

SC1 Gen2 V2 by Draper Command Summary

SC1 gen2V2 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 SC1 gen2V2 Bus. Typically an SC1 gen2V2 Bridge component (see **SC1 gen2V2 Bridge Command Summary**) will also be connected into the SC1 gen2V2 Bus as a Serial Interface (RS-232 or RS-422) to an automation system (AMX, Crestron, Vantage, etc.) or computer (PC or Mac). The SC1 gen2V2 Bus and the SC1 Bus operate independently from each other.

This Command Summary covers the SC1 gen2V2 commands associated with the SC1 Gen2 V2 motor controllers (see **SC1 gen2V2 Bridge Command Summary** for commands relating to the SC1 gen2V2 Bridge) and assumes a PC is connected to the serial interface on the SC1 gen2V2 Bridge. **HyperTerminal**, or other terminal emulator program, is utilized to enter SC1 gen2V2 commands and to display responses from SC1 gen2V2 devices.

The SC1 gen2V2 Protocol was developed to provide a powerful interface for Home Automation developers to build broad networks of SC1 gen2V2 devices. For more information on the SC1 gen2V2 Protocol, including coding examples, see **SC1 gen2V2 Protocol Summary**. The request-response nature of SC1 gen2V2 devices allows an application program running on the PC to continually direct the network and monitor SC1 gen2V2 device status.

SC1 gen2V2 Message Formatting

An SC1 gen2V2 message always begins with the *header* "!" (a.k.a. Bang) and ends with a *terminator* ";" (semicolon) or carriage return <CR>. There will always be an SC1 gen2V2 Address (3 alphanumeric characters) and a Command (1 alphanumeric character) as shown in the tables 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 for status. The downlink "end character" can be either ";" or <CR> (both are treated the same). The uplink "end character" is set by an SC1 gen2V2 Bridge parameter to be either ";" or <CR> — see **SC1 gen2V2 Bridge Command Summary** for commands relating to the SC1 gen2V2 Bridge.

SC1 gen2V2 Addressing is always three alphanumeric characters composed of only 0-9 and A-Z uppercase. For the case of 000 (global command), all nodes are addressed and for that reason, no node can have 000 as its address. All SC1 gen2V2 Bridges are factory addressed at BR1 and SC1 gen2V2 devices are randomly addressed from the factory ("C00" – "ZZZ"). Command and Data fields are alphanumeric characters, but not "!" and not <control> characters (0-31)

RQ downlink message format examples:

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

RQ uplink message format examples:

Start Character	Address	Command	Data	End Character
!	K0B	N	Bob's Bedroom	;
!	M10	v	ds2	;

Uplink refers to messages from an SC1 gen2V2 Bus, relayed via the SC1 gen2V2 Bridge, to an automation system or computer, while **Downlink** messages flow from an automation system or computer to the SC1 gen2V2 Bus, relayed via the SC1 gen2V2 Bridge. Improperly formatted messages or message content that is out of range will cause the message to be discarded by the SC1 gen2V2 Bridge and an appropriate Uplink error message generated.

Upon power up, SC1 gen2V2 motor controls do not send out any SC1 gen2V2 messages. SC1 gen2V2 motor controls respond to global commands, directly addressed commands, and also generate unsolicited responses in certain situations.



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SC1 Gen2 V2-Command Summary

Additional Terms or Abbreviations used in this document

Addr = SC1 gen2V2 Address; CAPS = all upper case letters; scene = a defined position for one or more motor controls; name = optional 16 character description of motor control; Parameter = a variable corresponding to motor control features; options = subsets of parameters

Table of Downlink Commands

Command Character and Description		Format (XXX=Addr)	Example Downlink Message	# Characters after Command Character [Description of Data]	
@	Re-address	!XXX@XXX;	!XYZ@123;	3	characters (001 ... ZZZ){0-9, A-Z CAPS only} [responds with Acknowledge address change]
~	Randomize address	!XXX~;	!XYZ~;	3	randomizes address in the range: C00 ... ZZZ [responds with Acknowledge address change]
c	Close ¹	!XXXc;	!XYZc;	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 ^{4,5}	!XXXdS%%; !XXXdSNS; !XXXd-;	!XYZdF56; !XYZdFNS; !XYZd-;	Varies 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 – Report scene setting]
d	Request scene setting ⁴	!XXXdS?;	!XYZdF?; !000dF?;	2	S = Scene ⁴ , question mark [responds by reporting scene setting]
g	Execute scene ^{1,4}	!XXXgS;	!000gF; or !XYZgF;	1	S = Scene ^{1,4} [no response, motor movement will cause unsolicited msg]
i	Identify	!XXXi;	!XYZi;	0	none, Flash the LED for 20 seconds [no response]
m	Move to position ^{1,3}	!XXXm%%;	!XYZm86;	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 ^{5,6}	!XXXNn;	!XYZNKitch1;	varies ⁵	n=Up to 16 ASCII printable characters ⁶ (no ";", "!" or "?" throughout 'name') [responds with Report the name msg]
N	Request the name	!XXXN?;	!XYZN?;	1	question mark [responds with Report the name msg]
o	Open ¹	!XXXo;	!XYZo;	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	Set parameter ^{2,5} (lowercase "p")	!XXXpPHH;	!XYZpM02; {Reverse motor direction}	Varies ⁵	P = parameter character (M, P, R or T), then parameter options data ² HH = Parameter Options data [responds with Report Parameter msg]
p	Request parameter ² (lowercase "p")	!XXXpP?;	!XXXpT?;	2	P = parameter character, then question mark ² [responds with Report parameter msg]
r	Request current position	!XXXr?;	!000r?; or !XYZr?;	1	question mark [responds with Report current position msg] [responds with E command if errors]
s	Stop ¹	!XXXs;	!000s; or !XYZs;	0	None [no response if not calibrated] [no response, motor movement will cause unsolicited msg]
t	Travel ¹	!XXXto###; !XXXtc###;	!XYZto060; !XYZtc020;	3	Travel open or close in 40ths of second ¹ [responds with current position and direction, unsolicited msg]
v	Request version	!XXXv?;	!XYZv?;	1	question mark '?' to request [responds with Report version msg]
x	Request status of Manual Input ⁷	!XXXxç?;	!XYZxd?;	2	ç = Manual Input contact either down or up ⁷ , question mark [responds current status of requested Manual Input]

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¹ may cause an unsolicited message

² see **Setting Parameters** for available options and appropriate data

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

⁴ means scene character 0-9, A-Z, a-z

⁵ means variable length message

⁶ A-Z, a-z, 0-9, @, #, \$, %, ^, &, *, ...et al: http://en.wikipedia.org/wiki/Ascii#ASCII_printable_characters

⁷ Manual inputs are marked on the PCB as **u** (up or open) **c** (common) and **d** (down or close).

Table of Uplink Messages

Command Character and Description	Format (XXX=Addr)	Example Uplink Message	# Characters after Command Character [Description of Data]	
< Moving towards 00 ¹	!XXX<%%;	!XYZ<74;	2	%% = 00-99 as current position in % ¹
> Moving towards 99 ¹	!XXX>%%;	!XYZ>28;	2	%% = 00-99 as current position in % ¹
A Acknowledge address change	!XXXAXXX;	!123XYZ;	3	XXX= characters (001 ... ZZZ) {0-9, A-Z CAPS only}
d Report scene setting ⁴	!XXXdS%%; !XXXdSNS;	!XYZdF56; !XYZdFNS;	3	S = Scene ⁴ , %%=00-99 (%) S = Scene ⁴ , "NS" not in scene
E Error ¹	!XXXEee;	!XYZEbz; !XYZEnc; !XYZEpu; !XYZEml;	2	Characters (ee) describing error bz = busy nc = not calibrated pu = position unknown ml = message lost (uplink or downlink)
N Report the name	!XXXNn;	!XYZNKitch1;	≤16	n=Up to 16 ASCII printable characters ⁶ (no ";" or "!" or "?" throughout 'name')
p Report parameter ^{2,5} (lowercase "p")	!XXXpPHHH;	!XXXpT018; !XXXpM01;	3 or 4 ⁵	P = parameter character, then appropriate data ² HHH = options for parameter character (2 or 3 characters accordingly) parameter Travel time is 18 seconds parameter Momentary Motor Action is enabled
r Report current ^{1,3} position	!XXXr%%;	!XYZr00;... !XYZr47; !XYZ>23; !XYZ<69;	2	%% = 00-99 (%) at current position ³ not moving, at 47% increasing from 23% decreasing from 69%
U Undefined / bad message	!XXXU;	!XYZU;	0	None
v Report version	!XXXvDSV;	!XYZvds2;	3	"DS" + 1 characters of version (1 = version 1) V=version
x Report status of Manual Input ^{1,7,8}	!XXXx¢\$;	!XYZxdo; !XYZxuc;	2 2	¢ = Manual Input contact either down or up ^{7,8} , \$ = o for open or c for close down contact is electrically open up contact is electrically closed

¹ may be an unsolicited message

² see **Setting Parameters** for available options and appropriate data

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

⁴ means scene character 0-9, A-Z, a-z

⁵ means variable length message

⁶ A-Z, a-z, 0-9, @, #, \$, %, ^, &, *, ...et al: http://en.wikipedia.org/wiki/Ascii#ASCII_printable_characters

⁷ Manual inputs are marked on the PCB as **u** (up or open) **c** (common) and **d** (down or close).

⁸ Manual inputs status reporting is always on. This means any change in the status of the manual inputs will result in an unsolicited uplink message.

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Corresponding Downlink Command and Uplink Message Examples

Downlink Message	Uplink Message	Comments
!M11v?;	!M11vds2;	Request to M11 for version, Draper SC1 gen2 AC Motor Control response w/ 2 (version 2)
!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) Unit is not calibrated (alt. possible response)
!M15m62;	!M15>18; !M15r62; !M15Enc;	M15 move to 62% , responds at 18% moving away from reference Later, Responds at 62% when finished moving Position unknown due to Error, not calibrated

Global Motor Control Message Examples

Downlink Message	Uplink Message	Comments
!000v?;	... !BR1vB10;!M01vds2; ...	All devices respond w/ version, including SC1 gen2V2 Bridge
!000r?;	... !M01r28; ...	All devices show position

Setting Parameters

A variety of special Parameters may be set that correspond to motor control features. It is important for the motor to be stopped when setting parameters on the SC1 Gen2 V2. Setting Parameters while the motor is moving may cause the position to drift.

The Parameter itself is one character followed by data characters, as appropriate. Each parameter defines the data that follows, if any. All Options for a particular parameter must be considered at once, since the corresponding characters will turn on/off various Options without regard for their previous values.

All parameter commands require **p** after the RQ address, followed by the Parameter Character then the corresponding Parameter Character Options.

Travel Time Parameter Table

	Travel Time Parameter Character and Description	Example Downlink Message	Example Uplink Message	Description of Data
T	Request Motor Travel Time	!XYZpT?;	!XYZpT016;	"T" for Time, question mark [responds with Report Motor Travel Time]
T	Report Motor Travel Time	!XYZpT?;	!XYZpT016;	Travel time in seconds If travel time is not known, an "Enc" error message is reported
T	Calibrate Motor Travel Time	!XYZpTC; or !000pTC;	no response ...then... !XYZpT016; or !XYZpT016;...	"C" = Calibrate. Calibration starts immediately. Direction and reference must be set BEFORE Calibration. This is an Auto-Calibrate. [later, unsolicited msg response acknowledging calibration completed]

Reset Motor Control Parameter Settings Table

	Reset Motor Control Parameter Character and Description	Example Downlink Message	Example Uplink Message	Description of Data
R	Reset SC1 gen2V2 Device	!XYZpRD;	n/a	"D" = Default. Resets all SC1 gen2V2 and SC1 programming to factory default except SC1 main channel and SC1 gen2V2 address and name

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Motor Action Parameter Table – detailed

Motor Action Parameter Character and Description							
Fast Motor Release Time	Stop On Transmitter / Keypad Button Release	Momentary Motor	Reverse Motor Direction	Do NOT Act on ALL Channel from Input Devices	Example Downlink Message	Example Uplink Message	Description of Data
Set All Motor Parameters to Factory Default					!XYZpM00;	!XYZpM00;	Sets motor parameters to factory defaults
	•				!XYZpM80;	!XYZpM80;	Stop On Transmitter Button Release (SOBR)
•	•				!XYZpMC0;	!XYZpMC0;	Fast Motor Release Time (FAST) + SOBR
		•			!XYZpM01;	!XYZpM01;	Momentary Motor (MOM)
			•		!XYZpM02;	!XYZpM02;	Reverse Motor (REV)
		•	•		!XYZpM03;	!XYZpM03;	REV + MOM
				•	!XYZpM04;	!XYZpM04;	Do Not Act on ALL channel commands (DNAC)
		•		•	!XYZpM05;	!XYZpM05;	MOM + DNAC
			•	•	!XYZpM06;	!XYZpM06;	REV + DNAC
		•	•	•	!XYZpM07;	!XYZpM07;	DNAC + REV + MOM
•		•			!XYZpM41;	!XYZpM41;	FAST + MOM
•		•	•		!XYZpM43;	!XYZpM43;	FAST + MOM + REV
•		•		•	!XYZpM45;	!XYZpM45;	FAST + MOM + DNAC
•		•	•	•	!XYZpM47;	!XYZpM47;	FAST + MOM + REV + DNAC
	•	•			!XYZpM81;	!XYZpM81;	SOBR + MOM
	•		•		!XYZpM82;	!XYZpM82;	SOBR + REV
	•	•	•		!XYZpM83;	!XYZpM83;	SOBR + MOM + REV
	•			•	!XYZpM84;	!XYZpM84;	SOBR + DNAC
	•	•		•	!XYZpM85;	!XYZpM85;	SOBR + MOM + DNAC
	•		•	•	!XYZpM86;	!XYZpM86;	SOBR + REV + DNAC
	•	•	•	•	!XYZpM87;	!XYZpM87;	SOBR + MOM + REV + DNAC
•	•	•			!XYZpMC1;	!XYZpMC1;	FAST + SOBR + MOM
•	•		•		!XYZpMC2;	!XYZpMC2;	FAST + SOBR + REV
•	•	•	•		!XYZpMC3;	!XYZpMC3;	FAST + SOBR + MOM + REV
•	•			•	!XYZpMC4;	!XYZpMC4;	FAST + SOBR + DNAC
•	•	•		•	!XYZpMC5;	!XYZpMC5;	FAST + SOBR + MOM + DNAC
•	•		•	•	!XYZpMC6;	!XYZpMC6;	FAST + SOBR + REV + DNAC
•	•	•	•	•	!XYZpMC7;	!XYZpMC7;	FAST + SOBR + MOM + REV + DNAC
Request Motor Parameters					!XYZpM?;	Response with current parameters	Review examples above or see Motor Action Parameter (uplink) Table - simplified [responds with current Motor Options]

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Intermediate Position Parameter Table - detailed

Intermediate Position Parameter Character and Description				
Set Close as Reference	Set Highest Accuracy	Example Downlink Message	Example Uplink Message	Description of Data
Set All Intermediate Position Parameters to Factory Default		!XYZpP00;	!XYZpP00;	Sets Intermediate Position parameters to factory defaults
•		!XYZpP04;	!XYZpP04;	Reference is Close
	•	!XYZpP08;	!XYZpP08;	High Accuracy
•	•	!XYZpP0C;	!XYZpP0C;	Reference is Close + High Accuracy
Request Intermediate Position Parameters		!XYZpP?;	Response with current parameters	Review examples above or see Intermediate Position Parameter (uplink) Table - simplified [responds with current Intermediate Position Options]

SC1 Gen2 V2-Command Summary

SIMPLIFIED MOTOR & INTERMEDIATE POSITION PARAMETER SETTINGS and REPORTING TABLES

Motor Action Parameter (downlink) Table - simplified

First Motor Action Parameter Character	First Motor Action Parameter Character Description	Second Motor Action Parameter Character	Second Motor Action Parameter Character Description
0	Factory defaults	0	Factory defaults
4	Fast Motor Release Time (FAST)	1	Momentary Motor (MOM)
8	Stop On Transmitter Button Release (SOBR)	2	Reverse Motor (REV)
C	SOBR + FAST	3	MOM + REV
		4	Not Act on ALL Buttons (DNAC)
		5	DNAC + MOM
		6	DNAC + REV
		7	DNAC + REV + MOM

Motor Action Parameter (uplink) Table - simplified

First Motor Action Parameter Character	First Motor Action Parameter Character Description	Second Motor Action Parameter Character	Second Motor Action Parameter Character Description
0, 1, 2 or 3*	Factory defaults	0 or 8*	Factory defaults
4, 5, 6 or 7*	Fast Motor Release Time	1 or 9*	Momentary Motor (MOM)
8, 9, A or B*	Stop On Transmitter Button Release (SOBR)	2 or A*	Reverse Motor (REV)
C, D, E or F*	SOBR + Fast Motor Release	3 or B*	Reverse Motor + Momentary Motor
		4 or C*	Not Act on ALL Buttons (DNAC)
		5 or D*	DNAC + MOM
		6 or E*	DNAC + REV
		7 or F*	DNAC + REV + MOM

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

SC1 Gen2 V2-Command Summary

Intermediate Position Parameter (downlink) Table - simplified

First Intermediate Position Parameter Character	First Intermediate Position Parameter Character Description	Second Intermediate Position Parameter Character	Second Intermediate Position Parameter Character Description
0	No Options Implemented for First Options Character, Must be 0	0	Factory defaults
		4	Reference is Close
		8	High Accuracy
		C	Reference is Close + High Accuracy

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

Intermediate Position Parameter (uplink) Table - simplified

First Intermediate Position Parameter Character	First Intermediate Position Parameter Character Description	Second Intermediate Position Parameter Character	Second Intermediate Position Parameter Character Description
0	No Options Implemented for First Options Character, Must be 0	0 or 2*	Factory defaults, Motor Not Calibrated
		1 or 3*	Motor is Calibrated
		4 or 6*	Not Calibrated + Reference is Close
		5 or 7*	Calibrated + Reference is Close
		8 or A*	Not Calibrated + High Accuracy
		9 or B*	Calibrated + High Accuracy
		C or E*	Not Calibrated + Reference is Close + High Accuracy
		D or F*	Calibrated + Reference is Close + High Accuracy

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