SERIES 53, 57 and 59
1.125” Diameter, 1/4 Amp

FEATURES
- Smallest Diameter Rotary Switch with this Number of Positions and Current Capacity
- Military Qualified MIL-DTL-3786/36
- Gold-plated Contact System
- Compatible with Logic Circuity

DIMENSIONS in inches (and millimeters)

<table>
<thead>
<tr>
<th>No. of Decks</th>
<th>Dimension A</th>
<th>Dimension B</th>
<th>Approx. Weight Grams</th>
<th>No. of Decks</th>
<th>Dimension A</th>
<th>Dimension B</th>
<th>Approx. Weight Grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.164 (23.27)</td>
<td>0.032 (0.81)</td>
<td>50</td>
<td>7</td>
<td>3.164 (80.37)</td>
<td>0.281 (7.14)</td>
<td>110</td>
</tr>
<tr>
<td>2</td>
<td>0.240 (31.72)</td>
<td>0.032 (0.81)</td>
<td>60</td>
<td>8</td>
<td>3.497 (88.82)</td>
<td>0.281 (7.14)</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>1.582 (40.18)</td>
<td>0.032 (0.81)</td>
<td>70</td>
<td>9</td>
<td>3.830 (97.28)</td>
<td>0.281 (7.14)</td>
<td>130</td>
</tr>
<tr>
<td>4</td>
<td>1.915 (48.64)</td>
<td>0.032 (0.81)</td>
<td>80</td>
<td>10</td>
<td>4.163 (105.74)</td>
<td>0.281 (7.14)</td>
<td>140</td>
</tr>
<tr>
<td>5</td>
<td>2.246 (57.10)</td>
<td>0.032 (0.81)</td>
<td>90</td>
<td>11</td>
<td>4.496 (114.20)</td>
<td>0.281 (7.14)</td>
<td>150</td>
</tr>
<tr>
<td>6</td>
<td>2.831 (71.91)</td>
<td>0.281 (7.14)</td>
<td>100</td>
<td>12</td>
<td>5.829 (122.60)</td>
<td>0.281 (7.14)</td>
<td>160</td>
</tr>
</tbody>
</table>

Mounting Hardware: Two mounting nuts, .094" (2.39) thick by .562" (14.27) across flats, one internal tooth lockwasher and one non-turn washer (see detail D for dimensions), are supplied with switch.

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

STANDARD STYLE MILITARY QUALIFIED

The Series 53, 57 and 59 rotary switches are all military type switches. Grayhill manufactures these switches in two styles: M and HS. Style M is unsealed and is not qualified; Style HS is shaft and panel sealed and is qualified. The non-qualified Style M can be regarded as our Standard Style for types of switches. Although it is not qualified, Style M is constructed of the same military grade materials and will provide comparable performance in all areas. For example, the Style ‘M’ switches, in addition to the electrical ratings listed elsewhere in these pages, will meet the following requirements of MIL-DTL-3786:

- Moisture Resistance: Medium and High Shock; Vibration (10 to 500 cps); Thermal Shock (-65 °C to 125 °C); Salt Spray; Explosion; Terminal Strength (pull, 2 lbs. minimum); and Stop Strength (15 pound-inches minimum).

The line drawings shown above are applicable to the Style M and Style HS. The only difference between the two is the length of the tab of the non-turn washer. The shorter tab for the HS is explained in the following paragraph.

The Series 53, 57 and 59 Style HS rotary switches are qualified to MIL-DTL-3786/36. The Style HS is shaft and panel sealed. The panel is sealed by an O-ring at the base of the bushing. The shaft is sealed by an O-ring inside the bushing. These seals do not alter the dimensions shown in the line drawings when the switch is mounted.

A non-turn washer, supplied with the mounting hardware, may be used with the Style HS switches. It is suggested that the non-turn washer be mounted in the following manner to preserve the seal: from the front of the panel into a hole that does not go through the panel.

The qualification of the Series 53, 57 and 59 rotary switches does not extend to all possible combinations listed in the Choices and Limitations chart. The limitations on the qualification are described in the chart shown below.

Standard variations, such as shaft and/or bushing length, etc., that do not affect switch performance can also be marked as qualified product. For complete details contact Grayhill.

Military qualified Series 53, 57 and 59 Style HS rotary switches may be ordered by the ‘M’ number listed in MIL-DTL-3786/36 or by the Grayhill part number. Military style switches will be marked to the specification.

Style HS Switches are MIL-DTL-3786/36 Qualified for the Following Characteristics

<table>
<thead>
<tr>
<th>Series</th>
<th>Max. No. of Decks</th>
<th>Max. No. Poles/Deck</th>
<th>Max. No. Total Poles/Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td>5</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>57</td>
<td>5</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>59</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>
CIRCUIT DIAGRAMS: Series 53

Switch is Viewed From Shaft End and Shown in Position No. 1
Note: All common terminals are located above base terminals as shown.

15° Angle of Throw

FIVE OR SIX POLE  SEVEN OR EIGHT POLE  NINE THRU TWELVE POLE

Rear View

1.350 ± .015
(34.29 ± 0.38)
OVER TERMINALS

SEE DETAIL

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

Terminal Detail

SEE NOTE

0.034 ± 0.003
(0.86 ± 0.08)
0.068 ± 0.005
(1.73 ± 0.13)

CIRCUIT DIAGRAMS: Series 59

Switch is Viewed From Shaft End and Shown in Position No. 1
Note: All common terminals are located above base terminals as shown.

18° Angle of Throw

ONE POLE  TWO POLE  THREE OR FOUR POLE

Rear View

1.190 ± .015
(30.23 ± 0.38)
OVER TERMINALS

SEE DETAIL

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

SEE NOTE
CIRCUIT DIAGRAMS: Series 57

Switch is Viewed From Shaft End and Shown in Position No. 1.

Note: All common terminals are located above base terminals as shown.

22½° Angle of Throw

VOLTAGE 115 VAC

CONTACT MILLIAMPS

CURRENT MILLIAMPS

30 VDC INDUCTIVE

30 VDC RESISTIVE

Cycles x 1,000

Cycles x 1,000

Rear View

SEE NOTE

SEE DETAIL

1.190 ± .015
(30.23 ± .38)
OVER TERMINALS

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

SPECIFICATIONS

Electrical Ratings

General

Switch rating for break before make contacts.

Voltage: As listed in the chart.

Contact Resistance: 50 milliohms maximum (20 milliohms initially).

Insulation Resistance: 1,000 megohms minimum between mutually insulated parts.

Voltage Breakdown: 500 Vac minimum between mutually insulated parts. These switches will carry 4 amperes with a maximum contact temperature rise of 20°C. If the life limiting characteristics are less critical than those shown above or if elevated temperatures or reduced pressures are involved, Grayhill can predict the switch life for the application.

Electrical Ratings

Military Qualified

The Series 53, 57 and 59 Style HS, Rotary Switches have been tested to make and break the following loads as stated in MIL-DTL-3786/36: 70,000 ft. altitude for 10,000 cycles: 10mA, 28 Vdc, inductive (250 mH); 50 mA, 28 Vdc, resistive; 20 mA, 115 Vac, resistive. Atmospheric pressure, 125°C for 10,000 cycles: 25 mA, 28 Vdc inductive (250 mH); 75 mA, 28 Vdc, resistive; 50 mA, 115 Vac resistive. Atmospheric pressure, 25°C for 10,000 cycles: 75 mA, 28 Vdc, inductive (250 mH); 250 mA, 28 Vdc, resistive; 150 mA, 115 Vac, resistive. Life limiting criteria for these loads are:

Contact Resistance: 50 milliohms maximum.

Dielectric Strength: 500 Vac (350 Vac—reduced pressure).

Insulation Resistance: 1,000 megohms minimum. These switches also meet MIL-DTL-3786/36 for moisture resistance, medium and high shock, vibration, thermal, thermal shock, salt spray, explosion, terminal strength and stop strength.

Materials and Finishes


Detent Balls: Steel, nickel-plated.

Detent Springs: Tinned music wire.

Rotor Contact: Silver alloy, gold-plated .00001" minimum.

Terminals and Common Plate Including Solder Lug: Brass, gold plate .00002" minimum over silver plate .0003" minimum.

Panel Seal: Silicone rubber.

Shaft Seal: O-ring per MIL-M-5516B.

Mounting Nut, Lock Washer: Brass, tin/zinc-plated or stainless steel.

Additional Characteristics

Rotational Torque: 20-80 in-ozs., depending on the number of poles per deck and the number of decks.

Contacts: Shorting or non-shorting wiping contacts with over 100 grams of contact force.

Shaft Flat Orientation: Flat opposite contacting position pole #1 (See Circuit Diagrams).

Extended Studs: Switches of 6 decks or more have longer studs with extra stud nuts for recommended double end mounting.

Terminals: Switch is provided with full complement of base or position terminals regardless of the number of active positions.
### CHOICES AND LIMITATIONS

<table>
<thead>
<tr>
<th>Series</th>
<th>Style and Designation</th>
<th>Angle of Throw</th>
<th>Stops</th>
<th>Terminals</th>
<th>Number of Decks</th>
<th>Poles Per Deck</th>
<th>Number of Positions/Pole</th>
</tr>
</thead>
</table>
| 53     | M = Military Style    | 15° Fixed      | Solder Lug | 01 thru 12  
01 thru 12  
01 thru 08  
01 thru 06  
01 thru 04  
01 thru 03  
01 or 02      | 01 thru 12  
01 thru 12  
01 thru 08  
01 thru 06  
01 thru 04  
01 thru 03  
01 or 02      | 1              | 02 thru 24  
02 thru 12  
02 thru 08  
02 thru 06  
02 thru 04  
02 or 03      | 1  
2  
3  
4  
5 or 6  
7 or 8  
9, 10, 11 or 12 |
| 57     | M = Military Style    | 221/2° Fixed   | Solder Lug | 01 thru 12  
01 thru 12  
01 thru 06  
01 thru 03      | 01 thru 12  
01 thru 12  
01 thru 06  
01 thru 03      | 1              | 02 thru 16  
02 thru 08  
02 thru 04  
02          | 2  
3 or 4  
5, 6, 7 or 8  
0  |
| 59     | M = Military Style    | 18° Fixed      | Solder Lug | 01 thru 12  
01 thru 12  
01 thru 06  
01 thru 04  
01 or 02      | 01 thru 12  
01 thru 12  
01 thru 06  
01 thru 04  
01 or 02      | 1              | 02 thru 20  
02 thru 10  
02 thru 05  
02 thru 04  
02          | 2  
3 or 4  
5  
6, 7, 8, 9 or 10  
0  |

MIL Spec. provides for qualification up to and including five decks. Switches of longer length, although not specifically qualified, are built of the same materials and are of the same construction.

### ORDERING INFORMATION

Series

Style*: Letter(s) from the Choices and Limitations chart

Angle of Throw: Must agree with Series Number

Number of Decks: As limited by Choices and Limitations chart

Stop Arrangement: Use suffix only when ordering 1 pole with maximum positions.

F = Stop between last and first positions; C = Continuous Rotation

Type of Contacts: N = Non-shorting; S = Shorting

Positions Per Pole: requires 02 as a minimum to the maximum allowable dependent on the angle of throw and poles per deck

Poles Per Deck: As limited by angle of throw

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