

A photograph of an industrial robotic welding cell. Several robotic arms with blue and orange cables are positioned over a metal worktable. Bright sparks are being generated at the points where the welding torches meet the metal. The scene is brightly lit, highlighting the metallic surfaces and the intense light from the welding process.

Rotary disconnect switches

Flexible  
options for  
every application

**EATON**

*Powering Business Worldwide*



## Eaton's new line of rotary disconnects provides OEM customers with a flexible product offering that has industry-leading fault current ratings.

The product range encompasses both the UL® 98 and UL 508 standards, and is the latest in a series of new and innovative products from the switching device product line.

The R5 (Rotary 508) Series of switches are UL 508 listed devices that are suitable for use as motor disconnects. Ideal for panel builders and custom control cabinets, the R5 Series is excellent for isolation of circuits in panels, or as enclosed motor disconnects when located downstream from appropriate overcurrent protection.

## This totally new line of products incorporates a truly modular design, allowing for simple addition of fourth poles, neutral modules, auxiliary contact modules and many other popular accessories.

Additionally, when protected by applicable upstream fusing, these products can be rated up to 65 kAIC—one of the highest short-circuit ratings in the industry. The R5 switches are available in two frame sizes—A-Frame (16–40A) and B-Frame (60–80A).

The R9 (Rotary 98) product offering consists of UL 98 listed fusible and non-fusible products that may be used as service entrance devices, or anywhere a local means of disconnect is needed or required. Both the fusible and non-fusible products span six frame sizes, or footprints, and have 100 kAIC or 200 kAIC ratings.

## The R9 offering includes a modular grouping of non-fusible switches at the low end of the range (30–100A), providing a compact, flexible solution where physical space is a concern.

As with the UL 508 products, these units allow for simple addition of fourth pole modules, neutral modules and other accessories. The balance of the line includes two-, three- and four-pole devices for safe isolation of any low voltage circuit. Further, the fusible products employ double-break-per-pole functionality, a safety feature that fully isolates the fusing when the switch is in the OFF position.

In addition to the R5 and R9 products, the new offering also includes a series of smaller footprint 30A, fusible molded-case switch disconnects in a compact design. These R4 (Rotary 489) units are listed to UL 489, and provide a small overcurrent device with short-circuit ratings of 100 kAIC.

The R5, R9 and R4 products have available new, state-of-the-art selector and pistol handle designs to give the final installation an up-to-date, professional look. In addition to the new handles, each offering includes an entirely new line of shafts, auxiliary contacts, terminal shields and other accessories.



# Powering business worldwide



R5 Series Non-Fusible  
UL 508 (CSA 22.2 No.14)  
16–80A

See page 5



R9 Series Non-Fusible—Compact  
UL 98 (CSA 22.2 No.4)  
30A, 60A and 100A

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R9 Series Non-Fusible  
UL 98 (CSA 22.2 No.4)  
100–1200A

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R9 Series Fusible  
UL 98 (CSA 22.2 No.4)  
30–800A

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R9 Series DC Rated  
UL 98 (CSA 22.2 No.4)

See page 47



MTS—Manual Transfer/Double  
Throw Switches

See page 55



Enclosed Rotary  
Disconnects (R5)

See page 64

Eaton delivers power in thousands of products and systems that are answering the demands of today's ever-changing world. We help customers manage power needed for trucks, cars, machinery, aircraft, buildings and entire business enterprises worldwide—and we do it in a way that consumes fewer resources.

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# Switching Devices

## Introduction



### UL®/CSA® Standards for Disconnect Switches

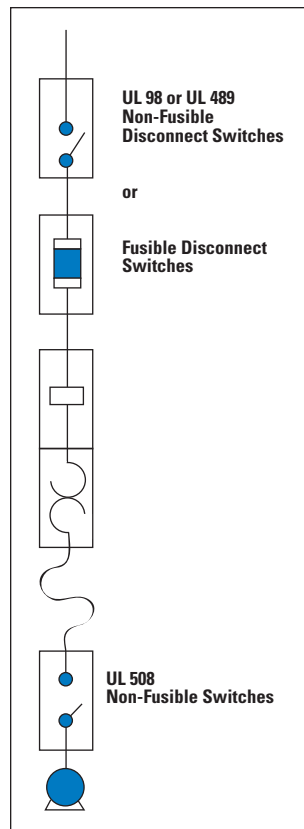
#### UL 98—Enclosed and Deadfront Switches (CSA C22.2 No. 4)

These requirements cover enclosed or deadfront switches, with or without provision for fuses, at 600V or less. These products are used as disconnecting means without restrictions; they are heavy-duty products requiring 2.00 inches (50.0 mm) minimum of creepage distance between phases, which gives maximum safety for users and installation. The short-circuit withstand of those products goes up to 200 kA.

#### UL 489—Molded Case Switches (CSA C22.2 No. 5)

These requirements cover molded case circuit breakers, molded case switches and fused molded case switches, rated at 600V or less and 6000A or less.

### Typical Control Panel



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### UL Standards for Electrical Machinery

#### UL 508—Industrial Control Equipment (CSA C22.2 No. 14)

These requirements cover manual, magnetic and solid-state starters and controllers, overload relays, pushbuttons, selector switches and control lights.

These products are smaller, requiring only a creepage distance between phases of 0.50 inch (12.7 mm). Their use as a disconnecting means is limited to local disconnection of motors. These products can be used as a disconnect means only when they have been additionally tested "suitable as motor disconnect." This additional testing ensures that the switch has a proper closing capacity on a short circuit. UL 508 devices cannot be used as main disconnect of an electrical panel, e.g., at the entrance of control panels.

A manual motor controller marked "suitable as motor disconnect" shall be installed only on the load side of the branch circuit protective device [UL 508A 30.33 and NEC 430.109 (6)].

#### NFPA® 79 Electrical Standard for Industrial Machinery

The following types of machines are identified as industrial machinery:

- Metalworking machine tools, including machines that cut or form metal
- Plastics machinery
- Wood machinery including woodworking, laminating and sawmill machines
- Assembly machines
- Material handling machines, including industrial robots and transfer machines
- Inspection and testing machines, including coordinate measuring and in-process gauging machines

### Eaton solutions for UL 508A and NFPA 79

The changes in UL 508A and NFPA 79 impact the design and construction of your equipment. Important modifications concern major safety issues, the disconnect means and the interlocking of the enclosure door.

#### **The disconnect shall be operable independent of the door position.**

The disconnect must be operable, by qualified persons, independent of the door position without the use of accessory tools or devices.

**Note:** NFPA 79; Paragraph 5.3.3.1 (5) T.

An operating mechanism for the disconnecting means shall be operable independent of the door position without the use of accessory tools or devices.

**Note:** UL 508A; Paragraph 66.6.3 c.

#### **The disconnect means is not closable with the enclosure door open, unless an interlock is operated by deliberate action.**

The interlocking means shall fulfill the following requirement: Prevent closing of the disconnect means while the enclosure door is open, unless an interlock is operated by deliberate action.

**Note:** NFPA 79; Paragraph 6.2.3.1.2.

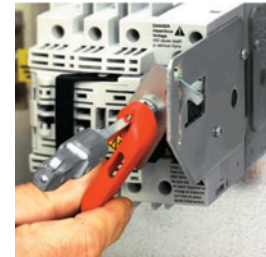
The disconnecting means is not closable with the enclosure door open, unless an interlock is operated by deliberate action.

**Note:** UL 508A; Paragraph 66.1.5.

### Operable independent of the position of the door



**Door closed:** operation with the external handle through the door.



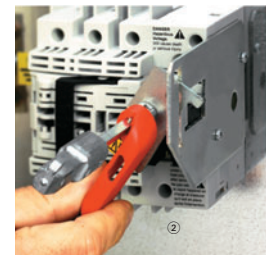
**Door open:** A robust optional kit with a handle directly fitted on the shaft of the switch allows the operation when the door is open.

### Operated by a deliberate action



① Push

**Door open:** It is necessary to push the handle from OFF to ON. This deliberate action permits the operator to turn and switch ON. This action is necessary as in most cases there is no padlock on the switch when somebody opens the door of an enclosure.



② Turn

**ON to OFF action** permits the operator to turn and switch ON. That is a major safety issue; switching ON directly without any other action is extremely dangerous. The use of a padlock does not comply with the request of the standard; when the panel door is opened, there is generally no padlock, and anybody can turn the switch ON.

# Switching Devices

## Introduction

### ***The disconnect means shall be able to be locked in the OPEN position independent of the door position.***

The circuit disconnecting device shall be provided with a permanent means, permitting it to be locked in the OFF position only independent of the door position. When locked, remote as well as local closing shall be prevented.

**Note:** NFPA 79; Paragraph 5.3.3.1 (3).

An operating mechanism for the disconnecting means shall be able to be locked in the OFF position independent of the door position. When locked, closing of the disconnect is not possible.

**Note:** UL 508A; Paragraph 66.6.3 d.

### **Locked in the open position independent of the door position**



**Door close:** The external through-the-door handle is padlocked when locked closing of the disconnect is not possible.



**Door open:** A strong metallic padlock kit allows up to three padlocks. The padlocking means is easily accessible, when locked closing of the disconnect is not possible.

### ***The interlocking of the enclosure door shall be provided with means to defeat the interlock without removing the power.***

The interlocking means required by 66.1.5 shall be provided with all of the following:

- Means to defeat the interlock without removing power, and requires the use of a tool to operate
- Reactivated automatically when all the doors are closed

**Note:** Added 66.1.5.1 effective March 1, 2007. UL 508A; Paragraph 66.1.5.1.

NFPA 79; Paragraph 6.2.3.1.2 states that the [enclosure] interlocking means shall meet the following requirements:

- Use a device or tool to allow qualified persons to defeat the interlock
- Be reactivated automatically when the door is closed

### **Defeat the interlock without removing the power**



**A tool allows defeat of the interlock without removing power. The interlocking is reactivated automatically when the door is closed.**



### R5 Series Non-Fusible 16–80A



### Product Overview

R5 Series (UL <sup>®</sup> 508 listed) products are manually operated modular switches. Load break switching and isolation provide safety solutions for any low voltage circuit, particularly for machine and control circuits. The R5 Series products are manual motor controllers suitable as motor disconnect.

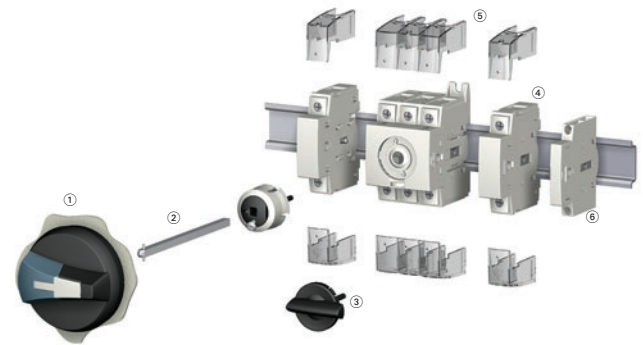
### Features, Benefits and Functions

- Up to 65 kAIC short-circuit rating
- Direct external operation
- Compact footprint
- DIN rail or base mount
- Wide range of accessories
- Up to eight-pole or four-pole MTS
- Open and enclosed devices
- Modular design
- Integrated terminals for additional safety
- Padlockable design (direct, toggle and external handles)



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### Overview

- ① External front handle
- ② Shaft extension for external handle
- ③ Direct handle
- ④ Switched fourth-pole module
- ⑤ Terminal shroud
- ⑥ Auxiliary contacts

**Note:** For further details, please see the installation instructions supplied with each device.

### Standards and Certifications

#### Conformity to Standards

- UL 508 listed, Guide NLRV, File E165150
- CSA <sup>®</sup> C22.2 No.14, File 217736
- IEC 60947-3, EN 60947-3
- CCC



# Switching Devices

R5 Series (UL 508) Non-Fusible 16–80A

## Product Selection

### Direct Operation



Switch body + Direct handle

### External Operation



Switch body + Shaft + External handle

## R5 Series

Ampere Rating	Three-Pole Toggle Switch Only <sup>①</sup>	Three-Pole Rotary Switch Only	Direct Handle	Front and Right External Handle SH00 (Choose one)	Front and Right External Handle SH0 (Choose one)	Three-Position Front External Handle SH00 (Black) <sup>②④</sup>	Shaft for SH0 and SH00—5 x 5 mm—In (mm)
16	—	<b>R5A3016U</b>	<b>DHR5</b>	SH00 Black	SH0 Black	SH00 4, 4X	2.20 (55.5) <b>SF55SH5X5</b>
25	—	<b>R5A3025U</b>		3R, 12 <b>SHB00N12</b>	3R, 12 <b>SHB0N12</b>	I–0–II Open transition <b>SHB00MTSOT</b>	3.50 (90.0) <b>SF90SH5X5</b>
30	<b>T5A3030U</b>	<b>R5A3030U</b>		SH00 Red	SH0 Red	SH00 4, 4X	5.90 (150.0) <b>SF150SH5X5</b>
40	<b>T5A3040U</b>	<b>R5A3040U</b>		3R, 12 <b>SHR00N12</b>	3R, 12 <b>SHR0N12</b>	I–II–I Closed transition <b>SHB00MTSCT</b>	7.90 (200.0) <b>SF200SH5X5</b>
60	<b>T5B3060U</b>	<b>R5B3060U</b>		SH00 Black 4, 4X <b>SHB00N4X</b>	SH0 Black 4, 4X <b>SHB0N4X</b>		12.60 (320.0) <b>SF320SH5X5</b>
80	<b>T5B3080U</b>	<b>R5B3080U</b>		SH00 Red 4, 4X <b>SHR00N4X</b>	SH0 Red 4, 4X <b>SHR0N4X</b>		

## Accessories

Ampere Rating	Switched Fourth-Pole Module	Unswitched Neutral Module	Auxiliary Contacts (Choose one)	Terminal Shrouds	Conversion Kit (Choose one) <sup>②</sup>	Door Mounting Kit <sup>③</sup>
16	<b>S4PR516</b>	<b>UNMR5A</b> <sup>②</sup>	1NO + 1NC <b>AC1N0NC</b>	1P <b>TS1R5A</b>	6/8 pole <b>CKR568</b>	<b>DMK</b>
25	<b>S4PR525</b>					
30	<b>S4PR530</b>			3P <b>TS3R5A</b>	Changeover switch Open transition I–0–II <b>MTSCKR50T</b>	
40	<b>S4PR540</b>		2NO <b>AC2N0</b>			
60	<b>S4PR560</b> <sup>②</sup>	<b>UNMR5B</b> <sup>②</sup>		1P <b>TS1R5B</b>		
80	<b>S4PR580</b> <sup>②</sup>			3P <b>TS3R5B</b>	Changeover switch Closed transition I–II–I <b>MTSCKR5CT</b>	

### Notes

- ① Toggle version includes direct handle.
- ② Available Q4 2011.
- ③ Includes shaft and accessory cap.
- ④ For use with conversion kits on Page 9, when external handle is required.

## Handles

## Direct Handle



## Direct Handle

Ampere Rating	Handle Color	Catalog Number
16–80	Black	DHR5

## Size 00 Handle



## Door Interlocked External Handle (Defeatable) ①

Ampere Rating	Handle Color	Handle Size	NEMA Type Rating	Catalog Number
<b>Front and Right Side Operation I–0</b>				
16–80	Black	SH00	3R, 12	SHB00N12
16–80	Black	SH00	4, 4X	SHB00N4X
16–80	Red/Yellow	SH00	3R, 12	SHR00N12
16–80	Red/Yellow	SH00	4, 4X	SHR00N4X
<b>For R5 Series Changeover Switches—Front Operation I–0–I</b>				
16–80	Black	SH0	3R, 12	SHB0N12
16–80	Black	SH0	4, 4X	SHB0N4X
16–80	Red/Yellow	SH0	3R, 12	SHR0N12
16–80	Red/Yellow	SH0	4, 4X	SHR0N4X
<b>For R5 Series Changeover Switches—Front Operation I–I+–I</b>				
16–80	Black	SH00	4, 4X	SHB00MTSOT
<b>For R5 Series Changeover Switches—Front Operation I–I+–I</b>				
16–80	Black	SH00	4, 4X	SHB00MTSCT

## Size 0 Handle



## Shafts

## Shaft 5 x 5



## Shaft Extensions for External Handle

Description	Ampere Rating	Use with Handle Type	Shaft Length In (mm)	Catalog Number
Standard lengths: 55 mm, 90 mm, 150 mm, 200 mm, 320 mm	16–80	SH00/SH0	2.17 (55.0)	SF055SH5X5
	16–80	SH00/SH0	3.54 (90.0)	SF090SH5X5
For 3/4-pole switches: shafts are for external front and side handle	16–80	SH00/SH0	5.91 (150.0)	SF150SH5X5
	16–80	SH00/SH0	7.87 (200.0)	SF2003H5X5
For 6/8-pole switches and changeover switches: shafts are for external front and side handle	16–80	SH00/SH0	12.60 (320.0)	SF320SH5X5



## Guide Cone

Description	Ampere Rating	Use with Handle Type	Catalog Number
The guide cone facilitates an easier connection between the shaft and a Size 00 or Size 0 external selector handle. It allows the shaft up to 10 mm of vertical play when making the connection	16–80	SH00 and SH0	SFGAB

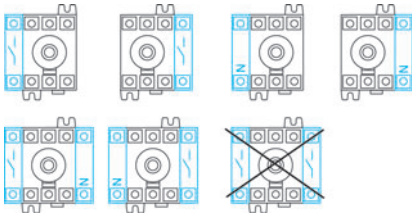
## Note

① Allows door to be opened when switch is in the ON position.

# Switching Devices

R5 Series (UL 508) Non-Fusible 16–80A

## Additional Pole Configurations



### Switched Fourth-Pole Module

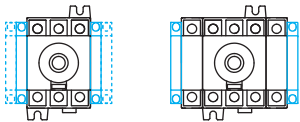
Description	Ampere Rating	Number of Poles	Type	Catalog Number
Add one or two poles and transform:	16	1	Switched	<b>S4PR516</b>
• Three-pole R5 Series load break switch into a four-pole	25	1	Switched	<b>S4PR525</b>
• Six-pole R5 Series switch into an eight-pole	30	1	Switched	<b>S4PR530</b>
• Three-pole changeover switch into a four-pole	40	1	Switched	<b>S4PR540</b>
	60	1	Switched	<b>S4PR560</b>
	80	1	Switched	<b>S4PR580</b>



### Unswitched Neutral Pole Module

Description	Ampere Rating	Number of Poles	Type	Catalog Number
Transforms a three-pole switch into a three-pole + solid neutral	16–40	1	Unswitched	<b>UNMR5A</b>
	60–80	1	Unswitched	<b>UNMR5B</b>

## Auxiliary Contact Configurations



### Auxiliary Contact Module

Description	Ampere Rating	Type	Catalog Number
Early-break/same-make and signalization of positions 0 and I by NO + NC or 2NO auxiliary contacts. They can be mounted on the left or on the right side of the device. Two modules maximum.	16–80	1NO + NC	<b>AC1NO NC</b>
	16–80	2NO	<b>AC2NO</b>



### Terminal Shrouds

Description	Ampere Rating	Number of Poles	Position	Catalog Number
Line and load protection against direct contact with the terminals or connection parts: single- or three-pole. Advantage: Perforations allowing thermographic inspection.	16–40	1	Line and load	<b>TS1R5A</b>
	16–40	3	Line and load	<b>TS3R5A</b>
	60–80	1	Line and load	<b>TS1R5B</b>
	60–80	3	Line and load	<b>TS3R5B</b>

### Conversion kit to create a six- or eight-pole load break switch



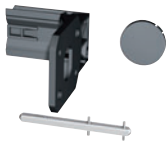
### Conversion Kits <sup>①②③</sup>

Description	Ampere Rating	Type	Catalog Number
This accessory enables the assembly of two three-pole switches plus additional poles in order to achieve: <ul style="list-style-type: none"> <li>• Six- or eight-pole load break switches</li> <li>• Direct handle included</li> </ul>	16–80	6/8-pole load break switches	<b>CKR568</b>

### Conversion kits to create three- or four-pole changeover/transfer switch



These two accessory kits enable the assembly of two three-pole switches to create a changeover (transfer) switch. R5 Series changeover switches ensure switching, transfer of sources (I–0–I) or transfer of two low voltage circuits on load (I–I+II–II), with the continuity of power supply. Direct handle included	16–80	Changeover switches (I–0–II) Open transition	<b>MTSCKR50T</b>
	16–80	Changeover switches (I–I+II–II) Closed transition	<b>MTSCKR5CT</b>



### Door/Panel Mounting Kit

Description	Ampere Rating	Number of Poles	Catalog Number
This kit enables direct mounting of the switch on the door panel. Moreover, the connection clamps of the switch are always accessible. The external handle is quick and easy to install due to an internal locking nut mounted on the inside of the enclosure.	16–80	3 and 4	<b>DMK <sup>④</sup></b>

#### Notes

- ① When external handle is required, please see options on Page 7.
- ② For use with two three-pole R5 Series switches (plus optional fourth-pole, if desired).
- ③ Available Q4 2011.
- ④ Includes shaft and accessory cap.

### Technical Data and Specifications

#### UL 508 (CSA 22.2 No. 14) Manual Motor Controller “Suitable as Motor Disconnect” from 16–80A

Technical Characteristics	16A	25A	30A	40A	60A	80A
Approvals	UL 508/CSA 22.2 No. 14	UL 508/CSA 22.2 No. 14	UL 508/CSA 22.2 No. 14	UL 508/CSA 22.2 No. 14	UL 508/CSA 22.2 No. 14	UL 508/CSA 22.2 No. 14
Short-circuit rating at 600 Vac (kA) ①	10/65	10/65	10/65	10/65	50/65	50/65
Branch circuit fuse type	J	J	J	J	J	J
Maximum fuse rating	60/30A	60/30A	60/30A	60/30A	100/60A	100/60A
<b>Maximum UL Horsepower Ratings/Maximum Motor FLA Current, Three-Phase</b>						
208 Vac	3/10.6	7.5/24.2	7.5/24.2	7.5/24.2	15/46.2	15/46.2
220–240 Vac	5/15	7.5/22	7.5/22	7.5/22	15/42	20/54
440–480 Vac	10/14	15/21	15/21	20/27	30/40	40/52
600 Vac	10/11	20/22	20/22	25/27	30/32	40/41
<b>Connection</b>						
Wire range (AWG), solid, single cable	#14–#10	#14–#10	#14–#10	#14–#10	#14–#10	#14–#10
Wire range (AWG), solid, two cables	2x #12	2x #12	2x #12	2x #12	2x #12	2x #12
Wire range (AWG), stranded, single cable	#14–#4	#14–#4	#14–#4	#14–#4	#14–#1	#14–#1
Wire range (AWG), stranded, two cables	2x (#14–#12)	2x (#14–#12)	2x (#14–#12)	2x (#14–#12)	2x (#10–#6)	2x (#10–#6)
<b>Mechanical Characteristics</b>						
Endurance, number of mechanical cycles	10,000	10,000	10,000	10,000	10,000	10,000
<b>Auxiliary Contacts</b>						
Electrical characteristics	A300	A300	A300	A300	A300	A300

#### IEC 60947-3 Characteristics

Technical Characteristics		16A	25A	32A	40A	63A	80A
<b>Rated Operational Currents <math>I_e</math> (A)</b>							
<b>Rated Voltage</b>	<b>Load Duty Category</b>	<b>A/B ②</b>	<b>A/B ②</b>	<b>A/B ②</b>	<b>A/B ②</b>	<b>A/B ②</b>	<b>A/B ②</b>
500 Vac	AC-22 A/AC-22 B	16/16	25/25	32/32	40/40	63/63	80/80
500 Vac	AC-23 A/AC-23 B	16/16	25/25	25/25	25/25	63/63	63/63
690 Vac	AC-21 A/AC-21 B	16/16	25/25	32/32	40/40	63/63	80/80
690 Vac	AC-22 A/AC-22 B	16/16	25/25	32/32	32/40	40/63	63/80
690 Vac	AC-23 A/AC-23 B	16/16	25/25	25/25	25/25	40/40	40/40
<b>Thermal Current <math>I_{th}</math> at 40°C (A)</b>							
Thermal current $I_{th}$ (40°C)		16	25	32	40	63	80
Rated insulation voltage $U_i$ (V)		800	800	800	800	800	800
Rated impulse withstand voltage $U_{imp}$ (kV)		8	8	8	8	8	8
<b>Operational Power in AC-23 (kW)</b>							
At 400 Vac without prebreaking AC in AC-23 (kW) ②③		7.5	11	15	18.5	30	37
At 500 Vac without prebreaking AC in AC-23 (kW) ②③		7.5	11	15	15	30	37
At 690 Vac without prebreaking AC in AC-23 (kW) ②③		7.5	15	18.5	18.5	30	37
<b>Fuse Protected Short-Circuit Withstand (kA rms Prospective)</b>							
Prospective short-circuit current (kA rms) ④		50	50	50	50	50	50
Associated fuse rating (A) ④		16	25	32	40	63	80
<b>Overload Capacity (<math>U_e</math> 415 Vac)</b>							
Rated short-time withstand current 0.3 s. $I_{CW}$ (kA rms) ④		2.5	2.5	2.5	2.5	3	3
Rated short-circuit making capacity $I_{cm}$ (kA peak) ④		6	6	6	6	9	9
<b>Connection</b>							
Minimum Cu cable cross section (mm <sup>2</sup> )		1.5	1.5	1.5	1.5	2.5	2.5
Maximum Cu cable section (mm <sup>2</sup> )		16	16	16	16	35	35
Tightening torque minimum/maximum (Nm)		2/2.2	2/2.2	2/2.2	2/2.2	3.5/3.85	3.5/3.85

#### Notes

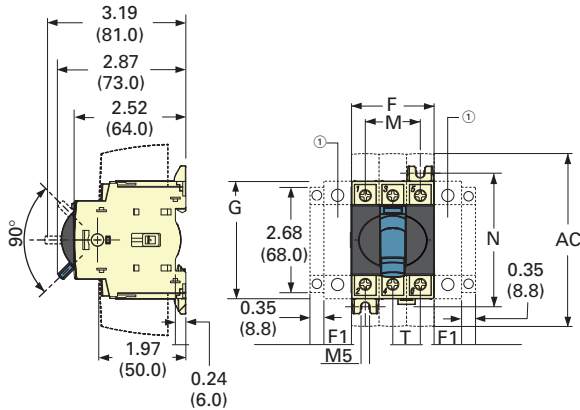
- ① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
- ② A/B: Category with index A = frequent operation; category with index B = infrequent operation.
- ③ The power value is given for information only; the current values vary from one manufacturer to another.
- ④ For a rated operating voltage,  $U_e = 400$  Vac.

### Dimensions

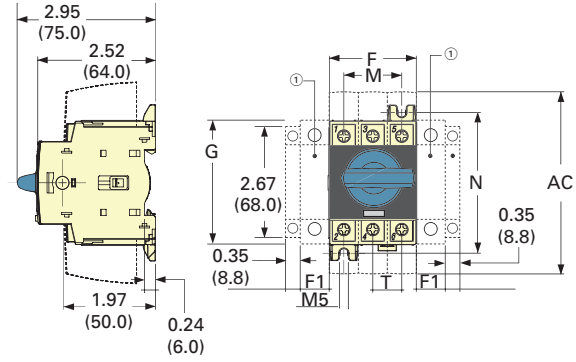
Approximate Dimensions in Inches (mm)

#### R5 Series 16–80A

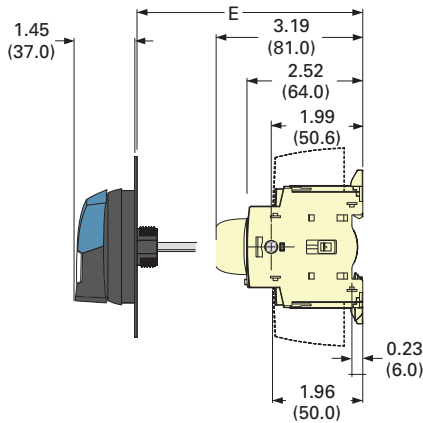
#### Toggle Operation



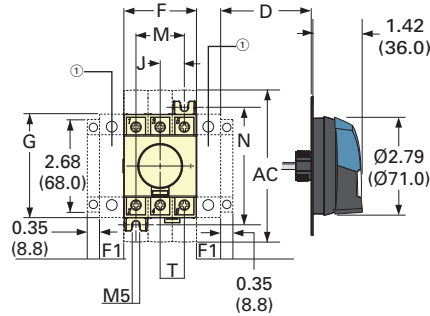
#### Direct Operation with Handle



#### External Front Operation



#### External Side Operation



#### R5 Series <sup>②</sup>

Ampere Rating	Overall Dimensions				Terminal Shrouds	Switch Body				Switch Mounting		Connection Terminal
	D Min.	D Max.	E Min.	E Max.	AC	F	F1	G	J	M	N	T
16–40	1.18 (30.0)	9.25 (235.0)	3.94 (100.0)	14.65 (372.0)	4.33 (110.0)	1.77 (45.0)	0.59 (15.0)	2.68 (68.0)	0.59 (15.0)	1.18 (30.0)	2.95 (75.0)	0.59 (15.0)
63–80	1.18 (30.0)	9.25 (235.0)	3.94 (100.0)	14.65 (372.0)	4.33 (110.0)	2.06 (52.5)	0.69 (17.5)	2.99 (76.0)	0.69 (17.5)	1.38 (35.0)	3.35 (85.0)	0.69 (17.5)

#### Notes

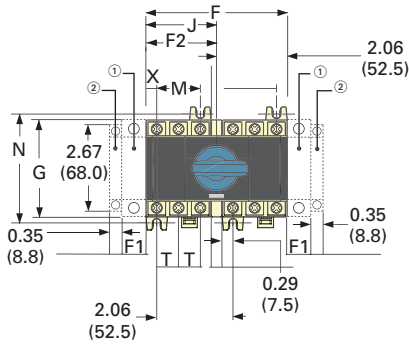
- ① One switched fourth-pole module (one per device maximum) or one unswitched neutral pole or one auxiliary contact.
- ② Maximum four additional blocks.

# Switching Devices

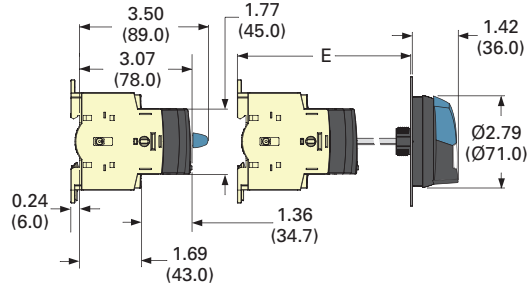
## R5 Series (UL 508) Non-Fusible 16–80A

Approximate Dimensions in Inches (mm)

### Direct Front Operation for 6/8-Pole R5 Load Break Switches or 3/4-Pole R5 Changeover Switches



### External Front Operation

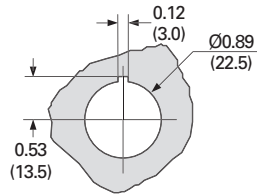


### R5 Series ③

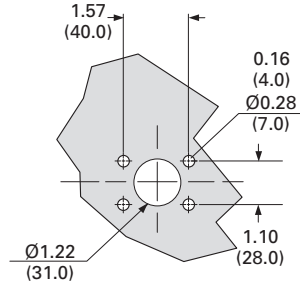
Ampere Rating	Overall Dimensions		Switch Body			Switch Mounting		Connection Terminals			
	E Min.	E Max.	F	F1	F2	G	J	M	N	T	X
16–40	4.13 (105.0)	14.64 (372.0)	3.83 (97.5)	0.59 (15.0)	1.77 (45.0)	2.67 (68.0)	1.92 (48.8)	1.18 (30.0)	2.95 (75.0)	0.59 (15.0)	0.29 (7.5)
63–80	4.13 (105.0)	14.65 (372.0)	4.13 (105.0)	0.69 (17.5)	2.06 (52.5)	2.99 (76.0)	2.06 (52.5)	1.38 (35.0)	3.35 (85.0)	0.69 (17.5)	0.34 (8.8)

### Door Drilling—SH00/SH0

#### With Fixing Nut

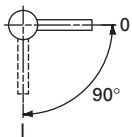


#### With Four Fixing Screws

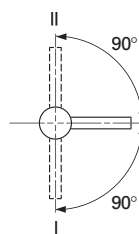


### Operating Handle—SH00/SH0

#### Front and Right Side Operation



#### Front Operation for R5 Changeover Switches I–0–II or I–I+II–II



### Notes

- ① One switched fourth-pole module (one per device maximum) or one unswitched neutral pole.
- ② Auxiliary contact.
- ③ Maximum four additional blocks.





### Contents

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Product Overview	13
Features, Benefits and Functions	13
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### Product Overview

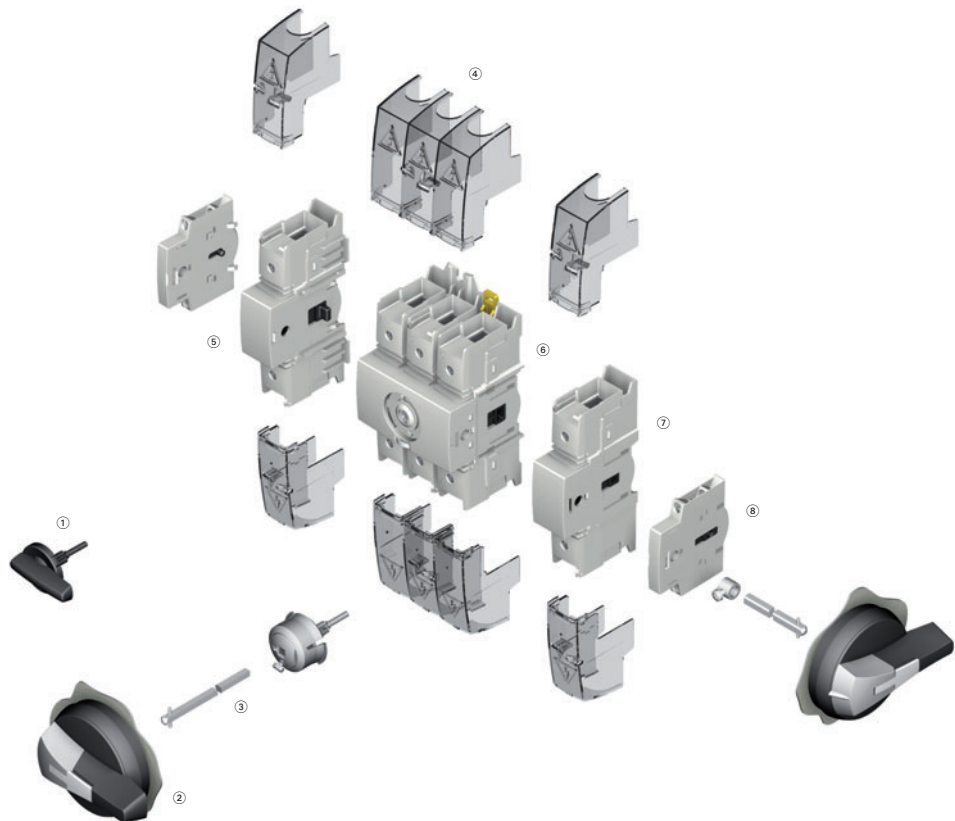
The R9 Series (UL 98 listed) non-fusible 30–100A compact range ensures making or breaking on load and safety isolation for low voltage electric circuits particularly for machine control circuits up to 600V.

### Features, Benefits and Functions

- Rating three-pole from 30A to 100A
- Direct external operation handle (padlockable in ON position)
- Double breaking per phase

### Standards and Certifications

- UL 98, File E222859
- CSA 22.2 No. 4, File 217736
- IEC 60947-3
- EN 60947-3



### Overview

- ① Direct handle
- ② Door interlocked external handle
- ③ Shaft extension
- ④ Terminal shrouds
- ⑤ Unswitched neutral pole
- ⑥ Switch body
- ⑦ Switched fourth-pole module
- ⑧ Modular type auxiliary contacts

**Note:** For further details, please see the installation instructions supplied with each device.

# Switching Devices

R9 Series (UL 98) Non-Fusible 30–100A Compact

## Product Selection

### Direct Operation



### External Operation



## R9 Series 30–100A

Ampere Rating (Frame)	Number of Poles	Switch Body Only	Direct Handle	Front and Right External Handle SH00 (Choose one)	Front and Right External Handle SH0 (Choose one)	Shaft for SH0 and SH00 Handles—In (mm) (Choose one)	Switched Fourth-Pole Module	Unswitched Neutral Module	Auxiliary Contacts (Choose one)	Terminal Shrouds (Choose one)
30 (C-Frame)	3	<b>R9C3030U</b>	<b>DHR9</b>	SH00 Black 3R, 12 <b>SHB00N12</b>	SH0 Black 3R, 12 <b>SHB0N12</b>	2.20 (55.5) <b>SF55SH5X5</b>	<b>S4PR930</b>	Neutral <b>UNMR9C</b>	1NO + 1NC <b>AC1N0NC</b>	1P <b>TS1R9</b>
60 (C-Frame)	3	<b>R9C3060U</b>		<b>SHB00N12</b>	<b>SHB0N12</b>	3.50 (90.0) <b>SF90SH5X5</b>	<b>S4PR960</b>		2NO <b>AC2NO</b>	3P <b>TS3R9CV</b>
100 (C-Frame)	3	<b>R9C3100U</b>		SH00 Red 3R, 12 <b>SHR00N12</b>	SH0 Red 3R, 12 <b>SHR0N12</b>	5.91 (150.0) <b>SF150SH5X5</b>	<b>S4PR9100</b>			
				SH00 Black 4, 4X <b>SHB00N4X</b>	SH0 Black 4, 4X <b>SHB0N4X</b>	7.87 (200.0) <b>SF200SH5X5</b>				
				SH00 Red 4, 4X <b>SHR00N4X</b>	SH0 Red 4, 4X <b>SHR0N4X</b>	12.60 (320.0) <b>SF320SH5X5</b>				

### Handles

#### Direct Handle



#### Direct Handle

Ampere Rating	Handle Color	Catalog Number
30–100	Black	DHR9

#### Size 00 Handle



#### Door Interlocked External Handle <sup>①</sup>

Ampere Rating	Handle Color	Handle Size	NEMA Type Rating	Catalog Number
<b>Front and Right External Handle</b>				

30–100	Black	SH00	3R, 12	<b>SHB00N12</b>
30–100	Black	SH00	4, 4X	<b>SHB00N4X</b>
30–100	Red	SH00	3R, 12	<b>SHR00N12</b>
30–100	Red	SH00	4, 4X	<b>SHR00N4X</b>
30–100	Black	SH0	3R, 12	<b>SHB0N12</b>
30–100	Black	SH0	4, 4X	<b>SHB0N4X</b>
30–100	Red	SH0	3R, 12	<b>SHR0N12</b>
30–100	Red	SH0	4, 4X	<b>SHR0N4X</b>

#### Size 0 Handle



### Shafts

#### Shaft 5 x 5



#### Shaft Extensions for External Handle

Description	Ampere Rating	Use with Handle Type	Shaft Length In (mm)	Catalog Number
Standard lengths: 55 mm, 90 mm, 150 mm, 200 mm, 320 mm	30–100	SH00/SH0	2.20 (55.5)	<b>SF55SH5X5</b>
	30–100	SH00/SH0	3.50 (90.0)	<b>SF90SH5X5</b>
Shafts are for external front and right side handles	30–100	SH00/SH0	5.91 (150.0)	<b>SF150SH5X5</b>
	30–100	SH00/SH0	7.87 (200.0)	<b>SF200SH5X5</b>
	30–100	SH00/SH0	12.60 (320.0)	<b>SF320SH5X5</b>



#### Guide Cone

Description	Ampere Rating	Use with Handle Type	Catalog Number
The guide cone facilitates an easier connection between the shaft and a Size 00 or Size 0 external selector handle. It allows the shaft up to 10 mm of vertical play when making the connection	16–80	SH00 and SH0	<b>SFGAB</b>

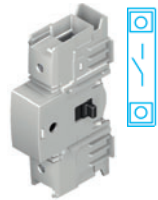
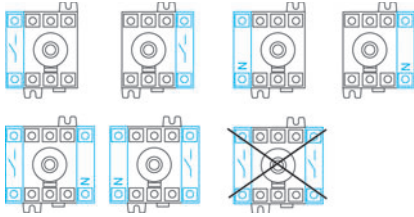
#### Note

<sup>①</sup> Allows door to be opened when switch is in the ON position.

# Switching Devices

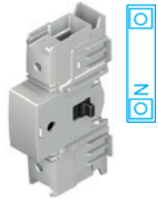
## R9 Series (UL 98) Non-Fusible 30–100A Compact

### Additional Pole Configurations



#### Switched Fourth-Pole Module

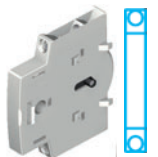
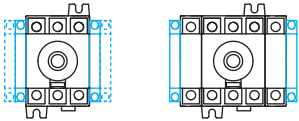
Description	Ampere Rating	Number of Poles	Type	Catalog Number
Transforms a three-pole, R9 Series load break switch into a four-pole	30	1	Switched	<b>S4PR930</b>
	60	1	Switched	<b>S4PR960</b>
	100	1	Switched	<b>S4PR9100</b>



#### Unswitched Neutral Module

Description	Ampere Rating	Number of Poles	Type	Catalog Number
Transforms a three-pole switch into a three-pole + solid neutral	30–100	1	Unswitched	<b>UNMR9C</b>

### Auxiliary Contact Configurations



#### Auxiliary Contacts

Description	Ampere Rating	Type	Catalog Number
Early-break/same-make and signalization of positions 0 and I by NO + NC or 2NO auxiliary contacts. They can be mounted on the left or on the right side of the device. Maximum four auxiliary contacts (two modules)	30–100	1NO + 1NC	<b>AC1N0NC</b>
	30–100	2NO	<b>AC2NO</b>



#### Terminal Shrouds

Description	Ampere Rating	Number of Poles	Position	Catalog Number
Line and load protection against direct contact with the terminals or connection parts: single- or three-pole Advantage: Perforations allowing thermographic inspection	30–100	1	Line and load	<b>TS1R9</b>
	30–100	3	Line and load	<b>TS3R9CV</b>

## Technical Data and Specifications

### UL and CSA Characteristics

#### UL 98/CSA 22.2 No. 4

Technical Characteristics	30A	60A	100A
Short-circuit rating at 480 Vac (kA) ①	100 kA	100 kA	100 kA
Short-circuit rating at 600 Vac (kA) ①	100 kA	100 kA	25 kA
Fuse type	J	J	J
Maximum fuse rating (A)	30	60	100
<b>Maximum Horsepower Rating/Maximum Motor FLA Three-Phase</b>			
220–240 Vac	10/28	20/54	20/54
440–480 Vac	20/27	40/52	50/65
600 Vac	25/27	50/52	50/52
<b>Maximum Horsepower Rating/Maximum Motor FLA Single-Phase</b>			
120 Vac	2/24	3/34	5/56
240 Vac	5/28	10/50	10/50
<b>Connection</b>			
Solid, 1 wire	#12–10	#12–10	#12–10
Stranded, 1 wire	#12–2/0	#12–2/0	#12–2/0
<b>Auxiliary Contacts</b>			
Electrical characteristic	A300	A300	A300

#### IEC 60647-3 Characteristics

Technical Characteristics	32A	63A	100A
<b>Thermal Current <math>I_{th}</math> at 40°C (A)</b>			
Thermal current $I_{th}$ (40°C)	30	60	100
Rated insulation voltage $U_i$ (V)	800	800	800
Rated impulse withstand voltage $U_{imp}$ (kV)	8	8	8
<b>Rated Operation Currents <math>I_e</math> (A)</b>			
<b>Load Duty Category</b>	<b>Rated Voltage</b>	<b>A ②</b>	<b>A ②</b>
400 Vac	AC-22 A	32	63
400 Vac	AC-23 A	32	63
690 Vac	AC-22 A	32	63
690 Vac	AC-23 A	32	63
<b>Operational Power in AC-23 (kW)</b>			
At 400 Vac without prebreak AC in AC-23 (kW) ③④	15	30	45
At 500 Vac without prebreak AC in AC-23 (kW) ③④	15	30	45
At 690 Vac without prebreak AC in AC-23 (kW) ③④	18.5	30	45
<b>Overload Capacity (<math>U_e</math> 415 Vac)</b>			
Rated short-time making capacity $I_{cm}$ (kA peak) ⑤	12	12	12
<b>Connection</b>			
Minimum Cu cable cross section (mm <sup>2</sup> )	2.5	2.5	10
Maximum Cu cable section (mm <sup>2</sup> )	70	70	70

#### Notes

- ① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
- ② Category with index A = frequent operation.
- ③ A/B: Category with index A = frequent operation; category with index B = infrequent operation.
- ④ The power value is given for information only; the current values vary from one manufacturer to another.
- ⑤ For a rated operating voltage,  $U_e = 400$  Vac.

# Switching Devices

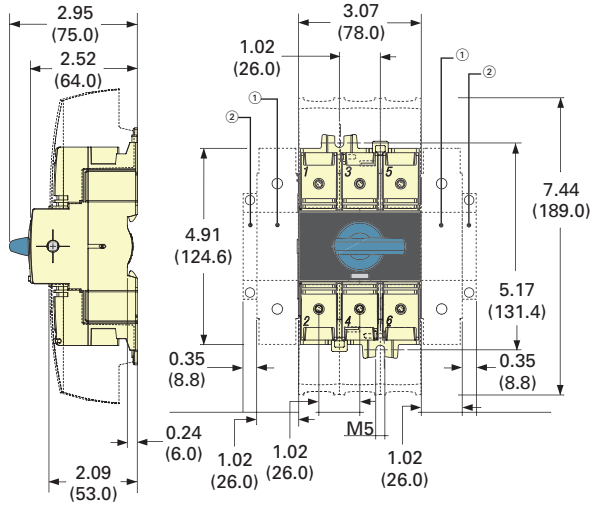
## R9 Series (UL 98) Non-Fusible 30–100A Compact

### Dimensions

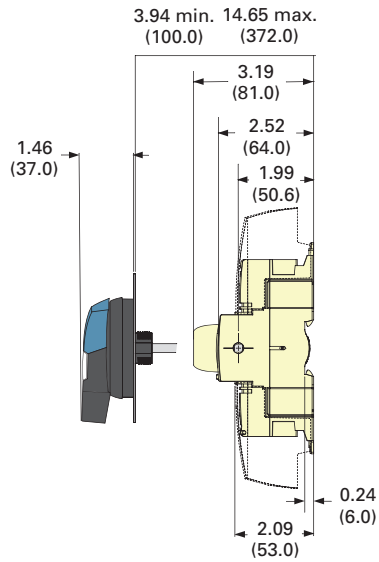
#### R9 Series 30–100A Compact

Approximate Dimensions in Inches (mm)

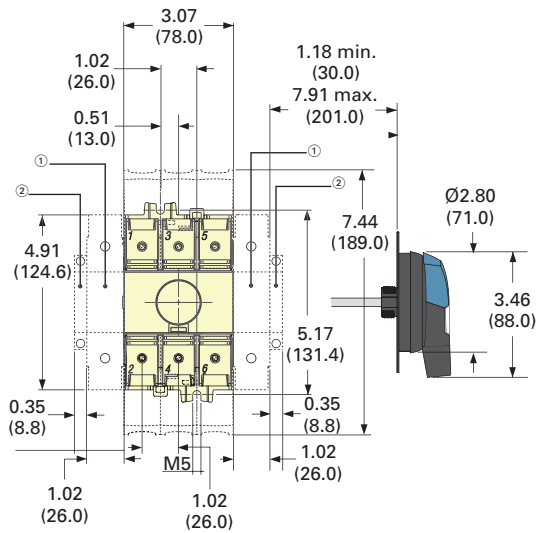
#### Direct Operation



#### External Front Operation



#### External Side Operation



#### Notes

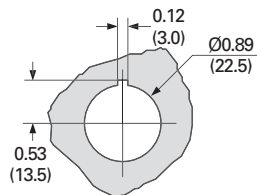
- ① One switched fourth-pole module (one per device maximum) and/or one unswitched neutral pole.
- ② Auxiliary contact.

Approximate Dimensions in Inches (mm)

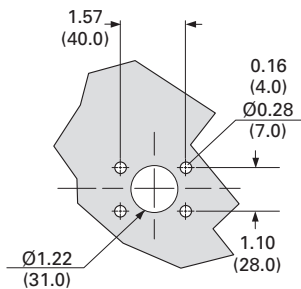
### R9 Series 30–100A Compact

#### Door Drilling—SH00/SH0

##### With Fixing Nut

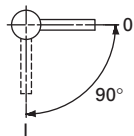


##### With Four Fixing Screws



#### Operating Handle—SH00/SH0

##### Front and Right Side Operation



### Coming Soon in 2011

#### V-Frame—60–100A Switches



- Visible blade construction for added safety
- Double break per pole
- Three- and four-pole configurations

# Switching Devices

R9 Series (UL 98) Non-Fusible 100–1200A



## Contents

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## Product Overview

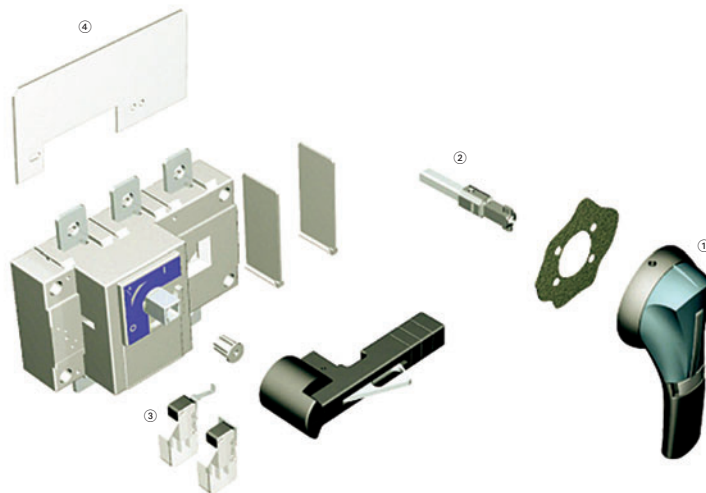
The R9 Series (UL 98 listed) non-fusible 100–1200A are manually operated multipole load-break switches. Quick-make, quick-break design provides safety isolation for any low voltage circuit.

## Features, Benefits and Functions

- High thermal and dynamic withstand ratings
- Arduous categories of applications
- High electrical and mechanical endurance

## Standards and Certifications

- UL 98, File E222859
- CSA 22.2 No. 4, File 217736
- IEC 60947-3
- EN 60947-3



## Overview

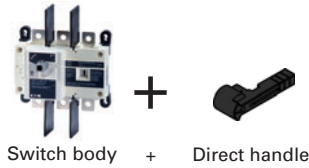
- ① External front handle
- ② Shaft extensions for external handle
- ③ Configurable U-type ACs, for pre-break and signalling or TEST
- ④ Terminal Screens

**Note:** For further details, please see the installation instructions supplied with each device.

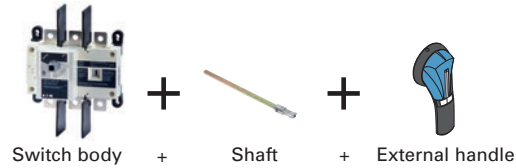


### Product Selection

#### Direct Operation



#### External Operation



### R9 Series Non-Fusible 100–1200A

Ampere Rating (Frame)	Number of Poles	Switch Body Only	Direct Handle	Door Interlocked External Pistol Handle (Choose one)	Shaft Extensions for External Handle—In (mm) (Choose one)	Auxiliary Contacts	Terminal Screens (Choose one)	Terminal Lugs <sup>③</sup>	
100 (D-Frame)	3	<b>R9D3100U</b>	<b>DHR9DE</b>	Size 2, Black 1, 3R, 12 Defeatable <b>PHB2N12F</b>	7.90 (200.0) <b>SF200PH10X10</b>	1NO + 1NC <b>AC1N0NCDE</b> <b>AC1N0NCDELL</b>	3-pole, Line side only <b>TS3R9DT</b>	<b>LK3R9DL</b>	
	4	<b>R9D4100U</b>					3-pole, Load side only <b>TS3R9DB</b>	<b>LK4R9DL</b>	
200 (D-Frame)	3	<b>R9D3200U</b>	<b>DHR9DE</b>	Size 2, Red 1, 3R, 12 Defeatable <b>PHR2N12F</b>	12.60 (320.0) <b>SF320PH10X10</b>	2NO + 2NC <b>AC2N0NCDE</b> <b>AC2N0NCDELL</b>	3-pole, Load side only <b>TS3R9DB</b>	<b>LK3R9DL</b>	
	4	<b>R9D4200U</b>					4-pole, Line or load side <b>TS4R9DTB</b>	<b>LK4R9DL</b>	
400 (E-Frame)	3	<b>R9E3400U</b>	<b>DHR9DE</b>	Size 2, Black 4, 4X Defeatable <b>PHB2N4XF</b>	15.70 (400.0) <b>SF400PH10X10</b>	19.70 (580.0) <b>SF500PH10X10</b>	3-pole, Line side only <b>TS3R9ET</b>	<b>LK3R9EM</b>	
		4					<b>R9E4400U</b>	3-pole, Load side only <b>TS3R9EB</b>	<b>LK4R9EM</b>
	600 (F-Frame)	3	<b>R9F3600U</b>	<b>DHR9FG</b>	Size 2, Red 4, 4X Defeatable <b>PHR2N4XF</b>	7.90 (200.0) <b>SF200PH15X12</b>	1NO AC U Type <b>AC1N0R9</b> <sup>②</sup>	4-pole, Line or load side <b>TS4R9ETB</b>	
		4	<b>R9F4600U</b>						
800 (G-Frame)	3	<b>R9G3800U</b>	<b>DHR9FG</b>	Size 3, Black 4, 4X Defeatable <b>PHB3N4XF</b>	12.60 (320.0) <b>SF320PH15X12</b>	1NC AC U Type <b>AC1NCR9</b> <sup>②</sup>	3-pole, Line side only <b>TS3R9F</b> <sup>①</sup>	<b>LK3R9FN</b>	
	4	<b>R9G4800U</b>					3-pole, Load side only <b>TS3R9G</b> <sup>①</sup>	<b>LK4R9FN</b>	
1000 (G-Frame)	3	<b>R9G31000U</b>	<b>DHR9FG</b>	Size 3, Red 4, 4X Defeatable <b>PHR3N4XF</b>	1.70 (400.0) <b>SF400PH15X12</b>		4-pole, Line or load side <b>TS4R9G</b> <sup>①</sup>	<b>LK6R9G</b>	
	4	<b>R9G41000U</b>					<b>LK8R9G</b>		
1200 (G-Frame)	3	<b>R9G31200U</b>	<b>DHR9FG</b>	Size 4, Black 4, 4X Defeatable <b>PHB4N4XF</b>					
	4	<b>R9G41200U</b>							

#### Notes

- ① Top (line side) supplied as standard.
- ② Auxiliary contact requires holder (catalog number ACHFG) when used on F and G-Frame switches (non-fusible 600–1200A).
- ③ Each catalog number is for line or load side. For both line and load, please order two sets.

# Switching Devices

R9 Series (UL 98) Non-Fusible 100–1200A

## Accessories

### Direct Handle



### Direct Handle

Description	Ampere Rating	Handle Color	Catalog Number
Front operation	100–400	Black	<b>DHR9DE</b>
	600–1200	Black	<b>DHR9FG</b>

### PH2 and PH3 Types



### Door Interlocked External Handle—Front Operation

Description	Ampere Rating	Switch Frame	Handle Type	Handle Color	NEMA Type	Defeatable ①	Catalog Number
The door interlocked external handle includes one lockable handle and one escutcheon.  For dimensions, see Page 28.	100–400	D/E	PH2	Black	1,3R,12	Yes	<b>PHB2N12F</b>
	100–400	D/E	PH2	Red	1,3R,12	Yes	<b>PHR2N12F</b>
	100–400	D/E	PH2	Black	4,4X	Yes	<b>PHB2N4XF</b>
	100–400	D/E	PH2	Red	4,4X	Yes	<b>PHR2N4XF</b>
	600–1200	F/G	PH3	Black	4,4X	Yes	<b>PHB3N4XF</b>
	600–1200	F/G	PH3	Red	4,4X	Yes	<b>PHR3N4XF</b>
	600–1200	F/G	PH4	Black	4,4X	Yes	<b>PHB4N4XF</b>
	600–1200	F/G	PH4	Red	4,4X	Yes	<b>PHR4N4XF</b>

### PH4 Type



### Shaft Extensions

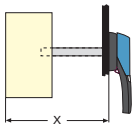


### Shaft Extensions for External Front Handle

#### Front Operation

Use	Ampere Rating (Frame)	Handle Type	Shaft Length In (mm)	Catalog Number
Standard lengths: 200 mm, 320 mm, 400 mm, 500 mm	100–400 (D-, E-Frame)	PH2	7.90 (200.0)	<b>SF200PH10X10</b>
	100–400 (D-, E-Frame)	PH2	12.60 (320.0)	<b>SF320PH10X10</b>
	100–400 (D-, E-Frame)	PH2	15.70 (400.0)	<b>SF400PH10X10</b>
	100–400 (D-, E-Frame)	PH2	19.70 (500.4)	<b>SF500PH10X10</b>
	600–1200 (F-, G-Frame)	PH3/PH4	7.90 (200.0)	<b>SF200PH15X12</b>
	600–1200 (F-, G-Frame)	PH3/PH4	12.60 (320.0)	<b>SF320PH15X12</b>
	600–1200 (F-, G-Frame)	PH3/PH4	15.70 (400.0)	<b>SF400PH15X12</b>

### Shaft Length Minimum Dimensions (X)—Inches (mm)



Description	Ampere Rating (Frame)	X In (mm)	Length In (mm)	Catalog Number
Standard lengths: • 7.90 (200.6) • 12.60 (320.0) • 5.70 (398.8)	100–400 (D-, E-Frame)	5.31–10.43 (135.0–265.0)	7.90 (200.6)	<b>SF200PH10X10</b>
		5.31–10.43 (135.0–385.0)	12.60 (320.0)	<b>SF320PH10X10</b>
		5.31–10.43 (135.0–465.0)	15.70 (398.8)	<b>SF400PH10X10</b>
		5.31–22.20 (135.0–565.0)	19.70 (500.4)	<b>SF500PH10X10</b>
600–1200 (F-, G-Frame)	600–1200 (F-, G-Frame)	8.70–13.50 (221.0–343.0)	7.90 (200.6)	<b>SF200PH15X12</b>
		8.70–18.23 (221.0–463.0)	12.60 (320.0)	<b>SF320PH15X12</b>
		8.70–21.38 (221.0–543.0)	15.70 (398.8)	<b>SF400PH15X12</b>

#### Note

① Allow the door to be opened when the switch is in 1 (ON) position.



### Auxiliary Contacts <sup>①</sup>

Description	Ampere Rating (Frame)	Number of AC	AC Type	Catalog Number
100–200A, up to two ACs max. 400A, up to two ACs max.	100–400 (D-, E-Frame)	1NO / 1NC	Standard	<b>AC1N0NCDE</b>
		1NO / 1NC	Low Level <sup>②</sup>	<b>AC1N0NCDELL</b>
		2NO / 2NC	Standard	<b>AC2N0NCDE</b>
		2NO / 2NC	Low Level <sup>②</sup>	<b>AC2N0NCDELL</b>
600–1200A, up to four ACs max.	600–1200 (F-, G-Frame)	1NO	Standard	<b>AC1N0R9</b> <sup>③</sup>
		1NC	Standard	<b>AC1NCR9</b> <sup>③</sup>
Auxiliary contact holder (for use with AC1N0R9 and AC1NCR9)	600–1200 (F-, G-Frame)	—	—	<b>ACHFG</b>



### Terminal Screens



Description	Maximum Ampere Rating (Frame)	Number of Poles	Line/Load Side	Catalog Number	
Line and load protection against direct contact with terminals or connection parts. Line side terminal shrouds are included standard on 600–1200A non-fusible switches. Shrouds are not included on the 100–400A.	100–200 (D-Frame)	3	Line	<b>TS3R9DT</b>	
		3	Load	<b>TS3R9DB</b>	
		4	Line or load	<b>TS4R9DTB</b>	
		400 (E-Frame)	3	Line	<b>TS3R9ET</b>
			3	Load	<b>TS3R9EB</b>
		600 (F-Frame)	4	Line or load	<b>TS4R9ETB</b>
	3		Line or load	<b>TS3R9F</b>	
	800–1200 (G-Frame)	4	Line or load	<b>TS4R9F</b>	
		3	Line or load	<b>TS3R9G</b>	
	4	Line or load	<b>TS4R9G</b>		



### Line and Load Terminal Lugs

Description	Maximum Ampere Rating (Frame)	Number of Poles	Number of Lugs/Pole	Lug Capacity/Phase	Cable Type	Catalog Number
Connection of copper cables on to the terminals (no spade lugs). Each kit includes lugs for line or load side. For line and load side, order two kits.  For dimensions, see Page 27.	100–200 (D-Frame)	3	1	#6–300 kcmil	Cu/Al	<b>LK3R9DL</b>
		4	1	#6–300 kcmil	Cu/Al	<b>LK4R9DL</b>
	400 (E-Frame)	3	1	#2–600 kcmil	Cu/Al	<b>LK3R9EM</b> <sup>④</sup>
		4	1	#2–600 kcmil	Cu/Al	<b>LK4R9EM</b> <sup>④</sup>
	600 (F-Frame)	3	1	(2) #2–600 kcmil	Cu/Al	<b>LK3R9FN</b>
		4	1	(2) #2–600 kcmil	Cu/Al	<b>LK4R9FN</b>
800–1200 (G-Frame)	3	2	2x (2) #2–600 kcmil	Cu/Al	<b>LK6R9G</b>	
	4	2	2x (2) #2–600 kcmil	Cu/Al	<b>LK8R9G</b>	

#### Notes

- ① Early-break/same-make.
- ② Gold plated for minimal resistance—for PLC applications.
- ③ Requires use of ACHFG auxiliary contact holder for F- and G-Frame switches.
- ④ For two-hole lug, consult factory.

### Technical Data and Specifications

#### UL and CSA Characteristics

Technical Characteristics		100A	200A	400A	600A	800A	1000A	1200A
Short circuit rating at 600 Vac (kA) ①		200 kA	200 kA	200 kA	200 kA	200 kA	100 kA	100 kA
Fuse type		J	J	J	J	L	L	L
Maximum fuse rating (A)		100	200	400	600	800	1000	1200
<b>Maximum Horsepower Rating/Maximum Motor FLA Three-Phase</b>								
220–240 Vac		30/80	75/192	125/312	200/480	200/480	200/480	200/480
440–480 Vac		75/96	150/180	250/302	400/477	500/590	500/590	500/590
600 Vac		100/99	200/192	350/336	350/336	500/472	500/472	500/472
<b>Maximum Horsepower Rating/Maximum Motor FLA Direct Current</b>								
125 Vdc	Two-pole in series	10/76	15/112	20/148	20/148	—	—	—
250 Vdc	Three-pole in series	15/55	15/55	50/173	50/173	—	—	—
<b>Connection</b>								
Minimum connection section/AWG		#6	#6	#2	2 x #2	2 x #2	4 x #2	4 x #2
Maximum connection section/AWG		300 kcmil	300 kcmil	600 kcmil	2 x 600 kcmil	2 x 600 kcmil	4 x 600 kcmil	4 x 600 kcmil
<b>Auxiliary Contacts</b>								
Electrical characteristics		A300	A300	A300	A600	A600	A600	A600

#### IEC 60947-3 Characteristics

Technical Characteristics		100A	200A	400A	600A	800A	1000A	1200A
Rated insulation voltage $U_i$ (V)		1000	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage $U_{imp}$ (kV)		8	8	8	12	12	12	12
<b>Rated Operational Currents <math>I_e</math> (A)</b>								
Rated Voltage	Load Duty Category	A ②	A ②	A ②	A ②	A ②	A ②	A ②
400 Vac	AC-22 A	100	200	400	630	800	1000	1200
400 Vac	AC-23 A	100	200	400	630	800	1000	1000
690 Vac	AC-22 A	100	200	400	500	630	630	630
690 Vac	AC-23 A	100	200	315	200	400	400	400
<b>Connection</b>								
Minimum Cu cable cross section (mm <sup>2</sup> )		35	70	185	2 x 150	2 x 185	2 x 240	—
Minimum Cu busbar section (mm <sup>2</sup> )		—	—	—	2 x 30 x 5	2 x 40 x 5	2 x 50 x 5	2 x 60 x 5
<b>Operational Power in Ac-23 (kW)</b>								
At 400 Vac without prebreaking AC in AC23 (kW) (2 x 3)		51	100	220	355	450	560	560
At 500 Vac without prebreaking AC in AC23 (kW) (2 x 3)		63	140	280	450	560	560	560
At 690 Vac without prebreaking AC in AC23 (kW) (2 x 3)		90	185	185	185	400	400	400
<b>Overload Capacity (<math>U_e</math> 415 Vac)</b>								
Rated short-circuit making capacity $I_{cm}$ (kA peak) ③		17.6	32	48	48	75	48	75

#### Notes

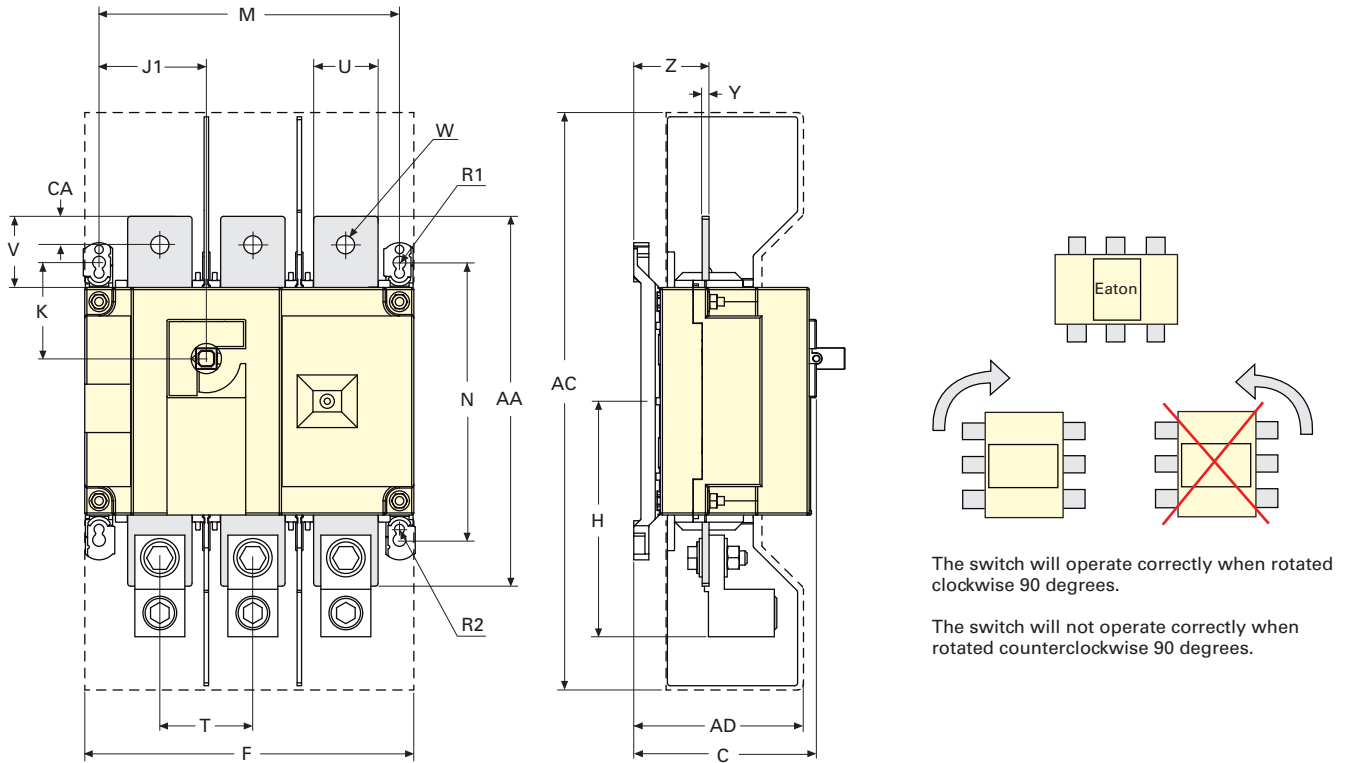
- ① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
- ② Category with index A = frequent operation.
- ③ For a rated operating voltage,  $U_i = 400$  Vac.

**Dimensions**

Approximate Dimensions in Inches (mm)

**Front Operation—D- and E-Frames**

**R9 Series Non-Fusible 100–400A**



The switch will operate correctly when rotated clockwise 90 degrees.

The switch will not operate correctly when rotated counterclockwise 90 degrees.

Ampere Rating (A)	Overall Dimensions— In (mm)	Terminal Shrouds		Switch Body		H	J1 3p	J1 4p	K
		AC	AD	F 3p	F 4p				
100	3.72 (94.6)	10.10 (256.0)	3.05 (77.5)	7.09 (180.0)	9.06 (230.0)	4.22 (107.0)	2.17 (55.0)	4.13 (105.0)	1.80 (45.6)
200	3.72 (94.6)	10.10 (256.0)	3.05 (77.5)	7.09 (180.0)	9.06 (230.0)	4.22 (107.0)	2.17 (55.0)	4.13 (105.0)	1.80 (45.6)
400	4.92 (128.0)	16.00 (406.0)	4.15 (115.0)	9.05 (230.0)	11.40 (290.0)	6.53 (166.0)	2.95 (75.0)	5.31 (135.0)	2.65 (67.5)

Ampere Rating (A)	Switch Mounting		Connection										
	M 3p	M 4p	N	R1	R2	T	U	V	W	Y	Z	AA	AC
100	6.30 (160.0)	8.27 (210.0)	5.31 (135.0)	0.35 (9.0)	0.27 (7.0)	1.97 (50.0)	0.98 (25.0)	1.18 (30.0)	0.43 (11.0)	0.14 (3.5)	1.35 (34.4)	6.30 (160.0)	0.60 (15.0)
200	6.30 (160.0)	8.27 (210.0)	5.31 (135.0)	0.35 (9.0)	0.27 (7.0)	1.97 (50.0)	0.98 (25.0)	1.18 (30.0)	0.43 (11.0)	0.14 (3.5)	1.35 (34.4)	6.30 (160.0)	0.60 (15.0)
400	8.26 (210.0)	10.60 (270.0)	7.67 (195.0)	0.35 (9.0)	0.27 (7.0)	2.56 (65.0)	1.77 (45.0)	1.97 (50.0)	0.43 (13.0)	0.20 (5.0)	2.08 (53.0)	10.20 (260.0)	0.80 (20.0)

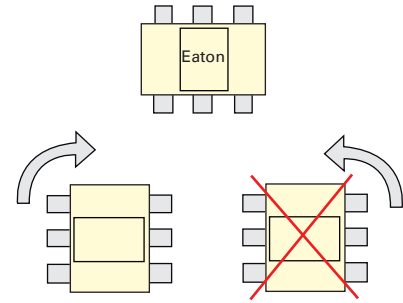
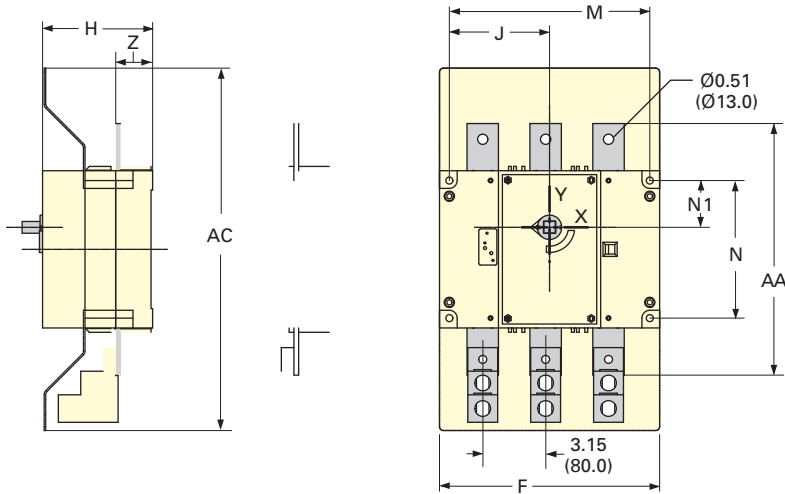
# Switching Devices

## R9 Series (UL 98) Non-Fusible 100–1200A

Approximate Dimensions in Inches (mm)

### Front Operation—F- and G-Frames

#### R9 Series Non-Fusible 600A

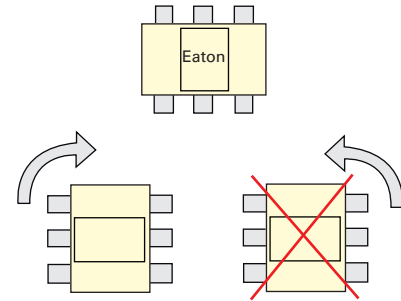
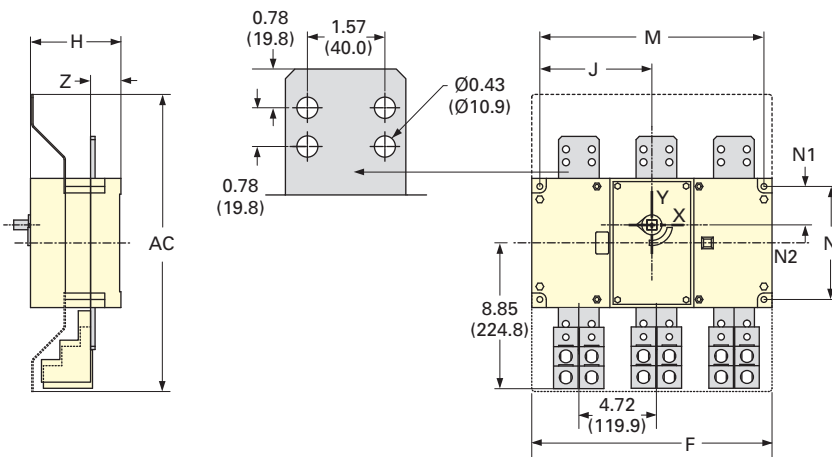


The switch will operate correctly when rotated clockwise 90 degrees.

The switch will not operate correctly when rotated counterclockwise 90 degrees.

Terminal Screens		Switch Body				Switch Mounting			Connection Terminals		
AC	F 3P	F 4P	H	J 2P	J 4P	M 4P	M 4 P	N	N1	AA	Z
18.11 (460.0)	11.02 (280.0)	14.17 (360.0)	5.51 (140.0)	5.00 (127.5)	6.59 (167.5)	10.03 (255.0)	13.19 (335.0)	6.89 (175.0)	2.34 (59.5)	12.6 (320.0)	1.85 (47.0)

#### R9 Series Non-Fusible 800–1200A



The switch will operate correctly when rotated clockwise 90 degrees.

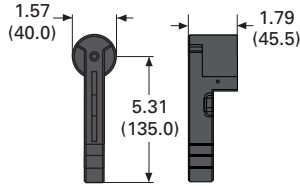
The switch will not operate correctly when rotated counterclockwise 90 degrees.

Terminal Screens		Switch Body				Switch Mounting			Connection Terminals		
AC	F 3P	F 4P	H	J 3P	J 4P	M 3P	M 4P	N	N1	N2	Z
18.12 (460.0)	14.64 (372.0)	19.37 (492.0)	5.51 (140.0)	6.83 (173.5)	9.19 (233.5)	13.66 (347.0)	18.38 (467.0)	6.89 (175.0)	2.34 (59.5)	1.10 (28.0)	1.85 (47.0)

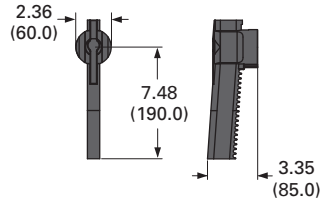
Approximate Dimensions in Inches (mm)

### Direct Handle—Front Operation

#### R9 Series Non-Fusible 400A

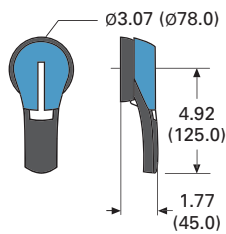


#### R9 Series Non-Fusible 600–1200A

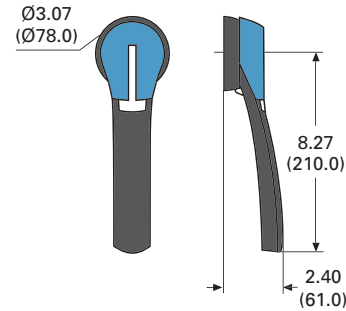


### Door Interlocked External Handle

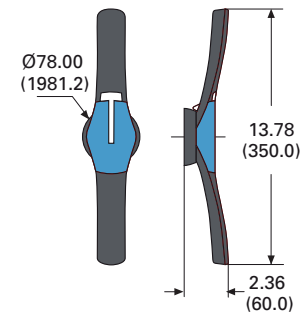
#### PH2 Type Handle



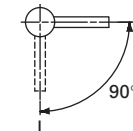
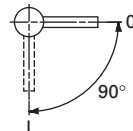
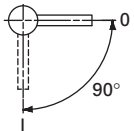
#### PH3 Type Handle



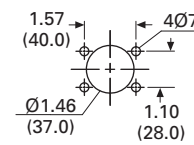
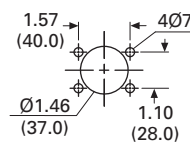
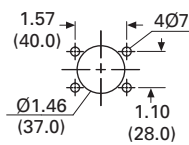
#### PH4 Type Handle



### Direction of Operation

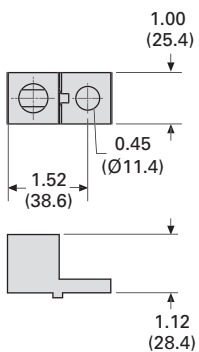


### Door Drilling Templates

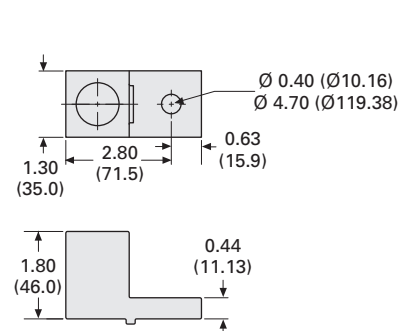


### Top and Bottom Terminal Lugs

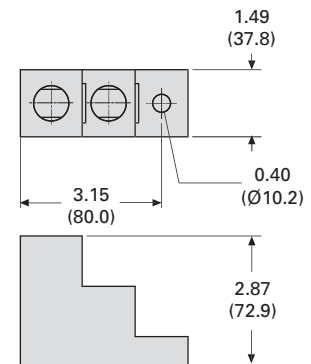
#### R9 Series Non-Fusible 100–200A



#### R9 Series Non-Fusible 400A



#### R9 Series Non-Fusible 600–1200A



# Switching Devices

## R9 Series (UL 98) Fusible 30–800A



### Contents

<b>Description</b>	<b>Page</b>
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### Product Overview

R9 Series (UL <sup>®</sup> 98 listed) Fusible 30–800A manual operated multi-pole fusible disconnect switches use double break contacts per pole that ensure complete isolation of the fuse when the switch is in the OFF position.

When installed with fuses, they provide protection for low voltage electrical installations against short circuit and overload.

### Features, Benefits and Functions

- Load break functionality
- Double break contacts
- Up to 200 kA short-circuit rating with Class CC, J or L fuses
- Compact footprints
- The optional TEST position function (up to 400A) enables testing of the control circuit auxiliaries without switching the main contacts. This function provides a simple alternative to a separately wired pushbutton
- Defeatable pistol handles automatically re-latch when the panel door is closed
- Front or side operation
- Flange operation
- NFPA <sup>®</sup> 79 compliant kits
- Two-, three- and four-pole devices

### Standards and Certifications

- UL 98, File E222859 for 30 to 800A ratings
- UL 489, File E305341 for H-Frame switches
- CSA <sup>®</sup> 22.2 No. 4, File 217736
- CSA 22.2 No. 5, File 217736, H-Frame only
- IEC 60947-1, EN 60947-1
- IEC 60947-3, EN 60947-3
- CE mark
- NFPA 79





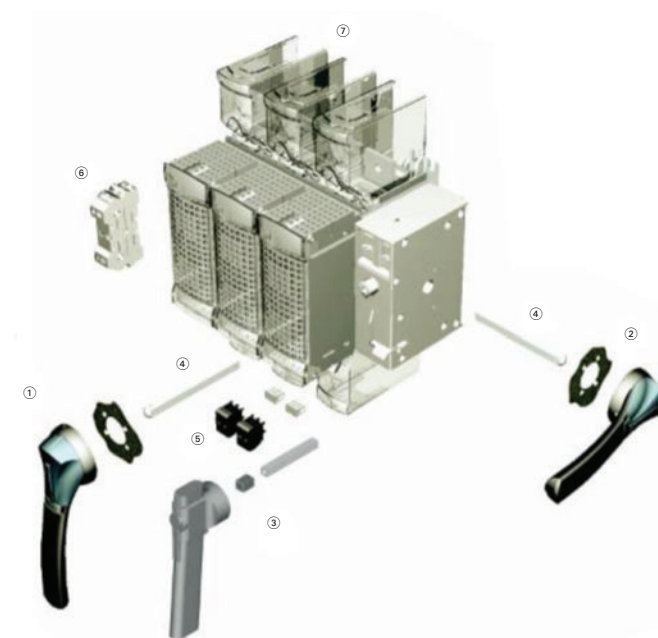
### Illustrations

#### R9 Fusible 30A/CC and 30A/J H-Frame—Direct and External Operation



- ① External front handles
- ② Direct handle
- ③ Shaft extensions for external handles
- ④ Configurable U Type ACs, for pre-break and signaling or TEST

#### R9 Fusible 30A/J-800A/L (I-N-Frames)—Direct and External Operation



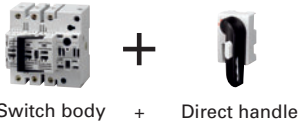
- ① External front handle
- ② External right side handle (not applicable for N-Frame 600/800A)
- ③ Direct handle
- ④ Shaft extensions for external handles
- ⑤ Configurable U Type ACs, for pre-break and signaling or TEST
- ⑥ Side auxiliary contacts
- ⑦ Terminal shrouds

# Switching Devices

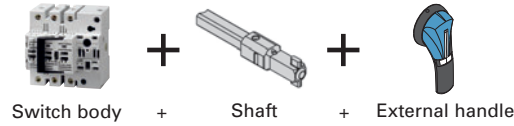
R9 Series (UL 98) Fusible 30–800A

## Product Selection

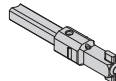
### Direct Operation



### External Operation



## Front and Right Side Operation

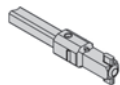


Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Direct Handle	External Selector Handle (Choose one)	Shaft Extension for Selector Handle Only (Choose one)	External Front Pistol Handle	External Right Side Pistol Handle
30 <sup>Ⓢ</sup> Compact (H-Frame) (CC)	3	<b>R4H3030FCC</b>	<b>DHR9HC</b>	Black 1,3R,12 <b>SHB0N12HV</b>	7.90 (200.0) <b>SF200SH5X5H</b>	Black 1,3R,12 <b>PHB1N12F</b>	—
30 <sup>Ⓢ</sup> (H-Frame) (CC)	3 + switched neutral	<b>R4H3030FCCSN</b>		Red 1,3R,12 <b>SHR0N12HV</b>	12.60 (320.0) <b>SF320SH5X5H</b>	Red 1,3R,12 <b>PHR1N12F</b>	
30 <sup>Ⓢ</sup> Compact (H-Frame) (J)	3	<b>R4H3030FJ</b>	<b>DHR9HJ</b>	Black 4,4X <b>SHB0N4XHV</b>	15.70 (400.0) <b>SF400SH5X5H</b>	Black 4,4X <b>PHB1N4XF</b>	
30 <sup>Ⓢ</sup> (H-Frame) (J)	3 + switched neutral	<b>R4H3030FJSN</b>		Red 4,4X <b>SHR0N4XHV</b>		Red 4,4X <b>PHR1N4XF</b>	
30 (I-Frame) (CC)	3 4	<b>R9I3030FCC</b> <b>R9I4030FCC</b>	<b>DHR9J2M</b>	—	—		
30 (J-Frame) (J)	2 3 4	<b>R9J2030FJ</b> <b>R9J3030FJ</b> <b>R9J4030FJ</b>				Black 4,4X (w/ TEST Position) <b>PHB1N4XFT</b>	Black 4, 4X <b>PHB1N4XS</b>
60 <sup>Ⓢ</sup> (J-Frame) (J)	2 3 4	<b>R9J2060FJ</b> <b>R9J3060FJ</b> <b>R9J4060FJ</b>				Red 4,4X (w/ TEST Position) <b>PHR1N4XFT</b>	Red 4, 4X <b>PHR1N4XS</b>

### Note

<sup>Ⓢ</sup> 100 kA short-circuit rating.

### Front and Right Side Operation, continued



**Shaft Extensions for  
Pistol Handle Only  
In (mm)  
(Choose one)**

**NFPA  
79 Kit**

**Auxiliary  
Contacts  
(Choose one)**

**S Type Auxiliary  
Contacts  
(Choose one)**

**Terminal  
Shrouds**

7.90 (200.0) <b>SF200PH5X5</b>	<b>NFPA79H</b>	1 AC NO <b>AC1NOR9</b>	—	Integral to switch
12.60 (320.0) <b>SF320PH5X5</b>		1 AC NC <b>AC1NCR</b>		
15.70 (400.0) <b>SF400PH5X5</b>				
7.90 (200.0) <b>SF200PH10X10</b>	<b>NFPA79JKL</b>		1 AC NO + NC <b>AC1N01NCJ2N</b>	
12.60 (320.0) <b>SF320PH10X10</b>			2 AC NO + NC <b>AC2N02NCJ2N</b>	
15.70 (400.0) <b>SF400PH10X10</b>			1 AC NO + NC w/ TEST <b>AC1N01NCJ2NT</b>	
19.70 (500.0) <b>SF500PH10X10</b>			2 AC NO + NC w/ TEST <b>AC2N02NCJ2NT</b>	

**Note**

① 100 kA short-circuit rating.

# Switching Devices

R9 Series (UL 98) Fusible 30–800A

## Front and Right Side Operation, continued

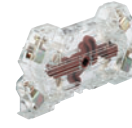
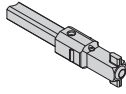


Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Direct Handle (Black)	External Front Pistol Handle (Choose one)	External Right Side Pistol Handle (Choose one)
60 <sup>Ⓢ</sup> (K-Frame) (J)	2	<b>R9K2060FJ</b>	<b>DHR9J2M</b>	Black	Black
	3	<b>R9K3060FJ</b>		1,3R,12 <b>PHB2N12F</b>	4, 4X <b>PHB2N4XS</b>
	4	<b>R9K4060FJ</b>			
100 (K-Frame) (J)	2	<b>R9K2100FJ</b>		Red	Red
	3	<b>R9K3100FJ</b>		1,3R,12 <b>PHR2N12F</b>	4, 4X <b>PHR2N4XS</b>
	4	<b>R9K4100FJ</b>			
200 (L-Frame) (J)	2	<b>R9L2200FJ</b>		Black	
	3	<b>R9L3200FJ</b>		4,4X <b>PHB2N4XF</b>	
	4	<b>R9L4200FJ</b>			
400 (M-Frame) (J)	3	<b>R9M3400FJ</b>		Red	
	4	<b>R9M4400FJ</b>		4,4X <b>PHR2N4XF</b>	
600 (N-Frame) (J)	2	<b>R9N2600FJ</b>	<b>DHR9N</b>	Black	
	3	<b>R9N3600FJ</b>		4,4X <b>PHB2N4XF</b>	
	4	<b>R9N4600FJ</b>			
800 (N-Frame) (L)	2	<b>R9N2800FL</b>		Red	
	3	<b>R9N3800FL</b>		4,4X <b>PHR3N4XF</b>	
	4	<b>R9N4800FL</b>			

**Note**

<sup>Ⓢ</sup> 200 kA short-circuit rating.

### Front and Right Side Operation, continued



Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Shaft Extensions for External Handle In (mm) (Choose one)	NFPA 79 Kit	Auxiliary Contacts (Choose one)	Auxiliary Contacts (Choose one)	Terminal Shrouds	
60 ① (K-Frame) (J)	2	<b>R9K2060FJ</b>	7.90 (200.0)	<b>NFPA79JKL</b>	1 AC NO <b>AC1NOR9</b>	1 AC NO + NC <b>AC1N01NCJ2N</b>	Integral to switch	
	3	<b>R9K3060FJ</b>	Pistol <b>SF200PH10X10</b>					
	4	<b>R9K4060FJ</b>						
100 (K-Frame) (J)	2	<b>R9K2100FJ</b>	12.60 (320.0)		1 AC NC <b>AC1NCR9</b>	2 AC NO + NC <b>AC2NO2NCJ2N</b>		
	3	<b>R9K3100FJ</b>	Pistol <b>SF320PH10X10</b>					
	4	<b>R9K4100FJ</b>						
200 (L-Frame) (J)	2	<b>R9L2200FJ</b>	15.70 (400.0)		1 AC NO + NC w/ TEST <b>AC1N01NCJ2NT</b> ②	1 AC NO + NC w/ TEST <b>AC2NO2NCJ2N</b> ②	<b>TSR9L2</b>	
	3	<b>R9L3200FJ</b>	Pistol <b>SF400PH10X10</b>				<b>TSR9L3</b>	
	4	<b>R9L4200FJ</b>					<b>TSR9L4</b>	
400 (M-Frame) (J)	3	<b>R9M3400FJ</b>	19.70 (500.0)		2 AC NO + NC w/ TEST <b>AC2NO2NCJ2NT</b> ②	2 AC NO + NC w/ TEST <b>AC2NO2NCJ2N</b> ②	<b>TSR9M3</b>	
	4	<b>R9M4400FJ</b>	Pistol <b>SF500PH10X10</b>				<b>TSR9M4</b>	
600 (N-Frame) (J)	2	<b>R9N2600FJ</b>	7.90 (200.0)	<b>NFPA79N</b>		1 AC NO + NC <b>AC1N01NCJ2N</b>	<b>TSR9N2</b>	
	3	<b>R9N3600FJ</b>	Pistol <b>SF200PH12X12</b>				<b>TSR9N3</b>	
	4	<b>R9N4600FJ</b>					<b>TSR9N4</b>	
800 (N-Frame) (L)	2	<b>R9N2800FL</b>	12.60 (320.0)			2 AC NO + NC <b>AC2NO2NCJ2N</b>	<b>TSR9N2</b>	
	3	<b>R9N3800FL</b>	Pistol <b>SF320PH12X12</b>				<b>TSR9N3</b>	
	4	<b>R9N4800FL</b>	15.70 (400.0)					<b>TSR9N4</b>
			Pistol <b>SF400PH12X12</b>					
		19.70 (500.0)	Pistol <b>SF500PH12X12</b>					

#### Notes

- ① 200 kA short-circuit rating.
- ② Requires test handle.

# Switching Devices

R9 Series (UL 98) Fusible 30–800A

## Accessories

### NFPA 79 Compliant



#### “Flange” Handle for Flange-Operated Switches

Description	Ampere Rating (Frame)	Handle Type	NEMA Type	Catalog Number
For side-operated switches only. Provides heavy-duty flange style operation. Meets both UL 508A and NFPA 79 requirements. Please order cable or rod link between handle and switch.	30–400 (J-, K-, L-, M-Frame)	Standard handle	1, 3, 3R, 4, 12	<b>FHS</b> ①②
	30–400 (J-, K-, L-, M-Frame)	Chrome-plated handle	1, 3, 3R, 4, 4X, 12	<b>FHCP</b> ①②



#### Cable Operator

**Mechanism for Flange Handle**



Description	Ampere Rating (Frame)	NEMA Type	Cable Length In (mm)	Catalog Number
Link between “Flange” handle and side-operated switches. Please order mechanism and “Flange” handle.	30–400 (J-, K-, L-, M-Frame)	Mechanism for “Flange” handle	—	<b>CFM1</b> ②
			36.00 (914.4)	<b>CFC36</b> ②
			60.00 (1524.0)	<b>CFC60</b> ②
			120.00 (3048.0)	<b>CFC120</b> ②



#### Rod Operator

Description	Ampere Rating (Frame)	For Enclosure Depth In (mm)	Catalog Number
Link between “Flange” handle and side-operated switches. Mechanism included. Please order “Flange” handle.	30–400 (J-, K-, L-, M-Frame)	8.00–24.00 (203.2–609.6)	<b>RFM1</b> ②



#### NFPA 79 “Through the Door” Kit

Description	Ampere Rating (Frame)	Catalog Number
For front-operated switches only. Meets both UL 508A and NFPA 79 requirements. Kit includes mechanism, shaft and internal handle. Please also order a “PH” type external pistol handle.	30 (H-Frame)	<b>NFPA79H</b>
	30–400 (J-, K-, L-, M-Frame)	<b>NFPA79JKL</b>
	600–800 (N-Frame)	<b>NFPA79N</b>

#### Notes

- ① Defeatable.
- ② Available October 2011.



### Direct Handles

Description	Ampere Rating (Frame)	Fuse	Catalog Number
Front operation. Black.	30 (H-Frame)	CC	<b>DHR9HC</b>
	30 (H-Frame)	J	<b>DHR9HJ</b>
	30 (I-Frame)	CC	<b>DHR9J2M</b>
	30–400 (J-, K-, L-, M-Frame)	J	<b>DHR9J2M</b>
	600–800 (N-Frame)	J/L	<b>DHR9N</b>

### S0 Type Handle



### Door Interlocked External Front Handles

Description	Ampere Rating (Frame)	Handle Type	NEMA Type	Color	Standard Catalog Number
The handle locking function of the front external operation handle prevents the user from opening the door of the enclosure when the switch is in the ON position, and when the switch is padlocked in the OFF position (PH1, PH2 and PH3 type handles only). Opening the door when the switch is in the OFF position is possible by defeating the locking function with the use of a tool (authorized persons only). The locking function is restored when the door is closed back.	30 (H-Frame)	S0	1, 3R, 12	Black	<b>SHB0N12HV</b>
	30 (H-Frame)	S0	1, 3R, 12	Red/yellow	<b>SHR0N12HV</b>
	30 (H-Frame)	S0	4, 4X	Black	<b>SHB0N4XHV</b>
	30 (H-Frame)	S0	4, 4X	Red/yellow	<b>SHR0N4XHV</b>
	30–60 (H-,I-, J-Frame)	PH1	1, 3R, 12	Black	<b>PHB1N12F</b>
	30–60 (H-,I-, J-Frame)	PH1	1, 3R, 12	Red/yellow	<b>PHR1N12F</b>
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Black	<b>PHB1N4XF</b>
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Red/yellow	<b>PHR1N4XF</b>
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Black	<b>PHB1N4XFT</b> ①
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Red/yellow	<b>PHR1N4XFT</b> ①
	60–400 (K-, L-, M-Frame)	PH2	1, 3R, 12	Black	<b>PHB2N12F</b>
	60–400 (K-, L-, M-Frame)	PH2	1, 3R, 12	Red/yellow	<b>PHR2N12F</b>
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Black	<b>PHB2N4XF</b>	
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Red/yellow	<b>PHR2N4XF</b>	
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Black	<b>PHB2N4XFT</b> ①	
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Red/yellow	<b>PHR2N4XFT</b> ①	
600–800 (N-Frame)	PH3	4, 4X	Black	<b>PHB3N4XF</b>	
600–800 (N-Frame)	PH3	4, 4X	Red/yellow	<b>PHR3N4XF</b>	

### PH1 Type Handle



### PH2 Type Handle



### PH3 Type Handle



### Right Side External Handles

Ampere Rating (Frame)	Handle Type	NEMA Type	Color	Standard Catalog Number
30–60 (J-Frame)	PH1	4, 4X	Black	<b>PHB1N4XS</b>
30–60 (J-Frame)	PH1	4, 4X	Red/yellow	<b>PHR1N4XS</b>
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Black	<b>PHB2N4XS</b>
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Red/yellow	<b>PHR2N4XS</b>

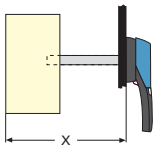
#### Note

① Includes TEST position.



### Shaft Extensions for External Handles

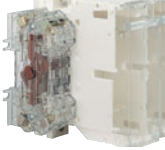
Ampere Rating (Frame)	Handle Type	Shaft Length In (mm)	Catalog Number
30 (H-Frame)	SH0	7.90 (200.0)	SF200SH5X5H
30 (H-Frame)	SH0	12.60 (320.0)	SF320SH5X5H
30 (H-Frame)	SH0	15.70 (400.0)	SF400SH5X5H
30 (H-Frame)	PH1	7.90 (200.0)	SF200PH5X5
30 (H-Frame)	PH1	12.60 (320.0)	SF320PH5X5
30 (H-Frame)	PH1	15.70 (400.0)	SF400PH5X5
30–400 (I-, J-, K-, L-, M-Frame)	PH2	7.90 (200.0)	SF200PH10X10
30–400 (I-, J-, K-, L-, M-Frame)	PH2	12.60 (320.0)	SF320PH10X10
30–400 (I-, J-, K-, L-, M-Frame)	PH2	15.70 (400.0)	SF400PH10X10
30–400 (I-, J-, K-, L-, M-Frame)	PH3	19.70 (500.0)	SF500PH10X10
600–800 (N-Frame)	PH3	7.90 (200.0)	SF200PH12X12
600–800 (N-Frame)	PH3	12.60 (320.0)	SF320PH12X12
600–800 (N-Frame)	PH3	15.70 (400.0)	SF400PH12X12
600–800 (N-Frame)	PH3	19.70 (500.0)	SF500PH12X12



### Handle Types SH and PH, X Minimum Dimensions

Ampere Rating (Frame)	Dimensions X In (mm)	Handle Type	Shaft Length In (mm)	Catalog Number
30 (H-Frame)	4.02–9.65 (102.0–245.0)	SH0	7.90 (200.0)	SF200SH5X5H
30 (H-Frame)	4.02–14.37 (102.0–365.0)	SH0	12.60 (320.0)	SF320SH5X5H
30 (H-Frame)	4.02–17.52 (102.0–445.0)	SH0	15.70 (400.0)	SF400SH5X5H
30 (H-Frame)	4.02–9.65 (102.0–245.0)	PH1	7.90 (200.0)	SF200PH5X5
30 (H-Frame)	4.02–14.37 (102.0–365.0)	PH1	12.60 (320.0)	SF320PH5X5
30 (H-Frame)	4.02–17.52 (102.0–445.0)	PH1	15.70 (400.0)	SF400PH5X5
30–100 (I-, J-, K-Frame)	5.30–9.06 (135.0–230.0)	PH2, PH3	7.90 (200.0)	SF200PH10X10
200 (L-Frame)	5.70–9.06 (145.0–230.0)	PH2, PH3	7.90 (200.0)	SF200PH10X10
400 (M-Frame)	7.87–10.24 (200.0–260.0)	PH2, PH3	7.90 (200.0)	SF200PH10X10
30–100A (I-, J-, K-Frame)	5.30–13.78 (135.0–350.0)	PH2, PH3	12.60 (320.0)	SF320PH10X10
200 (L-Frame)	5.70–13.78 (145.0–350.0)	PH2, PH3	12.60 (320.0)	SF320PH10X10
400 (M-Frame)	7.87–14.96 (200.0–380.0)	PH2, PH3	12.60 (320.0)	SF320PH10X10
30–100 (I-, J-, K-Frame)	5.30–16.93 (135.0–430.0)	PH2, PH3	15.70 (400.0)	SF400PH10X10
200 (L-Frame)	5.70–16.93 (145.0–430.0)	PH2, PH3	15.70 (400.0)	SF400PH10X10
400 (M-Frame)	7.87–18.10 (200.0–460.0)	PH2, PH3	15.70 (400.0)	SF400PH10X10
30–100 (I-, J-, K-Frame)	5.30–20.87 (135.0–530.0)	PH2, PH3	19.70 (500.0)	SF500PH10X10
200 (L-Frame)	5.70–20.87 (145.0–530.0)	PH2, PH3	19.70 (500.0)	SF500PH10X10
400 (M-Frame)	7.87–22.05 (200.0–560.0)	PH2, PH3	19.70 (500.0)	SF500PH10X10
600–800 (N-Frame)	10.63–11.97 (270.0–304.0)	PH3	12.60 (320.0)	SF320PH12X12
600–800 (N-Frame)	10.63–16.69 (270.0–424.0)	PH3	12.60 (320.0)	SF320PH12X12
600–800 (N-Frame)	10.63–19.84 (270.0–504.0)	PH3	15.70 (400.0)	SF400PH12X12
600–800 (N-Frame)	10.63–23.78 (270.0–604.0)	PH3	19.70 (50.00)	SF500PH12X12





### Auxiliary Contacts—NO + NC ①

Description	Ampere Rating (Frame)	Number of ACs	Operating Current I <sub>g</sub> (Amperes)	
			Nominal Current (Amperes)	Catalog Number
For the R9 Series Fusible 30–800A, indication of the O and I positions by 1 to 4 NO + NC auxiliary contacts. Electrical principle: Cabling by terminal cage with #16 AWG maximum. High electrical characteristics: A600/D600	600–800 (N-Frame)	1NO + 1NC	10	<b>AC1N01NCJ2N</b> ②
	600–800 (N-Frame)	2NO + 2NC	10	<b>AC2N02NCJ2N</b> ②
	30–400 (I–M-Frame)	1NO + 1NC (w/ TEST)	10	<b>AC1N01NCJ2NT</b>
	30–400 (I–M-Frame)	2NO + 2NC (w/ TEST)	10	<b>AC2N02NCJ2NT</b>



### Auxiliary Contacts—NO or NC ③

Description	Ampere Rating (Frame)	Number of ACs	Catalog Number
The different functions (pre-break, 0 and 1 indication, TEST feature) are easily configurable with pegs (one or two pegs per position). Two superposed auxiliary contacts maximum. For 30A/CC (H-Frame), maximum of four ACs. For 30A/J (H-Frame), maximum of two ACs. For 30 to 100A/J (I, J and K-Frame), maximum of four ACs. For 200 to 600A/J (L and M-Frame), maximum of eight ACs. Cabling to the control circuit by terminals with a maximum section of 2 x 2.5 mm <sup>2</sup> . Electrical characteristics: A300	<b>NO Auxiliary Contact</b>		
	30–600 (H–M-Frame)	1	<b>AC1N0R9</b>
	<b>NC Auxiliary Contact</b>		
	30–600 (H–M-Frame)	1	<b>AC1NCR9</b>

### Characteristics for Pre-Break Auxiliary Contacts

Ampere Rating	Contact Type	Nominal Current Amperes	Operating Current I <sub>g</sub> (Amperes)			
			250 Vac AC-13	400 Vac AC-13	24 Vdc DC-13	48 Vdc DC-13
30–800	NO + NC	10	6	4	5	3

### Terminal Shrouds



### Terminal Shrouds

Description	Ampere Rating (Frame)	Number of Poles	Catalog Number
Line or load side protection against direct contact with terminals or the connection parts	30–100 (H-, I-, J-, K-Frame)	2/3/4	Integral to switch
	200 (L-Frame)	2	<b>TSR9L2</b>
	200 (L-Frame)	3	<b>TSR9L3</b>
	200 (L-Frame)	4	<b>TSR9L3</b>
	400 (M-Frame)	2	<b>TSR9M2</b> ④
	400 (M-Frame)	3	<b>TSR9M3</b> ④
	400 (M-Frame)	4	<b>TSR9M4</b> ④
	600–800 (N-Frame)	2	<b>TSR9N2</b>
	600–800 (N-Frame)	3	<b>TSR9N3</b>
600–800 (N-Frame)	4	<b>TSR9N4</b>	

#### Notes

- ① Same-make/same-break auxiliary contacts.
- ② Auxiliary contacts without “Test” cannot be used on I–M-Frame switches.
- ③ Early-break/same-make auxiliary contacts.
- ④ For replacement only. Both line and load side terminal shrouds are included with 400A switch.

# Switching Devices

## R9 Series (UL 98) Fusible 30–800A



### Line and Load Terminal Lugs

Description	Ampere Rating (Frame)	Fuse	Number of Lugs	Lug Capacity/Phase	Cable Type	Catalog Number
Connection of bare copper cables on to the terminals (no spade lugs).	30 (H-, I-Frame)	CC/J	—	#14–#10	Cu	Integral to switch
	30 (H-, I-Frame)	CC/J	—	#14–#10	Cu	Integral to switch
	30–60 (J-Frame)	J	—	#10–#6	Cu	Integral to switch
	60–100 (K-Frame)	J	—	#12–#1	Cu	Integral to switch
	200 (L-Frame)	J	2	#6–300 kcmil	Cu/Al	<b>LK2R9DL</b>
	200 (L-Frame)	J	3	#6–300 kcmil	Cu/Al	<b>LK3R9DL</b>
	200 (L-Frame)	J	4	#6–300 kcmil	Cu/Al	<b>LK4R9DL</b>
	400 (M-Frame)	J	3	(2) #2–600 kcmil	Cu/Al	<b>LK3R9FN</b>
	400 (M-Frame)	J	4	(2) #2–600 kcmil	Cu/Al	<b>LK4R9FN</b>
	600–800 (N-Frame)	J/L	2	(2) #2–600 kcmil	Cu/Al	<b>LK2R9FN</b>
	600–800 (N-Frame)	J/L	3	(2) #2–600 kcmil	Cu/Al	<b>LK3R9FN</b>
	600–800 (N-Frame)	J/L	4	(2) #2–600 kcmil	Cu/Al	<b>LK4R9FN</b>



### Shorting Links

Ampere Rating (Frame)	Fuse	Pack Quantity	Catalog Number
60 (J-, K-Frame)	J	3	<b>SLJK360</b>
100 (K-Frame)	J	3	<b>SLK3100</b>
200 (L-Frame)	J	3	<b>SLL3</b>
400 (M-Frame)	J	3	<b>SLM3</b>
600–800 (N-Frame)	J/L	3	<b>SLN3</b>

## Technical Data and Specifications

### UL and CSA Characteristics

#### R9 Series Fusible 30–800A

Description	30A	30A	30A	30A	60A	60A	100A
<b>General Use Ratings</b>							
Switch Frame	H	H	I	J	J	K	K
600 Vac (A)	30	30	30	30	60	60	100
600 Vdc (A)	—	—	—	—	—	—	—
<b>Short-Circuit Ratings</b>							
Short-circuit rating at 600 Vac (kA)	100	100	100	200	100	200	200
Fuse type	CC	J	CC	J	J	J	J
Maximum fuse rating (A)	30	30	30	30	60	60	100
<b>Maximum Horsepower Rating/Maximum Motor FLA Three-Phase</b>							
220–240 Vac	7.5/22	7.5/22	7.5/22	7.5/22	15/42	15/42	30/80
440–480 Vac	15/21	15/21	15/21	15/21	30/40	30/40	60/77
600 Vac	20/22	20/22	20/22	20/22	50/52	50/52	75/77
<b>Maximum Horsepower Rating/Maximum Motor FLA Single-Phase</b>							
220–240 Vac	—	—	3/17	3/17	10/50	10/50	10/50
440–480 Vac	—	—	7.5/21	7.5/21	10/26	10/26	10/26
600 Vac	—	—	10/20	10/20	10/20	10/20	10/20
<b>Maximum Horsepower Rating/Maximum Motor FLA DC</b>							
125 Vdc <sup>①</sup>	3/25	3/25	3/25	3/25	5/40	5/40	7.5/58
250 Vdc <sup>②</sup>	5/20	5/20	5/20	5/20	10/38	10/38	20/72
<b>Mechanical Characteristics</b>							
Endurance (number of operating cycles)	10,000	10,000	10,000	10,000	10,000	10,000	10,000
<b>Terminal Lugs</b>							
Type	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
Minimum conn. section	#14	#14	#14	#10	#10	#12	#12
Maximum conn. section	#10	#10	#10	#6	#6	#1	#1

#### Notes

- ① Two-pole in series.
- ② Three-pole in series.

# Switching Devices

## R9 Series (UL 98) Fusible 30–800A

### R9 Series Fusible 30–800A, continued

Description	200A	400A	600A	800A
<b>General Use Ratings</b>				
Switch Frame	L	M	N	N
600 Vac (A)	200	400	600	800
600 Vdc (A)	—	—	600 <sup>②</sup>	800 <sup>②</sup>
<b>Short-Circuit Ratings</b>				
Short-circuit rating at 600 Vac (kA)	200	200	200	200
Fuse type	J	J	J	L
Maximum fuse rating (A)	200	400	600	800
<b>Maximum Horsepower Rating/Maximum Motor FLA Single-Phase</b>				
220–240 Vac	—	—	—	—
440–480 Vac	—	—	—	—
600 Vac	—	—	—	—
<b>Maximum Horsepower Rating/Maximum Motor FLA Three-Phase</b>				
220–240 Vac	60/154	125/312	200/480	200/480
440–480 Vac	125/156	250/302	500/590	500/590
600 Vac	150/144	350/336	500/472	500/472
<b>Maximum Horsepower Rating/Maximum Motor FLA DC</b>				
125 Vdc <sup>①</sup>	—	20/148	—	—
250 Vdc <sup>②</sup>	—	50/173 <sup>②</sup>	—	—
<b>Mechanical Characteristics</b>				
Endurance (number of operating cycles)	8000	6000	5000	5000
<b>Terminal Lugs</b>				
Type	Option	Option	Option	Option
Minimum conn. section	#6	#2	2x#2	2x#2
Maximum conn. section	3/0	300 kcmil	2 x 600 kcmil	2 x 600 kcmil

#### Notes

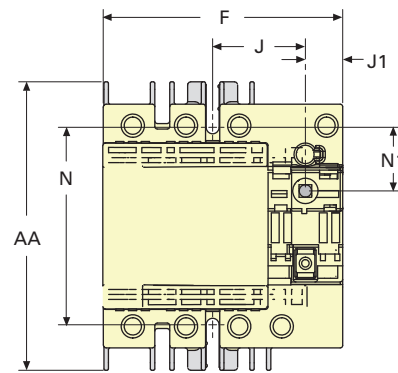
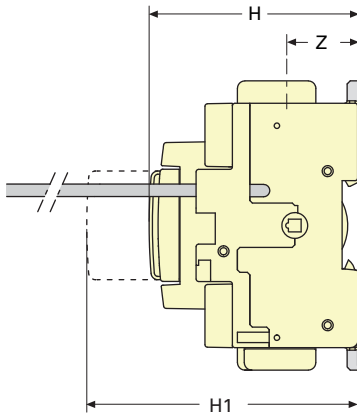
- ① Two-pole in series.
- ② Three-pole in series.

### Dimensions

Approximate Dimensions in Inches (mm)

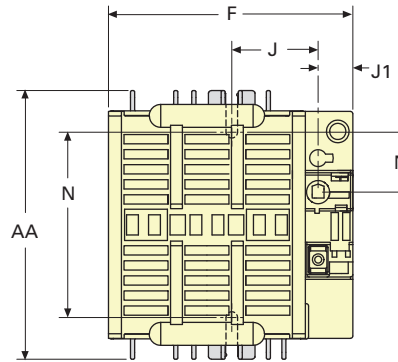
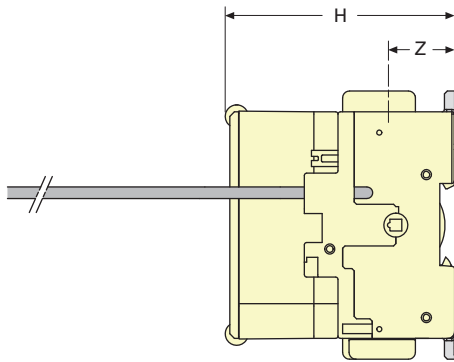
### Front Operation

#### R9 Series Fusible 30A/CC—H-Frame



F	Switch Body		J	J1	Switch Mounting		Connection Terminals	
	H	H1			N	N1	AA	Z
3.78 (96.0)	3.28 (83.3)	5.19 (131.8)	1.47 (37.3)	0.59 (15.0)	3.13 (79.5)	1.00 (25.4)	4.56 (115.8)	1.12 (28.4)

#### R9 Series Fusible 30A/J—H-Frame



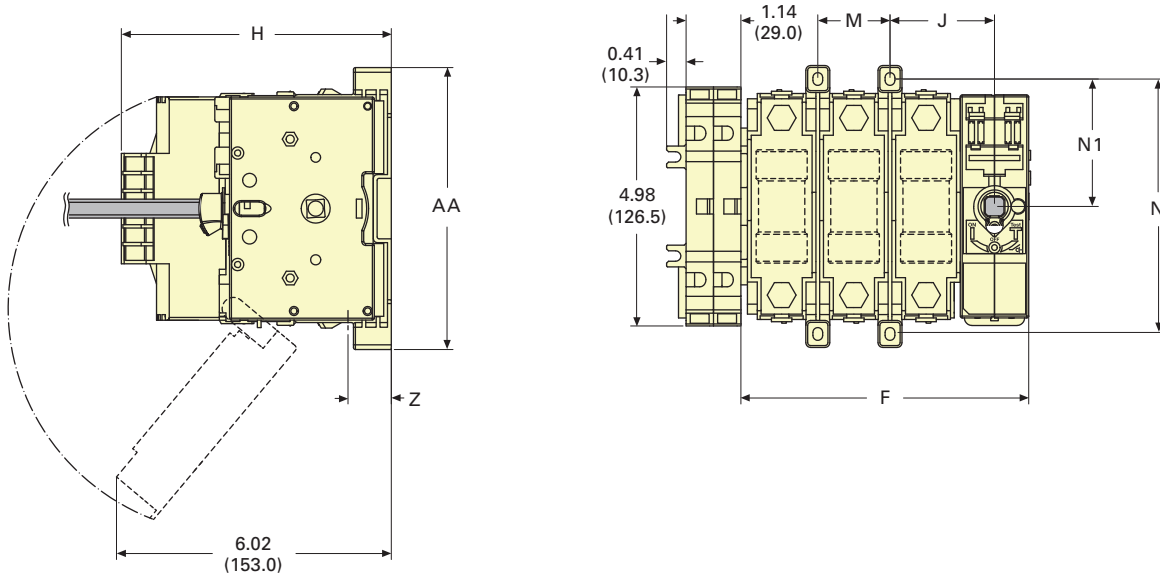
F	Switch Body		J1	Switch Mounting		Connection Terminals	
	H	J		N	N1	AA	Z
4.13 (104.9)	3.89 (98.8)	1.47 (37.3)	0.59 (15.0)	3.30 (83.8)	1.00 (25.4)	4.56 (115.8)	1.12 (28.4)

# Switching Devices

## R9 Series (UL 98) Fusible 30–800A

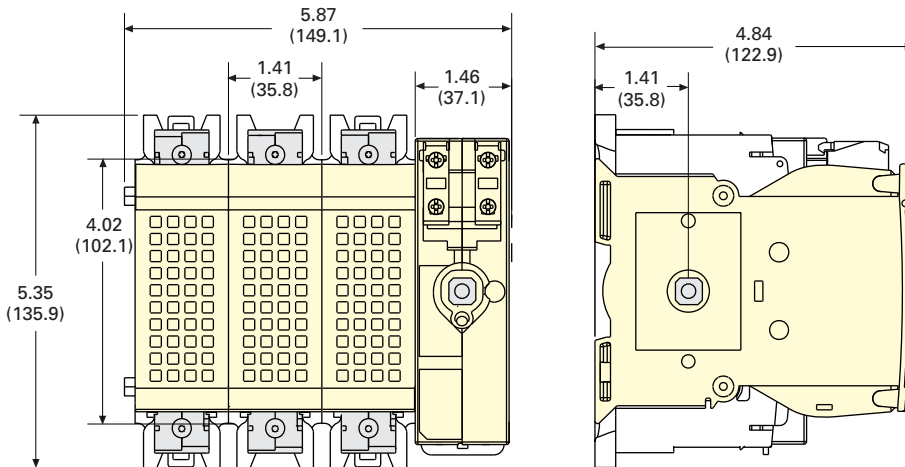
Approximate Dimensions in Inches (mm)

### R9 Series Fusible 30A/CC—I-Frame



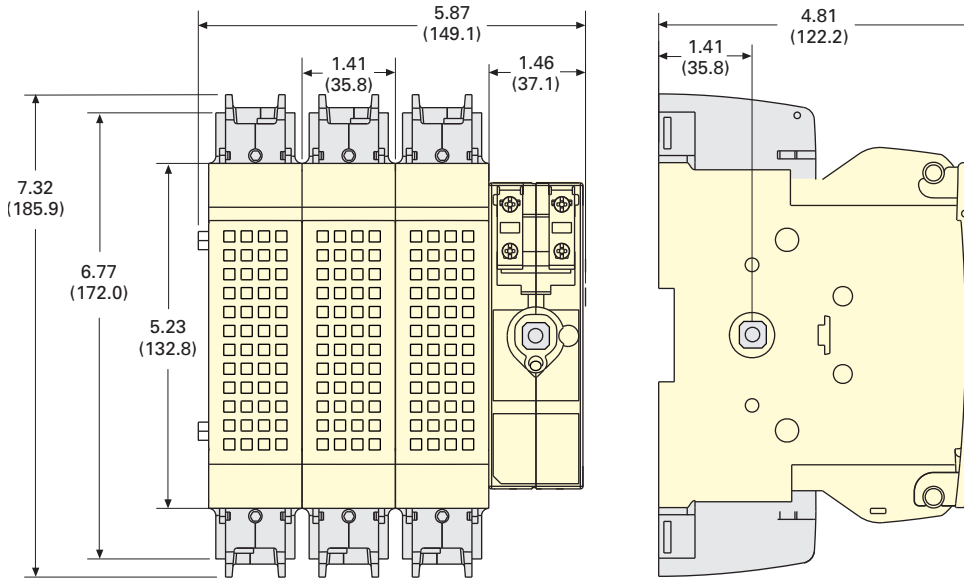
Ampere Rating (Fuse)	Switch body			Switch Mounting				Connection Terminals	
	F 3p	F 4p	H	J	M	N	N1	AA	Z
30 (CC)	4.92 (125.0)	6.06 (154.0)	3.89 (99.0)	1.77 (45.0)	1.14 (29.0)	5.31 (135.0)	2.63 (66.5)	5.87 (149.0)	1.21 (31.0)

### R9 Series Fusible 30A/J and 60A/J (100 kA)—J-Frame

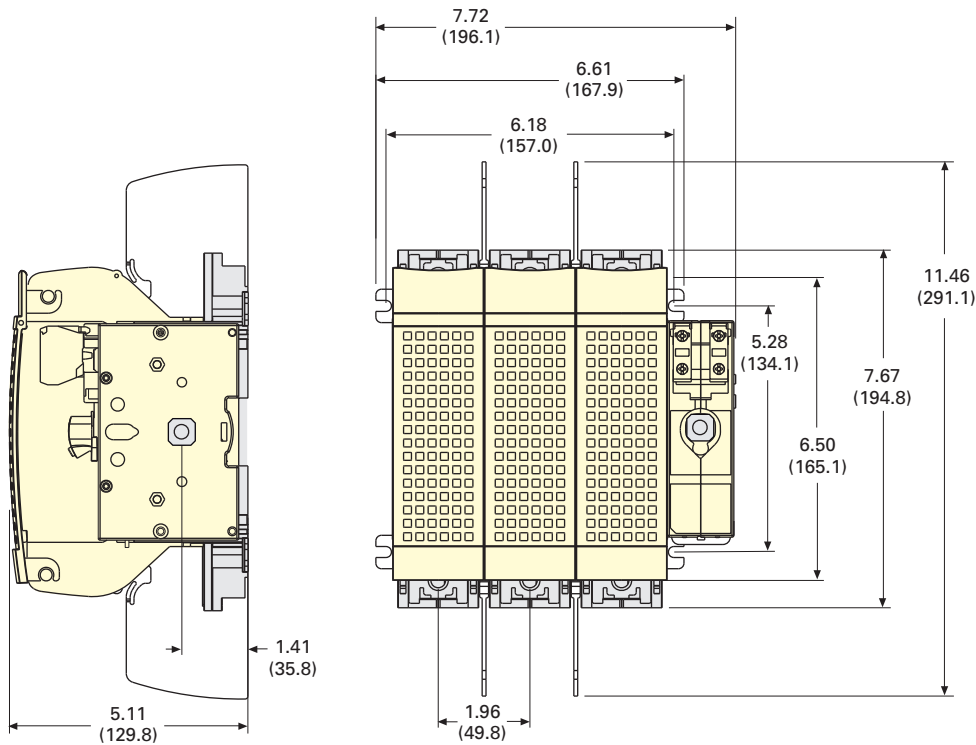


Approximate Dimensions in Inches (mm)

### R9 Series Fusible 60A/J (200 kA) and 100A/J—K-Frame



### R9 Series Fusible 200A/J—L-Frame

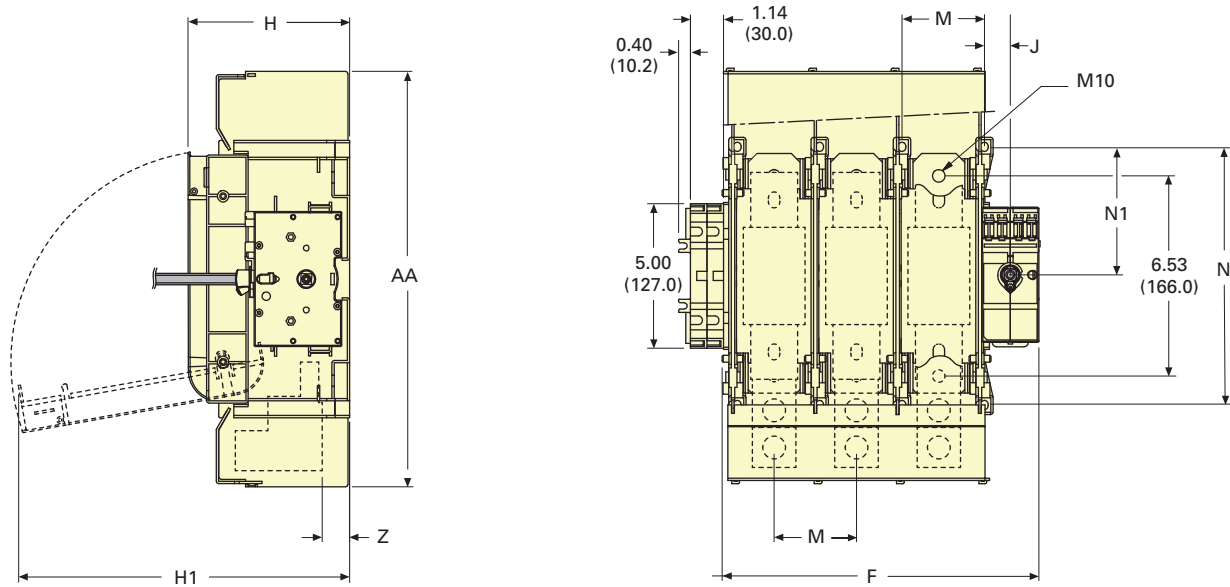


# Switching Devices

## R9 Series (UL 98) Fusible 30–800A

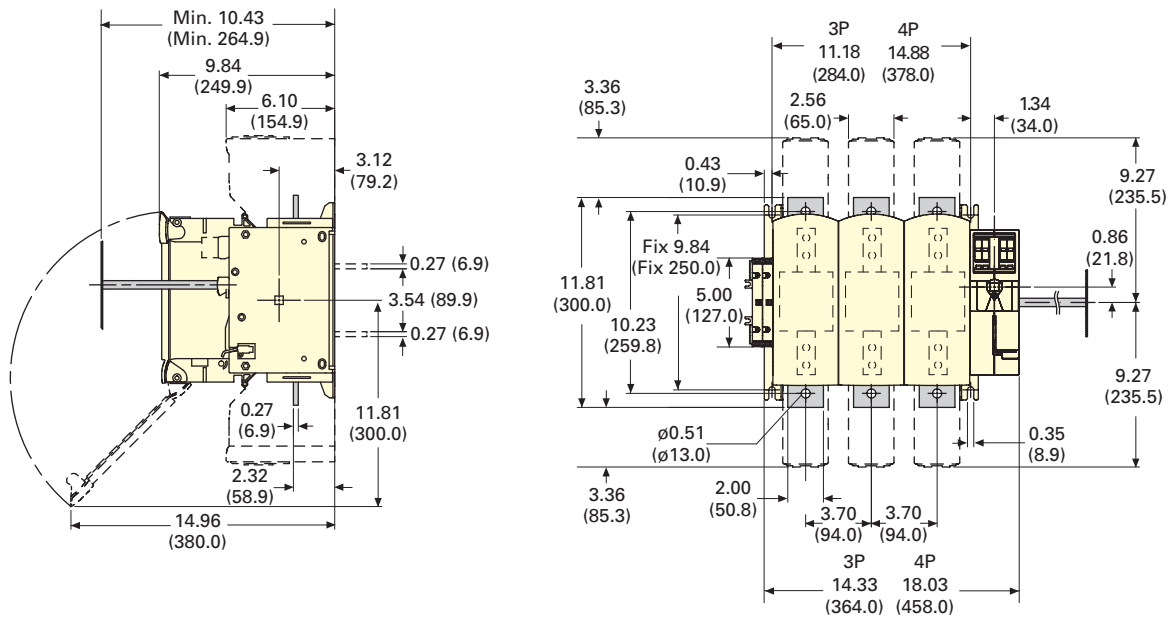
Approximate Dimensions in Inches (mm)

### R9 Series Fusible 400A/J—M-Frame



Switch Body				Switch Mounting				Connection Terminals	
F3p	F4p	H	H1	J	M	N	N1	AA	Z
10.80 (276.0)	13.70 (348.0)	5.56 (141.5)	11.41 (290.0)	0.88 (22.5)	2.84 (72.0)	8.83 (224.0)	4.41 (112.0)	14.31 (363.5)	1.06 (27.0)

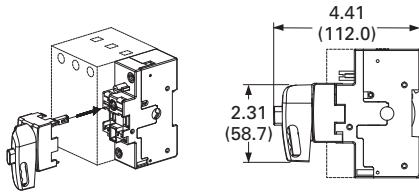
### R9 Series Fusible 600–800A J/L—N-Frame



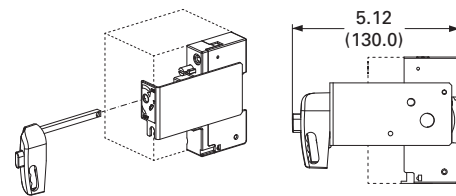


Approximate Dimensions in Inches (mm)

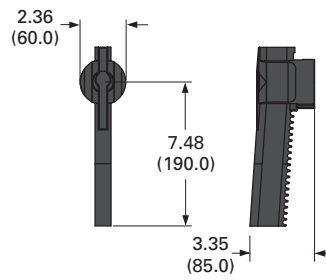
### 30CC (H-Frame)



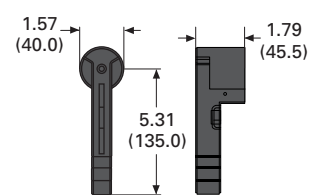
### 30J (H-Frame)



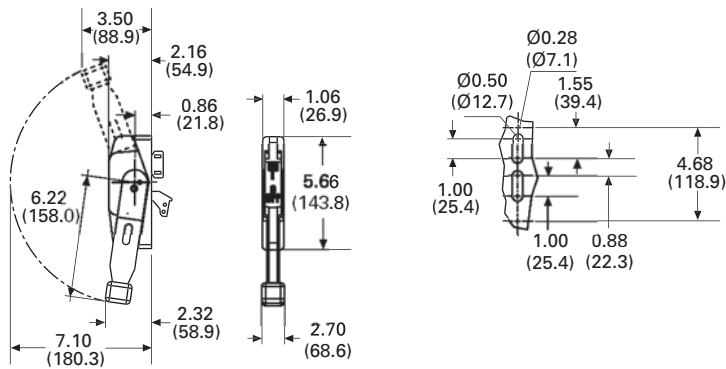
### 30J to 400J



### 600J and 800L



### Flange Handle



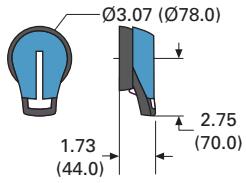
# Switching Devices

R9 Series (UL 98) Fusible 30–800A

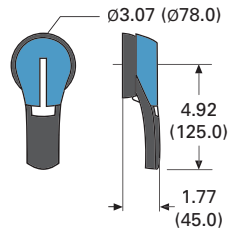
Approximate Dimensions in Inches (mm)

## Door Interlocked External Handle

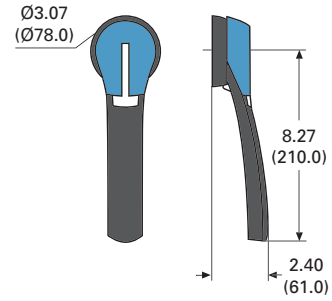
### PH1 Type Handle



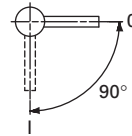
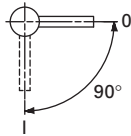
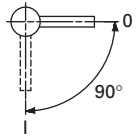
### PH2 Type Handle



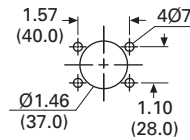
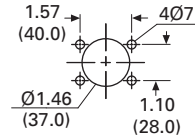
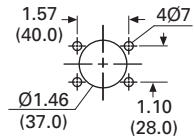
### PH3 Type Handle



## Direction of Operation

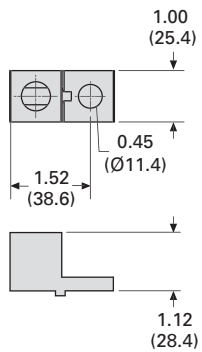


## Door Drilling Template

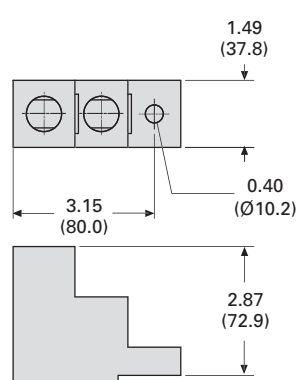


## Line and Load Side Lugs

### 200A (L-Frame)



### 400–800A (M and N-Frames)





### Contents

Description	Page
Product Overview	47
Features, Benefits and Functions	47
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Standards and Certifications	47
Product Selection	48
Accessories	49
Technical Data and Specifications	51
Dimensions	52

### Product Overview

#### UL listed disconnect switches 600 Vdc for photovoltaic applications 100 to 400A

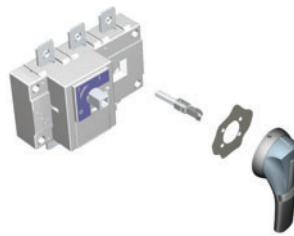
R9 Series (UL 98 listed) DC rated disconnects are manually operated multi-pole load break switches. They provide safety isolation for any low voltage circuit in a photovoltaic application.

#### Features, Benefits and Functions

- Unique switching technology
- Up to 600 Vdc according to UL 98 / CSA 22.2 No. 4, File 217736 ①
- Up to 1000 Vdc according to IEC 947-3

### Application Description

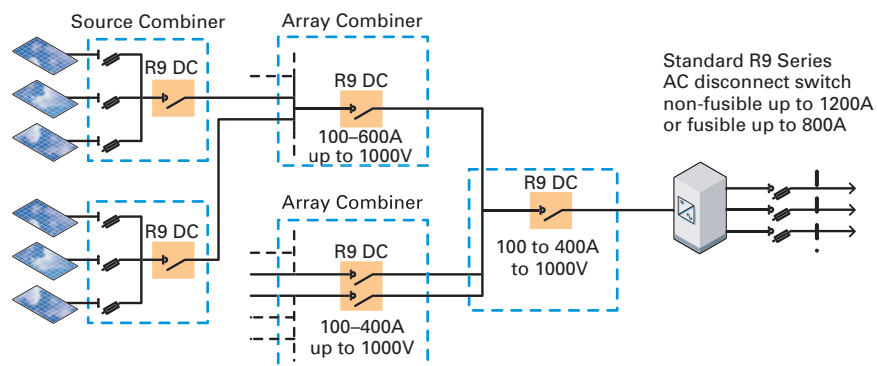
#### In three- and four-pole versions from 100 to 400A



### Standards and Certifications

- UL 98, cULus ②, File E222859
- CSA 22.2 No. 4, File 217736 ①
- IEC 60947-3
- EN 60947-3
- IEC 60-364-7-712 (Rules for the installations and sites special— photovoltaic applications)

① Q4 2010

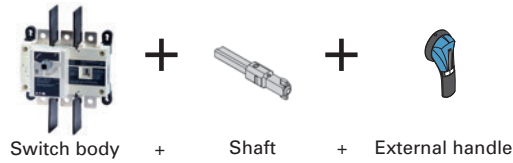
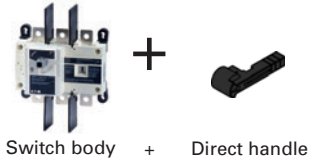


Simplified large photovoltaic system layout

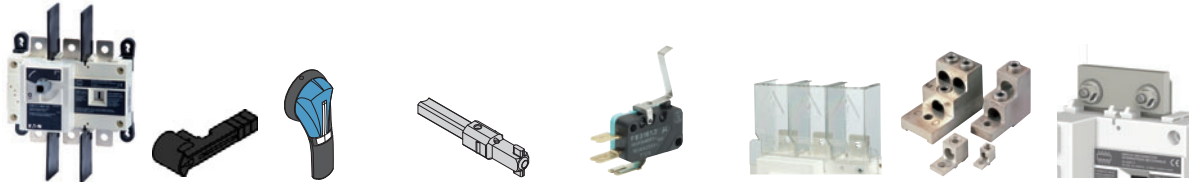
# Switching Devices

## R9 Series (UL 98) DC Rated Disconnects

### Product Selection



### Front Operation—Three- and Four-Pole



Ampere Rating	Number of Poles	Switch Body	Direct Handle	External Handle (Choose one)	Shaft for External Handle In (mm) (Choose one)	Auxiliary Contacts (Choose one)	Terminals Shroud	Terminal Lugs	Jumpers for Connecting Poles in Series			
100	3	<b>R9D3100UDC</b>	<b>DHR9DE</b>	S2 Type	7.90 (200.0)	C Type	<b>TS3R9DT</b>	<b>3P</b> ④	2 pieces <b>DCJUMPD2</b>			
	4	<b>R9D4100UDC</b>		Black	<b>SF200PH10X10</b>	1st Contact				<b>3P</b> ④		
200	3	<b>R9D3200UDC</b>	<b>PHB2N12F</b>	1, 3R, 12 ①	12.60 (320.0)	<b>NO+NC</b>	<b>TS3R9DB</b>	<b>4P</b> ④	3 pieces <b>DCJUMPD3</b>			
		<b>R9D4200UDC</b>		Red/Yellow	<b>SF320PH10X10</b>	<b>AC1NONCDE</b>				<b>4P</b> ④		
	4	<b>R9E3400UDC</b>		4, 4X ①	15.70 (400.0)	<b>SF400PH10X10</b>	<b>NO+NC</b>	<b>TS4R9DTB</b>	<b>4P</b> ④	3 pieces <b>DCJUMPE2</b>		
				<b>R9E4400UDC</b>	Black						<b>PHB2N4XF</b>	<b>AC2NONCDE</b>
400	3	<b>R9E3400UDC</b>	<b>PHR2N4XF</b>	Red/Yellow			<b>TS3R9ET</b>	<b>3P</b> ④	2 pieces <b>DCJUMPE2</b>			
	4	<b>R9E4400UDC</b>		4, 4X ①						<b>TS3R9EB</b>	<b>4P</b> ④	3 pieces <b>DCJUMPE3</b>

#### Notes

- ① Defeatable handle.
- ② Top (line side).
- ③ Bottom (load side).
- ④ Top or bottom (line or load side).

## Accessories

## Direct Handle



## Direct Handle

Description	Ampere Rating	Handle Color	Catalog Number
Front operation	100–400	Black	DHR9DE

## PH2 Type Handle



## Door Interlocked External Handle Front Operation—I-0, Three- and Four-Pole

Ampere Rating	Handle	Handle Color	NEMA Type	Catalog Number
100–400	PH2 Type	Black	1, 3R, 12	PHB2N12F ①
100–400	PH2 Type	Red/yellow	1, 3R, 12	PHR2N12F ①
100–400	PH2 Type	Black	4, 4X	PHB2N4XF ①
100–400	PH2 Type	Red/yellow	4, 4X	PHR2N4XF ①

## Auxiliary Contacts



Description	Ampere Rating	Number of AC	Type	Catalog Number
Early-break/same-make and signaling of positions 0 and 1: 1 to 2NO/NC auxiliary contacts 1 to 2 low level NO/NC auxiliary contacts Characteristics: NO/NC AC: IP2 with front and side operation Connection to the control circuit: By 6.35 mm fast-on terminal Electrical Characteristics: 30,000 operations; A300	<b>NO/NC Contact for Three and Four Poles</b>			
	100–400	1 AC NO + NC	C Type	AC1NONCDE
	100–400	2 AC NO + NC	C Type	AC2NONCDE
	<b>Low Level NO/ NC Contact for Three and Four Poles</b>			
	100–400	1 AC NO + NC	C Type	AC1NONCDELL
	100–400	2 AC NO + NC	C Type	AC2NONCDELL

## Terminal Screens



Description	Ampere Rating	Number of Poles	Position	Catalog Number
Line or load side protection against direct contact with terminals or connection parts	<b>Three- and Four-Pole</b>			
	100–200	3	Top (line)	TS3R9DT
	100–200	3	Bottom (load)	TS3R9DB
	100–200	4	Top or bottom (line or load)	TS4R9DTB
	400	3	Top (line)	TS3R9ET
	400	3	Bottom (load)	TS3R9EB
	400	4	Top or bottom (line or load)	TS4R9ETB

**Note**

① Order two sets for line and load sides.

# Switching Devices

## R9 Series (UL 98) DC Rated Disconnects

### Line and Load Terminal Lugs

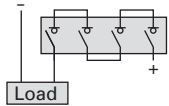
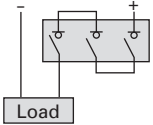


### Line and Load Terminal Lugs

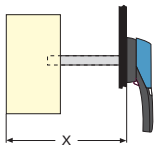
Description	Ampere Rating	Connection Type	Number of Cables per Terminal	Lugs per Kit	Cable Type	Catalog Number
Connection of bare copper cables onto the terminals	100–200	6–300 kcmil	1	2	Cu/Al	<b>LK2R9DL</b>
	100–200	6–300 kcmil	1	4	Cu/Al	<b>LK4R9DL</b>
	400	2–600 kcmil	1	2	Cu/Al	<b>LK2R9EM</b>
	400	2–600 kcmil	1	4	Cu/Al	<b>LK4R9EM</b>

### Jumpers for Connecting Poles in Series

Description	Ampere Rating	Kit of	Figure	Number of Poles in Series	Catalog Number
The jumpers will make easy the connection of the poles in series, allowing the following configurations: ①	100–200	2 Pieces	1	3	<b>DCJUMP2</b>
	100–200	3 Pieces	2	4	<b>DCJUMP3</b>
	400	2 Pieces	1	3	<b>DCJUMPE2</b>
	400	3 Pieces	2	4	<b>DCJUMPE3</b>



### Shaft Extensions for External Front Dimensions (X)—Inches (mm)



Description	Ampere Rating	Dimension X In (mm)	Handle	Shaft Length In (mm)	Catalog Number
Standard lengths: 7.9 inches/200 mm 12.6 inches/320 mm 15.7 inches/400 mm	<b>For Three- and Four-Pole</b>				
	100–400	135–265 (3429.0–6731.0)	PH2 Type	7.90 (200.0)	<b>SF200PH10X10</b>
	100–400	135–385 (3429.0–9779.0)	PH2 Type	12.60 (320.0)	<b>SF320PH10X10</b>
	100–400	135–465 (3429.0–11811.0)	PH2 Type	15.70 (400.0)	<b>SF400PH10X10</b>

#### Note

① For other connections, refer to installation instructions.

## Technical Data and Specifications

### 100–400A

#### Characteristics According to UL 98

Thermal Current $I_{th}$ at 40°C (A)		Ampere Rating		
		100	200	400
<b>General Use Purpose Ampere Rating</b>				
Rated voltage	In series	A	A	A
600 Vdc	3P	100	200	400
<b>Overload Capacity</b>				
Prospective short-circuit current (kA rms)		20	20	20
Type of fuse		A70P100	A70P200	LDC
Fuse rating		100	200	400
<b>Connection Terminals</b>				
Minimum connection section/AWG		#6	#6	#2
Maximum connection section/AWG		300 kcmil	300 kcmil	600 kcmil
<b>Auxiliary Contacts</b>				
Electrical characteristics		A300	A300	A300

#### Characteristics According to IEC 60947-3

Thermal Current $I_{th}$ at 40°C (A)		Ampere Rating		
		160	250	630
<b>Rated Operational Currents <math>I_e</math> (A), DC-22 B</b>				
Rated voltage	In series	A	A	A
750 Vdc	3P	160	250	400
750 Vdc	4P	—	—	—
1000 Vdc	4P	160	250	400

# Switching Devices

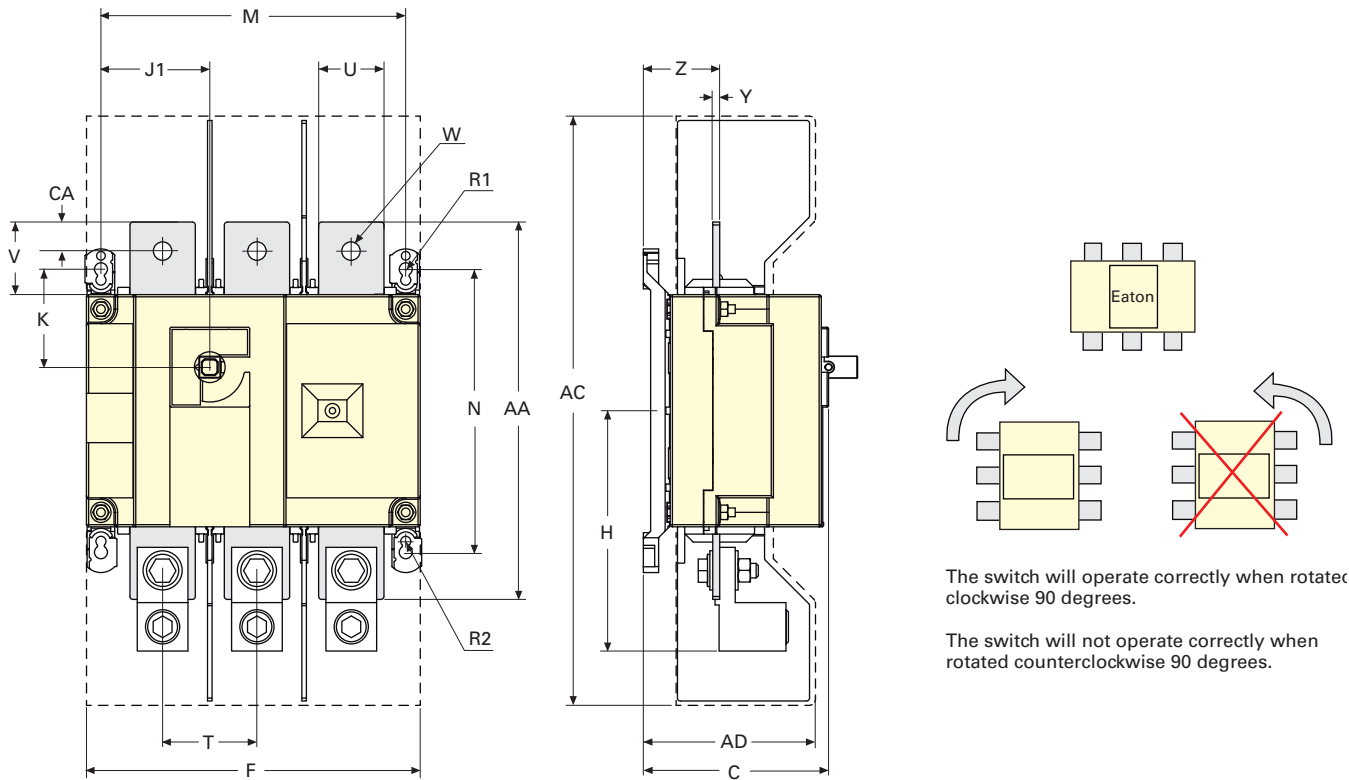
## R9 Series (UL 98) DC Rated Disconnects

### Dimensions

Approximate Dimensions in Inches (mm)

#### R9 Series DC Rated Disconnects 100–400A

#### Front Operation



#### Note

① Terminal screens

#### R9 Series DC Rated Disconnects

Ampere Rating	C	AC	AD	F 3p	F 4p	H	J1 3P	J1 4p	K	M 3p	M 4p
100–200	3.72 (94.5)	10.10 (256.5)	3.05 (77.5)	7.09 (180.1)	9.06 (230.0)	4.22 (107.2)	2.17 (55.1)	4.13 (104.9)	1.80 (45.7)	6.30 (160.0)	8.27 (210.1)
400	4.92 (125.0)	16.00 (406.4)	4.51 (114.5)	9.05 (230.0)	11.40 (290.0)	6.53 (166.0)	2.95 (75.7)	5.31 (134.9)	2.65 (67.3)	8.26 (209.8)	10.60 (269.2)

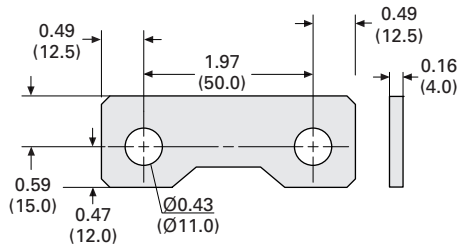
Ampere Rating	N	R1	R2	T	U	V	W	Y	Z	AA	CA
100–200	5.31 (135.0)	0.35 (8.9)	0.27 (6.9)	1.97 (50.0)	0.98 (24.9)	1.18 (30.0)	0.43 (10.9)	0.14 (3.6)	1.35 (34.3)	6.30 (160.0)	0.60 (15.2)
400	7.60 (193.0)	0.35 (8.9)	0.27 (6.9)	2.56 (65.0)	1.77 (45.0)	1.97 (50.0)	0.43 (10.9)	0.20 (5.1)	2.08 (52.8)	10.20 (259.1)	0.80 (20.3)



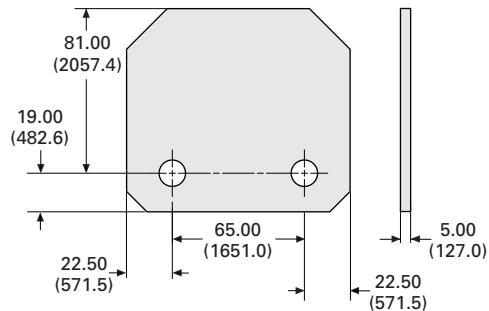
Approximate Dimensions in Inches (mm)

### Jumpers

#### 100-200A

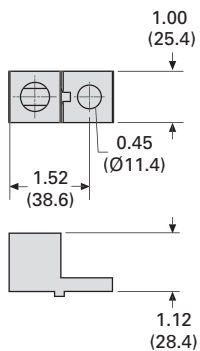


#### 400A

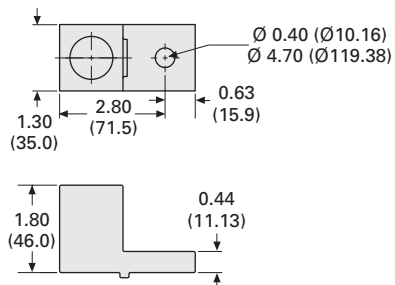


### Terminal Lugs

#### 100-200A



#### 400A



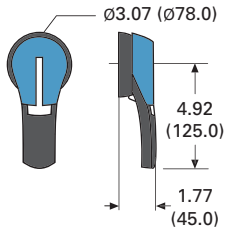
# Switching Devices

## R9 Series (UL 98) DC Rated Disconnects

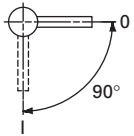
Approximate Dimensions in Inches (mm)

### **Door Interlocked External Handle—100 to 400A, Three- and Four-Pole**

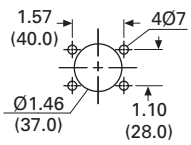
#### **PH2 Type Handle**

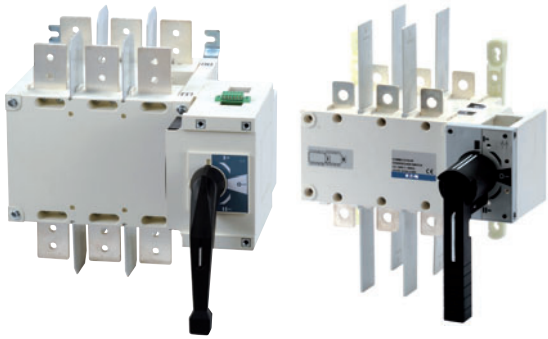


#### **Direction of Operation**



#### **Door Drilling Template**





### Contents

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Standards and Certifications .....	55
Product Selection .....	56
Accessories .....	57
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Dimensions .....	60

### Product Overview

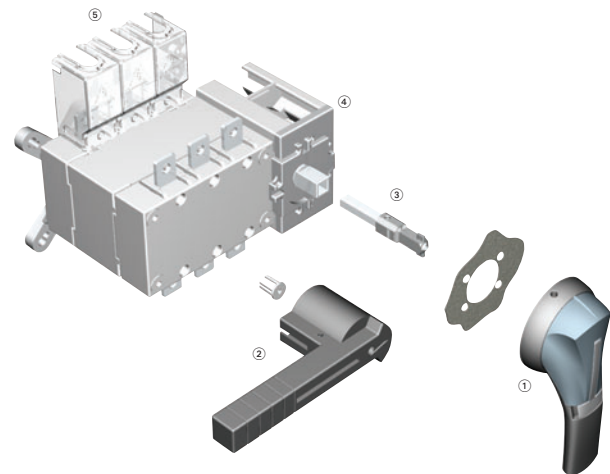
R9 Series (UL ® 98 listed) non-fusible disconnects are heavy-duty manual transfer switches, they transfer load manually between two low voltage circuits and provide safety disconnection.

These switches are extremely durable and are tested and approved for use in the most demanding applications as resistive load or total system applications.

- Three load break positions (I, 0, II)
- On load switching
- Direct or external handle
- 480 Vac total system
- 600 Vac resistive load

### Standards and Certifications

- UL 98, cULus ®, File E222859
- UL 1008 (600–1200A) 2011
- CSA ® 22.2 No. 4, File 217736
- IEC 60947-3
- EN 60947-3



### Overview

- ① External front handle
- ② Direct handle
- ③ Shaft extension for external handle
- ④ Pre-break ACs (standard on 600–1200A)
- ⑤ Terminal Screen

# Switching Devices

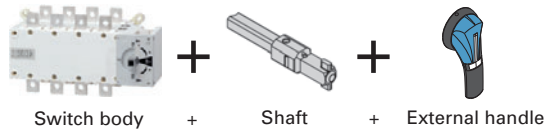
## Manual Transfer/Double Throw Switches

### Product Selection

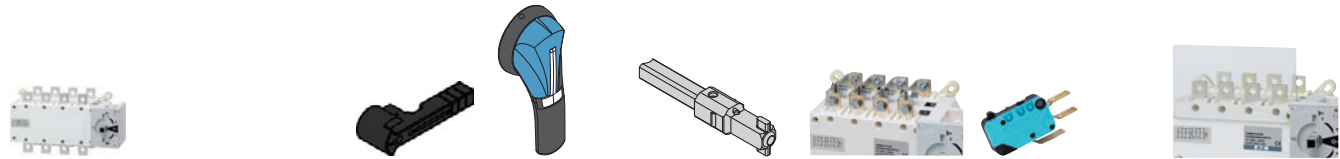
#### Direct Operation



#### External Operation



### Manual Transfer/Double Throw Switches—UL 98 Standard <sup>①</sup>



Ampere Rating	Number of Poles	Switch Body Only <sup>①</sup>	Direct Handle (Black)	External Three-Position Handle (Choose one)	Shaft Extensions for External Handle In (mm) (Choose one)	Bridging Bars	Auxiliary Contacts	Terminal Screens <sup>②</sup>
100	3	<b>RMTS3100U</b>	<b>DHMTSSL</b>	Size 2, Black I–O–II Type 4/4X <b>PHB2N4X3P</b>	7.90 (200.6) <b>SF200PH10X10</b>	<b>3P</b> <b>BB3P200</b>	NO/NC <b>AC1NONCMTS400</b>	<b>3P</b> <b>TS3MTS200TB</b>
	4	<b>RMTS4100U</b>			12.60 (320.0) <b>SF320PH10X10</b>			
200	3	<b>RMTS3200U</b>		Size 2, Red I–O–II Type 4/4X <b>PHR2N4X3P</b>	15.70 (398.8) <b>SF400PH10X10</b>	<b>4P</b> <b>BB4P200</b>		<b>4P</b> <b>TS4MTS200TB</b>
	4	<b>RMTS4200U</b>						
400	3	<b>RMTS3400U</b>		Size 3, Black I–O–II Type 4/4X <b>PHB3N4X3P</b>	7.90 (200.6) <b>SF200PH15X12</b>	<b>3P</b> <b>BB3P400</b>		<b>3P</b> <b>TS3MTS400TB</b>
	4	<b>RMTS4400U</b>			12.60 (320.0) <b>SF320PH15X12</b>			
600	3	<b>RMTS3600U</b>	<b>DHMTSDL</b>	Size 4, Black I–O–II Type 4/4X <b>PHB4N4X3P</b>	15.70 (398.8) <b>SF400PH15X12</b>	<b>3P</b> <b>BB3P600</b>	NO/NC contact standard	<b>3P</b> <b>TS3MTS600</b>
	4	<b>RMTS4600U</b>						
800	3	<b>RMTS3800U</b>	<b>DHMTSDLM</b>	Size 4, Red I–O–II Type 4/4X <b>PHR4N4X3P</b>		<b>3P</b> <b>BB3P1200</b>		<b>3P</b> <b>TS3MTS1200</b>
	4	<b>RMTS4800U</b>						
1200	3	<b>RMTS31200U</b>				<b>4P</b> <b>BB4P1200</b>		<b>4P</b> <b>TS4MTS1200</b>
	4	<b>RMTS41200U</b>						

#### Notes

- ① All ratings, 100–1200A, are UL 98 listed. Switches rated 600–1200A are to be UL 1008 listed in 2011.
- ② Line or load (top or bottom); for both line and load, order two kits.
- ③ Low level auxiliary contact—gold plated for minimal resistance—for PLC applications.

## Accessories



## Direct Handle

Ampere Rating	Handle Color	Handle Type	Catalog Number
100–400	Black	Single lever	DHMTSSL
600	Black	Double lever	DHMTSDL
800–1200	Black	Double lever	DHMTSDLM

## PH2 and PH3 Type



## External Handle

Description	Ampere Rating	Handle Type	Handle Color	NEMA Type	Lockable in the "3" Positions	Catalog Number
The handle locking function prevents the user from opening the door of the enclosure when the switch is in the "ON" position. Opening the door when the switch is in the "ON" position is possible by defeating the locking function with the use of a tool (authorized persons only). The locking function is restored when the door is once again closed.	100–200	PH2	Black	4, 4X	Yes	PHB2N4X3P
	100–200	PH2	Red/Yellow	4, 4X	Yes	PHR2N4X3P
	400	PH3	Black	4, 4X	Yes	PHB3N4X3P
	400	PH3	Red/Yellow	4, 4X	Yes	PHR3N4X3P
	600–1200	PH4	Black	4, 4X	Yes	PHB4N4X3P
	600–1200	PH4	Red/Yellow	4, 4X	Yes	PHR4N4X3P

## PH4 Type



## Shaft Extension



Ampere Rating	Handle Type	Length In (mm)	Catalog Number
100–800	PH1	7.90 (200.6)	SF200PH10X10
125–800	PH1	12.60 (320.0)	SF320PH10X10
100–200	PH2	15.70 (398.8)	SF400PH10X10
630–1200	PH2, PH3	7.90 (200.6)	SF200PH15X12
600–1200	PH2, PH3	12.60 (320.0)	SF320PH15X12
400–1200	PH2, PH3	15.70 (398.8)	SF400PH15X12
800–1200	V1	12.60 (320.0)	SF320V1
800–1200	V1	15.70 (398.8)	SF400V1

# Switching Devices

## Manual Transfer/Double Throw Switches



### Bridging Bars

Description	Ampere Rating	Number of Bridging Bars	Catalog Number
Creation of a common point, above or below the switch, between positions I and II.	100–200	3	<b>BB3P200</b>
	100–200	4	<b>BB4P200</b>
	400	3	<b>BB3P400</b>
	400	4	<b>BB4P400</b>
	600	3	<b>BB3P600</b>
	600	4	<b>BB4P600</b>
	800–1200	3	<b>BB3P1200</b>
	800–1200	4	<b>BB4P1200</b>



### Terminals Protection Screen

Description	Ampere Rating	Number of Poles	Catalog Number
Top or bottom (line or load) protection against direct contacts with terminal or connecting parts.	100–200	3	<b>TS3MTS200TB</b>
	100–200	4	<b>TS4MTS200TB</b>
	400	3	<b>TS3MTS400TB</b>
	400	4	<b>TS4MTS400TB</b>
	600	6	<b>TS3MTS600</b>
	600	4	<b>TS4MTS600</b>
	800–1200	3	<b>TS3MTS1200</b>
	800–1200	4	<b>TS4MTS1200</b>



### Mounting Spacers

Description	Ampere Rating	Number of Poles	Catalog Number
Raises the device's terminals 10 mm away from the bottom of the enclosure or frame on which the device is mounted.	100–400	1 set of 2 spacers	<b>MSP400</b>



### Auxiliary Contacts

Description	Ampere Rating	Contact (s)	Catalog Number
Early-break/same-make and signalization per position 1 and 2. Electrical characteristics: A300.	100–400	1NO/NC per position 1 and 2	<b>AC1NONCMTS400</b>
	100–400	1NO/NC per position 1 and 2 low level	<b>AC1NONCMTS400LL</b> ①
	600–1200	1NO/NC per position 1 and 2	Standard



### Line and Load Terminal Lugs

Description	Ampere Rating	Connection Type	Number of Poles	Number of Cables/Lug	Lugs per Kit	Cable Type	Catalog Number
Connection of bare copper cables onto the terminals (without spade lugs).	100–200	6–300 kcmil	3	1	3	Cu/Al	<b>LK3R9DL</b>
	100–200	6–300 kcmil	4	1	4	Cu/Al	<b>LK4R9DL</b>
	400	4–600 kcmil	3	1	3	Cu/Al	<b>LK3R9EM</b>
	400	4–600 kcmil	4	1	4	Cu/Al	<b>LK4R9EM</b>
	600	2x (#2–600 kcmil)	3	2	3	Cu/Al	<b>LK3R9FN</b>
	600	2x (#2–600 kcmil)	4	2	4	Cu/Al	<b>LK4R9FN</b>
	800–1200	2x (#2–600 kcmil)	3	2	6	Cu/Al	<b>LK6R9G</b>
	800–1200	2x (#2–600 kcmil)	4	2	8	Cu/Al	<b>LK8R9G</b>

#### Note

① Gold plated for minimal resistance—for PLC applications.

## Technical Data and Specifications

### UL 1008 Characteristics

Description	100A	200A	400A	600A	800A	1200A
Operation voltage	600	600	600	600	600	600
Short-circuit rating at 600 Vac (kA) ①	100	100	65	100	100	100
Type of fuse	J	J	J	L	L	L
Maximum fuse rating (A)	200	400	600	800	1000	1600
Short-circuit rating with circuit breaker (kA/ms)	10/25	10/25	14/50	35/50	35/50	35/50
<b>Operational Power/Current Maximum Operational Three-Phase</b>						
240 Vac total system (A)	100	100	250	400	700	700
240 Vac resistive load (A)	100	200	400	600	800	1200
480 Vac total system (A)	100	100	125	350	600	600
480 Vac resistive load (A)	100	200	400	600	800	1200
600 Vac resistive load (A)	100	200	400	400	800	1200
<b>Mechanical Endurance</b>						
Endurance (number of operating cycles)	6050	6050	6050	6050	3550	3550
<b>Connection Terminals</b>						
Minimum connection section/AWG	#6	#6	#4/2 x #6	2x #2	4x #2	4x #2
Maximum connection section/AWG	300 kcmil	300 kcmil	600 kcmil/2x 350 kcmil	2x 600 kcmil	4x 600 kcmil	4x 600 kcmil

### UL 98/CSA 22.2 No. 4 Characteristics

Description	100A ②	200A ②	400A ②	600A	800A	1200A
Short-circuit rating at 600 Vac (kA)	200	200	200	200	100	100
Type of fuse	J	J	J	J	L	L
Maximum fuse rating (A)	100	200	400	600	800	1200
<b>Maximum Motor, hp/FLA Three-Phase Motor Maximum</b>						
220–240 Vac	30/80	75/192	125/312	200/480	200/480	200/480
440–480 Vac	75/96	180/180	250/302	400/477	500/590	500/590
600 Vac	100/99	200/192	350/336	350/336	500/472	500/472
<b>Maximum Motor Power, hp/DC FLA Motor Maximum</b>						
125 Vdc ③	7.5/58	15/112	20/148	20/148	—	—
250 Vdc ④	20/72	40/140	50/173	50/173	—	—
<b>Mechanical Characteristics</b>						
Endurance (number of operating cycles)	10,000	8000	6000	6000	3500	3500
Operating torque (lbs.in/Nm)	88.5/10	88.5/10	128.3/14.5	327.5/37	442.5/50	442.5/50
<b>Auxiliary Contacts</b>						
Electrical characteristics	A300	A300	A300	A300	A300	A300

#### Notes

- ① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
- ② Only UL 98 listed. For UL 1008 availability, contact Eaton.
- ③ Two-pole in series.
- ④ Three-pole in series.

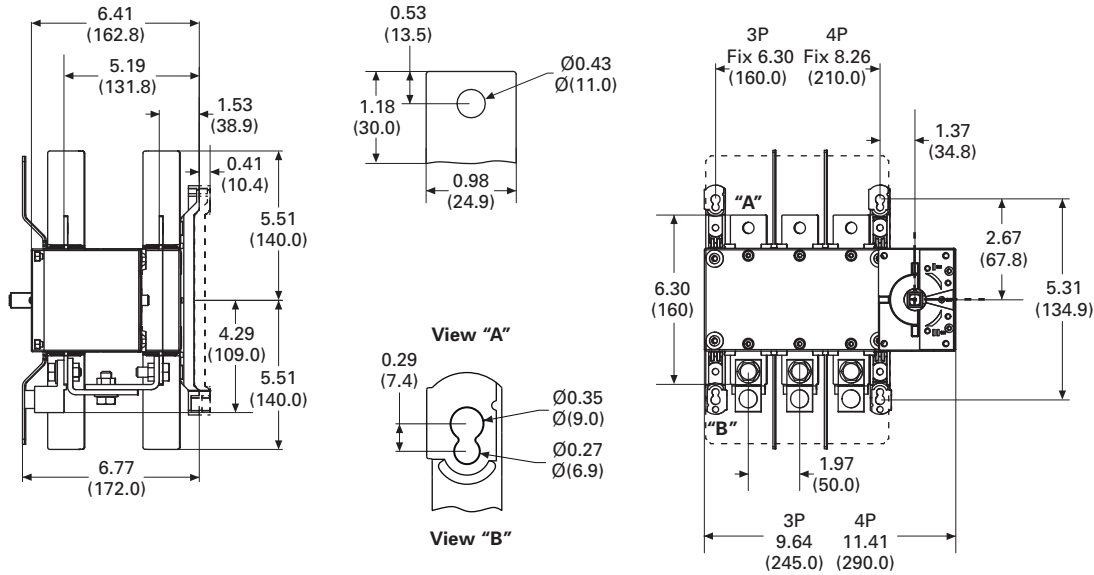
# Switching Devices

## Manual Transfer/Double Throw Switches

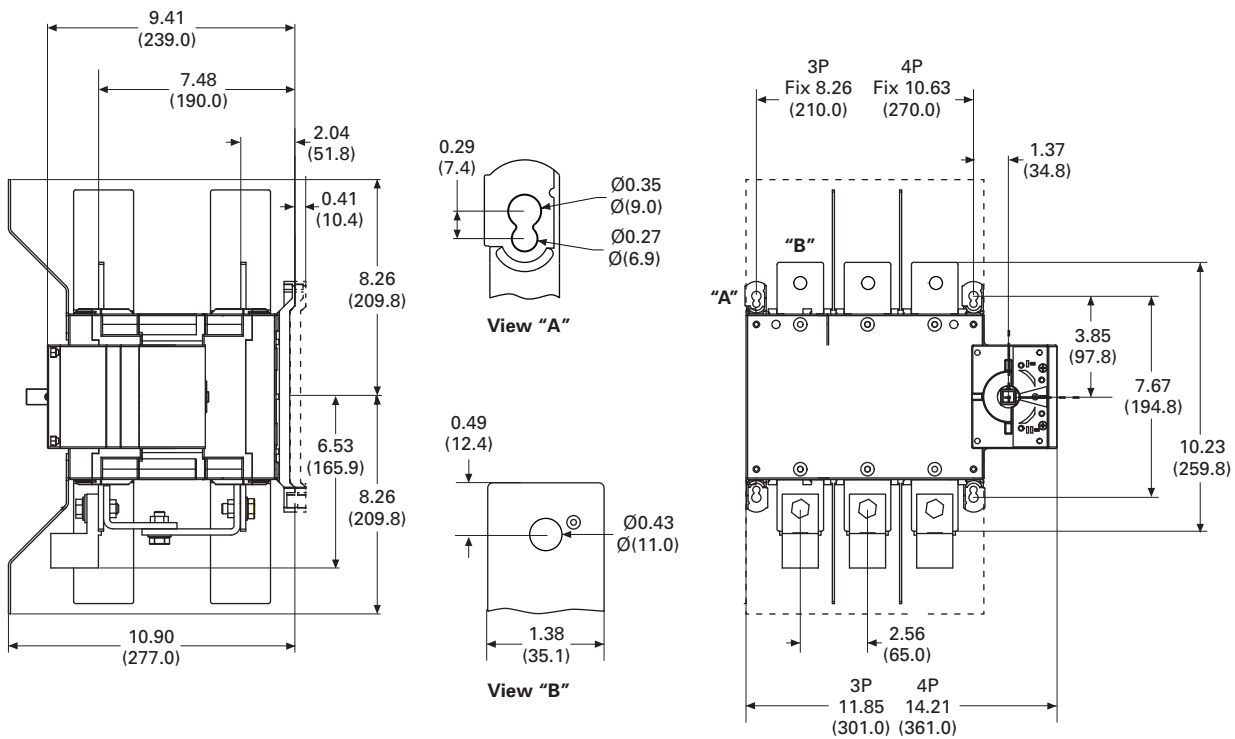
### Dimensions

Approximate Dimensions in Inches (mm)

#### 100 to 200A



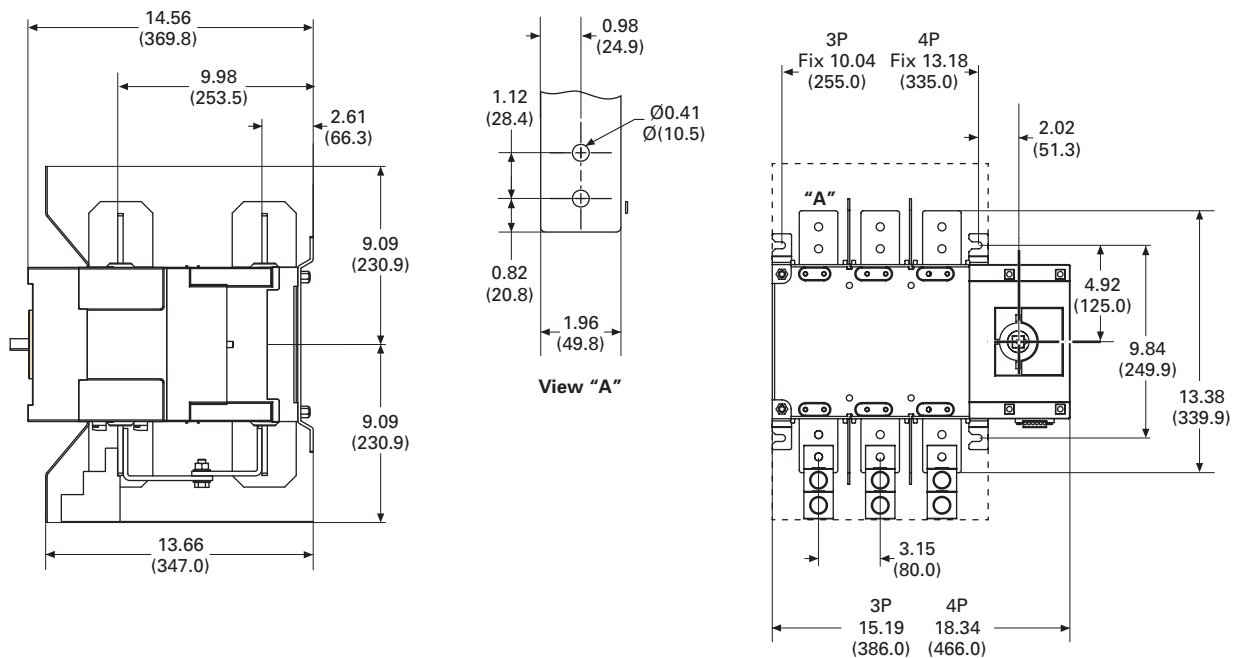
#### 400A



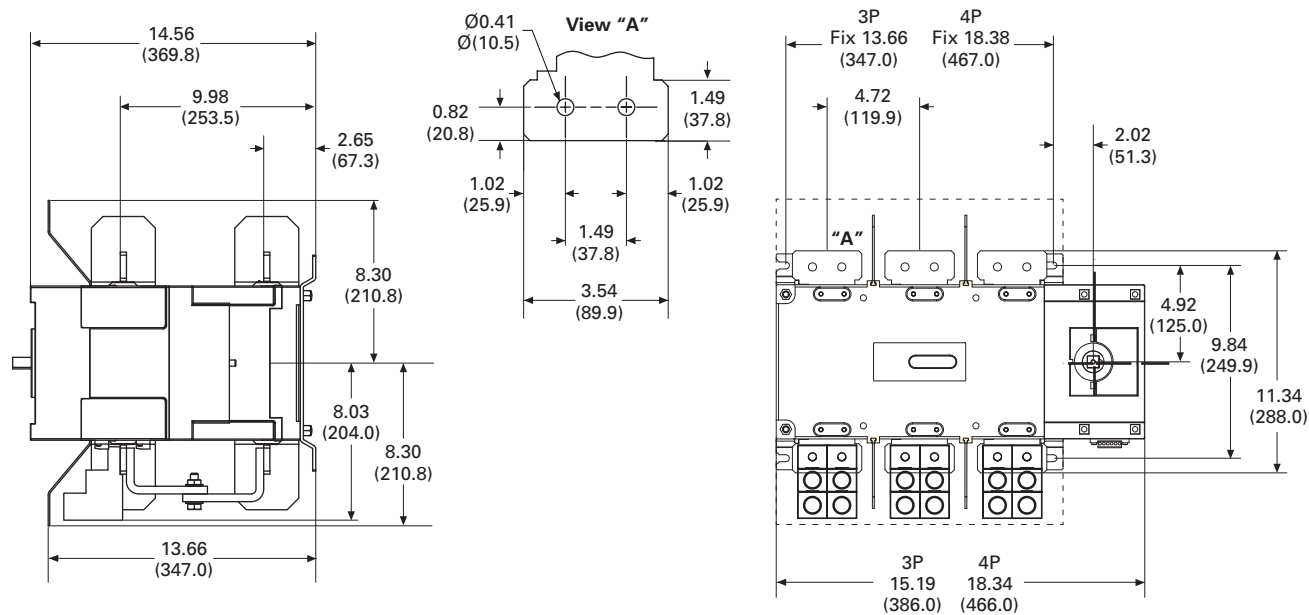


Approximate Dimensions in Inches (mm)

### 600A



### 800 to 1200A



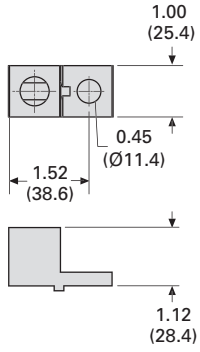
# Switching Devices

## Manual Transfer/Double Throw Switches

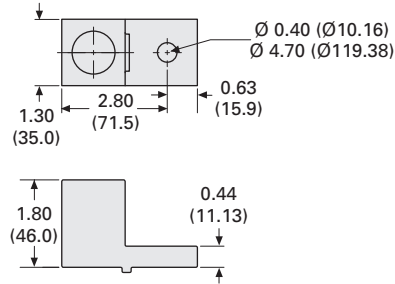
Approximate Dimensions in Inches (mm)

Terminal Lugs

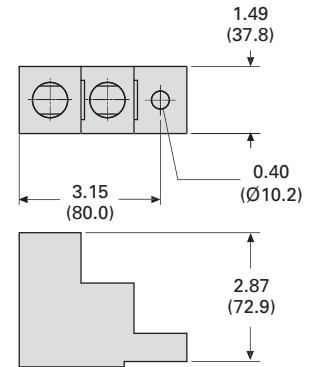
### 100–200A



### 400A

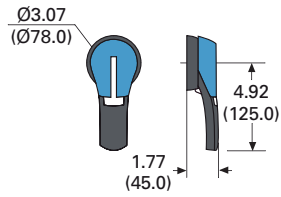


### 600–1200A

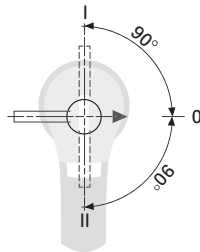


### 100–200A

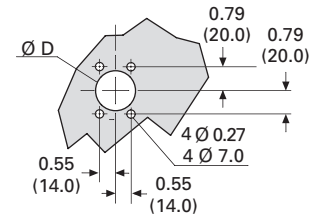
#### PH2 Type



#### Direction of Operation

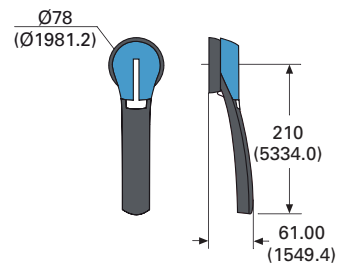


#### Door Drilling Template

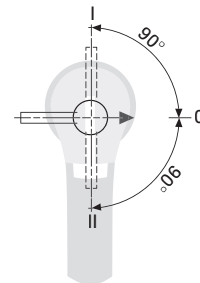


### 400A

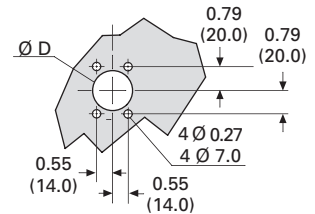
#### PH3 Type



#### Direction of Operation



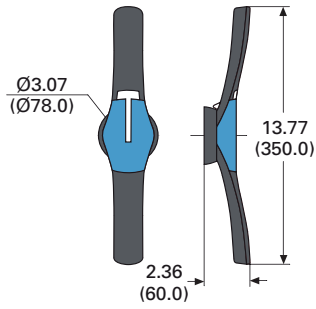
#### Door Drilling Template



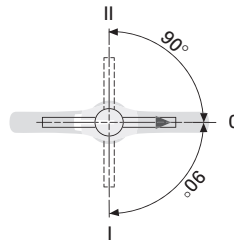
Approximate Dimensions in Inches (mm)

### 600-1200A

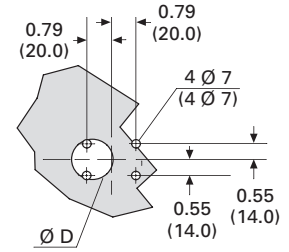
#### PH4 Type



#### Direction of Operation



#### Door Drilling Template



### Enclosed Rotary Disconnects



### Product Overview

Provides users with the ability to lock directly wired motor loads in the OFF position to comply with OSHA lockout/tagout regulations. Also for machine applications that require compact, economical disconnect switches.

Enclosed rotary disconnect switches allow safe control and safe disconnect of any motor application.

### Features, Benefits and Functions

- Padlockable in the OFF position (up to three padlocks) to meet OSHA lockout requirements
- Available in 16–80 A ratings
- 600 Vac, three- and four-pole non-fusible device
- Rated for making and breaking loads
- Accepts auxiliary contacts; capability to signal PLC controllers
- Ground lug connection provided
- Possibility of adding one power pole and one auxiliary contact
- NEMA® Type 1, 3R, 12, 4, 4X

Open rotary disconnects can be found in **Tab 38** in the *Control Products Catalog*.

### Contents

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Features, Benefits and Functions .....	<b>64</b>
Standards and Certifications .....	<b>64</b>
Product Selection .....	<b>65</b>
Dimensions .....	<b>66</b>

### Standards and Certifications

- Meets NEC® Article 430 requirements for a separate disconnect means within sight of all motor loads
- UL® listed under Section 508
- UL listed File No. E165150
- CSA® listed under 22.2 No. 14, File 162136



## Product Selection

Enclosed Rotary Non-Fusible <sup>①</sup>

Ampere Rating	Maximum Horsepower Ratings				NEMA 1 <sup>②</sup> Enclosure Indoor Catalog Number	NEMA 12 <sup>②③</sup> Enclosure Dust-Tight/ Rainproof Catalog Number	NEMA 4X <sup>②</sup> Enclosure Corrosion-Resistant, Stainless Steel Catalog Number	NEMA 4X <sup>②</sup> Enclosure Corrosion-Resistant, Non-Metallic Catalog Number	NEMA 4X Enclosure Polycarbonate- Non-Metallic Catalog Number
	Three-Phase AC		480V	600V					
<b>Three-Pole, 600 Vac</b>									
16	3	5	10	10	ER53016UG	ER53016UD	ER53016UW	ER53016UX	—
25	7-1/2	7-1/2	15	20	ER53025UG	ER53025UD	ER53025UW	ER53025UX	—
30	7-1/2	7-1/2	15	20	ER53030UG	ER53030UD	ER53030UW	ER53030UX	ER53030UPGB <sup>④⑤</sup>
40	7-1/2	7-1/2	20	25	ER53040UG	ER53040UD	ER53040UW	ER53040UX	—
60	15	15	30	30	ER53060UG	ER53060UD	ER53060UW	ER53060UX	ER53060UPGB <sup>④⑤</sup>
80	15	20	40	40	ER53080UG	ER53080UD	ER53080UW	ER53080UX	—
<b>Four-Pole, 600 Vac</b>									
16	3	5	10	10	ER54016UG	ER54016UD	ER54016UW	ER54016UX	—
25	7-1/2	7-1/2	15	20	ER54025UG	ER54025UD	ER54025UW	ER54025UX	—
30	7-1/2	7-1/2	20	25	ER54030UG	ER54030UD	ER54030UW	ER54030UX	—
40	7-1/2	7-1/2	20	25	ER54040UG	ER54040UD	ER54040UW	ER54040UX	—

Accessories for Enclosed Rotary Disconnects <sup>⑥⑦</sup>

Disconnect Ampere Rating	Switched Fourth Pole	Unswitched Neutral Pole	Auxiliary Contacts (Choose one)	Terminal Shrouds
16	S4PR516	UNMR5A	1NO + 1NC AC1NONC	Single-pole TS1R5A
25	S4PR525			
30	S4PR530		2NC AC2NC	Three-pole TS3R5A
40	S4PR540			
60	S4PR560 <sup>⑧</sup>	UNMR5B <sup>⑧</sup>		Single-pole TS1R5B
80	S4PR580 <sup>⑧</sup>			Three-pole TS3R5B

## Notes

- ① Short-circuit current ratings are same as those listed in the table on Page 10, for the respective disconnect amperage.
- ② For CSA listed switches, add prefix letter "C" to the front of the catalog number.
- ③ NEMA Type 12 enclosures (16–80A) can be field modified to meet NEMA Type 3R rainproof requirements when a factory-provided drain hole is opened.
- ④ "GB" suffix = **G**ray cover, **B**lack handle; "GR" suffix = **G**ray cover, **R**ed handle; "YR" suffix = **Y**ellow cover, **R**ed handle.
- ⑤ cULus only.
- ⑥ Ordered and shipped as separate components—not integral to enclosed device.
- ⑦ Enclosed disconnects can accept one power pole, neutral or up to two auxiliary contacts (one mounted on either side of switch).
- ⑧ Available 2011.

Contact the Safety Switch Flex Center (1-888-329-9272) for factory-installed accessories or other special modifications.

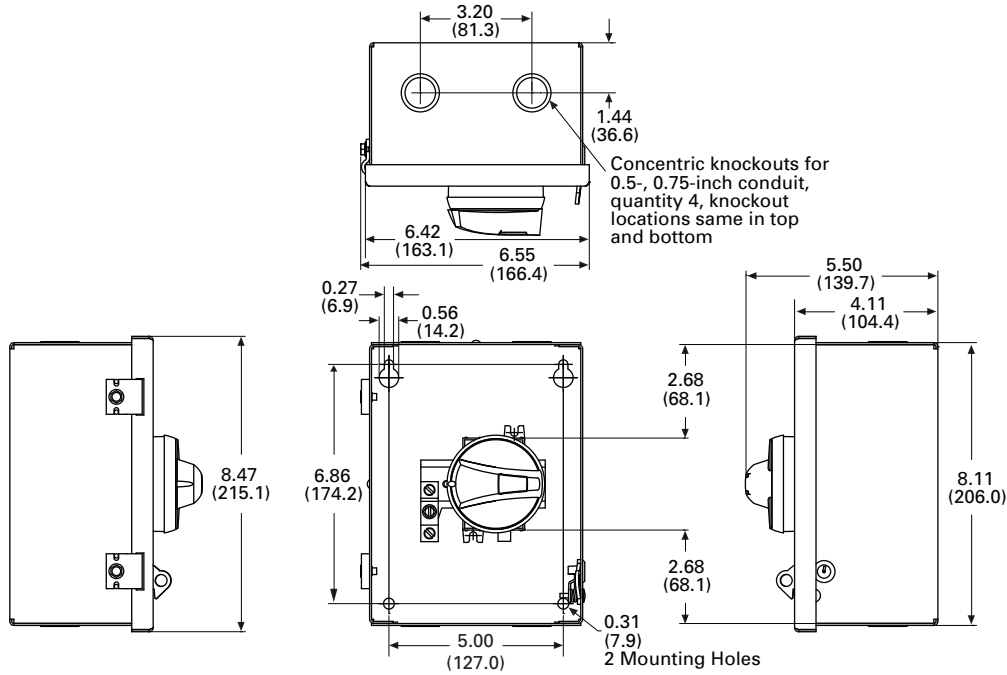
# Switching Devices

## Enclosed Rotary Disconnects

### Dimensions

Approximate Dimensions in Inches (mm)

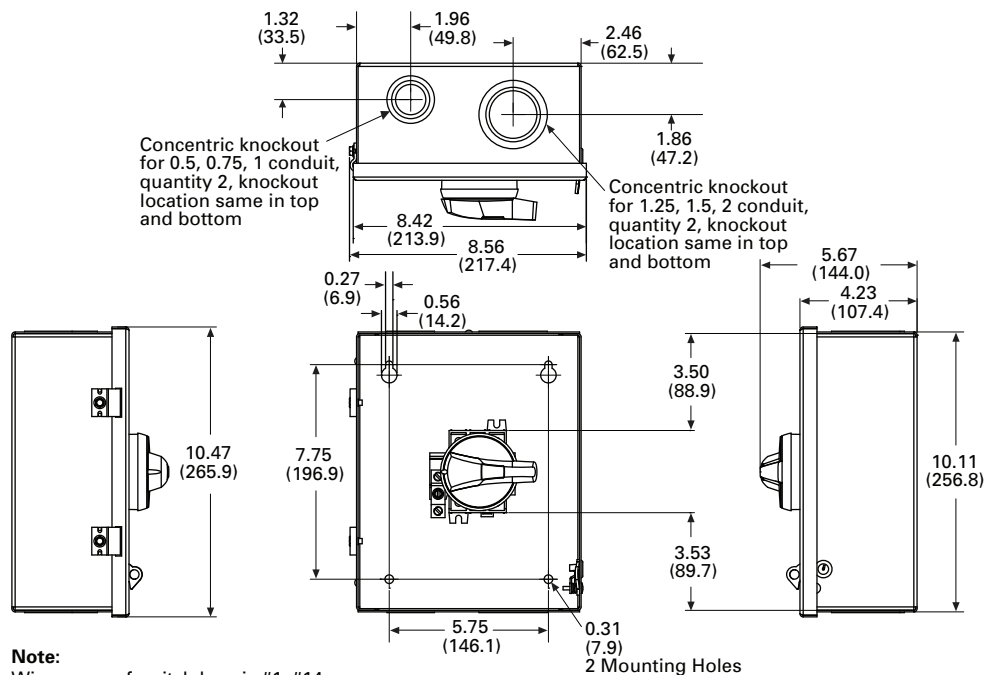
#### NEMA Type 1 (16–40A)



**Note:**

Wire range of switch lugs for 16–25A is #6–#10 copper, and for 30–40A is #8–#14.  
Wire range of ground lugs is #2–#14 copper or aluminum.

#### NEMA Type 1 (60–80A)

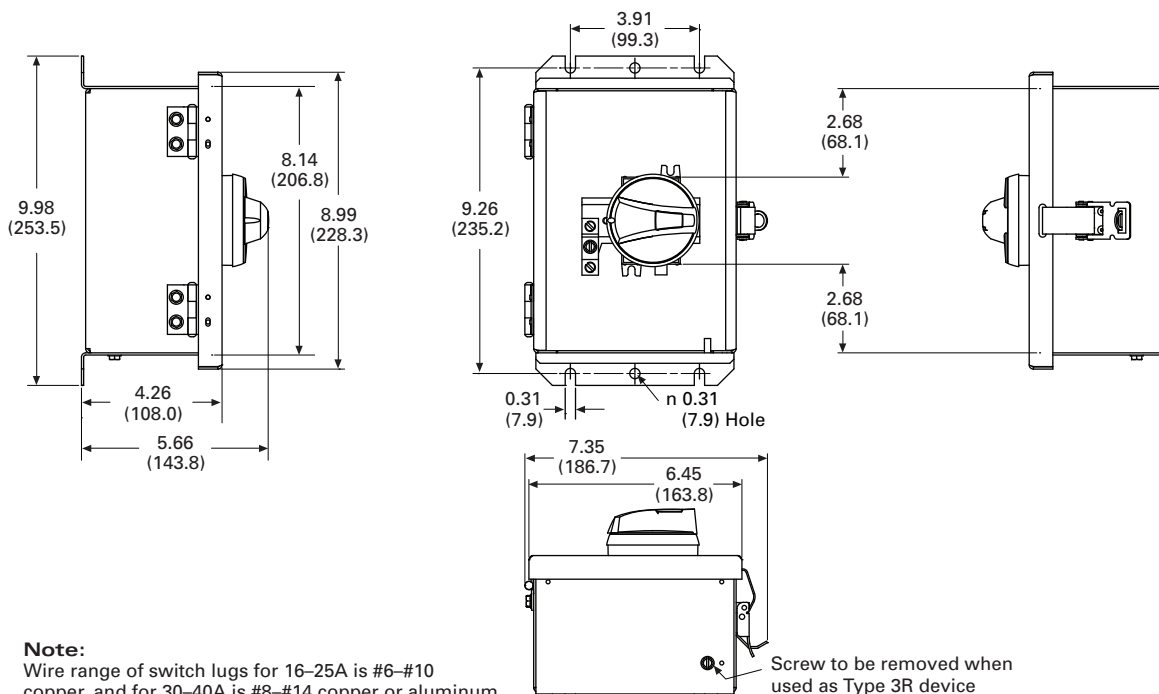


**Note:**

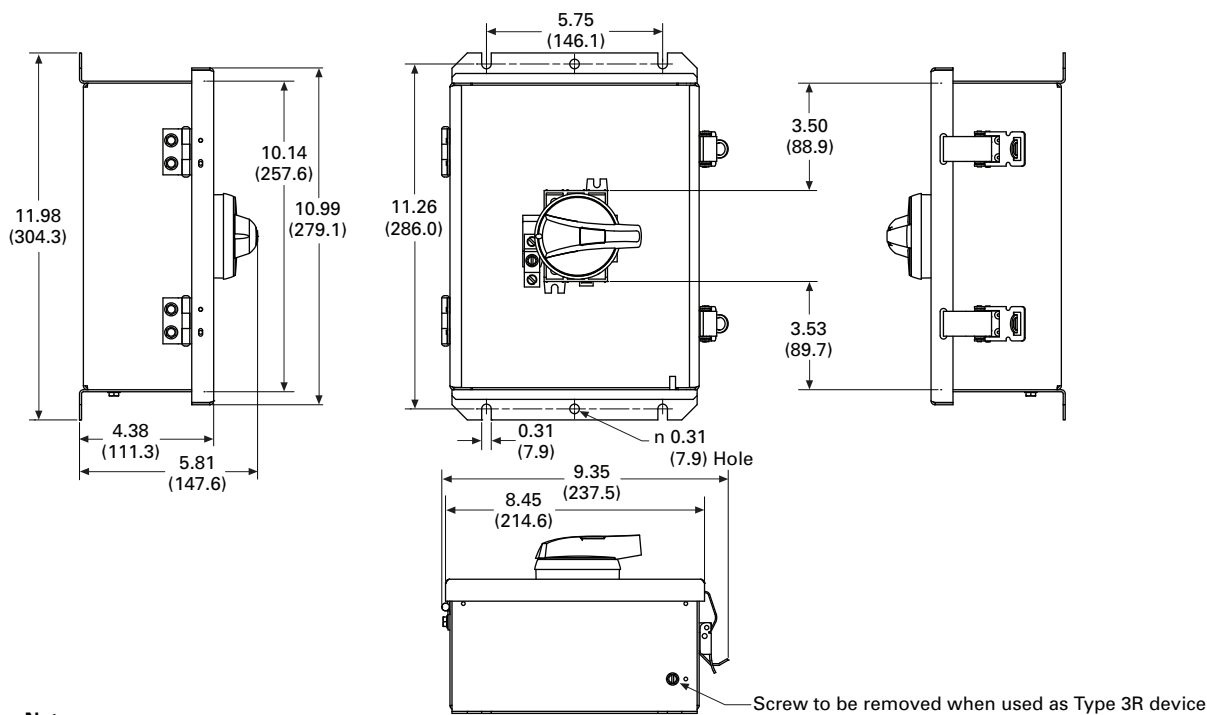
Wire range of switch lugs is #1–#14 copper.  
Wire range of ground lugs is #2–#14 copper or aluminum.

Approximate Dimensions in Inches (mm)

### NEMA Type 12/3R (16–40A)



### NEMA Type 12/3R (60–80A)

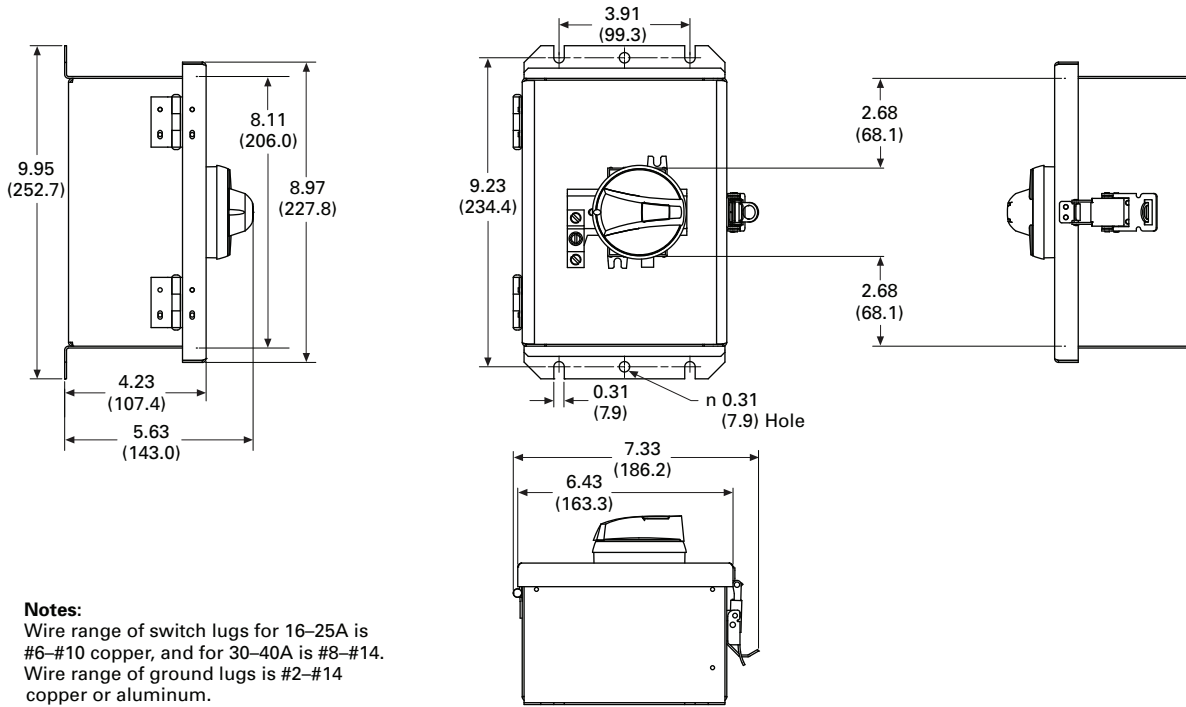


# Switching Devices

## Enclosed Rotary Disconnects

Approximate Dimensions in Inches (mm)

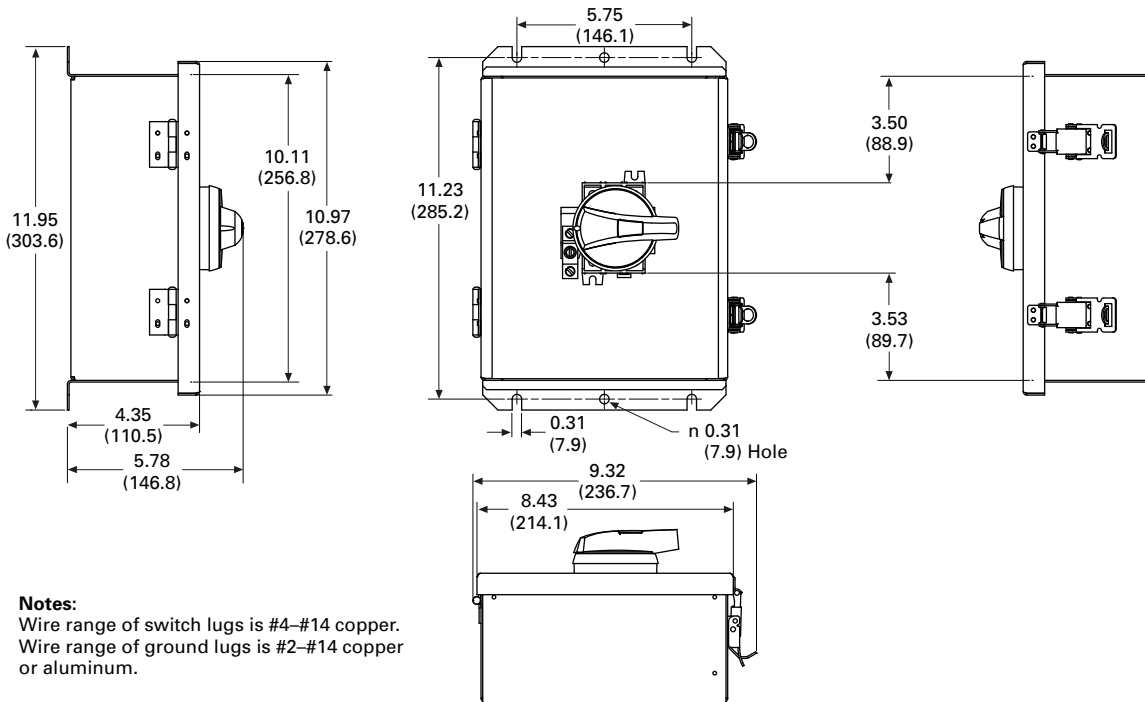
### NEMA Type 4X Stainless (16–40A)



**Notes:**

Wire range of switch lugs for 16–25A is #6–#10 copper, and for 30–40A is #8–#14. Wire range of ground lugs is #2–#14 copper or aluminum.

### NEMA Type 4X Stainless (60–80A)



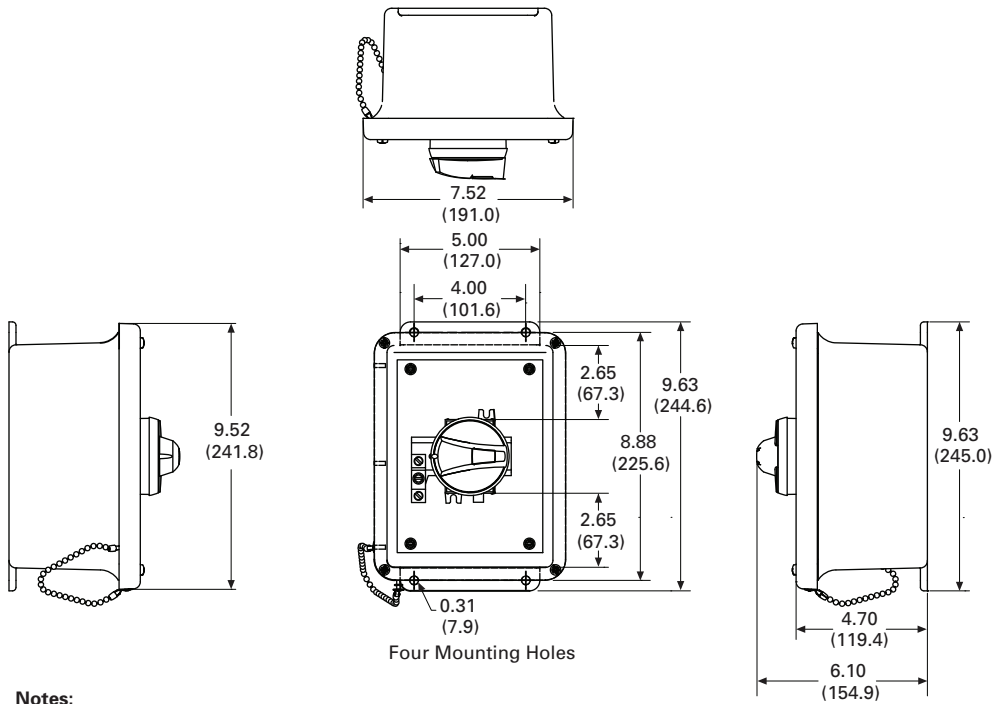
**Notes:**

Wire range of switch lugs is #4–#14 copper. Wire range of ground lugs is #2–#14 copper or aluminum.



Approximate Dimensions in Inches (mm)

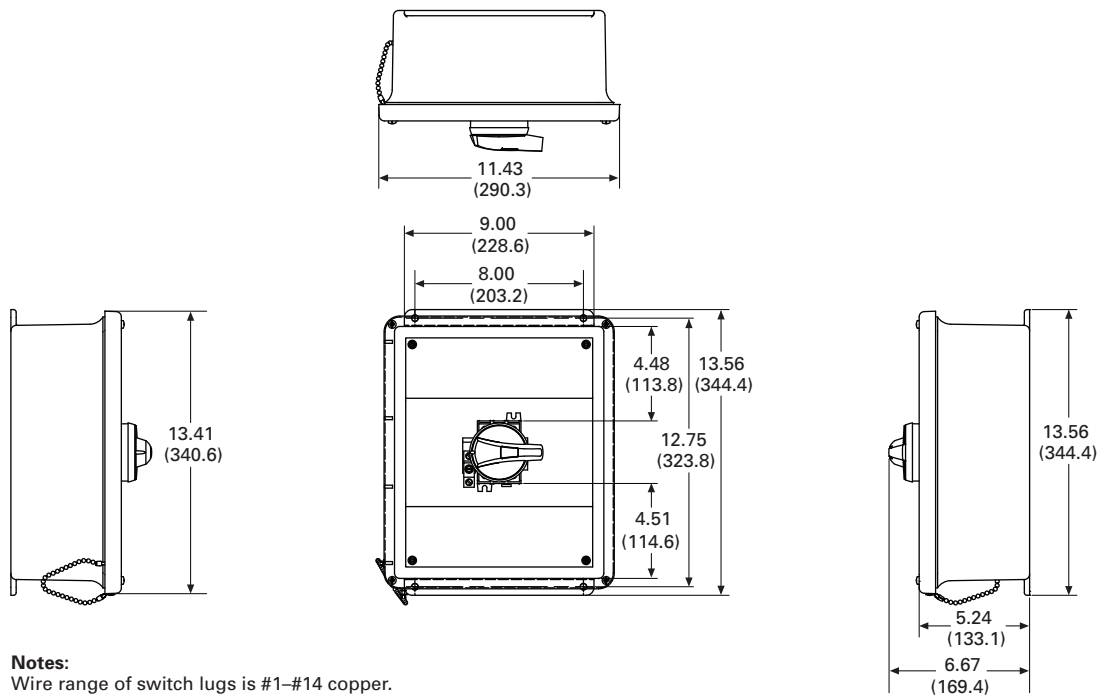
### NEMA Type 4X Thermoset Polyester (16-40A)



**Notes:**

Wire range of switch lugs for 16-25A is #6-#10 copper, and for 30-40A is #8-#14.  
Wire range of ground lugs is #2-#14 copper or aluminum.

### NEMA Type 4X Thermoset Polyester (60-80A)



**Notes:**

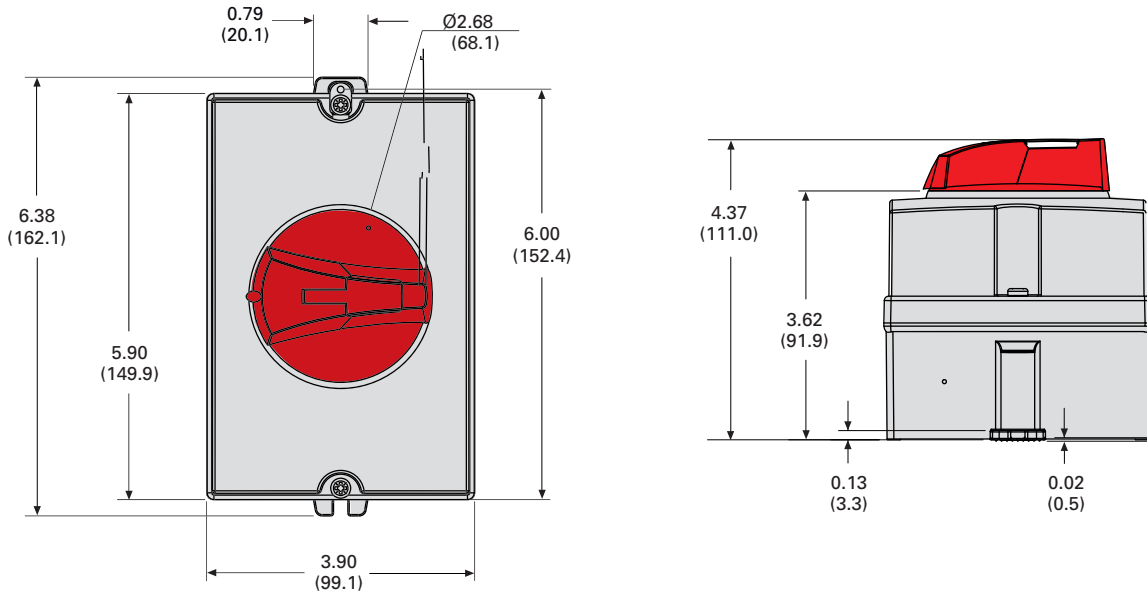
Wire range of switch lugs is #1-#14 copper.  
Wire range of ground lugs is #2-#14 copper or aluminum.

# Switching Devices

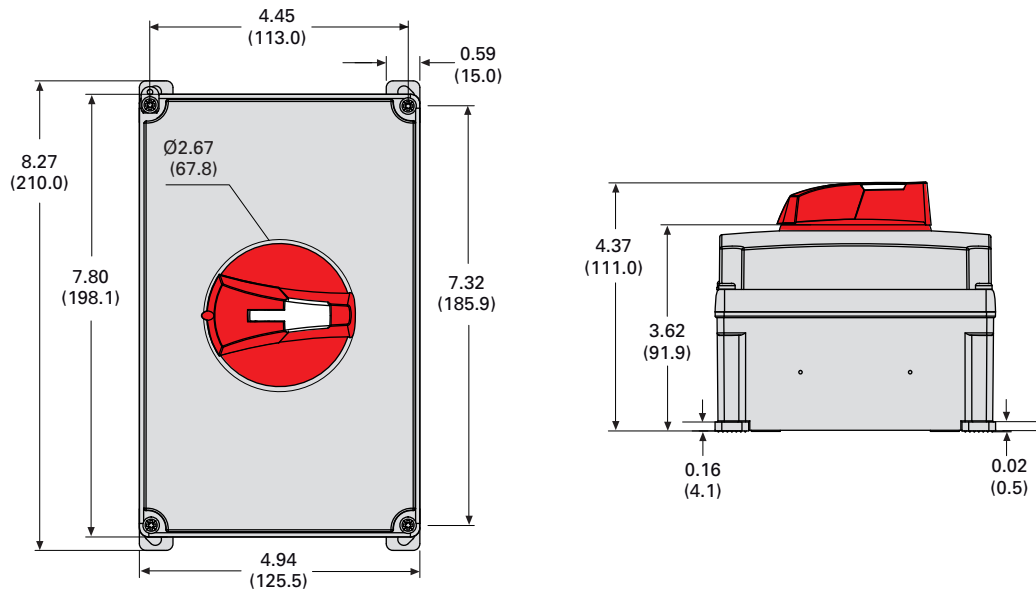
## Enclosed Rotary Disconnects

Approximate Dimensions in Inches (mm)

### NEMA Type 4X—Polycarbonate (30A)



### NEMA Type 4X—Polycarbonate (60A)



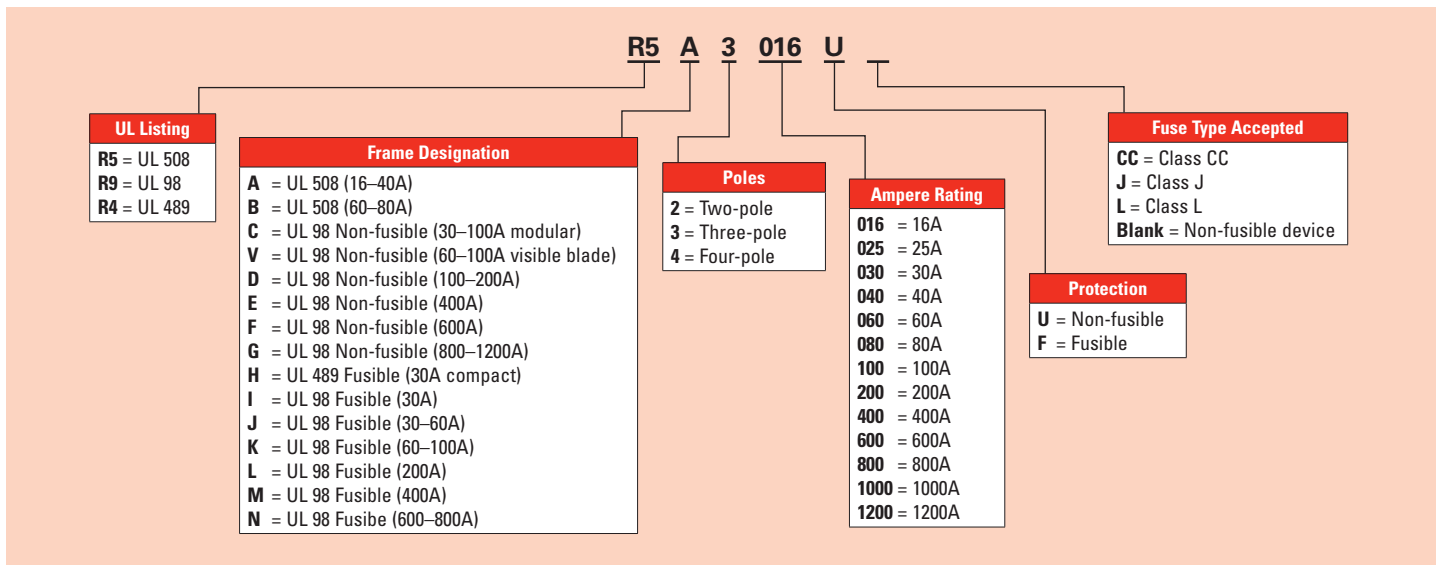
**Notes:**

**Notes:**

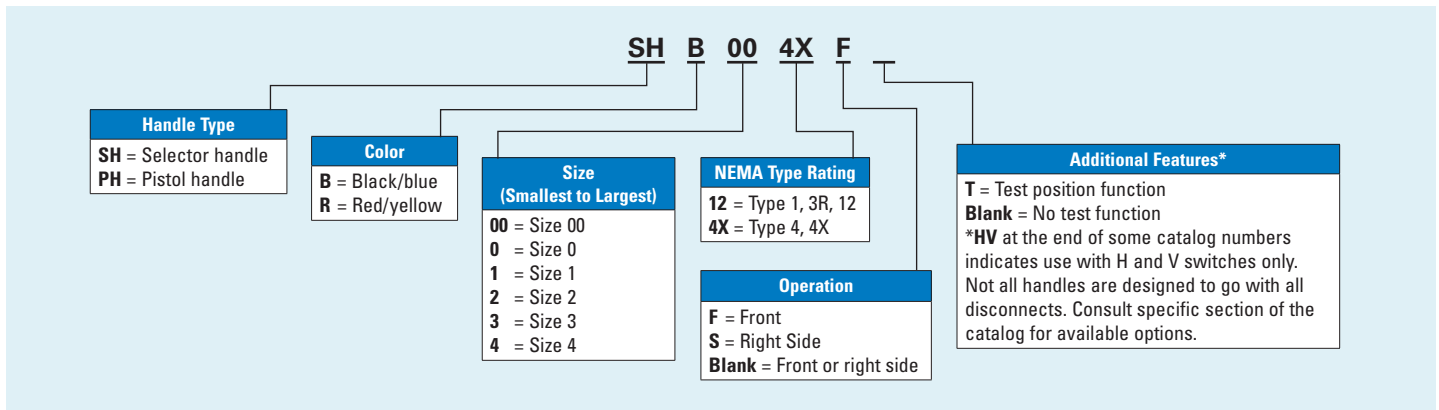
**Notes:**

# Catalog Numbering Systems

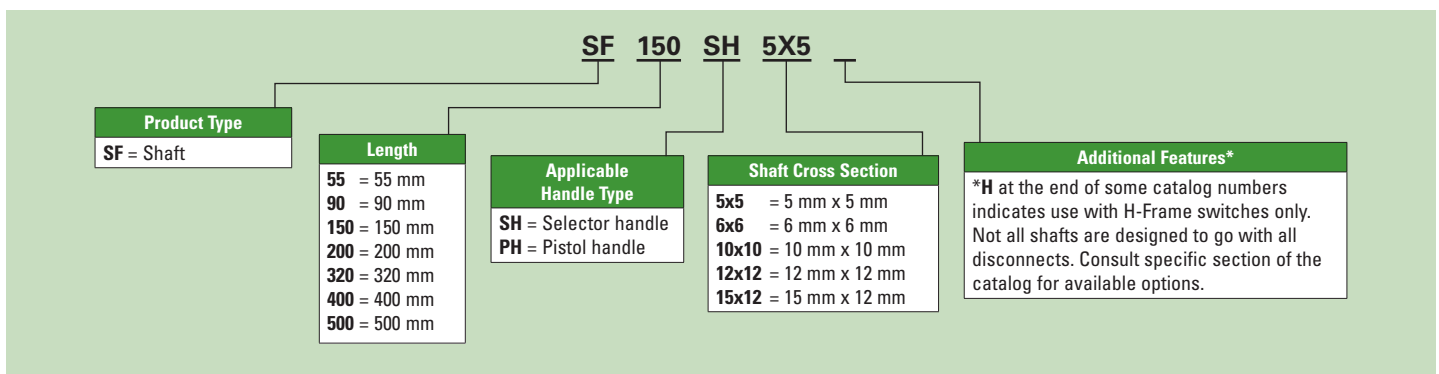
## Disconnects


























































## External Handles



## Shafts



# R Series Rotary Disconnects<sup>①</sup>

Direct Handles	Auxiliary Contacts	Available Shafts	Fusible Disconnect	External Handles	Non-Fusible Disconnect	Available Shafts	Auxiliary Contacts	Direct Handles
 DHR9HC	 AC1NOR9 AC1NCR9	<b>A</b> SF___SH5X5H SF___PH5X5	 R4 H-Frame 30A-CC/J	 SH_00_	 R5 A- & B-Frame (16-40A & 60-80A)	<b>A</b> SF___SH5X5 SF___SH5X5	 AC1NONC AC2NO	 DHR5
 DHR9HJ	 AC1N01NCJ2N AC2N02NCJ2N  AC1NOR9 AC1NCR9	<b>B</b> SF___PH10X10	 R9 I-Frame 30A-CC	 SH_0_	 R9 C-Frame 30-100A Modular	<b>A</b> SF___SH5X5 SF___SH5X5	 AC1NONC AC2NO	 DHR9
 DHR9J2M	 AC1N01NCJ2N AC2N02NCJ2N  AC1NOR9 AC1NCR9	<b>B</b> SF___PH10X10	 R9 J-Frame 30-60A J ②	 PH_1_	 R9 V-Frame 60-100A Visible Blade	<b>A</b> SF___SH6X6 SF___PH6X6	 AC1NONC AC2NO	 DHR9V
 DHR9J2M	 AC1N01NCJ2N AC2N02NCJ2N  AC1NOR9 AC1NCR9	<b>B</b> SF___PH10X10	 R9 K-Frame 60-100A J ②	 PH_2_	 R9 D-Frame 100-200A	<b>B</b> SF___PH10X10	 AC1NONC_	 DHR9DE
 DHR9J2M	 AC1N01NCJ2N AC2N02NCJ2N  AC1NOR9 AC1NCR9	<b>B</b> SF___PH10X10	 R9 L-Frame 200A J	 PH_3_	 R9 E-Frame 400A	<b>B</b> SF___PH10X10	 AC1NONC_	 DHR9DE
 DHR9J2M	 AC1N01NCJ2N AC2N02NCJ2N  AC1NOR9 AC1NCR9	<b>B</b> SF___PH10X10	 R9 M-Frame 400A J	 PH_3_	 R9 F-Frame 600A	<b>D</b> SF___PH15X12	 AC1NOR9 AC1NCR9	 DHR9FG
 DHR9N	 AC1N01NCJ2N AC2N02NCJ2N  AC1NOR9 AC1NCR9	<b>C</b> SF___PH12X12	 R9 N-Frame 600-800A J/L	 PH_4_	 R9 G-Frame 800-1200A	<b>D</b> SF___PH15X12	 AC1NOR9 AC1NCR9 ACHFG	 DHR9FG

**A**



**B**



**C**



**D**



① For reference only—please consult specific catalog pages for detailed information.

② 60A J-Frame (100 kAIC), K-Frame (200 kAIC).

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