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Serial communication Only MAC050 to I4I

When using the RS232 or RS422 serial links, it is possible to access all the internal registers in the motor.

This gives the same possibilities as using the general installation and monitoring program MacTalk.

In addition to these features, many more are accessible. In total, the MAC motor contains more than 150 internal registers such as nominal velocity, actual position, etc. but please note that several registers are not for the normal user and damage may occur if the contents of these registers is changed. These registers are marked in grey in the table below.

Register number	Name	Width	Unit	Description
1	PROG_VERS.	Word	-	Shows the actual version of the firmware.
2	MODE_REG	16 bit	-	The current MAC motor mode: 0: Passive 1: Velocity 2: Position 3: Gear Mode 4: Analog Torque mode 5: Analog Velocity mode 6: Analog Velocity/Gear mode. 7-11: Reserved for special purposes 12: Torque zero search 13: Sensor type 1 zero search 14: Sensor type 2 zero search
3	P_SOLL	32 bit	Encoder counts	The commanded position
5	V_SOLL	16 bit	Counts/sample	Desired velocity 1RPM=2.097 counts/sample.
6	A_SOLL	16 bit	Counts/sample ²	The maximum allowed acceleration. 1000 RPM/s = 4.026 Pulses/Sample ²
7	T_SOLL	16 bit	-	The maximum allowed torque. 1023 = 300%.
10	P_IST	32 bit	Encoder counts	The actual position
12	V_IST	16 bit	Counts/sample	Actual velocity. 1RPM=2.097 counts/sample.
14	GEARF1	Integer	-	Gear output factor. Used in gear mode
15	GEARF2	Word	-	Gear input factor. Used in gear mode
16	I2T	Word	-	Motor temperature calculated
17	I2TLIM	Word	-	Error trip level used for I2T register.
28	MIN_P_IST	Long Int.	Encoder counts	Software position limit - positive
30	MAX_P_IST	Long int.	Encoder counts	Software position limit - negative
32	ACC_EMERG	Word	Counts/sample ²	The maximum allowed deceleration when a fatal error has occurred. 1000 RPM/s = 4.026 Pulses/Sample ²
33	INPOSWIN	Word	Encoder counts	If actual position is within this window, the motor is in position.

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34	INPOSCNT	Word	Samples	The number of samples the motor has to be within the pos. interval spec. in INPOSWIN.
35	ERR_STAT	16 bit	-	Motor status: Bit 0: Overload Bit 1: Follow error Bit 2: Function error Bit 3: Regenerative error Bit 4: In position Bit 5: Accelerating Bit 6: Decelerating Bit 7: Position limits error

5.7.1 Serial Quick Guide (MacTalk protocol)

This section describes control of the MAC motor via the serial interface (RS232/485 connector on the MAC00-B1 or equivalent module).

The interface is RS232 compatible and uses 19200 baud with 8 data bits and no parity.

The MAC motor is completely controlled by reading and writing to registers. The registers are numbered 1-255. The width of the registers is 16 bits or 32 bits. To protect the communication from errors, the data is transmitted twice.

First the data byte is transmitted and then an inverted version (255-x) is transmitted.

The easiest way to become familiar with the registers and MAC communication is to use the *MacRegIO* program. This program lists all of the registers, and the serial commands sent and received can be monitored.

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5.7.2 Writing to a register

Controller sends	MAC motor response
<Write><Address><RegNum><Len><Data><End>	<Accept>

Block description

Block Name	Protected (1)	Example	Description
<Write>	No	52h,52h,52h	Write command
<Address>	Yes	07h,F8h (Address 7)	The address of the MAC motor
<RegNum>	Yes	05h,FAh (RegNum 5)	The register number to write to
<Len>	Yes	02h,FDh (Len = 2)	The number of data bytes
<Data>	Yes	E8h,17h, 03h,FCh (Data = 1000)	The data to write to the register
<End>	No	AAh, AAh	Command termination
<Accept>	No	11h, 11h,11h	Accept from MAC motor

(1) Protected means that these data must be sent twice, first non-inverted and then inverted.

Example 1:

Writing 600 (258h) to register 5 (16 bit) to the MAC motor with address 8.

Transmit: 52h,52h,52h - 08h,F7h - 05h,FAh - 02h,FDh - 58h,A7h,02h,FDh - AAh, AAh

Response: 11h,11h,11h

Example 2:

Write 230,000 (38270h) to register 3 (32 bit) to the MAC motor with address 7.

Transmit: 52h,52h,52h - 07h,F8h - 03h,FCh - 04h,FBh -
70h,8Fh,82h,7Dh,03h,FCh,00h,FFh - AAh, AAh

Response: 11h,11h,11h

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5.7.3 Reading from a register

Controller sends	MAC motor response
<Read><Address><RegNum><End>	<Write><Address><RegNum><Len><Data><End>

Block description

Block Name	Protected (1)	Example	Description
<Read>	No	50h,50h,50h	Read command
<Address>	Yes	07h,F8h (Address 7)	The address of the MAC motor
<RegNum>	Yes	05h,FAh (RegNum 5)	The register number to read
<End>	No	AAh, AAh	Command termination
<Write>	No	52h,52h,52h	Write command
<Address>	Yes	00h,FFh (Address 0)	This will always be 0, because this is the address of the master
<RegNum>	Yes	05h,FAh (RegNum 5)	This will always be the same as requested
<Len>	Yes	04h,FBh (Len = 4)	The length will always be 4
<Data>	Yes	E8h,17h, 03h,FCh, 00h, FFh, 00h,FFh (Data = 1000)	The data read from the register
<End>	No	AAh, AAh	Command termination

(1) Protected means that these data must be sent twice, first non inverted and then inverted.

Example 1:

Reading the value of register 5 from MAC motor with address 8.

Transmit: 50h,50h,50h - 08h,F7h - 05h,F6h - AAh, AAh

Response: 52h,52h,52h - 00h,FFh - 05h,F6h - 04h,FBh - 58h,A7h,02h,FDh,00h,FFh,00h,FFh - AAh, AAh

The value of register 5 was 500 (258h).

Example 2:

Reading the value of register 3 from MAC motor with address 8.

Transmit:50h,50h,50h - 08h,F7h - 03h,FCh - AAh, AAh

Response:52h,52h,52h - 00h,FFh - 05h,F6h - 04h,FBh - 70h,8Fh,82h,7Dh,03h,FCh,00h,FFh - AAh, AAh

The value of register 3 was 230,000 (38270h).

5.7.4 Application examples

Setting mode 1 (Position mode)

This command writes 1 to register 2 (MODE_REG) on motor 8.

Transmit: 52h,52h,52h - 08h,F7h - 02h,FDh - 02h,FDh - 01h,FEh,00h,FFh - AAh, AAh

Response: 11h,11h,11h

Setting position 100,000

This command writes 100,000 to register 3 (P_SOLL) on motor 8.

Transmit:52h,52h,52h - 07h,F8h - 03h,FCh - 04h,FBh -

A0h,5Fh,86h,79h,01h,FEh,00h,FFh - AAh, AAh

Response:11h,11h,11h

Reading the motor status

This command reads register 35 (ERR_STAT) from motor 8

Transmit:50h,50h,50h - 08h,F7h - 23h,DCh - AAh, AAh

Response:52h,52h,52h - 00h,FFh - 23h,DCh - 04h,FBh -

10h,EFh,00h,FFh,00h,FFh,00h,FFh - AAh, AAh

The motor responded with ERR_STAT = 0010h - meaning "In Position".

Setting the maximum speed

This command sets the maximum speed to 1000 RPM = 2097 pulses/sample (2097 = 831h).

This is done by writing to register 5 (V_SOLL)

Transmit: 52h,52h,52h - 08h,F7h - 05h,FAh - 02h,FDh - 31h,CEh,08h,F7h - AAh, AAh

Response: 11h,11h,11h

Reading the actual position

This command reads register 10 (P_IST) from motor 8

Transmit: 50h,50h,50h - 08h,F7h - 0Ah,F5h - AAh, AAh

Response: 52h,52h,52h - 00h,FFh - 0Ah,F5h - 04h,FBh -

08h,F7h,BDh,42h,03h,FCh,00h,FFh - AAh, AAh

The position was 245,000 (3BD08h)