

Generation 3 Controller Advanced Programming Guide

March 24, 2021

v1.0.5

Technical Brief

Android BLE & USB UART



INNOVATION

A Caldwell Company

G3 Advanced Programming Guide

Part Number(s): 28C0030(G3), 28C0061(RCM), 29C0052(RS485)

If you READ nothing else, read this...

- Prior to installing an INMOTION G3 system verify the mechanical installation is 100% operational.
 - All panels move smoothly, without excessive force required at all points across the span
 - The frame is square & plumb, and the lead panel meets the jam evenly top to bottom.
 - All required weather stripping is installed properly and not binding during panel movement.
 - Panels are NOT warped, and panel pickups release and operate smoothly without issues.
 - Interlocks engage and disengage properly without dragging extra panels etc.
 - In a nutshell the door should be at its mechanical “best” before automation is installed
- NEVER leave a door running on a Cycle Test unattended...even for a minute, unless it is in a controlled environment completely void of people and pets.
- DO NOT experiment with commands you find in this guide unless you know what you are doing or have been directed to do so by a trained factory representative.
- Remember the G3 has been certified by UL to be safe, but that only applies if it has been installed safely by the installer.
- If you have any question or concerns, please consult the factory.
- Remember INMOTION offers free training, year-round, all you have to do is ask.

About this Guide...

This guide documents the more advanced options and features of the G3 Controller by INMOTION. It covers the G3 Controller with v0.7.0 or later firmware. This release added 4 “special feature” modes besides the “normal” mode present in the previous release. In addition, there is a cycle test option available to integrators and installers that can exercise the G3 while running any of the 5 supported modes for testing, option enabling or tuning.

When the G3 first boots, it is operating at the “user” level, and no password is required. In this mode, all commands to operate the door must come from wired or wireless accessories such as wall switches and remotes or from a home automation system wired into the wall switch circuit.

To access any of the advanced mode options, called modifiers, a password is required. The password entered will set the user level. The current user / password level can be checked at any time by entering the command “**pwd**” or “**p**” on the CLI. The current level will be displayed on the CLI.

In this guide each page will indicate what user level is required for the given command or function by the graphic shown. A checkmark next to the various levels indicate which user levels can call or modify the command or function documented.

Installers have access to the User, Installer and Developer levels by entering the appropriate password. The difference between the Installer and Developer levels is that some commands change such that the Installer level will not accidentally erase critical door programming information causing more work than necessary. If an installer needs to access one these protected commands, they only need to change to the Developer level to perform the task. For general and advanced programming, the Installer password will work for 99% of the tasks required.

Supported User Levels

<input checked="" type="checkbox"/>	User
<input checked="" type="checkbox"/>	Installer
<input checked="" type="checkbox"/>	Developer
<input checked="" type="checkbox"/>	Factory

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CLI Password Access

Supported User Levels

- ☒ User
- ☒ Installer
- ☒ Developer
- ☒ Factory

Starting with the “Special Features” v0.7.0 firmware release, the G3 controller requires unique passwords for each controller. This is due a California law, as of Jan 1, 2020, requiring minimum security for IoT devices. To address this change, the G3 utilizes its unique serial number as part of the password. Once programmed at the factory, this new password scheme is activated. The previous release supported 2 password levels for access to the CLI. Those being “Installer” and “Developer” and they were the same for all G3’s running v0.6.7 firmware. If you memorized those passwords, then the new password mechanism will not take too much effort.

The previous passwords for firmware v0.6.7 were:

User:	“0”	// Rarely used as it’s the default at boot
Installer:	“pwd1”	
Developer:	“IM1635”	

The new passwords use the same characters as before but with different numbers at the end.

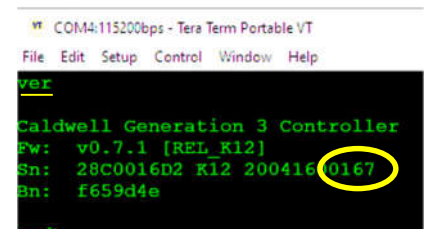
User:	“0”	// Did not change from v0.6.7
Installer:	“pwdXXXX”	// Replace the “XXXX” with the last 4 digits of the serial number
Developer:	“IMXXXX”	// Replace the “XXXX” with the last 4 digits of the serial number

Note: Entering an incorrect password, immediately puts the controller into “user” mode or minimum access.

As shown above adding the last 4 digits of the G3’s serial number will allow the installer to determine the password and access the G3’s CLI at the required user level. The serial number can be found on a sticker affixed to the back of the controller itself.



If for some reason the label is unreadable or missing, then the serial number must be obtained from the CLI using the “**ver**” or “**info**” commands. Both the password (**pwd**) and version (**ver**) commands are supported at boot (user level).



G3 VERSION COMMAND

After obtaining the serial number, the password can be entered in the CLI using the password command “**pwd**” or “**p**” for short.

Installer:	pwd pwd0167	// Installers should use this one
Developer:	pwd IM0167	// Only use if needed or when directed to do so by the factory

```
cmd>pwd pwd0167
Level = 1 (Installer)
cmd>
```

```
cmd>pwd IM0167
Level = 2 (Developer)
cmd>
```

* Passwords will auto-expire after 30 minutes regardless of CLI activity. This timeout can be extended by issuing the “**pwd**” or its abbreviation “**p**” (just the command, no password needs to follow)

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Tech Brief - Android BLE & USB UART

The Android platform provides the best terminal experience when compared to IOS, so if given a choice use Android. The factory has found 3 Apps by the same developer that support Wireless BLE, Wired USB UART and UART over Wi-Fi communication that are compatible with the G3's CLI. Each App presents a simple terminal screen and a field to enter commands for the G3 to respond to. The user also has the option to create on-screen buttons to send preselected commands to the G3 and this is what we are going to describe here.

Supported User Levels

- ☐ User
- ☒ Installer
- ☒ Developer
- ☒ Factory

Wireless Serial Terminal Connection (Bluetooth)



When a G3 is paired with the wired RS485 GPIO Adaptor wireless Bluetooth BLE communication is possible. This allows an Android tablet or smart phone with Bluetooth BLE 4.0 or later to wirelessly access the G3's CLI. A free terminal App is also required.



Wired Serial Terminal Connection



The G3's CLI can be accessed using "USB Debug" cable plugged into the "J17" connector. This is the same port the "RS485 GPIO Adaptor" uses to enable wired accessories and Bluetooth BLE CLI access.

The USB debug cable has a special keyed RJ45 connector compatible with the G3's J17 port. A standard RJ45 will not work. The debug cable can be obtained from the factory as well as the required "OTG" adaptor. OTG is a USB term which stands for "On-The-Go" and allows Android devices to support USB accessories like our debug cable, USB flash drives, keyboards, mice etc. For this solution to work your Android device must also support OTG. Most Samsung & Motorola phones have OTG.



Note: A laptop running a terminal program such as TeraTerm or Putty is the preferred CLI access method when a debug cable is available (OTG adaptor is not required for PC access).

UART over Wi-Fi (Experimental)



The factory has had some success using various Wi-Fi modules and Raspberry Pi's to enable CLI access over Wi-Fi. All that is required is the module and the factory USB debug cable. Commercial solutions have also been identified but not tested. For more information contact service support.



Install the Apps

The first step is to install the required Apps. We recommend you install at least the Bluetooth and the Wired USB Terminal versions so you can use wired and wireless CLI terminals.

Serial USB Terminal: https://play.google.com/store/apps/details?id=de.kai_morich.serial_usb_terminal

Serial Bluetooth Terminal: https://play.google.com/store/apps/details?id=de.kai_morich.serial_bluetooth_terminal

Serial Wi-Fi Terminal: https://play.google.com/store/apps/details?id=de.kai_morich.serial_Wi-Fi_terminal

TeraTerm (Open Source Windows PC Only): <https://ttssh2.osdn.jp/index.html.en>

Putty (Windows & Unix): <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

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INNOTION

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App Communication Configurations

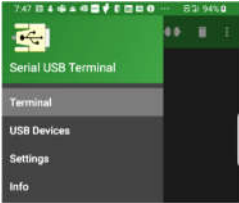
For Serial USB Terminal, TeraTerm & Putty Serial Parameters: **115200,8N1**

This step is only required for the Android “Serial USB Terminal” and PC terminal programs like TeraTerm or Putty. Apps that support a “wired” connection require the serial connection to be configured for the correct speed, number of bits, etc. The “Serial Bluetooth Terminal App does this automatically.

Access the settings menu in the “Serial USB Terminal” by selecting the “hamburger” icon in the top left corner.

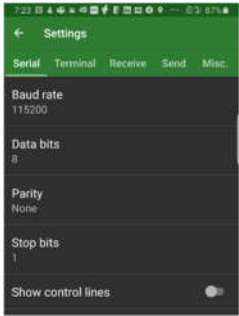


Choose “Settings” from the popout menu



On the first tab, “Serial”, set the parameters as shown.

- Baud Rate: **115200**
- Data Bits: **8**
- Parity: **None**
- Stop Bits: **1**



App User Interface Settings

For Android Serial Bluetooth, USB & Wi-Fi Terminals

All the Android Apps have nearly identical user interface settings. For the apps you have installed set the following values under the settings option and listed tabs for each app.

Terminal Tab

Serial

Terminal

Receive

Send

Misc.

Font size

10

Font style

Monospace

Charset

UTF-8

Display mode

Terminal

Auto scroll to end of buffer

☒

Show connection messages

☒

Show timestamps

☐

Timestamp format

HH:mm:ss

Buffer size

Unlimited

Receive Tab

Serial

Terminal

Receive

Send

Misc.

Newline

CR+LF

Send Tab

Serial

Terminal

Receive

Send

Misc.

Newline

Auto (same as Receive)

Edit mode

Text

Line delay

0 ms

Character delay

0 ms

Local echo

Show send data in terminal

☐

Clear input on send

☒

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Connecting to a G3 Over Bluetooth BLE

Android Serial Bluetooth App, (Requires the Wired RS485 Adaptor)

Bluetooth BLE does not require device pairing. The BLE device is found from within the App by scanning for it. Before we scan for the G3 we need to make sure the BLE radio is powered on. The G3 Controller will automatically power off the BLE radio 3 minutes after first boot if nothing connects to it so there is a good chance that it is powered off right now.

To power up the G3's BLE Radio: (Make sure the doors are closed)

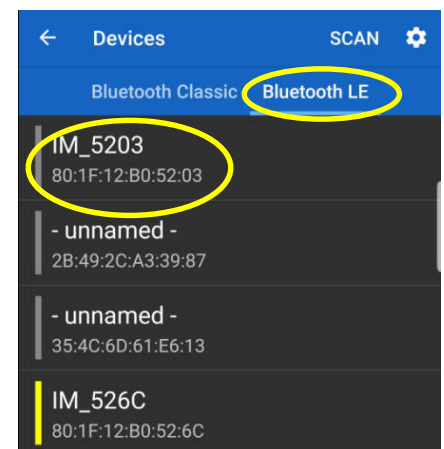
- From a wall switch, press and hold “**Stop**” and “**Release**” for about 10s. The system should reboot.
- Use the G3 power switch to power cycle the entire system.

Scanning for a G3's BLE Radio:

Open the “hamburger” menu and select “Devices”. Make sure that you are on the App's “Bluetooth LE” tab.

Press “SCAN” and in a few moments you should see 1 or more devices named IM_XXXX. Tip: The label on the back of “RS485 GPIO Adaptor” should have a label matching the “XXXX” numbers in the device names listed after scanning.

Select a device and you should be wirelessly connected to the G3. Test the connection with 1 or more “ver” commands or use the “Ver” button.



Connecting to a G3 Over Wired USB

Android Serial USB Terminal App

Start by connecting the Factory USB UART Debug cable to an appropriate OTG cable for your phone. Then plug the free end of the OTG cable into the phone's USB port. Most phones pause while a driver is loaded and then prompt you to choose the App to use. If the App selection shows the “Serial USB Terminal” selected it now making sure it's NOT the Bluetooth version as they look similar.

<p>1. Select the Serial USB Terminal</p> <p>2. Press the “Connect” Button</p>	<p>3. Connected</p>	<p>4. Test with “ver” command</p>
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App User Interface Button Settings

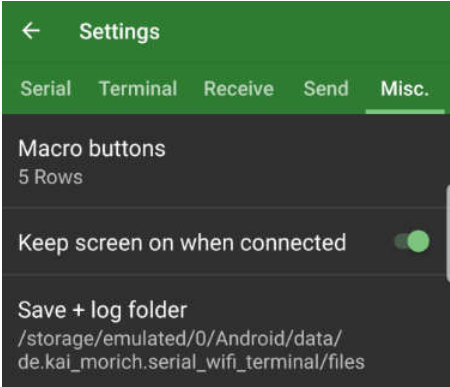
OPTIONAL for Android Serial Bluetooth, USB & Wi-Fi Terminals

This step is completely optional, but highly recommended unless you enjoy memorizing all the G3 CLI commands and typing commands on the “small screen”. The number of buttons displayed is dependent on your phone’s screen resolution and the font size choose in the app. All screen captures here were done on a Samsung Note 8 with the App’s font size set to 10, Monospaced.

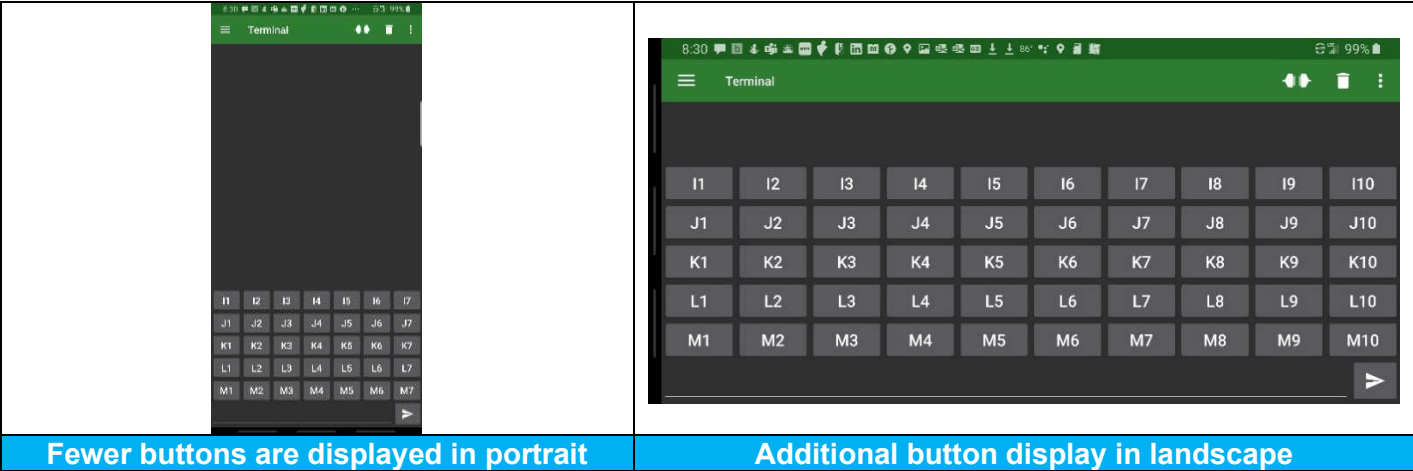
All 3 Android apps support user defined command buttons that will appear on screen. The user has the option to display up to 5 button rows or less. Once enabled, the buttons will appear on the main interface and the user can customize them or download a set of buttons already configured for the G3 from our support site. We have button configuration for the original 0.6.7 release and this 0.7.x release. First we have to enable the button display.

In the “Settings” menu, under the “Misc” tab...

- For now enable all 5 Rows as shown
- Setting “Keep screen on when connected” is optional



Then close the “Settings” menus and return to the main screen. You should see 5 rows of buttons. The buttons manually assigned or a template can be downloaded from the G3 support site.



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Importing & Exporting Factory Defined Buttons

The terminal app provides a way of importing and exporting user created buttons. We have created a set of buttons that cover most of the required G3 commands for the setup process. All 3 apps support import and export so having one set created means the other 2 Apps can simply import them instead of creating a set from scratch. The screen captures below were taken from the wired USB to UART version of the App.

Downloading the Factory Button Configurations

There are 2 configuration files available on the support site for the original G3 Firmware v0.6.7 and one for the latest v0.7.x. We recommend you download both so that you have the correct command set depending on what G3 firmware version you encounter in the field.

**Latest Firmware
v0.7.x**



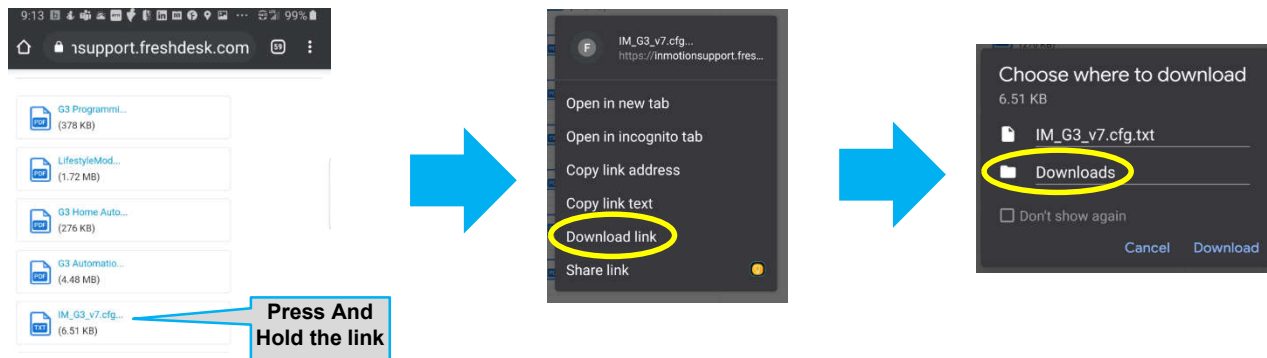
<https://inmotionsupport.freshdesk.com/support/solutions/articles/17000108662-g3-installation-with-500-series-motor-special-features-v0-7-x>

**Original Firmware
v0.6.7**



<https://inmotionsupport.freshdesk.com/support/solutions/articles/17000094962-g3-installation-with-500-series-motor-v0-6-7-original-release->

From a browser on your Android device, navigate to the G3 Support site above. Scroll to the bottom of the page and a number of files should be listed. The button files to download will be named “IM_G3_v7.cfg.txt” or “IM_G3_v6.cfg.txt”. On the link tap and hold on the link then choose “Download Link”. Download both button configuration files to the default folder on your device, probably “Downloads”.



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Importing the Factory Button Configuration to the Apps

Open one of the Terminal Apps and press the  options button in the upper right.

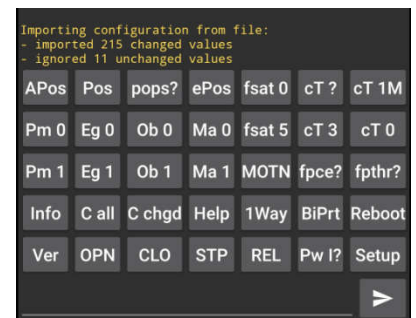
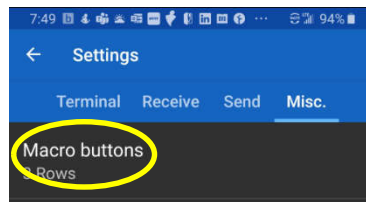
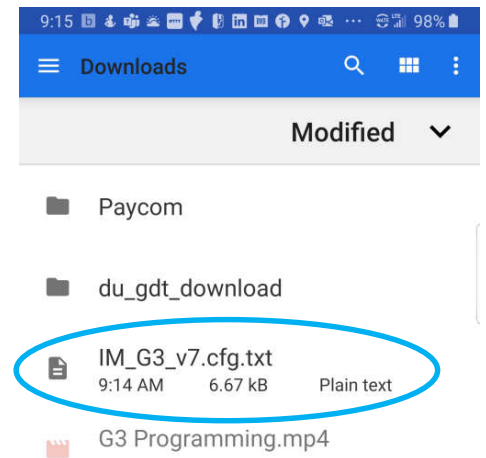
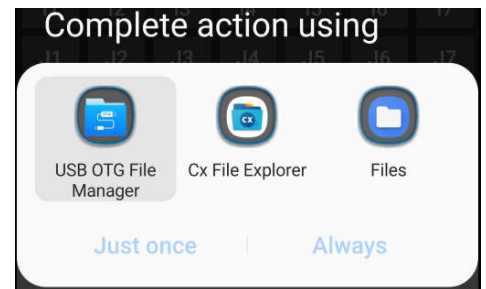
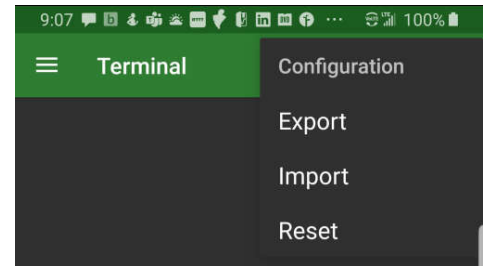
Select “Import”

The next steps depend on the make and model of your phone.

Select an app or function listed to locate the downloaded file you need to import.

Use the app or function to locate your “Downloads” directory and find the desired configuration file, either “IM_G3_v7.cfg.txt” or “IM_G3_v6.cfg.txt”.

After selecting the file, the main screen should return with the defined buttons displayed. If the screen returns, but without any buttons, open the hamburger menu again. Select the “Misc.” tab, “Macro buttons”, and make sure at least 1 row is selected.



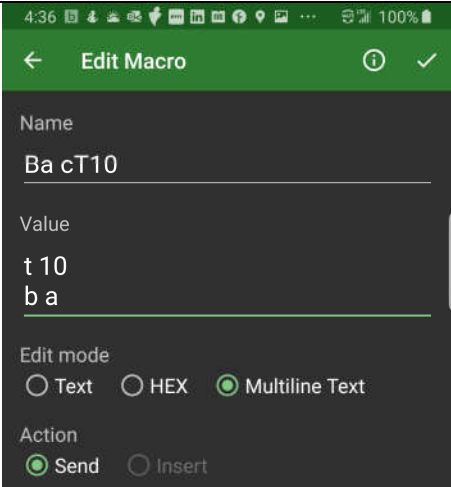
The import process should be repeated for each of the Android Serial Apps installed.

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The final button trick is sending multiple G3 commands with 1 button. For the most part the G3 controller does not respond well to multiple commands because there is not enough time to execute the first command, display the result and then run the second command.

I did find one set of commands that is very useful for G3 programming. When programming a door for the first time in the factory, we program first, then run a cycle test to verify Soft Touch. Fortunately, the G3 will accept a Cycle test command before its even programmed. Then when programming is complete the Cycle Test starts automatically. Here is how start a 10 cycle “Cycle Test” and program a G3 with single button.



Multiple Commands with One Button

Name: Button name on screen
Value: Multiple G3 CLI commands
Edit mode: Multiline Text
Action: Send

This works because the G3 supports starting a Cycle Test even before its programmed. The CycleTest will not run until the programming completes.

The “t 10” command must come first because once the “button autotest” command is received all other commands will be rejected until setup completes.

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Document Revisions

Revision	Release Date	Description
1.0.0	Sep 22, 2020	Initial release
1.0.1	Oct 2, 2020	Fixed typos in "Soft Touch" Tuning
1.0.2	Nov 19, 2020	Added info on "hard current limit" vs "Soft Touch"
1.0.3	Mar 15, 2021	TLE update with firmware v0.7.2
1.0.4	Mar 22, 2021	Updated TLE Tech Brief
1.0.5	Mar 24, 2021	Fixed some typos & added a recommended command to the TLE docs

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G3 Firmware Revisions

Revision	Release Date	Description															
0.7.2 (latest)	Mar 11, 2021	Maintenance release to address "TLE" over-current/temp issue. <ul style="list-style-type: none">• "hfi" help command added for "TLE" issues• Help commands "avi", "maxc" and "acdc" added• Config command "spl" added• "c all reset" updated to preserve "spl" and "hfi" settings• "TLE" over-current/temps counts tracked in flash• G3 LED color code updated• Panel 1 mass increased to 50,000/100,00lbs (Oneway/Bipart)															
0.7.1	Aug 28, 2020	Functionally identical to the v0.7.0 release. Updated 4 parameters to use new defaults. <table><tr><th>Command</th><th>v0.7.1 New Defaults</th><th>v0.7.0 Defaults</th></tr><tr><td>osp</td><td>4.0000 IPS</td><td>4.5000 IPS</td></tr><tr><td>csp</td><td>4.0000 IPS</td><td>4.5000 IPS</td></tr><tr><td>fpce</td><td>470mA</td><td>430mA</td></tr><tr><td>fpthr</td><td>10 counts</td><td>5 counts</td></tr></table>	Command	v0.7.1 New Defaults	v0.7.0 Defaults	osp	4.0000 IPS	4.5000 IPS	csp	4.0000 IPS	4.5000 IPS	fpce	470mA	430mA	fpthr	10 counts	5 counts
Command	v0.7.1 New Defaults	v0.7.0 Defaults															
osp	4.0000 IPS	4.5000 IPS															
csp	4.0000 IPS	4.5000 IPS															
fpce	470mA	430mA															
fpthr	10 counts	5 counts															
0.7.0	Aug 21, 2020	"Special Features" release for G3 K12. G3 K02 is not supported. <ul style="list-style-type: none">• Entertainment, Close Behind, Simplicity & Motion Assist modes• UL325 closing force reduced by 35% over v0.6.7• Improved security, delayed mag brake, manual span adjust, etc• Integrated cycle testing• Profile bin resolution increased by 300%.• Cleaner CLI interface optimized for smart phone access															
0.6.7 (K12) 0.5.91(K02)	Dec 3, 2019	Initial production release for G3 supporting basic door functions only using wired & wireless accessories. Processors K02 & K12 supported.															