the unit and to its telegram slots.

4.4.3 Outputs

Output	Data Type
Busy	Bool
At Velocity	Bool
Command Aborted	Bool
Error	Bool

4.4.3.1 Busy

Busy is TRUE whenever the motion command is running (both when the motor is accelerating/decelerating and when 'At Velocity') and the Error output is FALSE.

4.4.3.2 At Velocity

At Velocity is TRUE when the drive has reached the motion command target velocity and the Error output is FALSE.

4.4.3.3 Command Aborted

The command was interrupted by the execution of another command or an error on the motor (e.g. position limit reached).

4.4.3.4 Error

Error is TRUE if there is an error in the drive while the motion command is running, given by the Error signal in the Error word (register 35 Error bit 0).

4.5 JVL_MIS_Position

4.5.1 Description

Move the axis to the specified position, or by the specified distance.

4.5.2 Inputs/InOut

Input	Data Type	Units
Execute	Bool	
ContinuousUpdate	Bool	
Position	LReal	Counts
Velocity	LReal	RPM
Acceleration	LReal	RPM/s
Deceleration	LReal	RPM/s
AbsolutePositioning	Bool	
Axis	JVL_MIS_AXIS	

4.5.2.1 Execute

A rising edge is required to start the motion command.
If the input is given a rising edge whilst a motion command is currently running, then the current motion command is overriden/aborted.
The input is not required to remain TRUE for the duration of the motion command.
Setting the value of Execute to FALSE during the motion command will not stop the motion command.

4.5.2.2 ContinuousUpdate

If ContinuousUpdate is TRUE when the Execute input is set then the Position and Velocity inputs can be changed while the motion command is active and the new values are applied immediately (with the defined acceleration and deceleration).

A change to the ContinuousUpdate input is not effective when the command is running, Execute must be re-triggered to change ContinuousUpdate.

4.5.2.3 Position

The axis target position, or distance to move, in encoder counts. See AbsolutePositioning input and ContinuousUpdate input.

4.5.2.4 Velocity

The target velocity for the positional move in RPM. See ContinuousUpdate input.

A negative velocity does not affect the direction of movement.

4.5.2.5 Acceleration

The target acceleration in RPM/s.

Acceleration is not affected by the ContinuousUpdate input, the value when execute was triggered is used. Execute must be re-triggered to change the acceleration.

4.5.2.6 Deceleration

The target deceleration in RPM/s. If set to 0, the value in Acceleration is used instead. Deceleration is not affected by the ContinuousUpdate input, the value when execute was triggered is used. Execute must be re-triggered to change the deceleration.

4.5.2.7 AbsolutePositioning

Choose between absolute or relative positioning.

Value	Description
TRUE	Absolute Positioning Selected
FALSE	Relative Positioning Selected

4.5.2.8 Axis

The axis input should be linked to a data block of type JVL_MIS_Axis. This data block provides axis references to the unit and to its telegram slots.

4.5.3 Outputs

Output	Data Type
Busy	Bool
Done	Bool
Command Aborted	Bool
Error	Bool

4.5.3.1 Busy

Busy is TRUE whenever the motion command is running (both when the motor is accelerating and when 'At Velocty') and the Error output is FALSE.

4.5.3.2 Done

Done is TRUE when the positioning command has completed successfully.

4.5.3.3 Command Aborted

The command was interrupted by the execution of another command or an error on the motor (e.g. position limit reached).

4.5.3.4 Error

Error is TRUE if there is an error in the drive while the motion command is running, given by the Error signal in the Error word (register 35 Error bit 0).

4.6 JVL_MIS_Reset

4.6.1 Description

Resets any errors or faults in the drive.

4.6.2 Inputs/InOut

Input	Data Type
Execute	Bool
Axis	JVL_MIS_AXIS

4.6.2.1 Execute

A rising edge is required to start the command.
If the input is given a rising edge whilst a command is currently running, then the current command is overriden/aborted.
The input is not required to remain TRUE for the duration of the command.
Setting the value of Execute to FALSE during the command will not stop the command.

4.6.2.2 Axis

The axis input should be linked to a data block of type JVL_MIS_Axis. This data block provides axis references to the unit and to its telegram slots.

4.6.3 Outputs

Output	Data Type
Busy	Bool
Done	Bool
Command Aborted	Bool

4.6.3.1 Busy

Busy is TRUE whenever the command is in progress.

4.6.3.2 Done

Done is TRUE when the reset command has completed successfully.

4.6.3.3 Command Aborted

The command was interrupted by the execution of another command.

4.7 JVL_MIS_Velocity

4.7.1 Description

Run the motor at the specified velocity.

4.7.2 Inputs/InOut

Input	Data Type	Units
Execute	Bool	
ContinuousUpdate	Bool	
Velocity	LReal	RPM
Acceleration	LReal	RPM/s
Deceleration	LReal	RPM/s
Direction	Bool	
Axis	JVL_MIS_AXIS	

4.7.2.1 Execute

A rising edge is required to start the motion command.
If the input is given a rising edge whilst a motion command is currently running, then the current motion command is overriden/aborted.
The input is not required to remain TRUE for the duration of the motion command.
Setting the value of Execute to FALSE during the motion command will not stop the motion command.

4.7.2.2 ContinuousUpdate

If ContinuousUpdate is TRUE when the Execute input is set then the Velocity input can be changed while the motion command is active and the new value is applied immediately (with the defined acceleration and deceleration).

A change to the ContinuousUpdate input is not effective when the command is running, Execute must be re-triggered to change ContinuousUpdate.

4.7.2.3 Velocity

The target velocity in RPM.
Giving a negative value will NOT reverse the motor direction. The Direction input must be used to change the direction of motion.

4.7.2.4 Acceleration

The target acceleration in RPM/s.

Acceleration is not affected by the ContinuousUpdate input, the value when execute was triggered is used. Execute must be re-triggered to change the acceleration.

4.7.2.5 Deceleration

The target deceleration in RPM/s. If set to 0, the value in Acceleration is used instead. Deceleration is not affected by the ContinuousUpdate input, the value when execute was triggered is used. Execute must be re-triggered to change the deceleration.

4.7.2.6 Direction

Set the direction of travel.

Value	Description
TRUE	Positive motor direction (clockwise)
FALSE	Negative motor direction (counter-clockwise)

4.7.2.7 Axis

The axis input should be linked to a data block of type JVL_MIS_Axis. This data block provides axis references to the unit and to its telegram slots.

4.7.3 Outputs

Output	Data Type
Busy	Bool
At Velocity	Bool
Command Aborted	Bool
Error	Bool

4.7.3.1 Busy

Busy is TRUE whenever the motion command is running (both when the motor is accelerating and when 'At Velocty') and the Error output is FALSE.

4.7.3.2 At Velocity

At Velocity is TRUE when the drive has reached the motion command target velocity and the Error output is FALSE.

4.7.3.3 Command Aborted

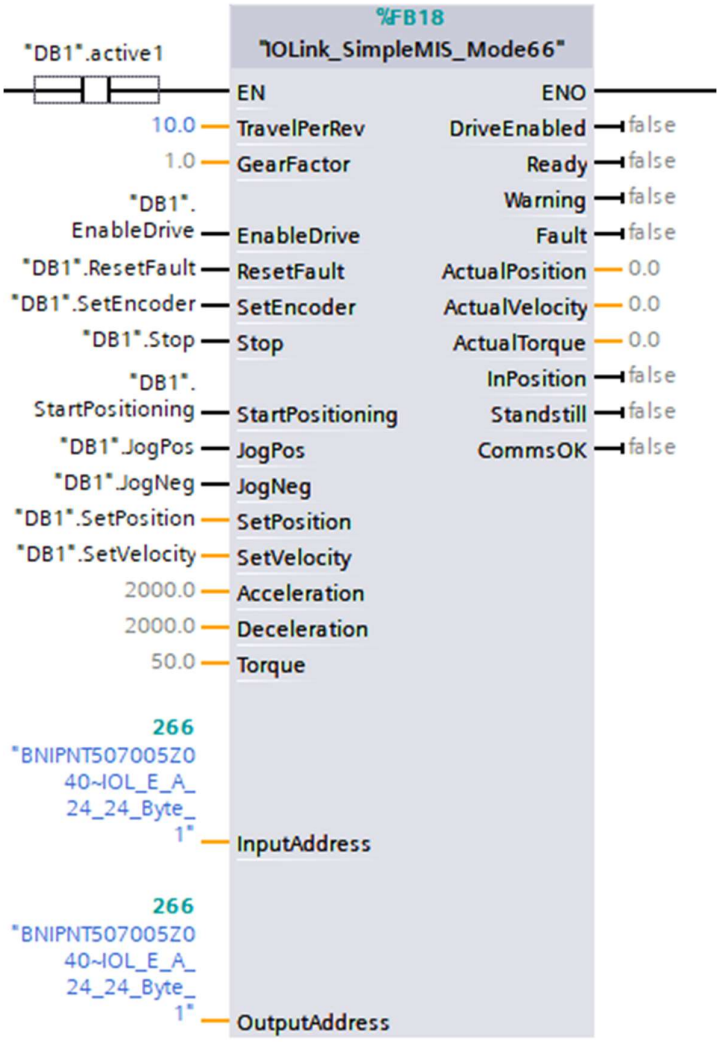
The command was interrupted by the execution of another command or an error on the motor (e.g. position limit reached).

4.7.3.4 Error

Error is TRUE if there is an error in the drive while the motion command is running, given by the Error signal in the Error word (register 35 Error bit 0).

4.8 IOLink_SimpleMIS_Mode66

This is a simple Functionblock to control the motor in Mode66.

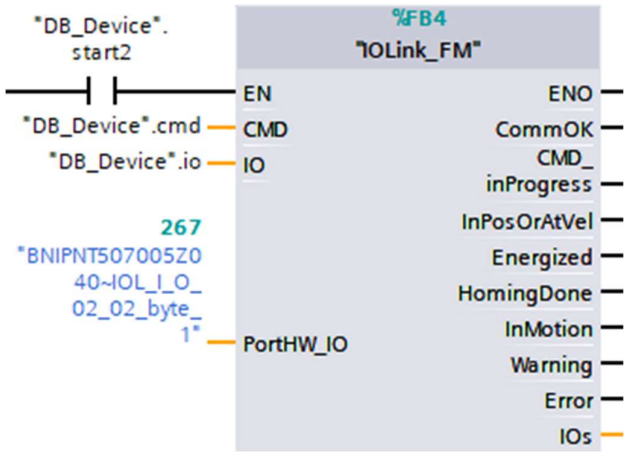


These are the parameters:

IOLink_SimpleMIS_Mode66

Name	Data type	Default value	Setpoint	Supervis...	Comment
Input					
TravelPerRev	Real	1.0			e.g. pitch of screw = 10.0 mm
GearFactor	Real	1.0			Gearfactor
EnableDrive	Bool	false			
ResetFault	Bool	false			
SetEncoder	Bool	false			
Stop	Bool	false			
StartPositioning	Bool	false			
JogPos	Bool	false			
JogNeg	Bool	false			
SetPosition	LReal	0.0			in mm
SetVelocity	LReal	0.0			in mm/s
Acceleration	Real	2000.0			in rpm/s
Deceleration	Real	2000.0			in rpm/s
Torque	Real	50.0			in %, 100% for MIS17 max 4A, MIS23 max 6A, MIS34 max 9A
InputAddress	HW_IO	0			HW_IO for cyclic Input
OutputAddress	HW_IO	0			HW_IO for cyclic Output
Output					
DriveEnabled	Bool	false			
Ready	Bool	false			
Warning	Bool	false			
Fault	Bool	false			
ActualPosition	LReal	0.0			
ActualVelocity	Real	0.0			
ActualTorque	Real	0.0			
InPosition	Bool	false			
Standstill	Bool	false			
CommsOK	Bool	false			

5 IO-Link Function Blocks in ModeFM



5.1 IOLink_FM

5.1.1 Description

In IO-Link ModeFM you only exchange 2 bytes (reading and writing).

This mode is very fast. Activate ModeFM in Mactalk (see chapter 2.5)

5.1.2 Input

Input	Data Type	Description
CMD	USINT	Commands
IO	Byte	IO1-4 Hardware output request
PortHW_IO	HW_IO	Hardware address of 2 byte exchange (ModeFM)

5.1.3 CMD

CMD	Description
0	reactivate Motion commands
1	passive Mode
97	error reset
101	Stop
129	passive Mode / stop
168	activate V1, Acc1, Velocity mode
169	activate V2, Acc2, Velocity mode
170	activate V3, Acc3, Velocity mode
171	activate V4, Acc4, Velocity mode
223	Positionmode is activated (Motor gets energized)
236	pos vector1
237	pos vector2
238	pos vector3
239	pos vector4
240	Homing

5.1.4 Output

Input	**Data Type**	**Description**
CommOK	BOOL	Communication ok
CMD_inProgress	BOOL	
InPosOrAtVel	BOOL	
Energized	BOOL	
HomingDone	BOOL	
InMotion	BOOL	
Warning	BOOL	
Error	BOOL	
IOs	Byte	IO1-4 Hardware Input status