

RQ motor controllers from Electronic Solutions, Inc. provide two-way communications over a 6-wire phone cable that connects each of the controllers together into an RQ Bus. Typically, an RQ Bridge unit (see *RQ Bridge Command Summary*) will also be connected into the RQ Bus as a Serial Interface (RS-232 or RS-422) to a Controller/PC. The RQ Bus actually uses three wires of the 6-wire cable (for clock, data, and unregulated +12VDC), leaving the other three wires for the legacy RP Bus (see *RQ60AUMHG Programming Summary* for RP Bus commands relating to the RQ60AUMHG). The RQ Bus and the RP Bus operate independently from each other.

This Command Summary covers the RQ commands associated with the RQ60AUMHG motor controller (see *RQ Bridge Command Summary* for commands relating to the RQ Bridge) and assumes a PC is connected to the serial interface on the RQ Bridge. *Hyperterminal*, or other terminal emulator program, is utilized to enter RQ commands and to display responses from RQ devices.

The RQ Protocol was developed to provide a powerful interface for Home Automation developers to build broad networks of RQ devices. For more information on the RQ Protocol, including coding examples, see *RQ Protocol Summary*. The request-response nature of RQ devices allows an application program running on the PC to continually direct the network and monitor RQ device status.

RQ Message Formatting

An RQ message always begins with a "!" (a.k.a. Bang) and ends with an "end character". There will always be an Address (3 ASCII characters) and a Command (1 ASCII character) as shown in the table below. In some cases the Data field will contain a variable number of characters or even no Data. A question mark ("?",) in the Data field signifies a request. The downlink "end character" can be either ";" or <CR> (both are treated the same). The uplink "end character" is set by a Bridge parameter to be either ";" or <CR>.

RQ Addressing is always three ASCII characters composed of only 0-9 and A-Z. For the case of 000 (global command), all nodes are addressed and for that reason, no node can have 000 as its address. All RQ Bridges are factory addressed at BR1 and RQ devices are randomly addressed from the factory ("C00" - "ZZZ"). Command and Data fields are ASCII characters, but not "!" and not <control> characters (0-31)

RQ message format:

Start Character	Address	Command	Data	End Character
!	K0B	N	Bob's Bedroom	;
!	M10	v	?	;

Uplink refers to messages from RQ Bridge to Controller/PC, while *Downlink* messages flow from Controller/PC to the RQ Bridge. Improperly formatted messages or message content that is out of range will cause the message to be discarded by the RQ Bridge and an appropriate Uplink error message generated.

Upon power up, RQ devices do not send out any RQ messages. RQ devices respond to global commands, directly addressed commands, and also generate unsolicited responses in certain situations.

Example Messages

Downlink Message	Uplink Message	Comments
!M11v?;	!M11vA10;	Request to M11 for version, AC Motor Control response w/ 10 (version 1.0)
!M34r?;	!M34r76; !M34<36; !M34Enc;	Request M34 position, M34 responds 76% and not moving M34 is at 36% and moving toward reference (alt. possible response) Position is unknown because unit is not calibrated (alt. possible response)
!M15m62;	!M15>18; !M15r62;	M15 move to 62%, responds at 18% moving away from reference Later, Responds at 62% when finished moving

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Command Summary

Global Motor Control Message Examples

Downlink Message	Uplink Message	Comments
!000v?;	... IM01vA10; ...	All devices respond w/ version
!000r?;	... IM01r28; ...	All devices show position

Table of Commands

Command Character and Description		Format (XXX=Addr)	Direction	# Characters and Description of Data	
@	Re-address	!XXX@XXX;	To Motor	3	characters (001 - ZZZ) [responds (addr=XXX) Acknowledge address change]
~	Randomize your address	!XXX~;	To Motor	0	None [responds (addr=C00-ZZZ) Acknowledge address change]
<	Moving towards 00	!XXX<%%;	From Motor ¹	2	%% = 00-99 as current position in %
>	Moving towards 99	!XXX>%%;	From Motor ¹	2	%% = 00-99 as current position in %
A	Acknowledge address change	!XXXA;	From Motor	0	none
c	Close	!XXXc;	To Motor	0	None [no response if not calibrated] [no response if all the way closed, otherwise responds with current position and direction, unsolicited msg] [later, unsolicited msg with final position]
d	Define a scene	!XXXdS%%; !XXXdSNS; !XXXd-;	To Motor	v ⁵	S=Scene ⁴ , %%=00-99 (%) S=Scene ⁴ , "NS" to not act on this scene - (minus sign) to clear all scenes [responds by echoing msg]
d	Request scene setting	!XXXdS?;	To Motor	2	S=Scene ⁴ , question mark [responds with Report scene setting]
d	Report scene setting	!XXXdS%%; !XXXdSNS;	from Motor	3	S=Scene ⁴ , %%=00-99 (%) S=Scene ⁴ , "NS" not in scene
E	Error	!XXXEee;	From Motor	2	Characters (ee) describing error bz = busy nc = not calibrated pu = position unknown ml = message lost (uplink or downlink)
g	Execute scene	!XXXgS;	To Motor	1	S=Scene ⁴ [no response, motor movement will cause unsolicited msg]
i	Identify	!XXXi;	To Motor	0	none, Flash the LED for 20 seconds [no response]
m	Move to position	!XXXm%%;	To Motor	2	%% = 00-99 (%) = destination position ³ [responds with current position and direction, unsolicited msg] [later, unsolicited msg with final position] [responds with E command for errors]
N	Assign a name	!XXXNBOB;	To Motor	v ⁵	1-16 characters (no "?" for first character) [responds by echoing msg]
N	Request the name	!XXXN?;	To Motor	1	question mark [responds with Report name msg]
N	Report name	!XXXNBOB;	From Motor	v ⁵	1-16 characters
o	Open	!XXXo;	To Motor	0	None [no response if not calibrated] [no response if all the way open, otherwise responds with current position and direction, unsolicited msg] [later, unsolicited msg with final position]
p	Request parameter (lowercase "p")	!XXXpP?;	To Motor	2	P = parameter character, then question mark ² [responds with Report parameter msg]
p	Set parameter (lowercase "p")	!XXXpPHH;	To Motor	v ⁵	P = parameter character, then appropriate data ² HH=Hex Options data [responds by echoing message]

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p	Report parameter (lowercase "p")	!XXXpPHH;	From Motor	v ⁵	P = parameter character, then appropriate data ² HH=Hex Options data
r	Request current position	!XXXr?;	To Motor	1	question mark [responds with Report current position msg] [responds with E command for errors]
r	Report current position	!XXXr%%;	From Motor ¹	2	%% = 00-99 (%) at current position ³
s	Stop	!XXXs;	To Motor	0	None [no response if not calibrated] [no response, motor movement will cause unsolicited msg]
U	Undefined / bad message	!XXXU;	From Motor	0	None
v	Request version	!XXXv?;	To Motor	1	question mark [responds with Report version msg]
v	Report version	!XXXvAVV;	From motor	3	"A" + 2 characters of version (10 = version 1.0) VV=version

¹ may be an unsolicited message

² see parameter table for parameters and appropriate data below

³ 00 means at reference (default = open), 99 means at limit away from reference (closed)

⁴ means scene number 0-9, A-Z, a-z

⁵ v means variable length message

Setting Parameters

A variety of special Parameters may be set. It is important for the motor to be stopped. Setting Parameters while the motor is moving may cause the position to drift.

The Parameter itself is one character followed by data characters, if appropriate. Each parameter defines the data that follows, if any. For some parameters, the data is in the hexadecimal format (0-9, and A-F) that represents four binary "bits" that are each actually Options. The appropriate hex character is built from adding up the Options, which are described as having values such as +1, +2, +4, and +8. The binary value doubles by moving left one bit, starting at the right. All bits on (i.e., 1111) is decimal value 15 = hex F which is 1+2+4+8. All bits off (0000) is a hex value of 0 and means that none of the Options are set. If the value of one desired Option is +2 and the value of another is +8, then the two are added to form a decimal value of 10, which is a hex value of A (= binary1010), which will set just the two Options selected. All Options for a particular parameter must be considered at once, since each hex character will turn on/off all four Options without regard for their previous values.

Parameter and Description		Direction	# of Data Characters and Description	
R	Reset RQ device	To motor	1	"D" = Default. Resets all RQ and RP programming to factory default except RP main channel and RQ address and name [no response msg, device blinks red LED once]
T	Request Motor Travel Time	To Motor	1	"?" [respond with Report Motor Travel Time]
T	Report Motor Travel Time	from Motor	3	Travel time in seconds If travel time is not known, an "nc" error message is reported
T	Calibrate the motor travel time	To Motor	1	"C" = Calibrate. Calibration starts immediately. Direction and reference must be set BEFORE Calibration. [no response]

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M	Set Motor Options	To Motor	2	<p>First Hex character options:</p> <ul style="list-style-type: none"> +1 = not implemented, set it to 0 +2 = not implemented, set it to 0 +4 = Fast IR Release Time (similar to C6 O7 button presses, but does not set Momentary Motor Action) +8 = Stop On Transmitter Button Release (C6 O8) <p>Second Hex Character options:</p> <ul style="list-style-type: none"> +1 = Momentary Motor Action (C6 O1) +2 = Reverse Motor Direction (C6 O2) +4 = Do NOT Act on ALL Buttons from Transmitter (C6 O3) +8 = not implemented, set it to 0 <p>(not implemented values will not affect anything) [responds by echoing msg]</p>
M	Request Motor Options	To Motor	1	<p>"?"</p> <p>[responds with Report Motor Options]</p>
M	Report Motor Options	from Motor	2	<p>First Hex character options:</p> <ul style="list-style-type: none"> +1 = not implemented, can be 0 or 1 +2 = not implemented, can be 0 or 1 +4 = Fast IR Release Time (equivalent to C6 O7 button presses) +8 = Stop On Transmitter Button Release (C6 O8) <p>Second Hex Character options:</p> <ul style="list-style-type: none"> +1 = Momentary Motor Action (C6 O1) +2 = Reverse Motor Direction (C6 O2) +4 = Do NOT Act on ALL Buttons from Transmitter (C6 O3) +8 = not implemented, can be 0 or 1
P	Set Intermediate Position Options (uppercase "P")	To Motor	2	<p>First Hex character options:</p> <p>No options implemented, this character MUST be 0</p> <p>Second Hex character options:</p> <ul style="list-style-type: none"> +1 = not implemented, should be 0 +2 = not implemented, should be 0 +4 = Set Reference as close limit instead of open limit +8 = Set Highest Accuracy <p>[responds by echoing msg]</p>
P	Request Intermediate Position Options (uppercase "P")	To motor	1	<p>"?"</p> <p>[responds with Report Intermediate Position Options]</p>

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P	Report Intermediate Position Options (uppercase "P")	from Motor	2	First Hex character options: No options implemented, this character will be 0 Second Hex character options: +1 = Motor is Calibrated +2 = not implemented, may be 0 or 1 +4 = Reference is close limit instead of open limit +8 = Highest Accuracy Set
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Simplified Motor Option Setting Tables

First Motor Option Setting Character	Option Bit Values	Motor Options Setting Description
0	0000	Factory defaults
4	0100	Fast IR Rel. Time
8	1000	Stop On Transmitter Button Release (SOBR)
C	1100	SOBR + Fast IR Rel.

Second Motor Option Setting Character	Option Bit Values	Motor Options Setting Description
0	0000	Factory defaults
1	0001	Momentary Motor (MM)
2	0010	Reverse Motor (RM)
3	0011	Rev. Motor + Momentary Motor
4	0100	Not Act on ALL Buttons (NAAB)
5	0101	NAAB + MM
6	0110	NAAB + RM
7	0111	NAAB + RM + MM

Simplified Motor Reporting Option Tables

First Motor Option Reporting Character	Option Bit Values	Motor Options Reporting Description
0 or 1 or 2 or 3*	0000, 0001, 0010, 0011	Factory defaults
4 or 5 or 6 or 7*	0100, 0101, 0110, 0111	Fast IR Rel. Time
8 or 9 or A or B*	1000, 1001, 1010, 1011	SOBR
C or D or E or F*	1100, 1101, 1110, 1111	SOBR + Fast IR Rel.

*Due to undefined option bits that can return 0 or 1

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Second Motor Option Reporting Character	Option Bit Values	Motor Options Reporting Description
Ø or 8*	ØØØØ, 1ØØØ	Factory defaults
1 or 9*	ØØØ1, 1ØØ1	Momentary Motor (MM)
2 or A*	ØØ1Ø, 1Ø1Ø	Reverse Motor (RM)
3 or B*	ØØ11, 1Ø11	Rev. Motor + Momentary Motor
4 or C*	Ø1ØØ, 11ØØ	Not Act on ALL Buttons (NAAB)
5 or D*	Ø1Ø1, 11Ø1	NAAB + MM
6 or E*	Ø11Ø, 111Ø	NAAB + RM
7 or F*	Ø111, 1111	NAAB + RM + MM

* Due to undefined option bits that can return Ø or 1

Simplified Intermediate Position Options Setting Tables

First Option Setting Character	Option Bit Values	Options Setting Description
Ø	ØØØØ	No Options Implemented for First Options Character, Must be Ø

Second Option Setting Character	Option Bit Values	Options Setting Description
Ø	ØØØØ	Factory defaults
4	Ø1ØØ	Reference is Close
8	1ØØØ	High Accuracy
C	11ØØ	Reference is Close + High Accuracy

Simplified Intermediate Position Options Reporting Tables

First Option Reporting Character	Option Bit Values	Options Reporting Description
Ø	ØØØØ	No Options Implemented for First Option Character, Reports Ø

Second Option Reporting Character	Option Bit Values	Options Reporting Description
Ø or 2*	ØØØØ, ØØ1Ø	Factory defaults, Motor Not Calibrated
1 or 3*	ØØØ1, ØØ11	Motor is Calibrated
4 or 6*	Ø1ØØ, Ø11Ø	Not Calibrated + Reference is Close
5 or 7*	Ø1Ø1, Ø111	Calibrated + Reference is Close
8 or A*	1ØØØ, 1Ø1Ø	Not Calibrated + High Accuracy
9 or B*	1ØØ1, 1Ø11	Calibrated + High Accuracy
C or E*	11ØØ, 111Ø	Not Calibrated + Reference is Close + High Accuracy
D or F*	11Ø1, 1111	Calibrated + Reference is Close + High Accuracy

* Due to undefined option bits that can return Ø or 1