



Figure 1
New Direct
Drive Keypad



Figure 2
Old Direct
Drive Keypad



Figure 3
Audit Keypad



Figure 4
A-Series
Keypad

No series on modern electronic safe locks would be complete without covering one of the pioneers of the American safe and vault industry — Sargent & Greenleaf. The company made its first real contribution to the electronic safe lock industry in 1994 with the introduction of the 6120. Sargent & Greenleaf's first electronic lock proved so successful that it soon gave rise to an entire 6100 series of electronic safe locks with a wide array of unique features.

The overwhelming popularity of these locks led S&G to further expand its electronic product line with additional designs such as the Z02/Z03, Direct Drive, RotaryBolt and Pulsetronic (see *Figures 1* and *2*). While Sargent & Greenleaf's production of multiple electronic safe lock models greatly benefits end users, it also represents new challenges to locksmiths and service technicians. Correctly determining the model of an S&G electronic lock and understanding its available features are crucial steps in programming, servicing and opening these locks.

Motorized Electronic Offerings

Sargent & Greenleaf electronic safe locks fall into two main categories — motorized and solenoid. This refers to the type of drive components that control each design's bolt movement. The motor-driven 6100 series includes the 6120, 6123, 6124/6125, 6126/6127 and 6128/6129. The most common of these models in service today are the 6120 and 6123. Each has many useful features like time delay, multiple users and a master reset code, and they carry a UL Type 1 classification.

Key differences of the 6123 include a longer time delay (99 minutes versus 9 minutes), available dual-control usage and the ability for users to change their own codes without the presence of a manager. The 6124/6125 line is extremely similar to the 6123 model but also carries a VdS Class 2 rating that meets requirements on most European containers. The 6124 and 6125 share the same firmware

but differ in their drive mechanisms, with the 6125 employing additional gearing that allows the lock bolt to push or pull over 2 pounds of attached boltworks. This design of the 6125, referred to as a "push/pull" motor lock, results in different drill points and opening methods compared to the 6124 model.

S&G's motor-driven 6100 series continues with the 6126/6127 models. These locks feature full audit capabilities that allow an administrator to review a history of all lock activity, using Dallas-style key and matching computer software (*Fig. 3*). The difference between the 6126 and 6127 is the 6127's use of a push/pull motor drive identical to that found on the 6125.

The final locks covered in the 6100 series are the 6128/6129 models commonly referred to as the A series (*Fig. 4*). These locks are specifically designed for the ATM market and feature one-time-use opening codes generated by special software for the highest level of security and access control. The 6129 differs from its 6128 sibling with a "push/pull" motor design.

Solenoid Electronic Offerings

The second, and most recently offered, category of Sargent & Greenleaf electronic safe locks are the solenoid-based models, which include the Z02 and Z03 series. The Z02 is based on the 6123 firmware and, therefore, shares the same features and programming procedures as its 6100 series cousin. The Z03 firmware is derived from the 6124/6125 series, giving it a VdS Class 2 rating that makes the Z03 more common overseas.

Both Z02 and Z03 locks are available in two types of bolt configurations — Direct Drive and RotaryBolt. In the Direct Drive setup, a user enters his code then rotates the outer portion of the keypad to retract the lock bolt. One of the advantages of this design is its ability to easily overcome bolt side pressure that might otherwise stall a traditional motor-driven design. The psychological impact of physically rotating the

keypad to retract the lock bolt — similar to a traditional mechanical lock — is also very appealing to many customers.

By contrast, the RotaryBolt design offers a simplified opening procedure that can be equally appealing. Once the combination is entered, simply turning the handle of the safe causes the RotaryBolt to collapse into the lock case and allows the safe door to be quickly opened without the need for secondary action such as rotating a keypad. S&G RotaryBolts are often referred to as Z-bolts due to their collapsing bolt's unique appearance that resembles the last letter of the English alphabet. From a forced opening perspective, the Z02/Z03 Direct Drive and RotaryBolt designs share the same drill points and troubleshooting procedures.

Identification Through Keypads

With a basic understanding of the different electronic safe lock designs available from Sargent & Greenleaf, it's much easier to correctly identify the various models you encounter in the field. One of the quickest methods to help determine the type of S&G lock on a safe is to examine the keypad. As the only external and readily accessible component of the lock assembly, the keypad can serve as a valuable reference in identifying what's installed behind it. In situations where the lock is nonfunctional and completely unresponsive, the keypad may be one of the only identification tools available to a technician.

Sargent & Greenleaf currently offers seven styles of keypads on its electronic safe locks — the one-battery or EZ-View, the standard two-battery keypad with round buttons, the two-battery 61KP with rectangular buttons, the Direct Drive keypad, the 6130-400 Low-Profile, the Biometric keypad and the new Time Lock keypad (Fig. 5, 6, 7, 8 and 9).

Although S&G keypads have a high degree of interchangeability between the available lock models, certain restrictions apply that limit each keypad from being truly

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universal, and these can be used in lock identification. For example, the Biometric keypad is only compatible with 6120, 6123 and Z02 RotaryBolt lock models. The new Time Lock keypad is only available on 6124, 6125, 6126, 6127 and Z03 RotaryBolt locks.

Direct Drive models of the Z02 and Z03 can be identified by the use of the Direct Drive keypad with its yellow or blue tab located at the 12 o'clock position. (Note: The now obsolete yellow-tab Direct Drive keypads have been replaced by a new, more durable version featuring a blue tab.)

Another easily noticeable feature is the presence of a Dallas-key reader next to the keypad housing that indicates an 6126/6127 Audit lock or an 6128/6129 A series. A-series locks can also frequently be distinguished from 6126/6127 and other S&G electronic locks by the optional silver plate installed behind the keypad, which displays an 8-digit lock ID code for use with the A-series' software.

While certain keypads are limited to specific lock models based on compatibility, general rules and a knowledge of common keypad/lock model pairings can still be applied to help identify Sargent & Greenleaf electronic locks from outside the container. The standard two-battery keypad, for instance, is typically found on 6120, 6123 and Z02/Z03 RotaryBolt models; it's not available on 6126/6127 Audit locks, 6128/6129 A-Series or Z02/Z03 Direct Drives. The same is also true for the single-battery EZ-View keypad. The two-battery 61KP keypad is fully compatible with all S&G electronic locks other than



Figure 5
Single-Battery
Keypad



Figure 6
Two-Battery
Keypad



Figure 7
Low-Profile
Keypad



Figure 8
Biometric Keypad



Figure 9
Time Lock Keypad

Direct Drives, but it's typically found only on 6124/6125, 6126/6127 and 6128/6129 locks (Fig. 10). Z02/Z03 Direct Drive solenoid locks are only paired with Direct Drive keypads and are easily identifiable by the yellow or blue tab on the keypad. The Low-Profile keypad, which is similar in appearance to the Direct Drive but features a black tab and is not compatible with Direct Drive locks or 6126-through 6129-series locks.

Clues from Cables

Another useful tool in identifying different Sargent & Greenleaf electronic locks is the type and appearance of the keypad cable. Since S&G keypad cables are hard wired into the lock case, they can be used to determine the lock model even in the absence of a keypad or in situations when the lock is unresponsive to keypad input.

Each current 6100-series lock features a gray four-pin ribbon cable that connects the

lock body to the keypad. Early 6120s, manufactured until 1996, used four separate wires colored gray, green, red and orange. In 1996 the switch was made to a gray ribbon cable on the 6120 and 6123.

In 2002 these locks were redesigned to incorporate a deadlocking mechanism, and a red band was added to the keypad cable to distinguish these new locks. Locks manufactured prior to 2002 had a solid gray cable without colored banding, and they used a springbolt design.

This 6100 series revision is of particular importance to safe technicians because it requires a different forced opening procedure. Older, springbolt-style 6120/6123 locks — often referred to as Version 1 — can be opened by drilling for the lock bolt and probing the bolt into the lock case. The addition of a deadlocking mechanism on the newer, red-banded locks renders this straightforward opening method obsolete.

Identifying an S&G Electronic Lock in 2 Easy Steps

1

Press * 8 #, listen for lock response/beep pattern

Responses:

6120: no response, or single low beep, or 2 low beeps

6121: 1 low beep, 1 high beep

6123 or Z02: 1 low beep, 3 high beeps, or 1 low, 3 high, 1 low, or 1 low, 3 high, 2 low

6124–6129, Z03: long, steady error tone; go to Step 2

2

Press 4 3 *, listen for lock response/beep pattern

Responses:

6124 single-user: 4 high-pitch beeps, 1 low-pitch beep

6124 multi-user: 4 high, 2 low

6124 dual-control: 4 high, 3 low

6125 single-user: 5 high, 1 low

6125 multi-user*: 5 high, 2 low

6125 dual-control*: 5 high, 3 low

6126 Audit lock: 4 high, 2 low, 4 high

6127 Audit lock*: 5 high, 2 low, 4 high

6128 A series: 4 high, 4 low

6129 A series*: 5 high, 4 low

* Push/Pull motor lock

In March 2009, Sargent & Greenleaf further revised the 6120 and 6123. It updated firmware to make the deadlocking mechanism more robust by reversing the motor rotation briefly before retracting the lock bolt. With the firmware update, S&G has switched from a red band on the keypad cable to a new yellow band to indicate the latest 6120/6123 revisions.

See Fig. 11 for a comparison of the different colored bands found on S&G keypad cables. On the left is the old-style springbolt 6120/6123, followed by the Version 2 red-banded deadlocking cable and the latest yellow band 6120/6123. The keypad cable on the far right shows the green colored band used to indicate the presence of a Z02 RotaryBolt lock.

In addition to the gray four-pin cable, 6126/6127 Audit locks and 6128/6129 A-series locks have a six-pin cable that interfaces with the Dallas-style key reader used on these locks. Direct Drive and Z03 RotaryBolt locks utilize a single, round, four-pin keypad cable rather than a ribbon cable.

Noting the direction of the keypad cable routing through the spindle hole can also help determine the model of an S&G lock as well as its handling inside the container. Original, nondeadlocking 6120 and 6123 locks have a single cable channel cast into the lock case with the cable running in the direction opposite the lock bolt. Newer-style deadlocking versions have a T-shaped cable channel with the cable also running away from the lock bolt.

Knowledge of this characteristic can be used to determine the handling of these locks and the direction of the bolt. For example, if the keypad cable runs to the right, then the bolt is on your left, and the lock is mounted right-hand. On a 6124/6125 series lock, the keypad cable runs to the side of the lock case. On a vertical, down-mounted lock, the keypad cable runs to the left through the spindle hole. 6126 through 6129 locks have both a four-pin and six-pin cable that route to opposite sides of the lock case. On a vertical down lock, the six-pin cable goes left and the

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four-pin ribbon cable routes to the right when viewed through the spindle hole. The green-banded keypad cable on a Z02 RotaryBolt routes into the opening side of the lock case (the side of the lock in the direction of the bolt works).

Knowing Sargent & Greenleaf

During the past 150 years, Sargent & Greenleaf has positioned itself as one of the leading manufacturers in the security industry, and the company continues to evolve with the latest changes in technology. Since its entry into the electronic safe lock market in the mid '90s, S&G has seen tremendous success and today makes up a significant portion of the electronic locks currently in use. With innovative new designs such as its biometric keypad, direct-drive lock and A series, this trend shows no sign of fading. The sheer number of S&G electronic locks in the field makes it essential for modern safe technicians to have the knowledge necessary to service these locks. With such a large variety of vintages and models available, accurate lock identification is critical. ☺

Special thanks to Shaun Stewart with Sargent & Greenleaf for his contributions to this article.



Ryan Taylor has been with Lockmasters Inc. since 2006, where he is involved in safe, safe deposit and safe lock technical support, along with new product development. Ryan is also a combination lock manipulation, safe deposit lock servicing and electronic safe lock servicing instructor for Lockmasters, and he is the lead safe and safe lock instructor for PureAuto seminars.



Figure 10
61KP Keypad

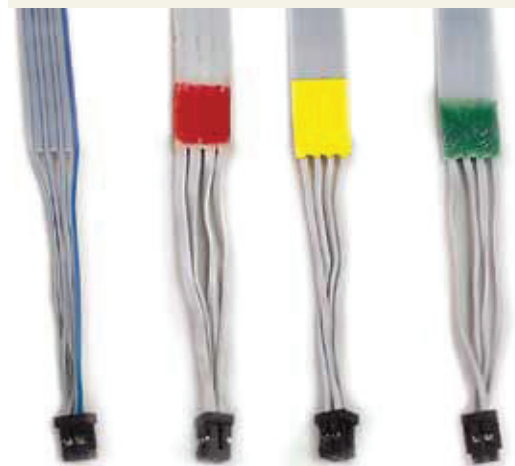


Figure 11 Keypad Cables