

### SERIES 08 SERIES 09

0.5" Diameter, 1/4 Amp, Standard, Military SR13

#### **FEATURES**

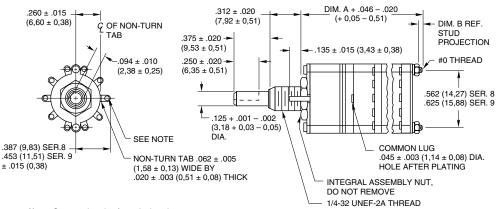
- Proven Quality in Thousands of Applications
- Gold-plated Contact System
- 30°, 36°, 45°, 60° and 90° Angle of Throw Options
- MIL Qualified Versions MIL-S-3786/13



#### **DIMENSIONS** in inches (and millimeters)



Front view shows terminal location of Series 8, 36° angle of throw. Transpose rear view for terminal location of other angles of throw.

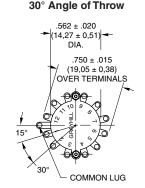


Note: Common location for a single pole per deck switch. For common location on multi-pole switches, see circuit diagrams.

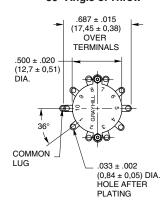
| Dimension     | Dimension  | Approx. Weig<br>Grams   |   | ht No.<br>of   | Dimension   | Dimension  | Approx. Weight<br>Grams                                 |  |
|---------------|--|---|---|--|---|--|---|--|
| Α             | В  | Srs. 08   | Srs. 09   | Decks  | Α   | В  | Srs. 08   | Srs. 09  |
| .960 (24,38)  | .062 (1,57)  | 12  | 16.0  | 7  | 2.818 (71,58)   | .312 (7,92)  | 24  | 31.0   |
| 1.228 (31,19) | .062 (1,57)  | 14  | 18.5  | 8  | 3.086 (78,38)   | .312 (7,92)  | 26  | 33.5   |
| 1.496 (38,00) | .062 (1,57)  | 16  | 21.0  | 9  | 3.354 (85,19)   | .312 (7,92)  | 28  | 36.0   |
| 1.764 (44,81) | .062 (1,57)  | 18  | 23.5  | 10   | 3.622 (91,00)   | .312 (7,92)  | 30  | 38.5   |
| 2.032 (51,61) | .062 (1,57)  | 20  | 26.0  | 11   | 3.890 (98,81)   | .312 (7,92)  | 32  | 41.0   |
| 2.550 (64,77) | .312 (7,92)  | 22  | 28.5  | 12   | 4.158 (105,61)  | .312 (7,92)  | 34  | 43.5   |
|               | .960 (24,38)<br>1.228 (31,19)<br>1.496 (38,00)<br>1.764 (44,81)<br>2.032 (51,61) | A B  .960 (24,38) .062 (1,57) 1.228 (31,19) .062 (1,57) 1.496 (38,00) .062 (1,57) 1.764 (44,81) .062 (1,57) 2.032 (51,61) .062 (1,57) | Dimension A         Dimension B         Grammar           .960 (24,38)         .062 (1,57)         12           1.228 (31,19)         .062 (1,57)         14           1.496 (38,00)         .062 (1,57)         16           1.764 (44,81)         .062 (1,57)         18           2.032 (51,61)         .062 (1,57)         20 | Dimension A         Dimension B         Grams           .960 (24,38)         .062 (1,57)         12         16.0           1.228 (31,19)         .062 (1,57)         14         18.5           1.496 (38,00)         .062 (1,57)         16         21.0           1.764 (44,81)         .062 (1,57)         18         23.5           2.032 (51,61)         .062 (1,57)         20         26.0 | A B Srs. 08 Srs. 09 Decks  .960 (24,38) .062 (1,57) 12 16.0 7  1.228 (31,19) .062 (1,57) 14 18.5 8  1.496 (38,00) .062 (1,57) 16 21.0 9  1.764 (44,81) .062 (1,57) 18 23.5 10  2.032 (51,61) .062 (1,57) 20 26.0 11 | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | Dimension A         Dimension B         Grams Srs. 08         of Decks         Dimension A         Dimension B         Grams Srs. 08           .960 (24,38)         .062 (1,57)         12         16.0         7         2.818 (71,58)         .312 (7,92)         24           1.228 (31,19)         .062 (1,57)         14         18.5         8         3.086 (78,38)         .312 (7,92)         26           1.496 (38,00)         .062 (1,57)         16         21.0         9         3.354 (85,19)         .312 (7,92)         28           1.764 (44,81)         .062 (1,57)         18         23.5         10         3.622 (91,00)         .312 (7,92)         30           2.032 (51,61)         .062 (1,57)         20         26.0         11         3.890 (98,81)         .312 (7,92)         32 |

Grayhill part number and date code marked on standard style detent cover label. Customer part number marked on request. Grayhill part number and date code printed on military style cover. Military number printed when required.

# Rear Views Series 09



#### Series 08 36° Angle of Throw



For rear view of 45°, 60° and 90°, see circuit diagrams.



### **CIRCUIT DIAGRAMS: Solder Lug Terminals**

## Switch is Viewed From Shaft End and Shown in Position No. 1 Note: All common terminals are located above base terminals as shown. 연 OF NON-TURN TAB Series 09 30° Angle of Throw 5 <sup>O</sup> ONE POLE TWO POLE THREE POLE FOUR POLE FIVE OR SIX POLE 연 OF NON-TURN Series 08 36° Angle of Throw ONE POLE TWO POLE **Rear Views** GOF NON-TURN COMMON LUG SINGLE POLE Series 09 45° Angle of Throw ONE POLE TWO POLE THREE OR FOUR POLE G OF NON-TURN COMMON LUG SINGLE POLE TAB Series 09 60° Angle of Throw 3 0 C2 3 <sup>O</sup> 3 ° ONE POLE TWO POLE THREE POLE G OF NON-TURN TAB COMMON LUG SINGLE POLE Series 09 90° Angle of Throw ONE POLE TWO POLE



### **SERIES 08** SERIES 09

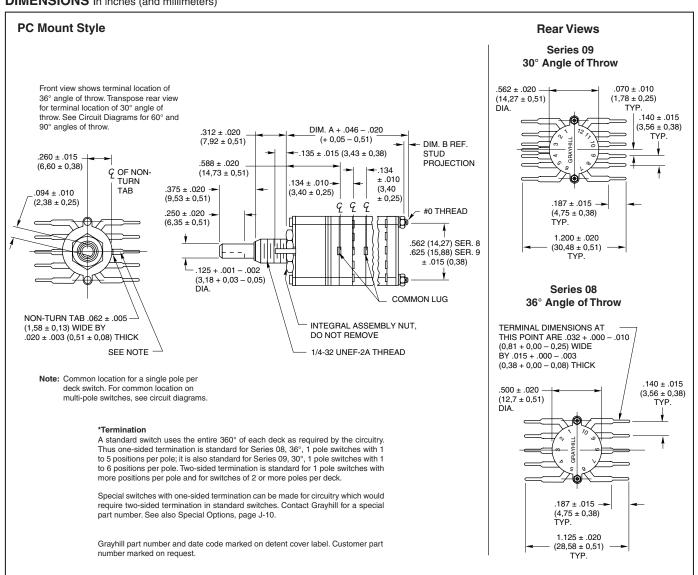
.5" Diameter, 1/4 Amp, PC Mount

#### **FEATURES**

- Gold-plated Contact System
- 30°, 36°, 60° or 90° Angle of **Throw Options**
- Compatible with Logic Level Voltages and Currents

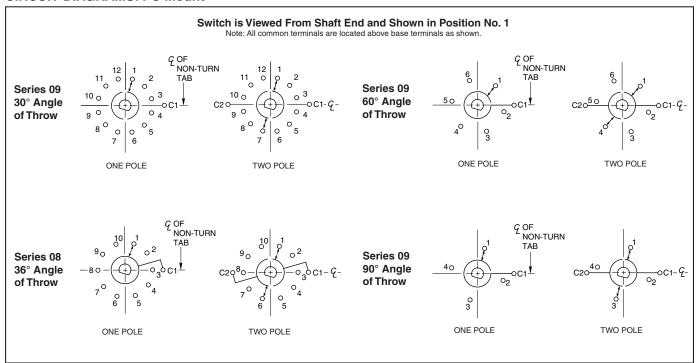


#### **DIMENSIONS** in inches (and millimeters)

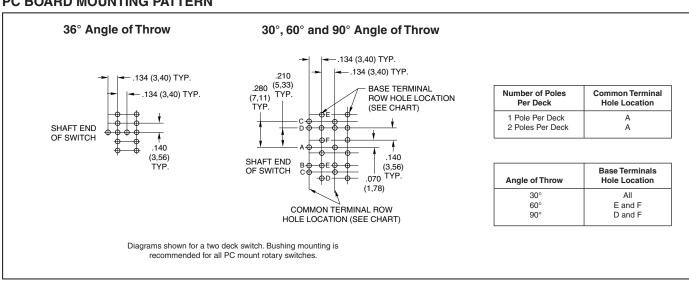




#### **CIRCUIT DIAGRAMS: PC Mount**



#### PC BOARD MOUNTING PATTERN



#### **SHAFT AND PANEL SEAL**

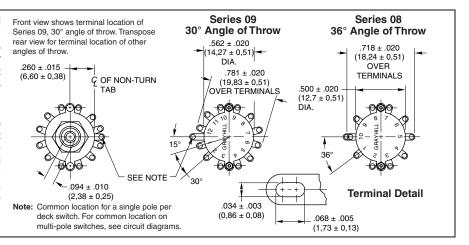
A shaft and panel seal is available to provide watertight mounting of the Series 08 and 09. Standard and Military Style rotary switches. Sealing is accomplished by O-ring shaft seal and panel seal washer. When the panel seal is compressed, dimensions are approximately the same as an unsealed switch. Sealed switches are provided with a double flat bushing. Non-turn feature can be accomplished by proper fit of this bushing into panel hole and/or by allowing non-turn tab to extend into (but not through) panel. Military Style rotary sealed switches do not have a non-turn tab.



#### **MILITARY QUALIFIED**

Series 08 and 09 military switches are qualified to MIL-DTL-3786/13. They include 30°, 36°, 45° and 60° angles of throw with solder lug terminals in sealed and unsealed styles. See front and rear views at right. Standard variations which do not affect switch performance can also be marked as qualified product—contact Grayhill.

The military style is dimensionally the same as the standard except for the solder lug. Convert standard style switch drawings to military style drawings by including this terminal detail and changing the over-terminal dimensions shown here. Grayhill can provide complete specification drawings. Qualified switches can be ordered by the Grayhill number or the "M" number; they will be marked per MIL-DTL-3786/13.



#### **SPECIFICATIONS**

#### **Electrical Ratings**

#### Standard Style

Rated: To make and break the following loads: 1/4 amp, 115 Vac resistive; 1/4 amp, 6-28 Vdc resistive; 20 mA, 115 Vdc resistive; 50 mA, 115 Vdc inductive; to carry 4 amps continuous.

Contact Resistance: After 25,000 cycles of operation, 50 milliohms maximum

Insulation Resistance: 1,000 megohms minimum between terminals and shaft Voltage Breakdown: 1,000 Vac initially

(500 Vac or better after most environmental tests)

**Life Expectancy:** 50,000 mechanical cycles of operation. *Note:* Actual life is determined by a number of factors, including electrical loading, rate of rotation and environment, as well as maximum contact resistance, minimum insulation resistance and minimum voltage breakdown required at the end of life.

#### Electrical Ratings Military Qualified

Qualified to the following MIL-DTL-3786/13 Circuit Values: (Also see Standard Style description.) The Series 08M and 09M have been tested to meet the requirements of MIL-S-3786, Style SR13, the majority of which are listed. At 85°C, approximately 68% relative humidity and sea level pressure, the switches have been tested to make and break the following loads, as stated in MIL-DTL-3786/SR13:125 milliamperes at 128 Vdc resistive: 75 milliamperes at 115 Vac resistive

The switches have also been tested at reduced barometric pressure (70,000 feet), 25°C at approximately 68% relative humidity to make and break the following loads as stated in MIL-DTL-3786/SR13. 50 milliamperes 28 Vdc resistive; 20 milliamperes 115 Vac resistive. When tested to the above loads at the stated conditions, the Series 08M and 09M switches meet the following life-limiting criteria after 25,000 cycles of operation in accordance with

MIL-DTL-3786.

Contact Resistance: 50 milliohms maximum after life

**Insulation Resistance:** 1,000 megaohms minimum between terminals and shaft

**Dielectric Strength:** 500 Vac (atmospheric pressure) and 350 Vac (reduced pressure) between mutually insulated parts.

The Series 08M and 09M also meet the requirements of MIL-DTL-3786 SR13 for moisture resistance, stop strength, rotational torque, vibration (10 to 2,000 cps), medium and high shock, salt spray, explosion, thermal shock (-65°C to 85°C) and terminal pull. When tested at sea level, 25°C and 68% relative humidity with failure criteria of 50 milliohms maximum contact resistance and 500 Vac breakdown voltage, these switches will make and break 250 mA at 28 Vdc inductive (250 millihenries): 1/2 amp: at 28 Vdc resistive: 1/2 amp; at 115 Vac: 60 Hz resistive for 10,000 cycles of operation.

## Materials and Finishes Standard Style

Switch Bases: Melamine per (MIL-M-14) ASTM-

Cover, Deck Separators and End Plate: Phenolic per (MIL-M-14) ASTM-D-5948 Rotor Mounting Plate: Thermoplastic Mounting Bushing: Brass, tin/zinc-plated.

Shaft, Retaining Rings, Through Bolts, Shaft Extension, Stop Washers, Stop Arm, Thrust Washers, Nuts, Cover Plate and Rear Support

Plate: Stainless steel

**Detent Balls:** Steel, nickel-plated **Detent Springs:** Tinned Music wire

Terminals, Stator (Base) Contacts and Common Plate: Brass, gold plate .00001" minimum over silver plate .0003" minimum Rotor Contact: Silver alloy, gold-plated .00001"

minimum

**Mounting Hardware:** Two mounting nuts .062" (1,57) thick by .312" (7,92) across flats and one internal lockwasher are supplied with switch.

Lockwasher: Stainless steel

**Mounting Nuts, Washers:** Brass, tin/zinc-plated and or stainless steel.

## Materials and Finishes Military Qualified

Deck Separators, End Plate and Switch Bases:

Diallyl per (MIL-M-14) ASTM-D-5948 Rotor Mounting Plate: Thermoplastic Mounting Bushing: Brass, tin/zinc-plated.

Shaft, Cover, Stop Plate, Retaining Ring, Through Bolts, Shaft Extension, Stop Arm, Thrust Washers, Cover Plate and Rear Support Plate, Lockwashers and Nuts: Stainless steel

**Detent Balls:** Steel, nickel-plated **Detent Springs:** Tinned music wire

Terminals, Stator (Base) Contacts and Common Plate: Brass, gold plate .00001" minimum over silver plate .0003" minimum Rotor Contact: Silver alloy, gold-plated .00001" minimum

**Mounting Hardware:** Two mounting nuts .062" (1,57) thick by .312" (7,92) across flats and one internal tooth lockwasher are supplied with this switch.

**Mounting Nuts, Washers:** Brass, tin/zinc-plated and or stainless steel.

## ADDITIONAL CHARACTERISTICS Standard Style and Military Qualified

**Contacts:** Shorting or Non-shorting contacts available in 30°, 36° and 45° angle of throw rotary switches. Non-shorting contacts available in 60° and 90° angle of throw switches. All are wiping contacts with over 100 grams of contact force.

Stop Strength: 12 lb-inches minimum

Rotational Torque: 8-64 oz-in depending upon the number of poles per deck and the number of decks

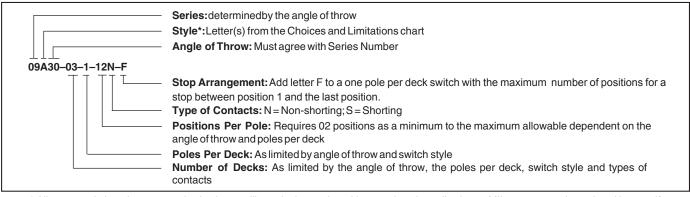
**Extended Studs:** Switches of six decks or more have longer studs with extra stud nuts for recommended double end mounting.



#### **CHOICES AND LIMITATIONS**

| Series | Style and Designation   | Angle of Throw |       |                    | Number of Decks<br>Shorting   Non-Shorting                                      |  | Poles<br>Per Deck          | Number of Positions/Pole                                       |
|--------|---|----------------|-------|--------------------|---|--|----------------------------|--|
| 08     | A = Standard S = Standard, Shaft/Panel Seal M = Military Style MS = Style M, Shaft/Panel Seal                                 |                | Fixed | Solder             | 01 thru 12<br>01 thru 09  | 01 thru 12<br>01 thru 09   | 1 2                        | 02 thru 10<br>02 thru 05                                       |
|        | P = Standard, PC Mount<br>SP = Style P, Shaft/Panel Seal<br>MP = Military Style, PC Mount<br>MSP = Style MP, Shaft/Panel Seal | 36°            |       | Printed<br>Circuit | 01 thru 12<br>01 thru 09  | 01 thru 12<br>01 thru 09   | 1<br>2                     | 02 thru 10<br>02 thru 05                                       |
| 09     | A = Standard<br>S = Standard, Shaft/Panel Seal<br>M = Military Style<br>MS = Style M, Shaft/Panel Seal                        | 30°            | Fixed | Solder             | 01 thru 12<br>01 thru 09<br>01 thu 06<br>01 thru 04<br>01 thru 03<br>01 thru 03 | 01 thru 12<br>01 thru 09<br>01 thru 06<br>01 thru 04<br>01 thru 03<br>01 thru 03 | 1<br>2<br>3<br>4<br>5<br>6 | 02 thru 12<br>02 thru 06<br>02 thru 04<br>02 or 03<br>02<br>02 |
|        | P = Standard, PC Mount<br>SP = Style P, Shaft/Panel Seal<br>MP = Military Style, PC Mount<br>MSP = Style MP, Shaft/Panel Seal |                |       | Printed<br>Circuit | 01 thru 12<br>01 thru 09  | 01 thru 12<br>01 thru 09   | 1<br>2                     | 02 thru 12<br>02 thru 06                                       |
|        | A = Standard,<br>S = Standard, Shaft/Panel Seal<br>M = Military Style<br>MS = Style M, Shaft/Panel Seal                       | 45°            |       | Solder             | 01 thru 12<br>01 thru 06<br>01 thru 04<br>01 thru 03                            | 01 thru 12<br>01 thru 06<br>01 thru 04<br>01 thru 03                             | 1<br>2<br>3<br>4           | 02 thru 08<br>02 thru 04<br>02<br>02                           |
|        | A = Standard,<br>S = Standard, Shaft/Panel Seal<br>M = Military Style<br>MS = Style M, Shaft/Panel Seal                       |                |       |                    | Not<br>Available  | 01 thru 06<br>01 thru 03<br>01 or 02   | 1<br>2<br>3                | 02 thru 006<br>02 or 03<br>02                                  |
|        | P = Standard, PC Mount<br>SP = Style P, Shaft/Panel Seal<br>MP = Military Style, PC Mount<br>MSP = Style MP, Shaft/Panel Seal | 60°            |       | Printed<br>Circuit | Not<br>Available  | 01 thru 06<br>01 thru 03   | 1<br>2                     | 02 thru 06<br>02 or 03   |
|        | A = Standard<br>S = Standard, Shaft/Panel Seal  |                |       | Solder             | Not<br>Available  | 01 thru 06<br>01 thru 03   | 1<br>2                     | 02 thru 04<br>02   |
|        | P = Standard, PC Mount<br>SP = Style, Shaft/Panel Seal  | 90°            |       | Printed<br>Circuit | Not<br>Available  | 01 thru 06<br>01 thru 03   | 1<br>2                     | 02 thru 04<br>02   |

#### **ORDERING INFORMATION**



<sup>\*</sup> All rotary switches that are required to have military designated markings and testing adhering to MIL-3786 are to be ordered by specifying the military part number identified on the appropriate slash sheet.

## **Mouser Electronics**

**Authorized Distributor** 

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Grayhill:

09A30-04-2-04N 09A60-02-1-06N 09MS30-01-1-08N 09A60-02-1-04N 09A30-06-1-04S 083162-2-03N 08P36-01-2-05N 09M60-05B06N 093101-1-04S 09M45-02-1-03N 09A30-02-6-02N M3786/13-0237 08S36-11-1-10N 09A30-01-1-03N 09S90-01-2-02N 09M30-01-1-04N M3786/13-0029 09S30-02-2-05N M3786/13-0880 08M36-02-2-03N 09P30-02B12N 08M36-05-1-10N 08MS36-01-1-04N 09M30-02-1-12S 09M30-01-3-04S 09A30-01-4-03S 09A45-02-1-04N 09M45-01-2-02N 09M30-03-1-03N 09A45-02-2-03N 09P30-01-1-06N 08S36-09-1-10N 09MS45-02-2-04N 09A30-03-4-02N 09A30-08-1-08N 09MS30-03-2-05N 09M30-02-1-10N 09S45-03-1-06N 08A36-01-1-03N 093101-2-02N 09S30-04-1-05N M3786/13-0091 09A90-02-2-02N M3786/13-0483 09MS60-01-2-02N 08A36-12-1-04S 09A60-03-1-06N 09A45-04-1-04N 09A45-10B08N 093111-4-03S 09M60-01-1-04N 09M30-05-1-06N M3786/13-0471 08A36-03B10S 08MS36-06-1-07N 09M45-02B08S 09M60-03-2-03N 093121-3-03N 09S60-01-1-02N 09P30-05-1-03N M3786/13-0033 09M30-03B12N 09A30-04B12N 08M36-08-1-08N 09A30-02-1-05N 083192-2-03N 08M36-01-1-07N 09S30-06-2-06N 09MS30-04-4-03S 08M36-06-1-04N 09A30-02-2-03S M3786/13-0447 09P30-04-1-11N 09S45-03-4-02N M3786/13-0073 09M30-01-6-02N 09S30-01-1-12N 09A30-03-1-10N M3786/13-0754 09MS45-04-2-03N 08M36-02-1-03N 08MSP36-05B04N 09A30-07B12N 08A36-01B10N 09M30-08-1-09N 08S36-03-1-03N 09A30-02-1-08N 09A60-01-1-02N 09M30-04-1-08N 093102-2-03N 09MS45-01-1-02N 08M36-03-2-05S 09A45-01-1-07N 09M45-03-2-02N 09A30-06-1-08N 09M45-02-1-08N 09A90-04B04N 09MS60-03-2-02N 09A30-10-1-08N 083173-2-05N