MAC00-FSx Documentation

Module description

The module is equipped with a RS485 port, cable of running up to 460,800 baud. On request up to 921,600 Baud.
The communication is 8 data bit no parity and 1 stop bit (8,N,1).

The module is connected to the motor and can also be access with MacTalk (Only on the RS232 channel) for setting up parameters.

This document describes the features of the module.

Module communication

With the module it is possible to access all the motor registers. This can be done with the standard commands. If the OCX driver is used, the commands is ReadParameter, ReadParameterAlternate, WriteParameter, WriteParameterAlternate.
The module also provides a group command. This command is called WriteGroup. With this command a parameter is written to all motor with the corresponding group number.
The module also has a status command that gives different information about the module and motor. This command is called ReadStatus.

Other commands available in the OCX can't be used.

NOTE: The normal broadcast address 255 isn't supported by the MAC00-FSx module.

Writing motor parameters

When writing motor parameters the value is add to a queue and transferred to the motor later.
This is because the RS485 communication is faster than the internal communication and therefore a queue is needed.
If too many parameters are written too fast there will be a queue overflow. If this occur the bit 7 in module status is set.
The queue can hold up to 32 parameters.

Reading motor parameters

Some motor parameters are automatically scanned all the time. The response will come instantly, if one of these parameters is read. If reading one of the other parameters there will be a delay, until the parameter is transferred over the internal communication channel. The delay will typically be 15-25ms.
The parameters that are scanned are P_IST (10), V_IST (12) and VF_OUT (121/169, depends on the connected motor).

ReadStatus command

The ReadStatus command returns some values with status of the module. The following values are returned:

Name	Description
Status	Different status bits of the module, see below
Position	The actual position of the motor
ErrCount	The number of transmissions that the module couldn't interpret.

Module status

The following bits are available:

Bit	Name	Description
0	Motor error	Show the status of the motor
1	In position	Show the in position status from the motor
2	Reserved	
3	End limit error	This bit is set when an enabled end limit is activated.
4	MacTalk active	When this bit is set, the module and motor is communicating with MacTalk. When this is active it is not possible to read/write parameters from the motor. When MacTalk is disconnected there will go up to 5 seconds before the module switches back to normal mode.
5	Position search active	When the position search function is active, this bit is 1.
6	Motor disconnected	This bit indicated that the module can't communicate with the motor.
7	Write queue overflow	This bit is set if the write queue is overflowed.
8	IN1	The status of IN1
9	IN2	The status of IN2
10	IN3	The status of IN3
11	IN4	The status of IN4
12	AIN	The status of AIN

Module parameters

The module also contains some internal parameters. These can be accessed with the normal ReadParameter and WriteParameter function in the OCX. In order to access those 256 must be added to the parameter number when using ReadParameter and WriteParameter.

Number (OCX)	Size [Bytes]	Name	Saved in flash	Description
1 (257)	2	Version	No	The module firmware version in the format 0xAAAB where A is the major version and B is the minor.
2 (258)	2	Baudrate	Yes[1]	The actual baudrate. If the buadrate is changed, it will first be active after next powerup.
3 (259)	1	Address	Yes[1]	The module address.
4 (260)	1	GroupID	Yes[1]	The module group ID.
5 (261)	1	Transmit delay	Yes[1]	The transmit delay. This is the time from a request is receive until the response is transmitted. (Unit = Bits) Default value is 20 bits.
6 (262)	1	Inputs	No	The status of the inputs
7 (263)	1	Input active levels	Yes[1]	The active level of the inputs
8 (264)	1	Outputs	No	Output control
9 (265)	1	Output setup	Yes[1]	Select the function of the output.
10 (266	2	Module status	No	This is the bits that also are read by the read status command.
11 (267)	1	Module command	No	Writing to this register will execute a module command.
12 (268)	2	Analogue input	No	The voltage on the analogue input. Unit = 0.00978 volt/step
13 (269)	2	Analogue turn off value	Yes[1]	The turn on voltage for the analogue digital readout. Unit is the same as 12.
14 (270)	2	Analogue turn on value	Yes[1]	The turn off voltage for the analogue digital readout. Unit is the same as 12.
15 (271)	1	Negative limit mask	Yes[1]	This is the input bit mask for the negative limit input.
16 (272)	1	Positive limit mask	Yes[1]	This is the input bit mask for the positive limit input.
101 (357)	4	Captured position 1	No	Used by position search
102 (358)	4	Captured position 2	No	Used by position search

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[1] When the module command 12 is executed these values are stored in flash. Please notice that the flash memory has limited endurance. Therefore avoid executing command 12 regularly.

Baudrate

The following baud rates can be selected:

Baudrate	Parameter 2 value
19200	0
38400	1
57600	2
115200	3
230400	4
460800	5

Inputs

The inputs is mapped to parameter 6.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
			AIN	IN4	IN3	IN2	IN1

Input active levels

With parameter 7 the input active level of the inputs can be selected. A 1 means active high input and 0 active low input. The default is that all inputs are active high.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
			AIN	IN4	IN3	IN2	IN1

Outputs

With parameter 8 the output level can be set. In order to control the output it must first be set to user controlled with parameter 9.

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

Output setup

With parameter 9 the function of the output can be selected. When the bit is 0 the output have the standard function. When set to 1 the output can be controlled with parameter 8.

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

Module commands

When writing to this register a special command is executed in the module.
The following commands are available:

Command number	Description
1	Start the position search
2	Stop the position search. The velocity is also set to 0, to ensure that the

	motor stops.
3	Set P_SOLL = P_IST.
10	Clears the receive error count. See the ReadStatus command.
11	Load default setup into flash parameters
12	Save setup in flash. The parameters marked as "saved in flash" is stored in the flash.

Position search

The module has a special feature to search for to positions.
When the search is started the following will happen:

1. Velocity is set to value in parameter V1 (65).
2. Position is set to value in parameter P1 (49).
3. Wait for AIN to become active
4. Wait for AIN to become inactive
5. Capture position and save in (Capture position 1)
6. Wait for AIN to become active
7. Capture position and save in (Capture position 2)

While the search is active the bit 5 in module status will be 1.

End limit inputs

1 or 2 inputs can be configures as end limit inputs. This function is controlled with parameter 15-16. Parameter 15 and 16 is a binary mask selecting witch input to use. Example, if IN3 is the negative end limit, the value 0x04 must be written to parameter 15.
When parameter 15+16 is setup, the HARDWARELIM parameter in motor will be updated with the state of the inputs.
The motor will then take care of handling the end limits.

By default the end limits are active in the motor. If one of the inputs are activated the bit 7 (PLIM_ERR) in ERR_STAT will be set and the motor be put in passive mode.

For moving away from the end limits the value 16384 can be written to ERR_STAT. This will disable the end limit temporally. The end limit will be reenabled as soon as the limit input goes inactive.
Please refer to the MAC50-141 technical manual for further details.

Please notice if this is used for MAC800, the firmware must support HARDWARELIM. This it not supported in version 1.14.

Please notice that this function is disabled when MacTalk is connected on RS232.