



# Rittal – RiLine60



60 mm system technology  
for the global market

# Rittal RiLine60 – three systems



## Classic

for busbars with a rectangular cross-section up to 30 x 10 mm in feeder-circuits up to 700 A

## Innovative and compact

### PLS 800

For feeder-circuits up to 700 A

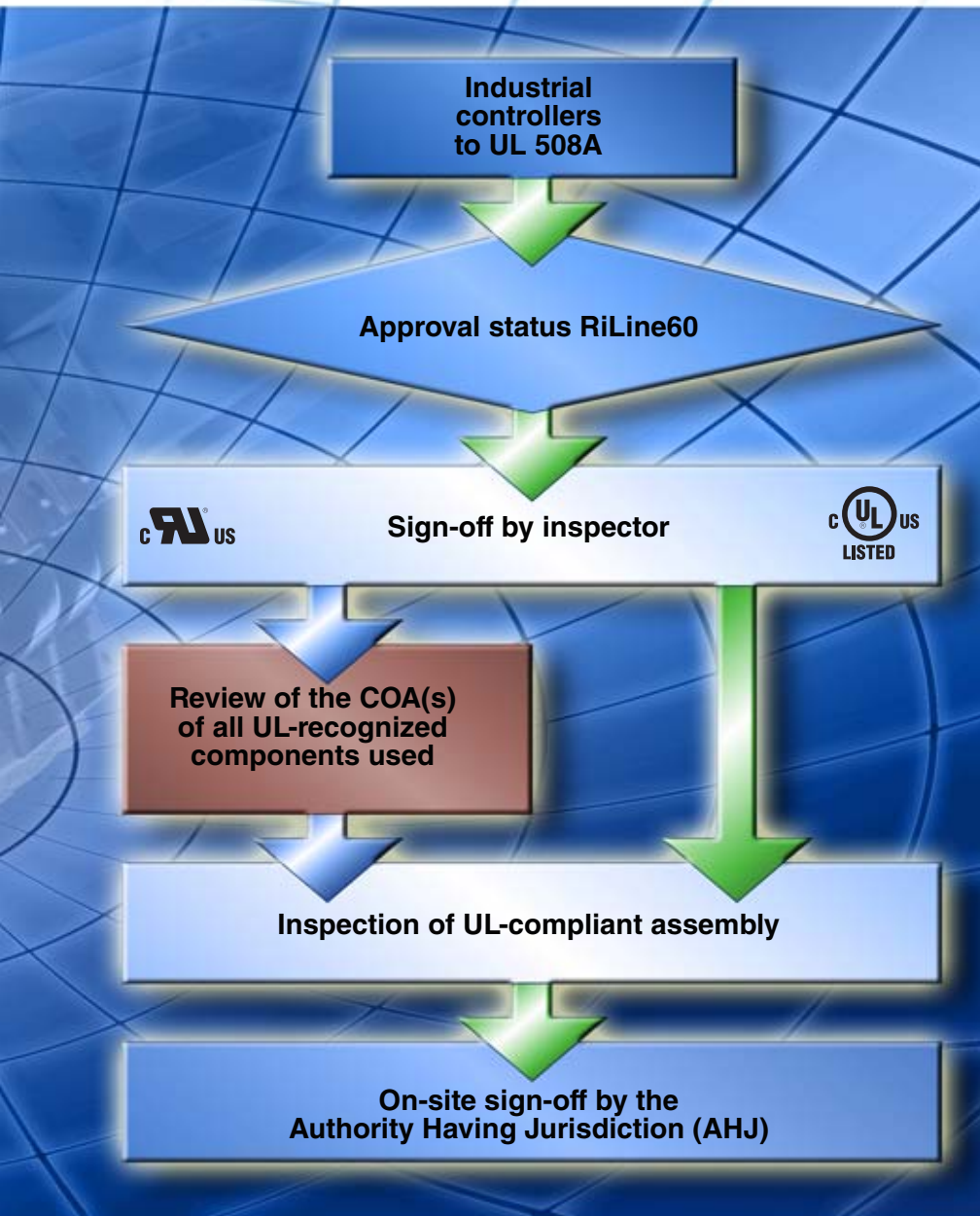
### PLS 1600

For feeder-circuits up to 1400 A

**Unlike busbar sections with a rectangular cross-section, PLS sections offer unrestricted top-mounting of the busbar supports with top-mounting components.**



# Simple, fast system sign-offs



**Save time and money with easier**

**UL and CSA sign-offs.**

The approval of power distribution components is becoming ever more important for international switchgear manufactures.

cUL<sup>US</sup> LISTED approval of RiLine60 busbar systems offers significant advantages for both the UL and CSA market. Complex, time-consuming engineering, inspection and sign-off processes are reduced to a minimum.

## Important benefits and added value with RiLine60 cUL<sup>US</sup> LISTED

### 1. Dramatic time savings

Straightforward UL and CSA sign-off processes

### 2. Conditions of Acceptability (COA) are eliminated, documentation work is minimised

No additional tests required as with UL-recognized components.

### 3. Cost savings for listed switchgear manufactures

The usual UL costs for file entry of the UL-recognized components are eliminated.

### 4. A high level of acceptance among end customers

RiLine60 cUL<sup>US</sup> LISTED meets the requirements of valid safety standards to perfection.

### 5. Barrierless access to the CSA market

cUL<sup>US</sup> LISTED products are accepted on the Canadian market with no further test requirements.

### 6. Time- and cost-efficient project planning

Reduced project planning work when incorporating the engineering considerations.

# Rittal RiLine60 – Details for mechanical and plant engineering

## Background information on UL

UL or Underwriter Laboratory was founded in 1894 as a non-profit-making organisation for testing and certification. UL operates five testing laboratories in the United States and subsidiaries worldwide, with an emphasis on product testing aimed at general safety.

## Why are UL approvals important?

- International regulations and standards such as NEMA and IEC are used as a basis by manufacturers for product developments and subsequent testing.
- Nationally recognised test laboratories confirm and certify that a product complies with the specific standards; in North America this is carried out by organisations such as UL or CSA (Canadian Standards Association).
- For many applications, the sole use of UL and/or CSA-approved products is a requirement; consequently, it is advisable to design electrical controllers for North American applications with suitable UL-approved components.

## How does the US system for electrical safety work?

Every piece of electrical equipment (machine/plant) is tested by the competent local inspector (AHJ = Authority Having Jurisdiction) prior to commissioning. The AHJ has the final say with regard to commissioning. All AHJs use Standard NFPA 70 (NFPA = National Fire Protection Association) as a basis, which is generally regarded as the NEC (National Electrical Code). NFPA 70 is therefore an important basis for UL 508A (Industrial Control Panels).

The AHJ considers the use of UL-recognized or UL-listed components an important indication that a system complies with the safety requirements to NFPA 70. This saves time and money during construction and commissioning of the equipment, as the UL symbol indicates that testing of the components and/or of the system did not reveal any foreseeable risks with regard to fire, electric shock and associated dangers.

## The UL symbols: “UL-listed” or “UL-recognized”

When labelling UL-approved products, a general distinction is made between Recognized Components and Listed Devices:

### 1 (Recognized Components)

This label is used on products which are not complete in terms of their application. These products are listed in the UL's “yellow component database”. The correct use of such components must make due allowance for the “Conditions of Acceptability”, listing the framework conditions and application parameters approved by the UL.

### 2 (Listed Devices)

Here, it is only important to note that the remarks and rating data specified on the product are observed with the application. Terminals for field-wiring are authorised as Listed Devices (cf. point 3).

## Application areas for UL 508 and UL 508A

UL 508 describes industrial control components and is therefore the decisive standard for the assessment of Rittal SV components. For example, this standard contains information on:

- Starters
- Relays and contactors
- Circuit-breakers
- Controllers

UL 508A describes industrial control panels and is therefore the decisive standard for switchgear manufacturers.

For example, this standard contains information on:

- Machine controllers
- Elevator controllers
- Crane controllers
- Equipment for heating, air-conditioning and ventilation systems

Both standards describe control systems for general industrial applications with a rated voltage of up to 600 V. The maximum permissible ambient temperature is 40°C.

## Distinguishing between feeder- and branch-circuits

Standard UL 508A makes a distinction between feeder-circuits and branch & control circuits. Generally speaking, the term “feeder-circuits” refers to the part of the circuit located at the supply end before the last over-current protective device (a device approved to UL 489). Increased requirements with regard to creepage distances and clearances apply to this part of the circuit.



**Recognized Component**  **US**  
Sample rating plate for a busbar support with  **US**.



**Listed Device**  **US LISTED**  
Sample rating plate for a busbar support with  **US LISTED**.



The term "branch & control circuits" refers to the part of the circuit located after the last over-current protective device. When using busbar systems, it is important to know whether the application is in the feeder section or the branch section, as the requirements governing the required creepage distances and clearances are significantly higher for feeder-circuits.

### Important remarks for the use of busbar systems to UL 508A

#### 1. Creepage distances and clearances

One of the principal requirements in UL 508A is the amendment to the required creepage distances and clearances for feeder-circuits.

For applications >250 V the following distances and clearances are required:

- Between phases:
  - A** Creepage distance 50.8 mm (2 inches)
  - B** Clearance 25.4 mm (1 inch)
- Between phase and earthed, uninsulated metal parts:
  - C** Creepage distance 25.4 mm (1 inch)
  - D** Clearance 25.4 mm (1 inch)

Rittal RiLine60 complies with these requirements. All busbar connection adaptors and component adaptors (OM adaptors with standard AWG connection cables and circuit-breaker adaptors) have been designed in accordance with these requirements. However, users should bear in mind a small number of differences from the IEC version:

- Special UL busbar supports for flat bars and Rittal PLS with increased creepage distances and clearances.

- In order to guarantee the required distances between live parts and the earthed mounting plate, the use of a Rittal RiLine60 base tray is compulsory.

#### 2. Rated currents

For untested busbar applications, UL 508A specifies a current carrying capacity of 1000 A/inch<sup>2</sup> (1.5 A/mm<sup>2</sup>) in the absence of testing.

This value may be higher if the product or application has undergone suitable testing. Rittal has conducted extensive testing in this respect in order to give users the maximum benefits when using the RiLine60 busbar system. The benefit of such testing is that SV busbar systems with higher rated currents may be used than permitted by the default value. For example, a busbar with dimensions 30 x 10 mm can take 700 A instead of 465 A.

#### 3. Terminals for factory or field-wiring

In accordance with the UL standards, connection terminals may be approved for factory or field-wiring. If a terminal is approved for factory-wiring, it may only be used in switchgear assembly by suitably trained professionals.

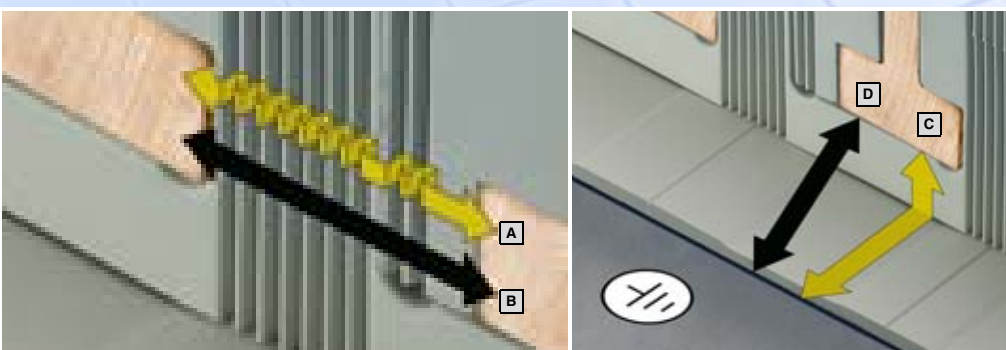
If connection terminals are to be used in the field (e.g. on a construction site), the component must be approved for field-wiring. **The terminals of the busbar connection adaptors and component adaptors in the Rittal RiLine60 series have therefore been tested for field-wiring applications.**

Compliance with standards is indispensable for the safe design and operation of electrical systems.

This is particularly true of the North American market.

Here, products which conform to the relevant regulations are a key factor for problem-free acceptance of electrical systems.

UL-approved components provide a suitable basis, saving time and money for the user by minimising acceptance problems in advance.



### Definition of creepage distances and clearances:

- A** Creepage distance between active conductors/busbars
- B** Clearance between active conductors/busbars
- C** Creepage distance between active conductors/busbars and earthed metal parts
- D** Clearance between active conductors/busbars and earthed metal parts

# Product overview



## RiLine60 busbar system for flat copper bars (3-/4-pole)

For feeder-circuits UL 508A, cUL<sup>®</sup> US LISTED, file E191125

Designation	Version	Bar centre distance mm	For busbars mm	Packs of	Model No. SV	Cat. 32, page
Busbar support	3-pole	60	15 x 5 – 30 x 10	4	<b>9340.050</b>	354
Busbar support	4-pole	60	15 x 5 – 30 x 10	4	<b>9340.004</b>	380
Busbar support 30 x 10 PLUS	4-pole	60	30 x 10	4	<b>9342.014</b>	382

### System components

Designation	Length mm	Packs of	Model No. SV		Cat. 32, page
			3-pole	4-pole	
Base tray for SV 9340.050	500	2	<b>9340.100</b>	–	351
	700	2	<b>9340.110</b>	–	351
	900	2	<b>9340.120</b>	–	351
	1100	2	<b>9340.130</b>	–	351
Base tray for SV 9340.004	1100	2	–	<b>9340.134</b>	381
Base tray for SV 9342.014	1100	2	–	<b>9342.134</b>	383
Cover section	700	2	<b>9340.200</b>	–	351
	1100	2	<b>9340.210</b>	<b>9340.214</b>	351, 381/383
Base tray infill	100	2	<b>9340.140</b>	–	351
Support panel for cover section		5	<b>9340.220</b>	<b>9340.224</b>	351, 381/383
End covers for SV 9340.050		2	<b>9340.070</b>	–	354
End covers for SV 9340.004		2	–	<b>9340.074</b>	380
End covers for SV 9342.014		2	–	<b>9342.074</b>	382

#### Note:

The use of a base tray is compulsory for UL applications.



## RiLine60 busbar system PLS 800 (3-pole)

For feeder-circuits UL 508A, cUL<sup>®</sup> US LISTED, file E191125

Designation	Version	Bar centre distance mm	For PLS busbars <sup>1)</sup> Cross-section mm <sup>2</sup>	Packs of	Model No. SV	Cat. 32, page
Busbar support PLS 800	3-pole	60	300	4	<b>9341.050</b>	355

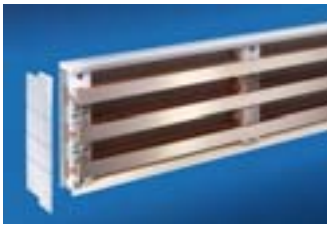
### System components

Designation	Length mm	Packs of	Model No. SV	Cat. 32, page
Base tray	500	2	<b>9341.100</b>	353
	700	2	<b>9341.110</b>	353
	900	2	<b>9341.120</b>	353
	1100	2	<b>9341.130</b>	353
Cover section	700	2	<b>9340.200</b>	353
	1100	2	<b>9340.210</b>	353
Base tray infill	100	2	<b>9341.140</b>	353
Support panel for cover section		5	<b>9340.220</b>	353
End covers for SV 9341.050		2	<b>9341.070</b>	355

<sup>1)</sup> 5 mm bar thickness

#### Note:

The use of a base tray is compulsory for UL applications.



## RiLine60 busbar system PLS 1600 (3-/4-pole)

For feeder-circuits UL 508A, cUL<sup>®</sup> US LISTED, file E191125

Designation	Version	Bar centre distance mm	For PLS busbars <sup>1)</sup> Cross-section mm <sup>2</sup>	Packs of	Model No. SV	Cat. 32, page
Busbar support PLS 1600	3-pole	60	900	4	<b>9342.050</b>	355
Busbar support PLS 1600 PLUS	4-pole	60	900	4	<b>9342.004</b>	382

### System components

Designation	Length mm	Packs of	Model No. SV		Cat. 32, page
			3-pole	4-pole	
Base tray	500	2	<b>9342.100</b>	–	353
	700	2	<b>9342.110</b>	–	353
	900	2	<b>9342.120</b>	–	353
	1100	2	<b>9342.130</b>	<b>9342.134</b>	353/383
Cover section	700	2	<b>9340.200</b>	–	353
	1100	2	<b>9340.210</b>	<b>9340.214</b>	353/383
Base tray infill	100	2	<b>9342.140</b>	–	353
Support panel for cover section	–	5	<b>9340.220</b>	<b>9340.224</b>	353/383
End covers for busbar supports	–	2	<b>9342.070</b>	<b>9342.074</b>	355/382

<sup>1)</sup> 10 mm bar thickness

### Note:

The use of a base tray is compulsory for UL applications.



## Busbar connection adaptor (3-/4-pole)

For feeder-circuits UL 508A, cUL<sup>®</sup> US LISTED, file E191125

Rated current up to	Rated operating voltage	Connection of round conductors mm <sup>2</sup> (AWG)	Clamping area for laminated copper bars mm	Packs of	Model No. SV			Cat. 32, page
					Outlet at top/bottom	Outlet at top	Outlet at bottom	
<b>3-pole</b>								
60 A	600 V~	6 – 16 (AWG 10 – AWG 6)	–	1	–	<b>9342.200</b>	<b>9342.210</b>	356
125 A	600 V~	16 – 35 (AWG 6 – AWG 2)	10 x 7.8	1	–	<b>9342.230</b>	<b>9342.240</b>	356
250 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	<b>9342.250</b>	<b>9342.260</b>	<b>9342.270</b>	356
600 A	600 V~	95 – 300 (AWG 3/0 – MCM 600)	33 x 20	1	–	<b>9342.290</b>	<b>9342.300</b>	356
<b>4-pole</b>								
125 A	600 V~	16 – 35 (AWG 6 – AWG 2)	10 x 7.8	1	<b>9342.224</b>	<b>9342.234</b>	<b>9342.244</b>	384
250 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	<b>9342.254</b>	<b>9342.264</b>	<b>9342.274</b>	384



Rated current up to	Rated operating voltage	Connection of round conductors mm <sup>2</sup> (AWG)	Clamping area for laminated copper bars mm		Packs of	Model No. SV		Cat. 32, page
			for 5 mm bar thickness	for 10 mm bar thickness		Outlet at top/bottom		
						Busbar connection adaptor (3 x 1-pole)	Expansion set for 4-pole configuration	
<b>3-/4-pole</b>								
800 A	600 V~	95 – 300 (AWG 3/0 – MCM 600)	33 x 27	33 x 22	1 set	<b>9342.310</b>	<b>9342.314<sup>1)</sup></b>	357/385
1400 A	600 V~	–	65 x 27	65 x 22	1 set	<b>9342.320</b>	<b>9342.324<sup>1)</sup></b>	357/385

<sup>1)</sup> Packs of = 1

# Product overview



## OM adaptor/OM support (3-pole)

For feeder-circuits UL 508A, cUL<sup>®</sup> US LISTED, file E191125

Version	Con-struction width mm	Rated current up to	Rated operating voltage	Connection cables <sup>1)</sup>	Connection of round conductors mm <sup>2</sup>	Support rails		Packs of	Model No. SV	Cat. 32, page
						Height mm	Qty.			
OM adaptor	45	25 A	600 V~	AWG 12	–	10	1	1	<b>9340.310<sup>2)</sup></b>	364
	45	25 A	600 V~	AWG 12	–	10	1	1	<b>9340.340</b>	364
	45	25 A	600 V~	AWG 12	–	10	1	1	<b>9340.370<sup>3)</sup></b>	364
	45	32 A	600 V~	AWG 10	–	10	1	1	<b>9340.350</b>	364
	45	32 A	600 V~	AWG 10	–	10	2	1	<b>9340.380</b>	364
	55	32 A	600 V~	AWG 10	–	10	1	1	<b>9340.460</b>	364
	55	32 A	600 V~	AWG 10	–	10	2	1	<b>9340.470</b>	364
	75	40 A	600 V~	AWG 8	–	7.5	2	1	<b>9340.710<sup>4)</sup></b>	365
	55	65 A	600 V~	AWG 6	–	10	1	1	<b>9340.410<sup>2)</sup></b>	365
	55	65 A	600 V~	AWG 6	–	10	1	1	<b>9340.430</b>	365
OM Premium adaptor	45	25 A	600 V~	–	1.5 – 4	10	1	1	<b>9340.900<sup>5)</sup></b>	362
	45	25 A	600 V~	–	1.5 – 4	10	2	1	<b>9340.910<sup>6)</sup></b>	362
	55	25 A	600 V~	–	1.5 – 4	10	2	1	<b>9340.930<sup>6)</sup></b>	362
OM support	45	–	–	–	–	10	–	1	<b>9340.260<sup>3)</sup></b>	368
	55	–	–	–	–	10	1	1	<b>9340.270</b>	368

### Accessories

Connection pin	20	<b>9340.280</b>	401
Insert strip 10 mm	2	<b>9340.290</b>	400

<sup>1)</sup> AWG = American Wire Gauges  
 AWG 12 = 3.31 mm<sup>2</sup> ± 4 mm<sup>2</sup>  
 AWG 10 = 5.26 mm<sup>2</sup> ± 6 mm<sup>2</sup>  
 AWG 8 = 8.37 mm<sup>2</sup> ± 10 mm<sup>2</sup>  
 AWG 6 = 13.3 mm<sup>2</sup> ± 16 mm<sup>2</sup>

<sup>2)</sup> Without support frame

<sup>3)</sup> With pin block

<sup>4)</sup> Without support frame, with insert strips

<sup>5)</sup> With sub-unit and pin block

<sup>6)</sup> With connector outlet



## Circuit-breaker component adaptor (3-pole)

For feeder-circuits UL 508A, cUL<sup>®</sup> US LISTED, file E191125

Con-struction width mm	Rated current up to	Rated operating voltage	Connection of round conductors mm <sup>2</sup> (AWG)	Clamping area for laminated copper bars mm	Packs of	Model No. SV		Cat. 32, page
						Cable outlet top <sup>1)</sup>	Cable outlet bottom <sup>1)</sup>	
72	100 A	600 V~	10 – 35 (AWG 6 – AWG 2)	10 x 7.8	1	<b>9342.400</b>	<b>9342.410</b>	370
90	125 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	<b>9342.540</b>	<b>9342.550</b>	370
105	250 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	<b>9342.600</b>	<b>9342.610</b>	371
140	600 A	600 V~	–	32 x 10 <sup>2)</sup>	1	<b>9342.700</b>	<b>9342.710</b>	371

### Accessories

Insert strip 25 mm, for SV 9342.700/710	4 <sup>3)</sup>	<b>9342.720</b>	400
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<sup>1)</sup> Switch outlet or outgoing cable

<sup>2)</sup> Via M10 screw terminal

<sup>3)</sup> ≥ 1 set





## Circuit-breaker component adaptor (4-pole)

For feeder-circuits UL 508A, cUL<sup>US</sup> LISTED, file E191125

Construction width mm	Rated current up to	Rated operating voltage	Connection of round conductors mm <sup>2</sup> (AWG)	Clamping area for laminated copper bars mm	Packs of	Model No. SV		Cat. 32, page
						Cable outlet top <sup>1)</sup>	Cable outlet bottom <sup>1)</sup>	
120	125 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	<b>9342.504</b>	<b>9342.514</b>	386
140	250 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	<b>9342.604</b>	<b>9342.614</b>	386

<sup>1)</sup> Switch outlet or outgoing cable



# Short-circuit resistance diagrams

## Rittal RiLine60 UL 508

The short-circuit resistance of Rittal RiLine60 has been extensively tested. Short-circuit resistance to UL criteria is assessed via the root-mean-square value of the short-circuit current ( $I_{RMS}$ ), which must be applied for at least 3 periods.

During the course of testing, the test equipment has been adjusted to the respective root-mean-square values ( $I_{RMS}$ ). The resultant peak short-circuit currents  $I_p$  are shown in the short-circuit protection diagrams below.

### Busbar supports for feeder-circuits 700 A, 3-pole

60 mm bar centre distance, for busbars 15 x 5 – 30 x 10 mm.

#### Note:

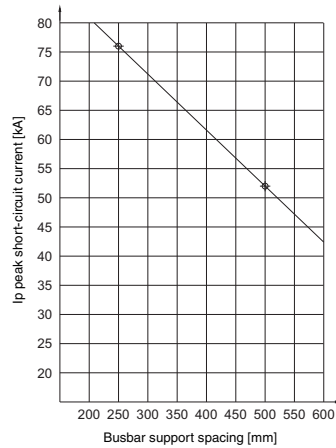
#### SV 9340.050 with 30 x 5/10 mm

With a pre-fuse, the following short-circuit value can be achieved:  
Support spacing: 350 mm  
Fuse: Class L 800 A  
 $I_{RMS}$ : 50 kA

Settings  $I_{RMS}$  ( $I_{eff.}$ ) of the test equipment without pre-fuse:

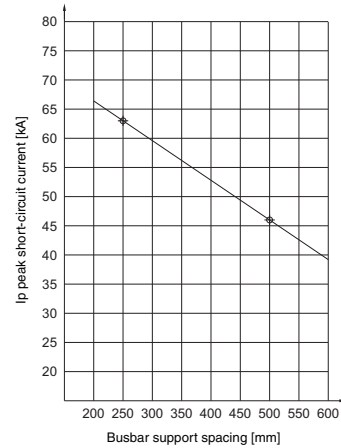
Support spacing mm	$I_{RMS}$ kA
250	35
500	25

Model No. SV 9340.050 with 30 x 5/10 mm



Support spacing mm	$I_{RMS}$ kA
250	30
500	22

Model No. SV 9340.050 with 25 x 5 mm  
20 x 5/10 mm  
15 x 5/15 mm



### PLS busbar supports

#### for feeder-circuits 700 A (PLS 800)/1400 A (PLS 1600), 3-pole

60 mm bar centre distance, for Mini-PLS special busbars.

#### Note:

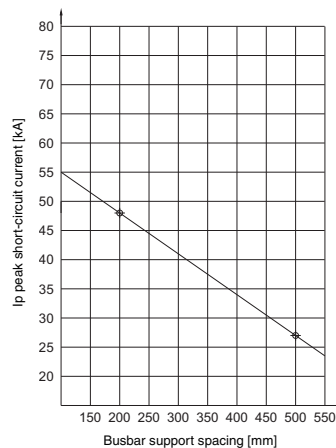
#### SV 9342.050 (PLS 1600)

With a pre-fuse, the following short-circuit value can be achieved:  
Support spacing: 250 mm  
Fuse: Class L 1400 A  
 $I_{RMS}$ : 65 kA

Settings  $I_{RMS}$  ( $I_{eff.}$ ) of the test equipment without pre-fuse:

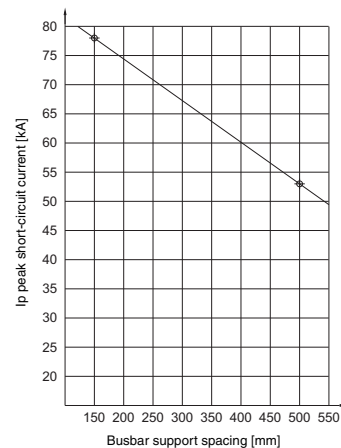
Support spacing mm	$I_{RMS}$ kA
200	22
500	14

Model No. SV 9341.050 (PLS 800)



Support spacing mm	$I_{RMS}$ kA
150	35
500	25

Model No. SV 9342.050 (PLS 1600)

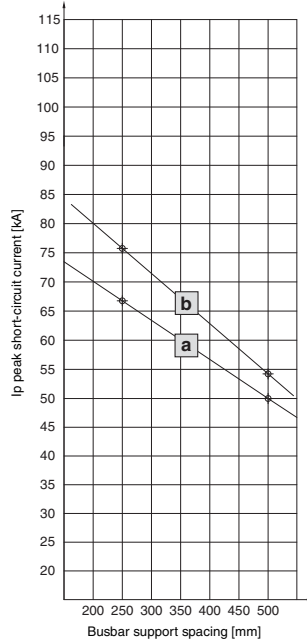


# Short-circuit resistance diagrams

## Busbar supports up to 700 A, 4-pole

Model No. SV 9340.004/SV 9342.014

60 mm bar centre distance



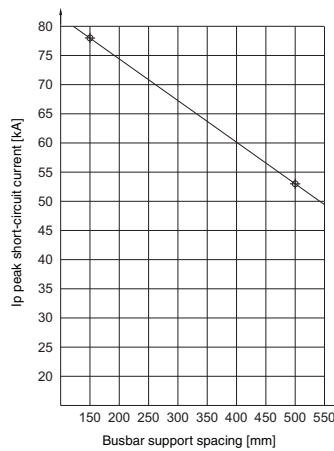
Settings  $I_{RMS}$  ( $I_{eff.}$ ) of the test equipment without pre-fuse:

Model No. SV	Busbar mm	Support spacing mm	$I_{RMS}$
a) 9340.004	15 x 5 – 30 x 10	250	30
		500	22
b) 9342.014	30 x 10	250	35
		500	25

## PLS busbar support up to 1400 A, 4-pole

Model No. SV 9342.004

60 mm bar centre distance,  
for PLS special busbar 1400 A.



Settings  $I_{RMS}$  ( $I_{eff.}$ ) of the test equipment without pre-fuse:

Busbar mm	Support spacing mm	RMS kA
PLS 1600	150	35
	500	25



# All in all – solutions from Rittal



**Industrial Enclosures**



**Power Distribution**

Busbar systems RiLine60  
Busbar systems 40/100/150/185 mm  
Ri4Power low-voltage distribution systems



**Electronic Packaging**



**System Climate Control**



**IT Solutions**



**Communication Systems**

Rittal has one of the largest ranges of enclosures available for immediate delivery. However, Rittal also supplies integrated solutions – up to Level 4. This comprises mechanical installation, power supply, electronic components, climate control and central monitoring. For all of your requirements.

Fully assembled and functional. Wherever in the world you develop and implement solutions for yourself and your customers, we are close at hand. The global alliance between production, distribution and service guarantees closeness to the customer. Worldwide!

02/09 • E 480

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