MAC00-FDx Documentation

Inctroduction

The MAC00-FDx allows you to connect a JVL MacMotor to a DeviceNet network. The module supports the baud rates 125,250 and 500kbit. The module contains a galvanic isolation between the motor and the DeviceNet network. The baud rate and node id must be configures, with the dip switch, before the module is connected to the network.

The module supports polled IO with 8 bytes in and 8 bytes out. The specification of the IO is according the position controller device type.

Please refer to the following parts of the DeviceNet specifications for additional information:

① Volume II, Section 3-12: Position Controller.
② Volume II, Section 6-24: Position Controller Supervisor Object.
③ Volume II, Section 6-25: Position Controller Object.
④ Volume II, Section 6-14: Parameter Object.
⑤ Volume I, Appendix H: DeviceNet Error Codes
⑥ Volume I, Appendix J: Data Type Specification

The dipswitches

The 10 way dipswitch is used to select the node id and the baudrate. Switch 1-6 selects the node id, and switch 8-9 selects the baudrate. The baudrate is selected from the following table:

Switch setting	SW9	SW8	Baudrate
0	Off	Off	125 kbit
1	Off	On	250 kbit
2	On	Off	500 kbit
3	On	On	Reserved

The switch 7 and 10 is not used and should be set to Off.

The 2 way dipswitch is used to enable termination. When both switched are one, the termination is enabled.

The position controller

The position controller contains 8 bytes input and 8 bytes output. All the functions can be accessed through these IO.

The outputs define a Command Message with the following format:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	-	Hard Stop	Smooth Stop	Direction (V. Mode)	Incremental	-	Load Data
1	Command Data 1							
2	Command Axis Number			Command Message Type				
3	Command Data 2							
4	Command Data 3							
5	Command Data 4							
6	Command Data 5							
7	Command Data 6							

The inputs define a Response Message with the following format:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	-	-	-	General Fault	On Target Position	-	Profile in progressa
1	Response Data 1							
2	Load Complete	-	-	-	-	Rev Limit	Fwd Limit	-
3	Response Axis Number			Response Message Type				
4	Response Data 2							
5	Response Data 3							
6	Response Data 4							
7	Response Data 5							

These command messages are supported: 0x01, 0x02, 0x03, 0x05, 0x1B, 0x1F.
Refer to ① for a description of the commands.
These response message types are supported: 0x01, 0x03, 0x05, 0x14, 0x1B, 0x1F.
Refer to ① for a description of the responses.

Object class 100

Each instance has 2 attributes.
With this class all parameters in the motor can be written and read.
The Instance number refer to the parameter number in the motor.

Attribute 1 = Value
Attribute 2 = Parameter size in bytes

Object class 101

Instance 1 (I/O Setup)

Attribute ID	Access rule	Data type	Description	Parameter mapping
1	Get	USINT	The total number of supported attributes	
2	-	-	Reserved	
3	Get	BYTE	Show the input status. IN1-4, NL,PL	240
4	Get/Set	BYTE	Set the output level	241
5	Get/Set	BYTE	Input active level	242
6	Get/Set	BYTE	Input setup	243
7	Get/Set	BYTE	Output setup	244

Instance 2 (Status)

Attribute ID	Access rule	Data type		Parameter mapping
1	Get	USINT	The total number of supported attributes	
2	-	-	Reserved	
3	Get	BYTE	Motor status	245

Instance 3 (Commands)

Attribute ID	Access rule	Data type		Parameter mapping
1	Get	USINT	The total number of supported attributes	
2	-	-	Reserved	
3	Get/Set	BYTE	Module Setup	246
4	Set	USINT	Execute FastMac Command	247
5	Set	USINT	MAC00-FDx command	248

Instance 1, Attribute 3, Input status

This object is used to read out the actual value of the inputs.

Bit	7	6	5	4	3	2	1	0
Input	-	-	PL	NL	IN4	IN3	IN2	IN1

Instance 1, Attribute 4, Outputs

With this object the outputs can be controlled.
The value written to this object is directly shown on the outputs, if the output is not used for its default function (see attribute 7).

Bit	7	6	5	4	3	2	1	0
Output	-	-	-	-	-	-	O2	O1

Instance 1, Attribute 5, Input active level

With this object the active level of the inputs can be selected. When bit x = 0 the input is active low and when bit x = 1 the input is active high.
The default setup for the output is active high.

Bit	7	6	5	4	3	2	1	0
Input	-	-	PL	NL	IN4	IN3	IN2	IN1

Instance 1, Attribute 6, Input setup

With this object the dedicated function of the inputs can be enabled. When the corresponding bit is 0 the input work as a normal input. When the corresponding bit is 1 the dedicated function of the input will be enabled. When the end limit inputs NL or PL is enabled and one of these is activated, the error action will be executed. The error action is defined in instance 3, attribute 3.

Bit	7	6	5	4	3	2	1	0
Input	-	-	PL	NL	-	-	-	-

Instance 1, Attribute 7, Output setup

This object is used to control the function of the outputs. When bit x = 0 then the output is controlled by the attribute 4.
When bit x = 1, then the output is controlled by the default function. The default function for O1 is "In position" and for O2 "Error".

Bit	7	6	5	4	3	2	1	0
Output	-	-	-	-	-	-	O2	O1

Instance 2, Attribute 3, Motor status

With this object the status of the motor can be monitored.

Bit	7	6	5	4	3	2	1	0
Data	-	Deceleration	Acceleration	In position	-	Limit switch Error	Disconnected	Motor Error

Bit 6: Equals 1, if the velocity is decreasing.
Bit 5: Equals 1, if the velocity is increasing.
Bit 4: Equals 1, if the motor is in the commanded position.
Bit 2: Equals 1, if a limit switch has been actived.
Bit 1: Equals 1, if there is a communication error between the MAC00-FDx and the motor. This could occur if the motor was reset due to a voltage drop.
Bit 0: Equals 1, if there is a fatal motor error, read subindex 4, to get extended information.

Instance 3, Attribute 3, Module setup bits

This object is used auxillary setup of the module.

Bit	7	6	5	4	3	2	1	0
Setup	Endless relative	Error action	-	-	-	-	-	-

Endless relative: When this bit is 1 the endless relative position mode is used when doing incremental positioning. When using this mode absolute positioning can no longer be used.
Error action: 0 = Set motor in passive mode, 1 = Stop motor by setting velocity to zero.

Instance 3, Attribute 4, FastMac command.

When writing to this attribute a FastMac command is executed. Please refer to the MAC00-FPx section for a description of the FastMac commands.

Instance 3, Attribute 5, Module command.

When writing to this attribute it is possible to execute some special commands for the MAC00-FDx module.
The following commands are available:

Number	Function
0	No operation
1	Reset limit error
2	Reset communication error
3-255	Reserved

Object class 15 (Parameter)

This object class is the parameter class defined by the DeviceNet standard.
The attributes that is mapped into this object is from object class 100 and 101.
Instance 0-239 is mapped to the value attribute in object class 100 from the corresponding instance.
Instance 240-255 is mapped to attributes from object class 101. Refer to the description of this object class for the mappings.

Object class 36 (Position Controller Supervisor)

This object class is the position controller supervisor object as defined in the DeviceNet standard.
The following class attributes is supported: 1,2,3,6,32,33.

The following attributes is supported for instance 1: 1,3,5,6,7.

Object class 37 (Position Controller)

This object class is the position controller object as defined in the DeviceNet standard.
The following attributes is supported for instance 1:
1,2,3,6,7,8,10,11,12,13,14,17,20,21,25,45,48,49,52,54,55,58.

The range for attribute 25:Torque is 0-1023.

These additional manufacture specific attributes is supported:

Attribute ID	Access rule	Data type	Description
100	Get/Set	USINT	Search mode. This mode will be used next time the controller is enabled and the selected mode is position. This value will be cleared after the enable.
101	Get/Set	DINT	The zero search offset in counts.
102	Get/Set	DINT	The velocity to use during zero search in counts/s.
103	Get/Set	DINT	The torque limit to use during zero search. The range is -1023 to1023. A negative torque value means that the zero sensor is active low.
104	Get/Set	BOOL	Use Index. If this is enabled the zero point will be corrected with reference to the motors index mark.