

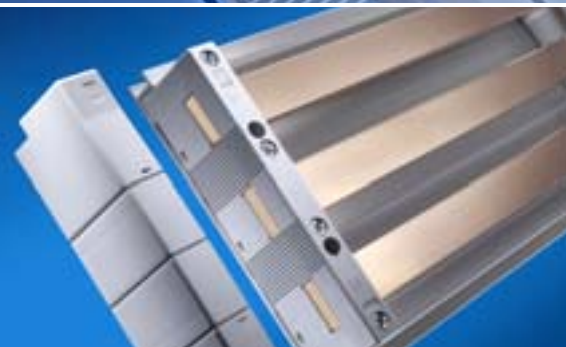


Rittal – RiLine60



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

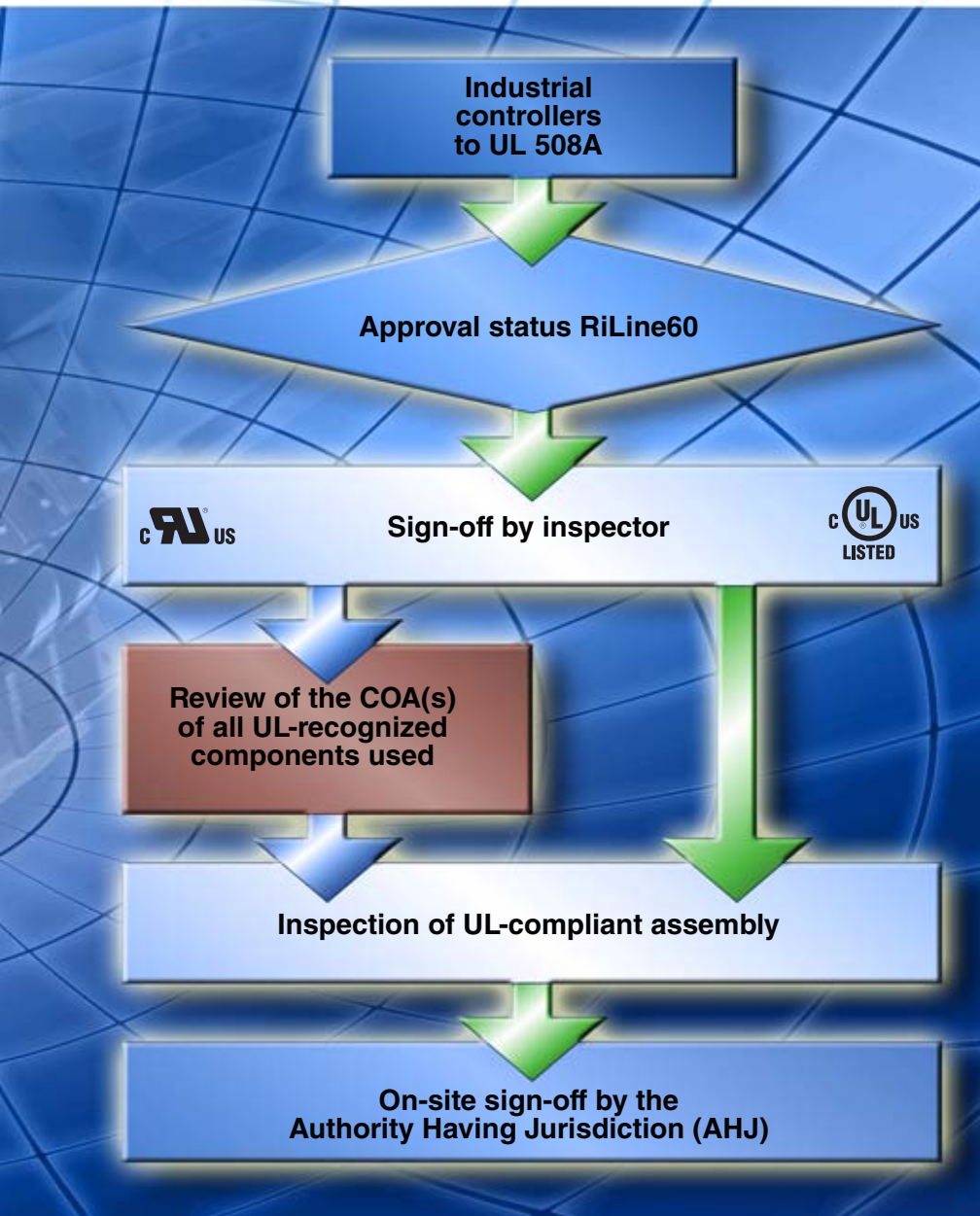
For feeder-circuits up to 700 A

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^{US 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^{US 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^{US LISTED} meets the requirements of valid safety standards to perfection.

5. Barrierless access to the CSA market

cUL^{US 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/inch² (1.5 A/mm²) 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.

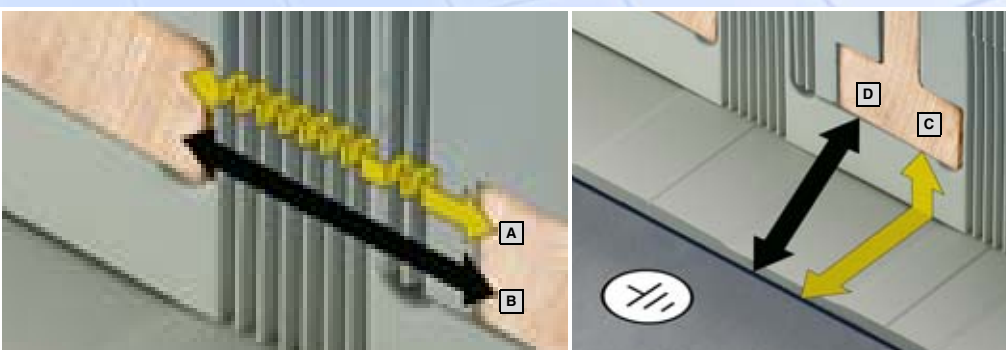
If connection terminals are to be used in the field (e.g. on a construction site), the component must be approved for field-wiring. **The terminals of the busbar connection adaptors and component adaptors in the Rittal RiLine60 series have therefore been tested for field-wiring applications.**

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[®] 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	9340.050	354
Busbar support	4-pole	60	15 x 5 – 30 x 10	4	9340.004	380
Busbar support 30 x 10 PLUS	4-pole	60	30 x 10	4	9342.014	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	9340.100	–	351
	700	2	9340.110	–	351
	900	2	9340.120	–	351
	1100	2	9340.130	–	351
Base tray for SV 9340.004	1100	2	–	9340.134	381
Base tray for SV 9342.014	1100	2	–	9342.134	383
Cover section	700	2	9340.200	–	351
	1100	2	9340.210	9340.214	351, 381/383
Base tray infill	100	2	9340.140	–	351
Support panel for cover section		5	9340.220	9340.224	351, 381/383
End covers for SV 9340.050		2	9340.070	–	354
End covers for SV 9340.004		2	–	9340.074	380
End covers for SV 9342.014		2	–	9342.074	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[®] US LISTED, file E191125

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

System components

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

¹⁾ 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[®] US LISTED, file E191125

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

System components

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

¹⁾ 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[®] US LISTED, file E191125

Rated current up to	Rated operating voltage	Connection of round conductors mm ² (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	
3-pole								
60 A	600 V~	6 – 16 (AWG 10 – AWG 6)	–	1	–	9342.200	9342.210	356
125 A	600 V~	16 – 35 (AWG 6 – AWG 2)	10 x 7.8	1	–	9342.230	9342.240	356
250 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	9342.250	9342.260	9342.270	356
600 A	600 V~	95 – 300 (AWG 3/0 – MCM 600)	33 x 20	1	–	9342.290	9342.300	356
4-pole								
125 A	600 V~	16 – 35 (AWG 6 – AWG 2)	10 x 7.8	1	9342.224	9342.234	9342.244	384
250 A	600 V~	35 – 120 (AWG 2 – MCM 250)	18.5 x 15.5	1	9342.254	9342.264	9342.274	384



Rated current up to	Rated operating voltage	Connection of round conductors mm ² (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	
3-/4-pole								
800 A	600 V~	95 – 300 (AWG 3/0 – MCM 600)	33 x 27	33 x 22	1 set	9342.310	9342.314¹⁾	357/385
1400 A	600 V~	–	65 x 27	65 x 22	1 set	9342.320	9342.324¹⁾	357/385

¹⁾ Packs of = 1

Product overview



OM adaptor/OM support (3-pole)

For feeder-circuits UL 508A, cUL[®] US LISTED, file E191125

Version	Con- struction width mm	Rated current up to	Rated operating voltage	Connection cables ¹⁾	Connection of round conductors mm ²	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	9340.310²⁾	364
	45	25 A	600 V~	AWG 12	–	10	1	1	9340.340	364
	45	25 A	600 V~	AWG 12	–	10	1	1	9340.370³⁾	364
	45	32 A	600 V~	AWG 10	–	10	1	1	9340.350	364
	45	32 A	600 V~	AWG 10	–	10	2	1	9340.380	364
	55	32 A	600 V~	AWG 10	–	10	1	1	9340.460	364
	55	32 A	600 V~	AWG 10	–	10	2	1	9340.470	364
	75	40 A	600 V~	AWG 8	–	7.5	2	1	9340.710⁴⁾	365
	55	65 A	600 V~	AWG 6	–	10	1	1	9340.410²⁾	365
	55	65 A	600 V~	AWG 6	–	10	1	1	9340.430	365
OM Premium adaptor	45	25 A	600 V~	–	1.5 – 4	10	1	1	9340.900⁵⁾	362
	45	25 A	600 V~	–	1.5 – 4	10	2	1	9340.910⁶⁾	362
OM support	55	25 A	600 V~	–	1.5 – 4	10	2	1	9340.930⁶⁾	362
	45	–	–	–	–	10	–	1	9340.260³⁾	368
	55	–	–	–	–	10	1	1	9340.270	368

Accessories

Connection pin	20	9340.280	401
Insert strip 10 mm	2	9340.290	400

¹⁾ AWG = American Wire Gauges
 AWG 12 = 3.31 mm² ± 4 mm²
 AWG 10 = 5.26 mm² ± 6 mm²
 AWG 8 = 8.37 mm² ± 10 mm²
 AWG 6 = 13.3 mm² ± 16 mm²

²⁾ Without support frame

³⁾ With pin block

⁴⁾ Without support frame, with insert strips

⁵⁾ With sub-unit and pin block

⁶⁾ With connector outlet



Circuit-breaker component adaptor (3-pole)

For feeder-circuits UL 508A, cUL[®] US LISTED, file E191125

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

Accessories

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

²⁾ Via M10 screw terminal

³⁾ ≥ 1 set



Circuit-breaker component adaptor (4-pole)

For feeder-circuits UL 508A, cUL^{US} LISTED, file E191125

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

¹⁾ 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:

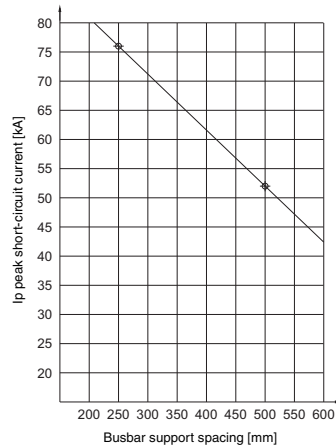
SV 9340.050 with 30 x 5/10 mm

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:

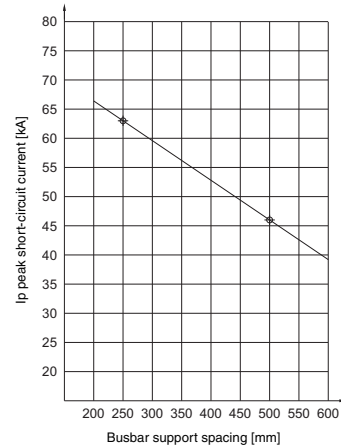
Support spacing mm	I_{RMS} kA
250	35
500	25

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:

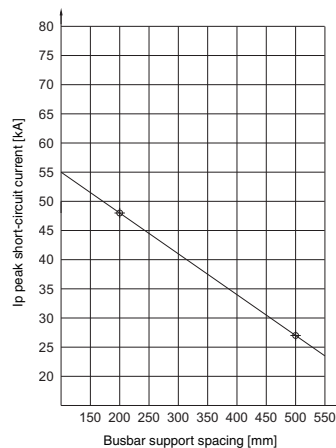
SV 9342.050 (PLS 1600)

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:

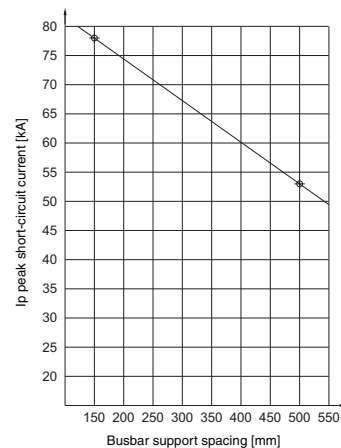
Support spacing mm	I_{RMS} kA
200	22
500	14

Model No. SV 9341.050 (PLS 800)



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

Model No. SV 9342.050 (PLS 1600)

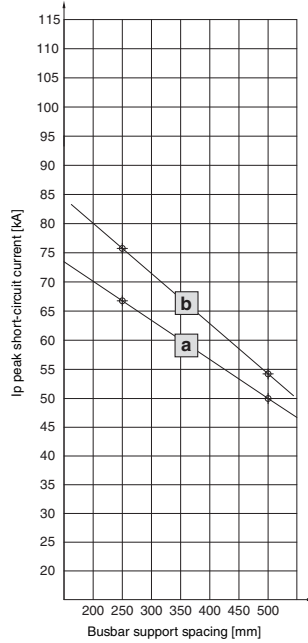


Short-circuit resistance diagrams

Busbar supports up to 700 A, 4-pole

Model No. SV 9340.004/SV 9342.014

60 mm bar centre distance



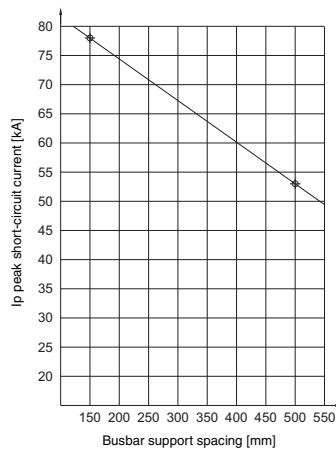
Settings I_{RMS} ($I_{eff.}$) of the test equipment without pre-fuse:

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

Rittal GmbH & Co. KG · Postfach 1662 · D-35726 Herborn
Telephone: +49(0)2772 505-0 · Telefax: +49(0)2772 505-2319 · eMail: info@rittal.de · www.rittal.com



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