summary

webnavigation

How to use the SCHURTER Range at a Glance Catalog

This SCHURTER catalog contains an overview of the company's entire product range in a handy quick-reference guide. It is intended to be used in combination with the SCHURTER website, where continuous updates are made to ensure the latest available product information.

Navigating the SCHURTER Range at a Glance Catalog to the Web

Navigating the SCHURTER catalog and the website is made easy because their look alike format. Use the SCHURTER Range at a Glance Catalog to identify your products of interest, the visit the mentioned URL to locate detailed technical information including .PDF files, approvals, CAD drawings and other related tools to aid your selection of SCHURTER products.

Quick Tour

Take a look at the example below, which is taken from a section of this SCHURTER catalog. Proceed with following steps:

1. Select product area of interest and specific type in the catalog
2. Go to the mentioned URL and select your preferred language
3. Select specific type, e.g. KFB1 to access detailed product information

Product Search

Take a look at the example below, which is taken from a section of this SCHURTER catalog. Proceed with following steps:
If you want to run a quick search, proceed with following steps:

1. Select product of interest
2. Go to www.schurter.com and enter by your region or country
3. From the drop down search box, select search by part no. or type
4. Enter specific type, e.g. KFB1 to access detailed product information

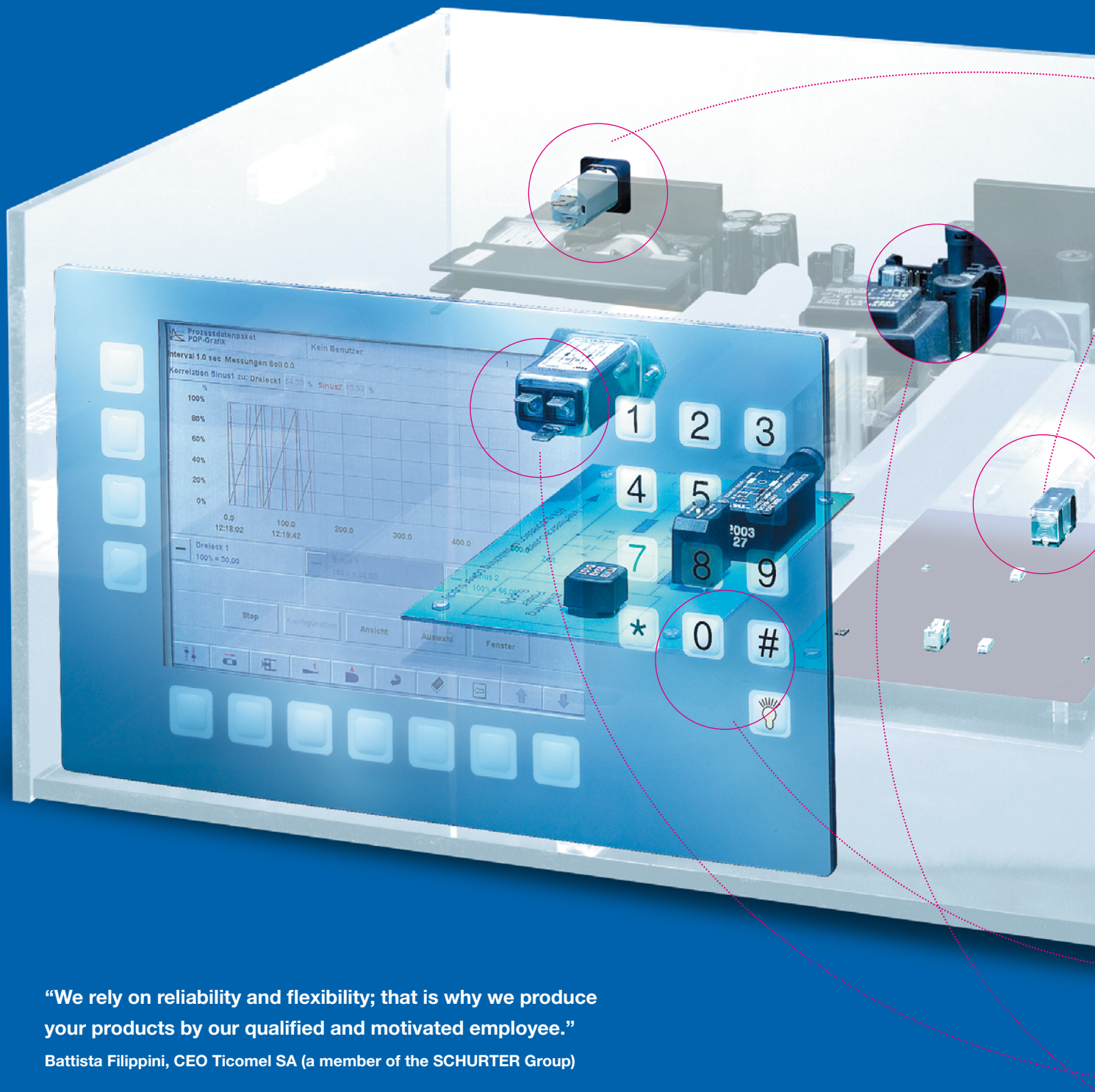
Product Selection by Attributes

If you want to compare different products on attribute base:

1. Select product area of interest and specific attributes
2. Go to the mentioned URL and select your preferred language
3. From the search area, select the relevant attribute instance
4. Select specific type based on comparison


www.schurter.com/pg01_2
SURFACE MOUNT FUSE
URL
(Catalog)
type
product of
interest
SCHURTER
ELECTRONIC COMPONENTS
Our Products
News
search by part number
or type
Products
Fuses
Resettable Fuses
Non Resettable Fuses
Telecom Fuses
Fuseholders
Fuseholder Blocks & Clips
Connectors
Circuit Breakers for Equipment
Input Systems
EMC Products
Other Products
New Products
Company
Services
Resettable Fuses
Indicated types: 1 - 9 of 9
Result Page: 1
Picture(s)
Type
Hold Current
Rated Voltage
I min
I max
U min
U max
Reset
New
Phase Out
(all)
PFDF
PFHT
PFMF
PFNF
PFRA
PFRX
PFRY
PFSM
PFUF
select product
of interest
UMT 250
Non Resettable Fuses
Rated Current
Rated Voltage
VAC
VDC
Breaking
Capacity
Characteristic
Style
USF 1206
RoHS
CHINA-RoHS
conform
Super-Quick-Acting FF
select instance
of interested attribute
Documents / References
Contact
safe&easy

safe&easy

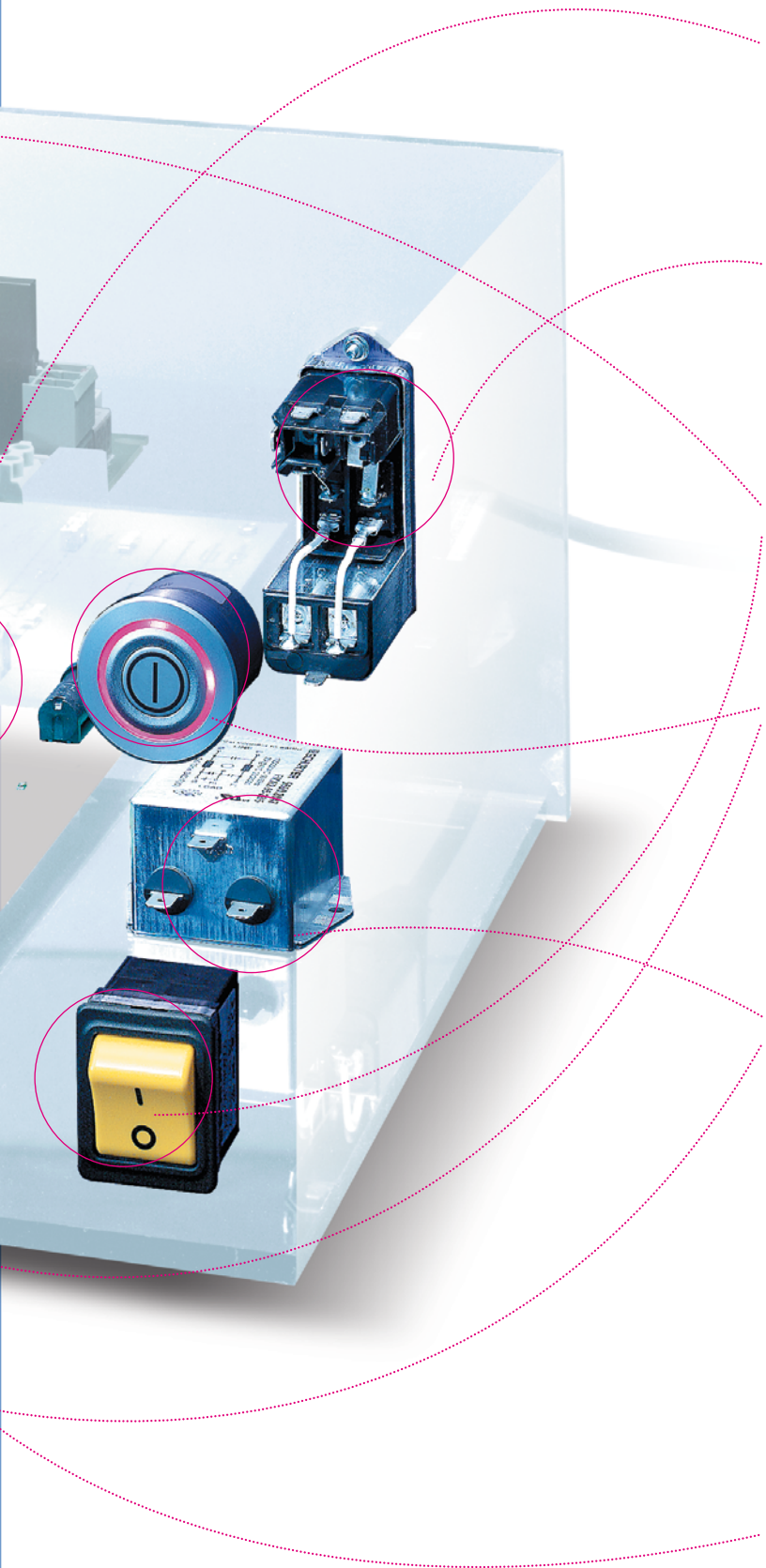


“We rely on reliability and flexibility; that is why we produce your products by our qualified and motivated employee.”

Battista Filippini, CEO Ticomel SA (a member of the SCHURTER Group)

> the Schurter Range at the Glance

SCHURTER is a progressive innovator and manufacturer of fuses, connectors, circuit breakers, input systems, EMC products and manufacturing services for the electronics industry. We focus on components that ensure safe supply of power and make the interface between human and machine easier.



fuses
non resettable fuses
telecom fuses
resettable fuses
fuseholders
fuseholders blocks & clips

connectors
power entry modules without line filter
power entry modules with line filter
appliance couplers
cord connectors (rewireable)
distribution units
cord sets

circuit breakers
thermal (t- and ta-line)
thermal-magnetic (tm- and as-line)
undervoltage protection
power entry modules with CBE

input systems
printmount switches
frontpanel switches
public transport switch
metal line switches
sensor switches
membrane keypads
sensor keypad
metal line keypads
touch panel / touch screen
housing systems and front panels

EMC products
power entry modules with line filter
1-phase line filters
3-phase line filters
chokes
pulse transformers
power stage driver modules

other products
voltage selector
test jacks & probes
indicators
data & signal, audio, dc/ din connectors

EMS
Electronic Manufacturing Services

the **components** of our **success**

A leader in many markets, a role model in every respect: For SCHURTER, success is based on more than just technological achievements. After all, it is the people here that make it possible to offer people elsewhere a maximum of advantages and security. The task we have assigned to ourselves therefore is clear: Let us establish an environment that facilitates and fosters human achievements – for the benefit of all.

Corporate Ethics
SCHURTER knows that an impeccable brand image can only be built on a foundation of rock-solid values. That is why we continuously optimize the quality of our products and services. We collaborate intensively with our customers and partners. And we take – perhaps our most demanding job – full responsibility for our actions towards our staff, society and the environment.

Quality
SCHURTER considers the quality of its products and services key factors for the continuing success of our company. We manage, monitor and further improve excellent processes with the aid of our management systems which we have established and certified in accordance with ISO 9001, ISO 14001, OHSAS 18001 and SA 8000 (for more information: www.schurter.ch). They confirm unequivocally that we take very personally and seriously issues such as quality assurance, process, environmental and human resources management and on-the-job safety as well as socially responsible and ethical behavior in management.

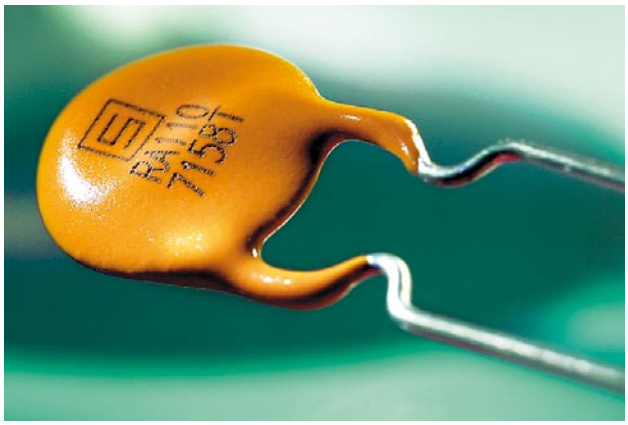
> Both now and in the future, our customers are guaranteed the best products worldwide; products which perfectly correspond to their individual needs. SCHURTER is permanently committed to the excellent quality of its products and business practices which are ecologically sound.

Hans-Rudolf Schurter, Schurter Holding AG

Research and Development
SCHURTER, being an innovator, manufacturer and leading supplier of electronic and electrical components, refuses to slow down. To be successful is our permanent incentive. We are used to meeting new challenges in the most diverse of markets each day. To boldly realizing new ideas, to supporting and driving forward our R&D teams, and to learning from our own successes and our customers' expectations.

Sales and Distribution
SCHURTER is an influential, globally active industrial partner. We are not only, thanks to our products, on the cutting edge of technology; we are, thanks to our distribution network, very close to the markets – with headquarters in Europe, the Americas and Asia as well as regional representatives in over 50 countries and about 200 distributors worldwide, all perfectly familiar with their local regulations, needs and peculiarities – making it a great deal easier for us to always have the best solutions ready for our customers.

Sustainability
SCHURTER didn't subscribe to this vision just yesterday. Also, we commit ourselves to it from points of view by far surpassing healthy long-term economic development and respect for the environment. Sustainability also determines our social commitment and our principles of leadership. It is so important to us, in fact, that we have dedicated an entire information brochure to it (we will gladly send you a copy). Let us join forces and work on a secure future, in every respect!

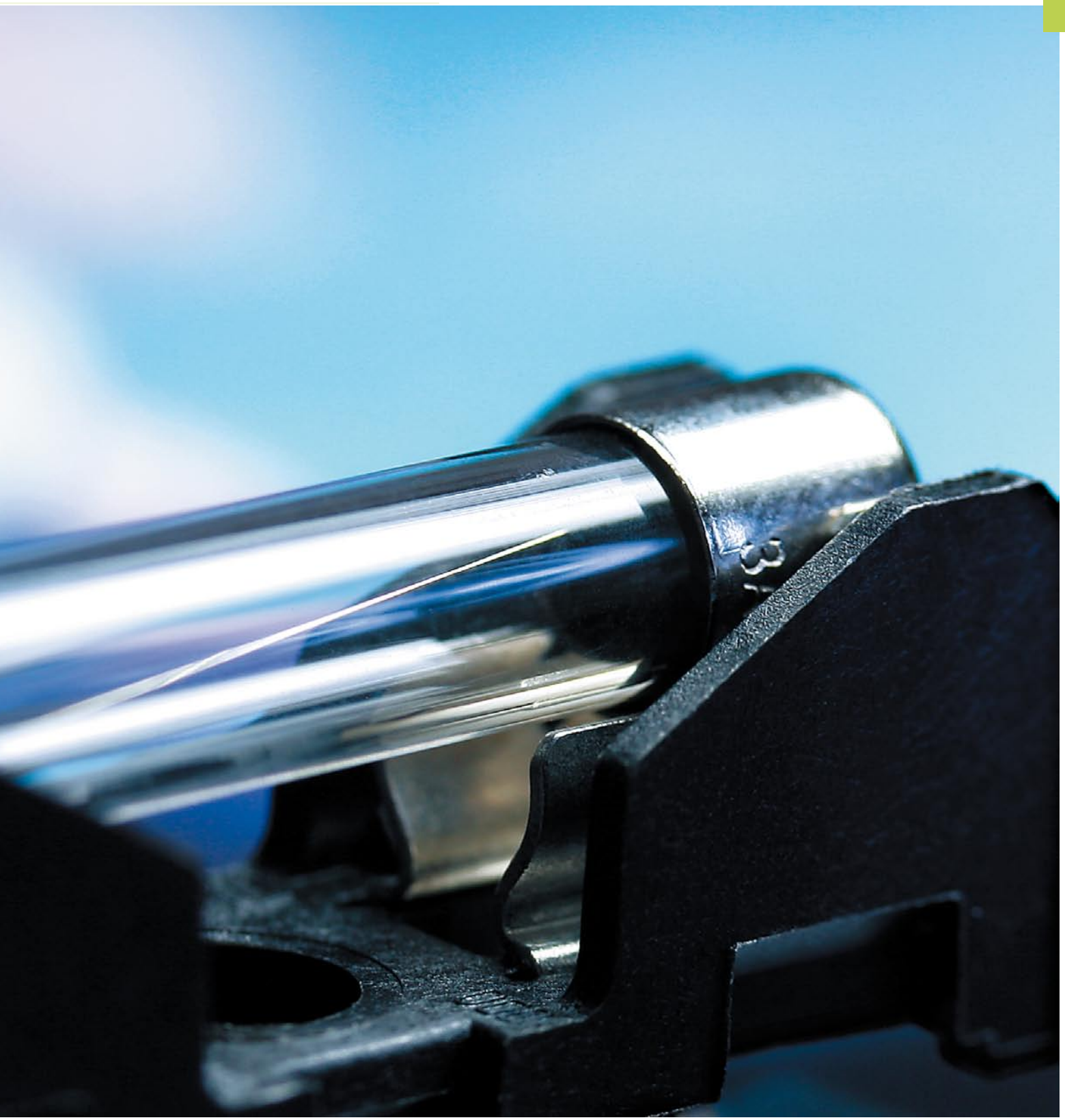


PFRA - Radial Leaded Resettable Fuse

UMZ 250 - SMD Fuse with Clip

FUA - Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm

fuses



	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	SURFACE MOUNT FUSE					
 new	Surface Mount Fuse, 1.05 x 0.55 mm, Super-Quick-Acting FF, 32 VDC cULus CCC	0.375 - 5A	Super-Quick-Acting FF	1.05 x 0.55 mm	- 32 VDC - 35A	**USF 0402**
	Surface Mount Fuse, 1.6 x 0.8 mm, Super-Quick-Acting FF, 32 VAC, 32 VDC cULus CCC	0.5 - 5A	Super-Quick-Acting FF	1.6 x 0.8 mm	- 32 VAC / 32 VDC - 50A	**USF 0603**
	Surface Mount Fuse, 3.2 x 1.6 mm, Super-Quick-Acting FF, 32 VAC, 63 VDC cULus CCC	0.375 - 4A	Super-Quick-Acting FF	3.2 x 1.6 mm	- 32 VAC / 63 VDC - 50A	**USF 1206**
 new	Surface Mount Fuse, 3.2 x 1.6 mm, Quick-Acting F, 32 VAC, 63 VDC cULus CCC	0.5 - 6.3A	Quick-Acting F	3.2 x 1.6 mm	- 32 VAC / 63 VDC - 63A	**USI 1206**
 new	SMD Fuse, 3.2 x 1.6 mm, Slow-Blow, 32 VAC, 63 VDC cULus	7 - 25A	Slow-Blow	3.2 x 1.6 mm	- 32 VAC / 63 VDC - 100 - 200A	**UST 1206**
	Surface Mount Fuse, 3.2 x 1.55 mm, Super-Quick-Acting FF, 125 VAC, 125 VDC, 150 °C cULus CCC	0.2 - 5A	Super-Quick-Acting FF	3.2 x 1.6 mm	- 125 VAC / 125 VDC - 50A	**MGA**
 new	Surface Mount Fuse for Space Application, ESCC Generic Specification No 4008	0.14 - 3.5A	Super-Quick-Acting FF	3.2 x 1.6 mm	- 125 VAC / 125 VDC - 50 - 300A	**MGA-S**
	Surface Mount Fuse, 10.1 x 3 mm, Time-Lag T, 250 VAC, 125 VDC UL cULus CCC	0.08 - 10A	Time-Lag T	10.1 x 3 mm	- 250 VAC / 125 VDC - 35 - 200A	**UMT 250**

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Surface Mount Fuse with Clip, 11.1 x 3.8 mm, Time-Lag T, UMZ 250 = UMT 250 (Au) + UMC 250	0.315 - 4A	Time-Lag T	11.1 x 3.8 mm	- 250 VAC / 125 VDC - 200 A	**UMZ 250**
new						
	Surface Mount Fuse, 7 x 2 mm, Quick-Acting F, 125 VAC, 125 VDC cULus	0.063 - 15A	Quick-Acting F	7 x 2 mm	- 125 VAC / 125 VDC - 300 A	**172876**
	Surface Mount Fuse, 7 x 2.54 mm, Quick-Acting F, 125 VAC, 125 VDC cULus	0.063 - 15A	Quick-Acting F	7 x 2.54 mm	- 125 VAC / 125 VDC - 300 A	**MKF**
	Surface Mount Fuse, 7 x 2 mm, Time-Lag T, 125 VAC, 125 VDC cULus	0.75 - 15A	Time-Lag T	7 x 2 mm	- 125 VAC / 125 VDC - 50 - 150 A	**MSB**
	Surface Mount Fuse, 7 x 2.54 mm, Time-Lag T, 125 VAC, 125 VDC cULus	2 - 15A	Time-Lag T	7 x 2.54 mm	- 125 VAC / 125 VDC - 50 - 150 A	**MKT**
	Surface Mount Fuse, 7.4 x 3.1 mm, Quick-Acting F, 63 VAC, 63 VDC cULus CCC	0.063 - 10A	Quick-Acting F	7.4 x 3.1 mm	- 63 VAC / 63 VDC - 50 A	**OMF 63**
	Surface Mount Fuse, 7 x 2 mm, Time-Lag T, 125 VAC, 125 VDC cULus	0.75 - 15A	Time-Lag T	7 x 2 mm	- 125 VAC / 125 VDC - 50 - 150 A	**MSB**
	Surface Mount Fuse with Holder, 12 x 5.2 mm, Quick-Acting F, 63 VAC, 63 VDC CCC	0.063 - 5A	Quick-Acting F	12 x 5.2 mm	- 63 VAC / 63 VDC - 50 A	**OMK 63**

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Surface Mount Fuse, 7.4 x 3.1 mm, Quick-Acting F, 125 VAC, 125 VDC cULus CCC	0.063 - 10A	Quick-Acting F	7.4 x 3.1 mm	- 125VAC / 125VDC - 100A	**OMF 125**
	Surface Mount Fuse with Holder, 12 x 5.2 mm, Quick-Acting F, 125 VAC, 125 VDC CCC	0.063 - 5A	Quick-Acting F	12 x 5.2 mm	- 125VAC / 125VDC - 100A	**OMK 125**
	Surface Mount Fuse, 7.4 x 3.1 mm, Time-Lag T, 125 VAC, 125 VDC cULus CCC	0.25 - 5A	Time-Lag T	7.4 x 3.1 mm	- 125VAC / 125VDC - 100A	**OMT 125**
	Surface Mount Fuse with Holder, 12 x 5.2 mm, Time-Lag T, 125 VAC, 125 VDC CCC	0.25 - 5A	Time-Lag T	12 x 5.2 mm	- 125VAC / 125VDC - 100A	**OMZ 125**
	Surface Mount Fuse, 11 x 4.6 mm, Quick-Acting F, 250 VAC, 250 DC CCC	0.25 - 4A	Quick-Acting F	11 x 4.6 mm	- 250VAC / 250VDC - 100A	**OMF 250**
	Surface Mount Fuse, 11 x 4.6 mm, Time-Lag T, 250 VAC cULus CCC	0.75 - 5A	Time-Lag T	11 x 4.6 mm	- 250VAC - 50 - 100A	**OMT**
	Surface Mount Fuse, 5 x 20 mm, Time-Lag T, L, 250 VAC, Au plating cULus VDE	0.05 - 20A	Time-Lag T	5 x 20 mm	- 250VAC - 35 - 125A	**SMD-FST**
	Surface Mount Fuse, 5 x 20 mm, Time-Lag T, H, 250 VAC, Au plating cULus VDE	1 - 16A	Time-Lag T	5 x 20 mm	- 250VAC - 500 - 1500A	**SMD-SPT**

Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
Surface Mount Fuse, 5 x 20 mm, Super-Time-Lag TT, L, 250 VAC, Au plating cULus	0.16 - 4A	Super-Time-Lag TT	5x20mm	- 250VAC - 35A	SMD-FTT

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Fuses page 168

UMZ 250: The Successful SMD Fuse UMT 250 with Clip Option

The clip model ensures that the equipment manufacturer must specify the fuse which must be used in case of fuse failure. The can have the following advantages:

- The electrical specification of the fuse is the same, no replacement by a low cost product
- Spare fuses can be sold for higher prices
- Manufacturer has control over the number of failures in the field

Good Products and Excellent Service

"It was not just that our power entry module meets tough demands, the customer also appreciated the good support from our logistics department."

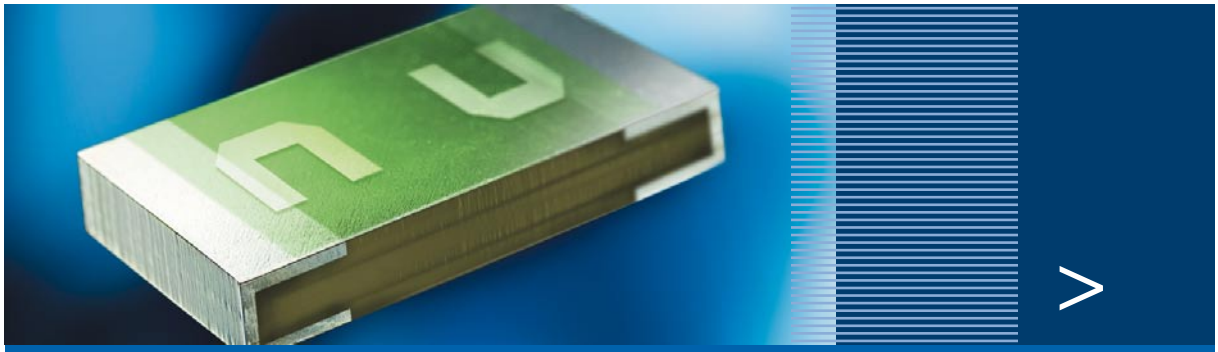
David Willems

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	SUBMINIATURE FUSE					
	Subminiature Fuse, 6.4 mm, Quick-Acting F, 125 VAC, 125 VDC	0.1 - 5A	Quick-Acting F	6.4 x 6.4 mm	- 125 VAC / 125 VDC - 100 A	MSF 125
	Subminiature Fuse, 8.5 mm, Quick-Acting F, 250 VAC, 250 VDC	0.04 - 5A	Quick-Acting F	8.5 x 8.5 mm	- 250 VAC - 35 A	MSF 250
	Subminiature Fuse, 8.5 mm, Time-Lag T, 250 VAC, 35 A	0.05 - 6.3A	Time-Lag T	8.5 x 8.5 mm	- 250 VAC - 35 - 63 A	MST 250
	Subminiature Fuse, 8.5 mm, Time-Lag T, 250 VAC, cULus	0.063 - 10A	Time-Lag T	8.5 x 8.5 mm	- 250 VAC - 50 A	MSTU 250
	Subminiature Fuse, 8.5 mm, Time-Lag T, 250 VAC, 100 A	0.8 - 10A	Time-Lag T	8.5 x 8.5 mm	- 250 VAC - 100 A	MXT 250
	Subminiature Fuse, 2.3 x 8 mm, Quick-Acting F, 125 VAC, 125 VDC	0.063 - 15A	Quick-Acting F	8 x 2.36 mm	- 125 VAC / 125 VDC - 300 A	172321
	Subminiature Fuse, 2.3 x 8 mm, Quick-Acting F, IEC, 125 VAC, 125 VDC	0.063 - 15A	Quick-Acting F	8 x 2.36 mm	- 125 VAC / 125 VDC - 50 - 300 A	172322
	Subminiature Fuse, 3.8 x 10 mm, Quick-Acting F, 250 VAC, 125 VDC	0.05 - 5A	Quick-Acting F	10 x 3.8 mm	- 250 VAC / 125 VDC - 50 - 300 A	172593

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Subminiature Fuse, 3.8 x 10 mm, Time-Lag T, 125 VAC, 125 VDC	0.125 - 10 A	Time-Lag T	10 x 3.8 mm	- 125 VAC / 125 VDC - 50 - 100 A	172844
	Subminiature Fuse, 3.6 x 10 mm, Time-lag T, 250 VAC	0.1 - 5 A	Time-Lag T	11 x 3.9 mm	- 250 VAC - 35 - 40 A	SPT 3.6x10

new

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Fuses page 168



USI 1206: First IEC Compliant Secondary Fuse with 1206 Footprint

The 1206 footprint [3.2x1.6 mm] becomes standard size for industrial applications in secondary overcurrent protection. The "Universal Modular Fuse UMF" has quick-acting characteristic according to IEC 60127-4 and allows to safe space on printed circuit boards and increases the density of components.

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	MINIATURE FUSE					
	Miniature Fuse, 5 x 20 mm, Quick-Acting F, L, 250 VAC	0.032 - 10A	Quick-Acting F	5x20 mm	- 250VAC - 35 - 100A	FSF 5x20
	Miniature Fuse with Pigtail, 5.4 x 22.5 mm, Quick-Acting F, L, 250 VAC	0.5 - 10A	Quick-Acting F	22.5x5.4 mm	- 250VAC - 35 - 100A	FSF 5x20 Pigtail
	Miniature Fuse, 5 x 20 mm, Time-Lag T, L, 250 VAC	0.02 - 20A	Time-Lag T	5x20 mm	- 250VAC - 35 - 200A	FST 5x20
	Miniature Fuse with Pigtail, 5.4 x 22.5 mm, Time-Lag T, L, 250 VAC	0.05 - 20A	Time-Lag T	22.5x5.4 mm	- 250VAC - 35 - 200A	FST 5x20 Pigtail
	Miniature Fuse, 5 x 20 mm, Quick-Acting F, H, 250 VAC	0.5 - 16A	Quick-Acting F	5x20 mm	- 250VAC - 500 - 1500A	SP 5x20
	Miniature Fuse with Pigtail, 5.4 x 22.5 mm, Quick-Acting F, H, 250 VAC	0.5 - 16A	Quick-Acting F	22.5x5.4 mm	- 250VAC - 500 - 1500A	SP 5x20 Pigtail
	Miniature Fuse, 5 x 20 mm, Time-Lag T, H, 250 VAC, UL: 115 V - 300 VDC	0.5 - 16A	Time-Lag T	5x20 mm	- 250VAC / 300VDC - 500 - 1500A	SPT 5x20
	Miniature Fuse with Pigtail, 5.4 x 22.5 mm, Time-Lag T, H, 250 VAC, UL: 115 - 300 VDC	0.5 - 16A	Time-Lag T	22.5x5.4 mm	- 250VAC / 300VDC - 500 - 1500A	SPT 5x20 Pigtail

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Miniature Fuse, 5 x 20 mm, Quick-Acting F, cULus, 250 VAC	0.05 - 6.3A	Quick-Acting F	5x20mm	- 250VAC - 32 - 10kA	FSK 5x20
	Miniature Fuse with Pigtail, 5.4 x 22.5 mm, Quick-Acting F, cULus, 250 VAC	0.05 - 6.3A	Quick-Acting F	22.5x5.4mm	- 250VAC - 32 - 10kA	FSK 5x20 Pigtail
	Miniature Fuse, 5 x 20 mm, Time-Lag T, cULus, 250 VAC	0.08 - 3A	Time-Lag T	5x20mm	- 250VAC - 35 - 10kA	FSL 5x20
	Miniature Fuse with Pigtail, 5.4 x 22.5 mm, Time-Lag T, cULus, 250 VAC	0.08 - 3A	Time-Lag T	22.5x5.4mm	- 250VAC - 35 - 10kA	FSL 5x20 Pigtail
	Miniature Fuse, 5 x 20 mm, Super-Quick-Acting FF, 250 VAC	1.6 - 10A	Super-Quick-Acting FF	5x20mm	- 250VAC - 1500A	SA 5x20
	Miniature Fuse, 5 x 20 mm, Medium-Time-Lag M, 250 VAC	0.315 - 10A	Medium-Time-Lag M	5x20mm	- 250VAC - 80 - 1000A	FSM 5x20
	Miniature Fuse, 5 x 20 mm, Super-Time-Lag TT, 250 VAC	0.063 - 4A	Super-Time-Lag TT	5x20mm	- 250VAC - 35A	FTT 5x20
	Miniature Fuse, 5 x 20 mm, Quick-Acting F, NF, 220 VAC	0.02 - 20A	Quick-Acting F	5x20mm	- 220VAC - 60 - 300A	D1

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Miniature Fuse, 5 x 20 mm, Super-Time-Lag TT, NF, 220 VAC	0.031 - 15A	Super-Time-Lag TT	5x20mm	- 220VAC - 40 - 100A	**D1TD**
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, 250 VAC	0.1 - 10A	Quick-Acting F	6.3x32mm	- 250VAC - 35 - 100A	**FSF 6.3x32**
	Miniature Fuse, 6.3 x 32 mm, Time-Lag T, 250 VAC	0.02 - 20A	Time-Lag T	6.3x32mm	- 250VAC - 35 - 200A	**FST 6.3x32**
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, Sand, 250 VAC	0.5 - 20A	Quick-Acting F	6.3x32mm	- 250VAC - 1000 - 1500A	**SP 6.3x32**
	Miniature Fuse, 6.3 x 32 mm, Time-Lag T, Sand, 250 VAC	0.5 - 32A	Time-Lag T	6.3x32mm	- 250VAC - 1000 - 1500A	**SPT 6.3x32**
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, UL, 250 VAC	0.1 - 15A	Quick-Acting F	6.3x32mm	- 250VAC - 200 - 10kA	**FSF 6.3x32 (UL)**
	Miniature Fuse, 6.3 x 32 mm, Time-Lag T, UL, 250 VAC	0.63 - 15A	Time-Lag T	6.3x32mm	- 250VAC - 35 - 10kA	**FST 6.3x32 (UL)**
	Miniature Fuse, 6.3 x 32 mm, Super-Quick-Acting FF, 250 VAC	1.6 - 16A	Super-Quick-Acting FF	6.3x32mm	- 250VAC - 1500A	**SA 6.3x32**

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, NNO, 220 VAC	0.04 - 20A	Quick-Acting F	6.3x32mm	- 220VAC - 100 - 500A	D8
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, 125 VAC, 125 VDC	0.16 - 6.3A	Quick-Acting F	6.3x32mm	- 125VAC / 125VDC - 5kA	D8M 125V
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, 10 A, 125 VAC, 125 VDC	10A	Quick-Acting F	6.3x32mm	- 125VAC / 125VDC - 5kA	A12M 125V
	Miniature Fuse, 6.3 x 32 mm, Super-Time-Lag TT, NNO, 220 VAC	0.012 - 30A	Super-Time-Lag TT	6.3x32mm	- 220VAC - 100A	D8TD
	Miniature Fuse, 6.3 x 32 mm, Super-Quick-Acting FF, 250 VAC	0.1 - 16A	Super-Quick-Acting FF	6.3x32mm	- 250VAC - 200kA	A12FA 250V
	Miniature Fuse, 6.3 x 32 mm, Super-Quick-Acting FF, 380 VAC	0.1 - 12.5A	Super-Quick-Acting FF	6.3x32mm	- 380VAC - 150kA	A12FA 380V
	Miniature Fuse, 6.3 x 32 mm, Super-Quick-Acting FF, 500 VAC	0.1 - 12.5A	Super-Quick-Acting FF	6.3x32mm	- 500VAC - 10 - 150kA	A12FA 500V
	Miniature Fuse, 6.3 x 32 mm, Super-Quick-Acting FF, 660 VAC	0.1 - 2A	Super-Quick-Acting FF	6.3x32mm	- 660VAC - 30kA	A12FA 660V

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, UL, NNO, 250 VAC	0.125 - 25A	Quick-Acting F	6.3 x 32 mm	- 250 VAC - 35 - 10 kA	A12BK
	Miniature Fuse, 6.3 x 32 mm, Time-Lag T, UL, NNO, 250 VAC	0.125 - 20A	Time-Lag T	6.3 x 32 mm	- 250 VAC - 35 - 10 kA	172600
	Miniature Fuse, 6.3 x 32 mm, Quick-Acting F, GAM T1, 250 VAC, 125 VDC	0.16 - 20A	Quick-Acting F	6.3 x 32 mm	- 250 VAC / 125 VDC - 1 - 10 kA	172582
	Miniature Fuse, 6.3 x 32 mm, Time-Lag T, GAM T1, 1.25 A, 220 VAC, 125 VDC	0.16 - 1.25A	Time-Lag T	6.3 x 32 mm	- 220 VAC / 125 VDC - 50A	D8STTD
	Miniature Fuse, 6.3 x 32 mm, Time-Lag T, GAM T1, 30 A, 220 VAC, 125 VDC	1.6 - 30A	Time-Lag T	6.3 x 32 mm	- 220 VAC / 125 VDC - 100A	A12TD
	Miniature Fuse, 4.7 x 16 mm, 125 VAC	0.063 - 10A	Quick-Acting F	4.7 x 16 mm	- 125 VAC - 35A	D0
	Miniature Fuse, 10.3 x 38 mm, Quick-Acting F, UL, 300 VAC	0.125 - 50A	Quick-Acting F	10.3 x 38 mm	- 300 VAC - 10000A	A3BK
	Miniature Fuse, 10.3 x 38 mm, Quick-Acting F, 250 VAC	0.4 - 30A	Quick-Acting F	10.3 x 38 mm	- 250 VAC - 100 - 4000A	D20K

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	Miniature Fuse, 10.3 x 38 mm, Super-Time-Lag TT, 250 VAC	0.2 - 50A	Super-Time-Lag TT	10.3 x 38 mm	- 250 VAC - 300 - 500 A	**D20TD**
	Miniature Fuse, 10.3 x 38 mm, gG, 500 VAC	0.5 - 32A	-	10.3 x 38 mm	- 500 VAC - 120 kA	**A10 gG**
	Miniature Fuse, 10.3 x 38 mm, aM, 500 VAC	0.16 - 32A	-	10.3 x 38 mm	- 500 VAC - 120 kA	**A10 aM**
	SPECIAL FUSE					
	Special Fuse, 14 x 50 mm Quick-Acting F, 500 VAC, 250 VDC	0.5 - 40A	Quick-Acting F	14 x 50 mm	- 500 VAC / 250 VDC - 10 - 100 kA	**MA**
	Special Fuse, 14.3 x 51 mm, 500 VAC, 250 VDC	1 - 25A	-	14.3 x 51 mm	- 500 VAC / 250 VDC - 100 kA	**MADM**

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Fuses page 168

Use experience for development

Achievements we gain through SIX SIGMA, are measurable. We secure new knowledge, new awareness and experience, by involving others.

	Description Approvals	Rated Current	Characteristic	Dimensions	Rated Voltage Breaking Capacity	Web Reference or Type
	SURFACE MOUNT FUSE					
	Surface Mount Fuse, 10.1 x 3.22 mm, Time-Lag T, Telecom cULus CCC	0.5 - 2A	Time-Lag T	10.1 x 3.22 mm	- 600 VAC / 125 VDC - 60 A	**TF 600**
	Surface Mount Fuse, 7.4 x 3.1 mm, Quick-Acting F, Telecom cULus CCC	0.25 - 3.15A	Quick-Acting F	7.4 x 3.1 mm	- 125 VAC / 125 VDC - 100 A	**OSU 125**
	Surface Mount Fuse, 11 x 4.6 mm, Quick-Acting F, Telecom cULus SP VDE CCC	0.25 - 3.15A	Quick-Acting F	11 x 4.6 mm	- 250 VAC / 250 VDC - 100 A	**OSU 250**
	SUBMINIATURE FUSE					
	Subminiature Fuse, 6.4 mm, Quick-Acting F, Telecom cULus CCC	0.25 - 3.15A	Quick-Acting F	6.4 x 6.4 mm	- 125 VAC / 125 VDC - 300 A	**MSU 125**
	Subminiature Fuse, 8.5 mm, Time-Lag T, Telecom cULus VDE	0.25 - 3.15A	Time-Lag T	8.5 x 8.5 mm	- 250 VAC - 35 A	**MSU 250**
	MINIATURE FUSE					
	Miniature Fuse, 5 x 20 mm, Time-Lag T, Telecom, L, 250 VAC cULus VDE	0.25 - 3.15A	Time-Lag T	5 x 20 mm	- 250 VAC - 35 A	**FSU 5x20**
	Miniature Fuse, 5 x 20 mm, Time-Lag T, Telecom, H, 250 VAC cULus VDE SP	0.25 - 3.15A	Time-Lag T	5 x 20 mm	- 250 VAC - 1500 A	**SSU 5x20**

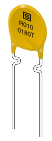
For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Fuses page 168

TF 600: Fuse for Telecommunication Applications (Tip&Ring)

The fuse meets all important telecommunications stanards like Telcordia GR-1089, ITU-T K.20 and K.21, UL/IEC 60950 and TIA-968-A and fits very well for applications like analog linecards, modems and office equipments.

SIX SIGMA uses process output

We base our decisions on data and facts. We identify the needs of our customers, measure process output, analyse results and take corrective action.

	Description Approvals	Dimensions	I hold	V max	Teperature	Web Reference or Type
	SURFACE MOUNT FUSE					
	Surface Mount Fuse, PTC, 1206 footprint, 3.2 x 1.6 mm, 30 VDC	3.2 x 1.6 mm	0.12 - 2A	6.0 - 30.0 VDC	-40 to 85 °C	PFNF
 new	Surface Mount Fuse, PTC, 1210 footprint, 3.2 x 2.6 mm, 30 VDC	3.2 x 2.6 mm	0.05 - 1.5A	6.0 - 30.0 VDC	-40 to 85 °C	PFUF
	Surface Mount Fuse, PTC, 1812 footprint, 4.6 x 3.2 mm, 60 VDC	4.6 x 3.2 mm	0.1 - 2.6A	6.0 - 60.0 VDC	-40 to 85 °C	PFMF
 new	Surface Mount Fuse, PTC, 2018 footprint, 5.1 x 4.6 mm, 60 VDC	5.1 x 4.6 mm	0.55A	60.0 VDC	-40 to 85 °C	PFDF
	Surface Mount Fuse, PTC, 2029 or 3425 footprint, 60 VDC	-	0.3 - 2.6A	6.0 - 60.0 VDC	-40 to 85 °C	PFSM
 new	Surface Mount Fuse, PTC, 2029 or 3425 footprint, 16 VDC, up to 125 °C	-	1.36 - 1.6A	16.0 VDC	-40 to 125 °C	PFHT
	RADIAL LEADED PTC-FUSE					
	Radial Leaded Fuse, PTC, 60 VDC	-	0.1 - 11A	16.0 - 60.0 VDC	-40 to 85 °C	PFRA
 new	Radial Leaded Fuse, PTC, 72 VDC	-	1.1 - 3.75A	72.0 VDC	-40 to 85 °C	PFRY

General Product Information see PTC-Circuit Protection page 176

Resettables PTC's for Overcurrent and Overtemperature Protection

PTC Fuses are available as SMD or THT components and cover most of the requirements of industrial applications.

Mission Statement

SCHURTER fulfills the most stringent requirements, thanks to its comprehensive quality, environment and personnel management systems according to ISO 9001, ISO 14001, OHSAS 18001, SIX SIGMA and EFQM.

	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	FUSE-LINK 5 X 20 MM					
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/ Fingergrip, IP 40 / IP 67, IEC 60335-1	- Panel Mount - Front-Side - IP 40 / IP 67	5 x 20 mm	- 10 A / 16 A - 250 VAC	2.5 W / 10 A	FPG1
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/ Fingergrip, Rear-Side, IP 40 / IP 67, IEC 60335-1	- Panel Mount - Rear-Side - IP 40 / IP 67	5 x 20 mm	- 10 A / 16 A - 250 VAC	2.5 W / 10 A	FPG2
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/ Fingergrip, IP 40 / IP 54	- Panel Mount - Front-Side - IP 40 / IP 54	5 x 20 mm	- 10 A / 10 A - 250 VAC	4 W / 10 A	FEF
	Shock-Safe Fuseholder, 5 x 20 mm, Slot, IP 40 / IP 65	- Panel Mount - Front-Side - IP 40 / IP 65	5 x 20 mm	- 10 A / 10 A - 250 VAC	2.5 W / 10 A	FIO
	Shock-Safe Fuseholder, 5 x 20 mm, Slot, IP 67	- Panel Mount - Front-Side - IP 67	5 x 20 mm	- 10 A / 10 A - 250 VAC	2.5 W / 10 A	FIN
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/ Fingergrip, PC3, medical	- Panel Mount - Front-Side - IP 40	5 x 20 mm	- 10 A / 10 A - 250 VAC	2.5 W / 10 A	FBS1
	Shock-Safe Fuseholder, 5 x 20 mm, Slot, 4 W / 16 A, IP 40 / IP 67	- Panel Mount - Front-Side - IP 40 / IP 67	5 x 20 mm	- 16 A / 30 A - 250 VAC	4 W / 16 A	FIZ
	Shock-Safe Fuseholder, 5 x 20 mm, Fingergrip, Rear-Side, NF, IP 40 / IP 67	- Panel Mount - Rear-Side - IP 40 / IP 67	5 x 20 mm	- 6.3 A - 250 VAC	1.5 W / 6.3 A	23316P

	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	Shock-Safe Fuseholder, 5 x 20 mm, Fingergrip, Solder	- Panel Mount - Front-Side - IP 40	5 x 20 mm	- 6.3A - 250 VAC	1.3 W	231411
	Shock-Safe Fuseholder, 5 x 20 mm, Fingergrip, NF	- Panel Mount - Front-Side - IP 68	5 x 20 mm	- 6.3A - 250 VAC	3.4 W / 6.3 A	231529P
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/ Fingergrip, Snap stepless, 1.0 - 3.0 mm, IEC 60335-1	- Panel Mount - Front-Side - IP 40	5 x 20 mm	- 10 A / 16 A - 250 VAC	2.5 W / 10 A	FPG3
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/ Fingergrip, Snap Stepless, 0.75 - 3.0 mm	- Panel Mount - Front-Side - IP 40	5 x 20 mm	- 10 A / 10 A - 250 VAC	4 W / 10 A	FEF (Snap)
	Shock-Safe Fuseholder, 5 x 20 mm, Slot, Press, IEC 60335-1	- Panel Mount - Front-Side - IP 40	5 x 20 mm	- 10 A / 16 A - 250 VAC	2.5 W / 10 A	FPG6
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/ Fingergrip, vertical, IEC 60335-1	- PCB - IP 40	5 x 20 mm	- 10 A / 16 A - 250 VAC	2.5 W / 10 A	FPG4
	Shock-Safe Fuseholder, 5 x 20 mm, Slot, vertical, IP 40 / IP 54	- PCB - IP 40 / IP 54	5 x 20 mm	- 6.3 A / 12 A - 250 VAC	2 W / 6.3 A	FAF
	Shock-Safe Fuseholder, 5 x 20 mm, Fingergrip, vertical, PC1	- PCB - IP 40	5 x 20 mm	- 6.3 A - 250 VAC	1.6 W / 6.3 A	FAP

	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	Shock-Safe Fuseholder, 5 x 20 mm, Fingergrip, horizontal oder vertical	- PCB - IP 00	5 x 20 mm	- 10 A - 250 VAC/DC	1.3 W / 10 A	231409
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/Fingergrip, horizontal, IEC 60335-1	- PCB - IP 40	5 x 20 mm	- 10 A / 16 A - 250 VAC	2.5 W / 10 A	FPG5
	Shock-Safe Fuseholder, 5 x 20 mm, Slot/Fingergrip, horizontal, PC3, medical	- PCB - IP 40	5 x 20 mm	- 10 A / 10 A - 250 VAC	2.5 W / 10 A	FBS2
	Shock-Safe Fuseholder, 5 x 20 mm, Slot, horizontal	- PCB - IP 40	5 x 20 mm	- 10 A / 12 A - 250 VAC	2W / 10 A	FAB
	Shock-Safe Fuseholder, 5 x 20 mm, Fingergrip, horizontal, PC1	- PCB - IP 40	5 x 20 mm	- 6.3 A - 400 VAC	1.6 W / 6.3 A	FAS
	Shock-Safe Fuseholder, 5 x 20 mm, horizontal, Slot/Fingergrip, SMD, IEC 60335-1	- PCB - IP 40	5 x 20 mm	- 10 A / 16 A - 250 VAC	2.5 W / 10 A	FPG7
	FUSE-LINK 6.3 X 32 MM					
	Shock-Safe Fuseholder, 6.3 x 32 mm, Fingergrip, Rear-Side, NF	- Panel Mount - Rear-Side - IP 40 / IP 67	6.3 x 32 mm	- 10 A / 10 A - 250 VAC	2.5 W / 10 A	23312P
	Shock-Safe Fuseholder, 6.3 x 32 mm, Fingergrip, Rear-Side, grau	- Panel Mount - Rear-Side - IP 67	6.3 x 32 mm	- 10 A - 250 VAC	2.5 W / 10 A	23463P

	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	Shock-Safe Fuseholder, 6.3 x 32 mm, NF, Fingergrip, IP 68	- Panel Mount - Front-Side - IP 68	6.3 x 32 mm	- 16A - 250 VAC	3.6 W / 16A	231549P
	FUSE-LINK 5 X 20 OR 6.3 X 32 MM					
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot	- Panel Mount - Front-Side - IP 40	5 x 20 or 6.3 x 32 mm	- 10A / 20A - 250 VAC	4 W / 10A	FEU
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot, Medical	- Panel Mount - Front-Side - IP 40	5 x 20 or 6.3 x 32 mm	- 10A / 20A - 250 VAC	4 W / 10A	FEU (Med)
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Fingergrip	- Panel Mount - Front-Side - IP 40	5 x 20 or 6.3 x 32 mm	- 10A / 20A - 250 VAC	4 W / 10A	FEU (Grip)
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot Knob/Fingergrip, IEC: 500 VAC, UL/CSA: 250 VAC	- Panel Mount - Front-Side - IP 40	5 x 20 or 6.3 x 32 mm	- 10A / 20A - 500 VAC / 250 VAC	4 W / 10A	FEC
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot Knob, 4 W / 16 A, IEC: 500 VAC, UL/CSA: 250 VAC	- Panel Mount - Front-Side - IP 40 / IP 67	5 x 20 or 6.3 x 32 mm	- 16A / 30A - 500 VAC / 250 VAC	4 W / 16A	FUL
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Fingergrip, EMI/RFI	- Panel Mount - Front-Side - IP 68	5 x 20 or 6.3 x 32 mm	- 16A / 6.3A - 250 VAC	3.5 W / 16A	231702
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot, vertical	- PCB - IP 40	5 x 20 or 6.3 x 32 mm	- 10A / 16A - 250 VAC	3.2 W / 10A	FAC

	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
 new	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot Knob, vertical, 4 W / 16 A, IEC: 500 VAC, UL/CSA: 250 VAC	- PCB - IP 40	5 x 20 or 6.3 x 32 mm	- 16 A / 30 A - 500 VAC / 250 VAC	4 W / 16 A	FUA
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot, horizontal	- PCB - IP 40	5 x 20 or 6.3 x 32 mm	- 10 A / 16 A - 250 VAC	3.2 W / 10 A	FAU
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Fingergrip, horizontal	- PCB - IP 40	5 x 20 or 6.3 x 32 mm	- 16 A - 250 VAC	-	231618
	Shock-Safe Fuseholder, 5 x 20 / 6.3 x 32 mm, Slot Knob, horizontal, 4 W / 16 A, IEC: 500 VAC, UL/CSA: 250 VAC	- PCB - IP 40	5 x 20 or 6.3 x 32 mm	- 16 A / 30 A - 500 VAC / 250 VAC	4 W / 16 A	FUP
FUSE-LINK 4.7 X 16 MM						
	Shock-Safe Fuseholder, 4.7 x 16 mm, Fingergrip, Rear-Side	- Panel Mount - Rear-Side - IP 67	4.7 x 16 mm	- 5 A - 250 VAC	1 W / 5 A	231600P
FUSE-LINK 10.3 X 38 MM						
	Shock-Safe Fuseholder, 10.3 x 38 mm, Fingergrip	- Panel Mount - Front-Side - IP 40 / IP 67	10.3 x 38 mm	- 25 A - 600 VAC	4.5 W / 25 A	23530P

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Fuseholders page 177

FUP: High Current Shock-Safe Fuseholder for Three-Phase Applications

With the FUP/FUA fuseholder series offer SCHURTER a product with rated power acceptance to 4 W / 16 A and a rated voltage of 500 VAC according IEC. There is no other product on the market with a such outstanding electrical performance.

A market leader s statement

With the development, production and sales of active and passive components for electronic and electromechanical applications SCHURTER is a leading global industry partner. The SCHURTER Group leads the way in its four strategic business areas, using its innovative strength and cutting- edge technology to provide customers with intelligent practical solutions.

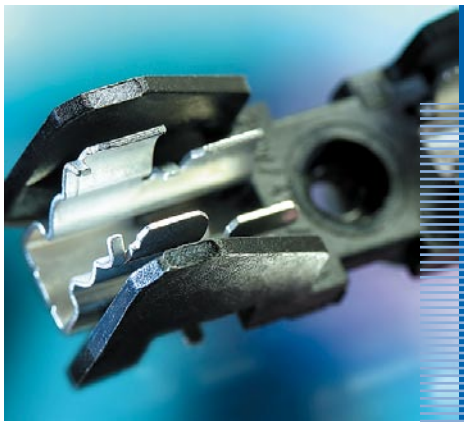
	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	FUSE-LINK 5 X 20 MM					
	Fuseholder Open Design, 5 x 20 mm, THT, var. Covers, IEC 60335-1	- PCB - IP 00 / IP 20	5 x 20 mm	- 10 A / 10 A - 250 VAC	4 W / 10 A	**OGN**
	Fuseholder Open Design, 5 x 20 mm, SMD, var. Covers, IEC 60335-1	- PCB - IP 00 / IP 20	5 x 20 mm	- 10 A / 10 A - 250 VAC	4 W / 10 A	**OGN-SMD**
	Fuseholder Open Design, 5 x 20 mm, THT, Cover	- PCB - IP 00	5 x 20 mm	- 10 A - 250 VAC	2.5 W / 10 A	**OG (Holder) 5x20**
	Fuseholder Open Design, 5 x 20 mm, Solder, Cover	- Screw - IP 00	5 x 20 mm	- 10 A - 250 VAC	3.2 W / 10 A	**UH**
	Fuseholder Open Design, 5 x 20 mm, Solder, transparent, Cover	- Screw - IP 00	5 x 20 mm	- 6.3 A - 250 VAC	3.2 W / 4 A	**UHB**
	FUSE-LINK 6.3 X 32 MM					
	Fuseholder Open Design, 6.3 x 32 mm, THT	- PCB - IP 00	6.3 x 32 mm	- 16 A - 250 VAC	2.5 W / 10 A	**OG (Holder) 6.3x32**
	Fuseholder Open Design, 6.3 x 32 mm, Solder	- Screw - IP 00	6.3 x 32 mm	- 16 A - 250 VAC	3.2 W / 10 A	**RSH**
	Fuseholder Open Design, 6.3 x 32 mm, Screw Clamp, grey	- Screw - IP 00	6.3 x 32 mm	- 16 A - 250 VAC	3.5 W / 16 A	**23748B**

	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	Fuseholder Open Design, 6.3 x 32 mm, Screw Clamp	- Screw - IP 00	6.3 x 32 mm	- 16 A - 250 VAC	3.5 W / 16 A	**23211B**
	FUSE-LINK 5 X 20 OR 6.3 X 32 MM					
	Fuseholder Open Design, 5 x 20 / 6.3 x 32 mm, THT, IEC: 500 VAC, UL/ CSA: 250 VAC, Cover, IEC 60335-1	- PCB - IP 00 / IP 20	5 x 20 or 6.3 x 32 mm	- 10 A / 16 A - 500 VAC / 250 VAC	4 W / 10 A	**OGD**
	Fuseholder Open Design, 5 x 20 / 6.3 x 32 mm, SMD, IEC: 500 VAC, UL/CSA: 250 VAC, Cover, IEC 60355-1	- PCB - IP 00 / IP 20	5 x 20 or 6.3 x 32 mm	- 10 A / 16 A - 500 VAC / 250 VAC	4 W / 10 A	**OGD-SMD**
	FUSE-LINK 10.3 X 38 MM					
	Fuseholder Open Design, 10.3 x 38 mm, Screw Clamp	- Screw - IP 00 / IP 20	10.3 x 38 mm	- 30 A - 500 VAC	3.6 W / 30 A	**23351B**
	FUSE-LINK 14.3 X 51 MM					
	Fuseholder Open Design, 14.3 x 51 mm, Screw Clamp	- Screw - IP 00	14.3 x 51 mm	- 40 A - 500 VAC	4 W / 40 A	**23162**
	Fuseholder Open Design, 14.3 x 51 mm, Screw Clamp, red	- Screw - IP 00	14.3 x 51 mm	- 50 A - 380 VAC/DC	5 W / 50 A	**231756R**
	FUSE-LINK 5 X 20 MM					
	Clip, 5 x 20 mm, UR, Cover	- PCB - IP 00	5 x 20 mm	- 6.3 A - 250 VAC	-	**OG (Clip) 5x20**

	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	Clip, 5 x 20 mm, Version 1	- PCB - IP 00	5 x 20 mm	- 6.3 A - 250 VAC	-	CQM
	Clip, 5 x 20 mm, Version 2	- PCB - IP 00	5 x 20 mm	- 6.3 A - 250 VAC	-	231828
	Clip, 5 x 20 mm, Version 3	- PCB - IP 00	5 x 20 mm	- 6.3 A - 250 VAC	-	231683
	FUSE-LINK 6.3 X 32 MM					
	Clip, 6.3 x 32 mm	- PCB - IP 00	6.3 x 32 mm	- 10 A - 250 VAC	-	231685
	FUSE-LINK 5 X 20 OR 6.3 X 32 MM					
	Clip, 5 x 20 / 6.3 x 32 mm, UR	- PCB - IP 00	5 x 20 or 6.3 x 32 mm	- 16 A - 500 VAC	2.5 W / 10 A	OG (Clip) 5x20 / 6.3x32
	FUSE-LINK 10.3 X 38 MM					
	Clip, 5 x 20 mm, 10.3 x 38 mm, UR	- PCB - IP 00	10.3 x 38 mm	20 A	-	231660
	FUSE-LINK 2 X 7 MM					
	Fuseholder Open Design, Holder for MSB and 172876, SMD	- PCB - IP 00	2 x 7 mm	125 VAC/DC	0.9 W	231787

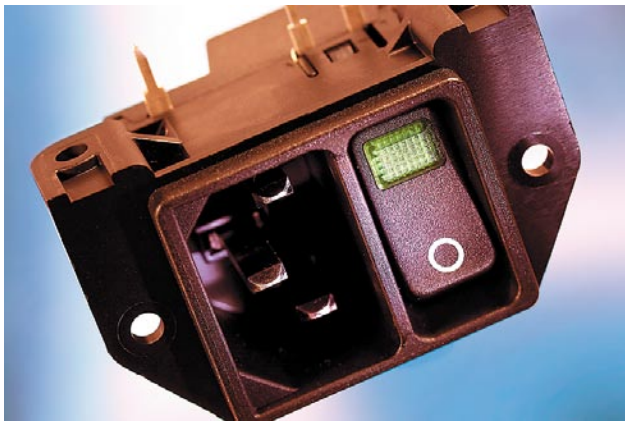
	Description Approvals	Mounting Style Mounting Side IP-Protection Class	Fuse-Link	Rated Current Rated Voltage IEC/ UL	Power Acceptance	Web Reference or Type
	Fuseholder Open Design, Holder for MSB and 172876, THT	- PCB - IP 00	2 x 7 mm	125 VAC/DC	0.9 W	231786
	FUSE-LINK OMX 63/125 FUSE					
	Fuseholder Open Design, Holder for OMF 63, OMF 125 and OMT 125, SMD	- PCB - IP 00	OMx 63/125 Fuse	- 5 A - 125 VAC	-	OMH 125
	FUSE-LINK MICROFUSE 125 V					
	Fuseholder Open Design, Holder for MSF 125, vertical, THT	- PCB - IP 40	Microfuse 125 V	- 5 A - 125 VAC	-	FMS (125V)
	Fuseholder Open Design, Holder for MSF 125, horizontal, THT	- PCB - IP 40	Microfuse 125 V	- 5 A - 125 VAC	-	FMR
	FUSE-LINK MICROFUSE 250 V					
	Fuseholder Open Design, Holder for MSx 250, THT	- PCB - IP 30	Microfuse 250 V	- 6.3 A - 250 VAC	-	FMS (250V)

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Fuseholders page 177



> OGD: Fuse Blocks with Dual Clip

The fuse block holds dual fuse clips and accepts either 5x20 mm or 6.3x32 mm fuse-links. This allows customers to cover two fuse standard sizes with one single product.

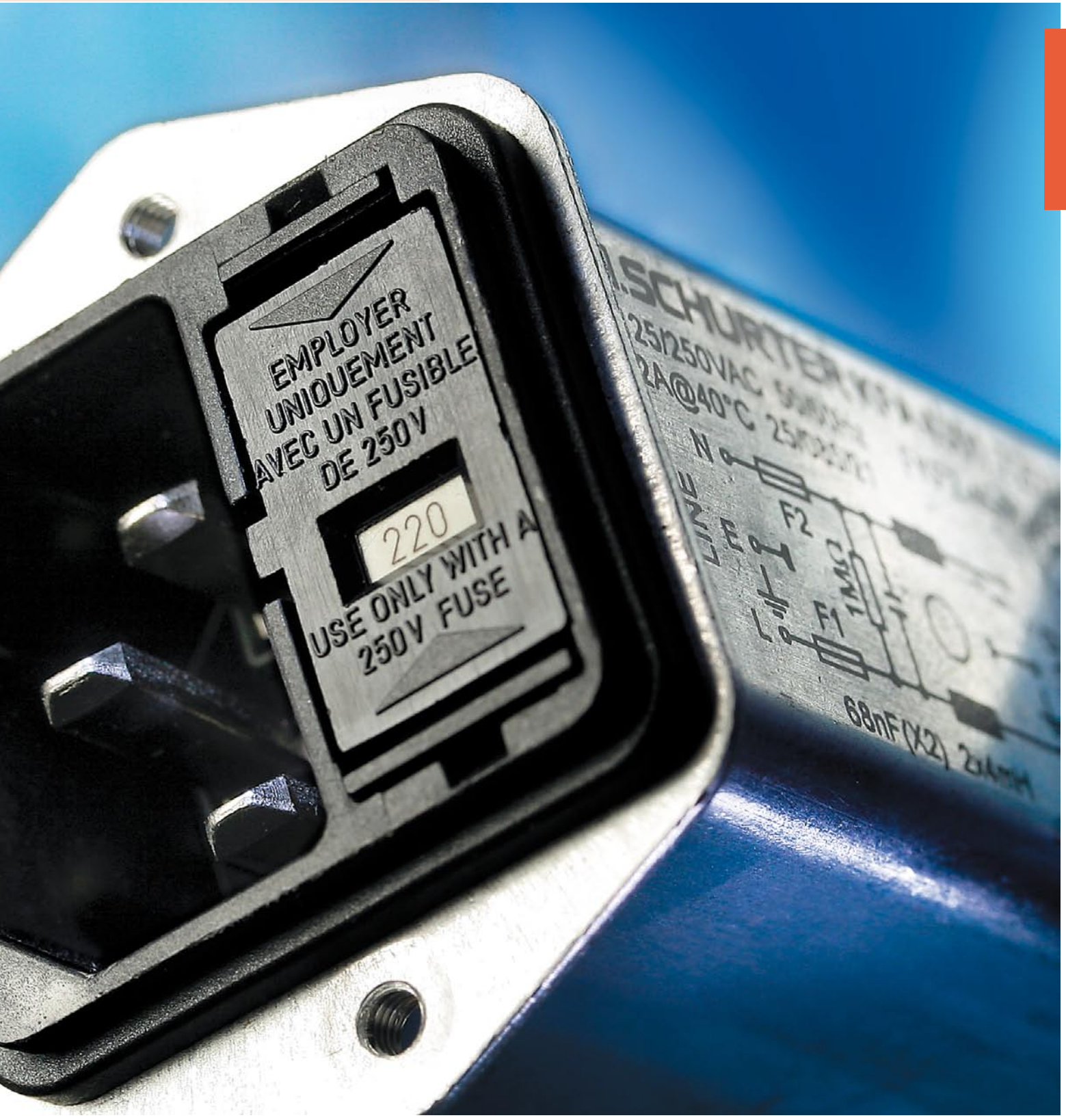


DC21 - IEC Appliance Connector C14 with Line Switch 1- or 2-pole

DD11 - Inlet for front- or rearsied mounting

5003 - DC-Inlet filter, front- or rear side mounting

connectors


EMPLOYER
UNIQUEMENT
AVEC UN FUSIBLE
DE 250V
220
USE ONLY WITH A
250V FUSE
SCHURTER
25/250VAC
2A@40°C
LINE
F2
F1
68nF(X2)

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	MAX. RATED CURRENT 2.5 A					
	IEC Appliance Connector C8 with Line Switch 1-pole	- Snap-in or screw-on - Rear-Side - PCB - unwired	-	- Rocker switch - 1 pole	C8 70° C	CMF1, CMF4
	IEC Appliance Connector C8 polarized with Line Switch 1-pole	- Snap-in or screw-on - Rear-Side - PCB - unwired	-	- Rocker switch - 1 pole	C8 polarized 70° C	CMF2, CMF5
	IEC Appliance Connector C6 with Line Switch 1-pole	- Snap-in or screw-on - Rear-Side - PCB - unwired	-	- Rocker switch - 1 pole	C6 70° C	CMF3, CMF6
 new	IEC Appliance Connector C6 with Line Switch, 70°C	- Snap-in - Front-Side - Solder/Quick-Connect/PCB	-	- Rocker switch - 1 or 2 pole	C6 70° C	2565-K
	MAX. RATED CURRENT 10 A					
	IEC Appliance Connector C14 with Line Switch 1-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	- Rocker switch - 1 pole	C14 70° C	KEB1

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	IEC Appliance Connector C14 with Line Switch 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	- Rocker switch - 2-pole	C14 70° C	KEB2
 new	IEC Appliance Connector C14 with Line Switch 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	- Rocker switch - 1 or 2 pole	C14 70° C	DC11
 new	IEC Appliance Connector with Line Switch C14 70°C	- Snap-in - Front-Side - Solder or Quick-Connect	-	- Rocker switch - 1 pole	C14 70° C	1074
 new	IEC Appliance Connector with Line Switch C14, 70°C	- Snap-in - Front-Side - Solder/Quick-Connect/Screw	-	- Rocker switch - 1 or 2 pole	C14 70° C	6010-K
 new	IEC Appliance Connector C14 with Line Switch 1- or 2-pole	- Screw-on - Rear-Side - PCB - prewired	-	- Rocker switch - 2-pole	C14 70° C	DC21

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance-Inlet/-Outlet	Web Reference or Type
	IEC Appliance Connector C14 with Fuseholder, Line Switch 2-pole and Voltage Selector	- Snap-in - Rear-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole - jumper - optional	C14 70° C	**GRM1**
	IEC Appliance Connector C14 with CBE 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	**DF11**
	IEC Appliance Connector C14 with CBE 1- or 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	**6145**
 new	IEC Appliance Connector C14 with Circuit Breaker, 70°C	- Snap-in - Front-Side - Solder or Quick-Connect	-	- Rocker switch - Circuit Breaker for Equipment - TA35 - 2-pole	C14 70° C	**7764**
	IEC Appliance Connector C14 with Appliance Plug F	- Sandwich - PCB - prewired	-	-	F 70° C	**KP (Outlet)**

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	IEC Appliance Connector C14 with Line Switch 1- or 2-pole	- Sandwich - PCB - prewired	-	- Rocker switch - 1 or 2 pole	C14 70° C	KP (Switch)
	IEC Appliance Connector C14 with Fuseholder 1- or 2-pole	- Sandwich - PCB - prewired	- 5 x 20 - 1 or 2 pole	-	C14 70° C	KP (FH)
	IEC Appliance Connector C14 with Fuseholder 1-/2-pole, 70°C, fits to Felcom	- Snap-in - Front-Side - Solder	- 5 x 20 - 1 or 2 pole	-	C14 70° C	6250 / 6255
	Line Switch, fits to Felcom	- Snap-in - Front-Side - Solder	-	- Rocker switch - 2-pole	-	6050
	IEC Appliance Connector C14 with Fuseholder 1- or 2-pole	- Sandwich - PCB - prewired	- 5 x 20 - optional, 1 or 2 pole	-	C14 70° C	GSF1

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	IEC appliance connector C14 with fuseholder 1- or 2-pole	- Snap-in - Front-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	-	C14 70° C	GSF2
	IEC Appliance Connector C14 with Fuseholder 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired or unwired	- 5 x 20 - 1 or 2 pole	- step - optional	C14 70° C	KEA
	IEC Appliance Connector C14 with Fuseholder 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - PCB - prewired	- 5 x 20 - 1 or 2 pole	-	C14 70° C	KEA-Print
	IEC Appliance Connector C14 with Fuseholder 1-pole	- Snap-in or screw-on - Front-/Rear-Side - Solder or Quick-Connect - prewired	- 5 x 20 - 1 pole	-	C14 70° C	6200
	IEC Appliance Connector C18 with Fuseholder 1-pole	- Snap-in or screw-on - Front-/Rear-Side - Solder or Quick-Connect - prewired	- 5 x 20 - 1 pole	-	C18 70° C	6202

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	IEC Appliance Connector C14 with Fuseholder 1-pole	- Snap-in or screw-on - Front-/Rear-Side - Solder or Quick- Connect - unwired	- 5 x 20 - 1 pole	-	C14 70° C	6205
	IEC Appliance Connector C14 with Fuseholder 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Solder or Quick- Connect - prewired	- 5 x 20 - 2-pole	-	C14 70° C	6220
	IEC Appliance Connector C14 with Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick- Connect	- 5 x 20 - 1 or 2 pole	-	C14 70° C	1062
	IEC Appliance Connector C18 with Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick- Connect	- 5 x 20	-	C18 70° C	1062-B
	IEC Appliance Connector C18 with Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick- Connect	- 5 x 20 - 1 or 2 pole	-	C18 70° C	1066

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	IEC Appliance Connector C14 with Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	- 5 x 20 - 1 or 2 pole	-	C14 70° C	1060
 new	IEC Appliance Connector C18 with Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	- 5 x 20 - 1 or 2 pole	-	C18 70° C	1065
	IEC Appliance Connector C14 with Fuseholder, 70°C	- Snap-in - Front-Side - Solder or Quick-Connect - prewired or unwired	- 5 x 20 - 1 or 2 pole	-	C14 70° C	1064
	IEC Appliance Connector C14 with Fuseholder 2-pole	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	-	C14 70° C	4707
	IEC Appliance Connector C14 with Fuseholder 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	-	C14 70° C	8842/8843

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	IEC Appliance Plug F with Fuseholder 1-pole	- Snap-in - Front-Side - Solder - prewired	- 5 x 20 - 1 pole	-	F 70° C	4719
	IEC Appliance Connector C14 with Fuseholder 1- or 2-pole and Voltage Selector	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired or unwired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- step - optional	C14 70° C	KEC
 new	IEC Appliance Connector C14 or C18 with Voltage Selector and Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	- 5 x 20 - 1 or 2 pole	- Step switch	C14 70° C	1067
	IEC Appliance Connector C14 with Fuseholder 1- or 2-pole and Voltage Selector	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired or unwired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- series-parallel	C14 70° C	KE
MAX. RATED CURRENT 16 A						
	IEC Appliance Coupler C20 with Line Switch, 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	- Rocker switch - 2-pole	C20 70° C	EC11

Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
IEC Appliance Connector C20 with CBE 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C20 70° C	EF11

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General Product Information see IEC Connector page 180

Maximum Functionality within Minimal Dimensions

The latest power entry modules, series DD11 and DD12, are extremely compact and robustly designed. The excellent performance makes them suitable for nearly any application using detachable power.

The DD11 is equipped with multiple functions including an apliance connector, switch and fuseholder. The DD12 combines the same functions and additionally includes a line filter. The fuseholder is available as 1- or 2-pole version. The switch - with or without illumination - is designed for inrush currents up to 100 A. The filtered version has a broad metal flange inshuring ideal filtering and shielding.

Appliance Connector Shuttered and Protected

The compact and shuttered power outlet 4719 integrates a fuse and a neo indicator. The element is ideal to be used in distribution units, in dusty environment or in application with increased requirements against contact with life parts.

In distribution units the integrated fuseholder assures that the power supply of the other attached appliances will not be interfered if an output fails due to an over current. The optional neon indicates the correct operation stage of the power line.

The shutters increase the protection against unintended contact to life parts and prevents the entrance of dust. The product is herewith ideally suitable to be used in medical devices according IEC 606001-1 or in applications to be used by children.

Best Products Worldwide

"Both, now and in the future, our customers are guaranteed the best products world-wide; products which perfectly correspond to their individual needs. SCHURTER is permanently committed to the excellent quality of its products and business practices which are ecologically sound."

Hans-Rudolf Schurter, Schurter Holding AG

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance-Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 6 A					
	IEC Appliance Connector C14 with Fuseholder, Bowden-Line Switch 2-pole and Voltage Selector	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - partially wired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Switch for bowdencable - 2-pole - series-parallel	C14 70° C	KG-Bowden-cable
	IEC Appliance Connector C14 with Fuseholder, Bowden-Line Switch 2-pole and Voltage Selector	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Switch for bowdencable - 2-pole - step - optional	C14 70° C	KD-Bowden-cable
	MAX. RATED CURRENT 10 A					
	IEC Appliance Connector C14 with Fuseholder and Line Switch 1- or 2-pole	- Snap-in - Front-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	KM
 new	Inlet for front or rear side mounting, fuse 1-/2-pole, line switch 2-pole	- Screw-on - Front-/Rear-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	DD11
 new	Inlet for PCB mounting, fuse 1-/2-pole, line switch 2-pole	- Screw-on - Rear-Side - PCB - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	DD21

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
	IEC Appliance Connector C14 with Appliance Plug F, Line Switch 2-pole and Voltage Selector	- Snap-in - Rear-Side - Quick-Connect - prewired	-	- Rocker switch - 1 or 2 pole - jumper - optional	F 70° C	PMM
 new	IEC Appliance Connector C14 or C18 with Line Switch and Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	- 1 pole	- Rocker switch - 2-pole	C14 70° C	6765
 new	IEC Appliance Connector C14 or C18 with Line Switch and Fuseholder, 70°C	- Snap-in or screw-on - Front-Side - Solder or Quick-Connect	- 1 pole	- Rocker switch - 1 or 2 pole	C14 70° C	6762
	IEC Appliance Connector C14 with Fuseholder, Line Switch 1- or 2-pole and Voltage Selector	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Rocker switch - 2-pole - step - optional	C14 70° C	KD
	IEC Appliance Connector C14 with Fuseholder, Line Switch 1- or 2-pole and Voltage Selector	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - partially wired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Rocker switch - 2-pole - series-parallel	C14 70° C	KG

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/- Outlet	Web Reference or Type
 new	IEC Appliance Connector C14, with Line Switch, Voltage Selector and Fuseholder, 70°C	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole - Step switch	C14 70° C	6766
 new	IEC Appliance Connector C14, with Line Switch, Voltage Selector and Fuseholder, 70°C	- Screw-on - Front-Side - Solder or Quick-Connect	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole - Step switch	C14 70° C	6788
	IEC Appliance Connector C14 with modular extended Components	- Snap-in - Front-Side - Solder or Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	Felcom 64

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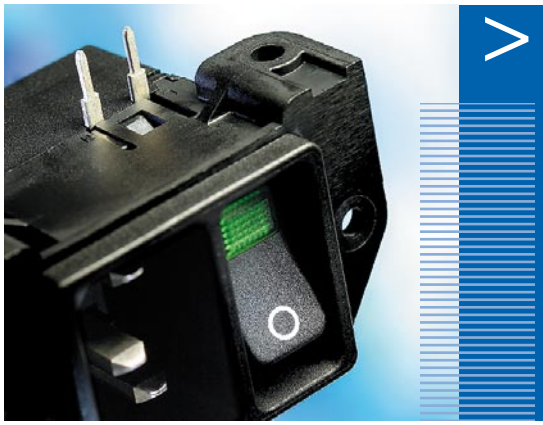

Compact Power Entry Modules for PCB-Mounting

The DC21 with IEC-Connector and 1-or 2-pole rocker switch is ideally suitable for compact mounting styles. The product be contacted directly to the borad and additionally be fixed with screws.

Mission Statement

SCHURTER is the leader in its field as innovator, manufacturer and supplier of fuses, connectors, circuit breakers, EMC products and input systems.

Mission Statement

Giving a good example, creating trust, assuming responsibility, accepting change.

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 2.5 A				
	IEC appliance inlet C8, screw-on mounting, rear side, solder terminal	2.5A / 2.5A	- Screw-on - Rear-Side - Solder	C8 70° C	0720-FS
	IEC appliance inlet C8, snap-in mounting, front side, solder terminal	2.5A / 2.5A	- Snap-in - Front-Side - Solder	C8 70° C	0721-PS
	IEC appliance inlet C8, screw-on mounting, rear side, PCB-/solder terminal	2.5A / 2.5A	- Screw-on - Rear-Side - Panel Mount	C8 70° C	0720-FP
	IEC appliance inlet C8, snap-in mounting, front side, solder terminal	2.5A / 2.5A	- Snap-in - Front-Side - Solder	C8 70° C	0721-PP
 new	IEC appliance inlet C8, screw-on mounting, front side, solder/ quick connect terminal	2.5A / 2.5A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB	C8 70° C	2571
 new	IEC appliance inlet C8, insert mounting, solder/PCB/quick connect terminal	2.5A / 2.5A	- Drop-in type - Solder/Quick-Connect/PCB	C8 70° C	2572
 new	IEC appliance inlet C8, screw-on mounting, font/rear side, solder/quick connect terminal	2.5A / 2.5A	- Screw-on - Front-/Rear-Side - Solder/Quick-Connect/PCB	C8 70° C	2573
 new	IEC appliance inlet C8, screw-on mounting, front side, solder/ quick connect terminal	2.5A / 2.5A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB	C8A 70 C	2574

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
 new	IEC appliance inlet C8, screw-on mounting, font/rear side, solder/quick connect terminal	2.5A / 2.5A	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	C8 70° C	2576
	IEC appliance inlet C6, screw-on mounting, front side, solder terminal	2.5A / 2.5A	- Screw-on - Front-Side - Solder	C6 70° C	0724
	IEC appliance inlet C6, screw-on mounting, front/rear side, solder/PCB/quick connect terminal	2.5A / 2.5A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB	C6 70° C	2561
 new	IEC appliance inlet C6, screw-on mounting, font/rear side, solder/PCB/quick connect terminal	2.5A / 2.5A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB	C6 70° C	2562
 new	IEC appliance inlet C6, insert mounting, font/rear side, solder/ PCB/quick connect terminal	2.5A / 2.5A	- Drop-in type - Solder/Quick-Connect/PCB	C6 70° C	2563
 new	IEC appliance inlet C6, snap-in mounting, front side, solder/ quick connect terminal	2.5A / 2.5A	- Snap-in - Front-Side - Solder or Quick-Connect	C6 70° C	2565
 new	IEC appliance inlet C8, snap-in mounting, front side, solder/ quick connect terminal	2.5A / 2.5A	- Snap-in - Front-Side - Solder or Quick-Connect	C8 70° C	2578
	MAX. RATED CURRENT 6 A				
 new	IEC appliance inlet C10, screw-on mounting, front side, solder/quick connect terminal	6A / 6A	- Screw-on - Front-Side - Solder or Quick-Connect	C10 70° C	6075

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
 new	IEC appliance inlet C10, screw-on mounting, front side, solder/quick connect terminal	6A / 6A	- Screw-on - Front-Side - Solder or Quick-Connect	C10 70° C	6076
	MAX. RATED CURRENT 10 A				
	IEC appliance inlet C14, screw-on mounting, font/rear side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	C14 70° C	6100-3
	IEC appliance inlet C14, snap-in mounting, front side, solder/ quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	C14 70° C	6100-4
	IEC appliance inlet C18, screw-on mounting, font/rear side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	C18 70° C	6102-3
	IEC appliance inlet C18, snap-in mounting, front side, solder/ quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	C18 70° C	6102-5
	IEC Appliance Connector C14, 70°C, fits to Felcom	10A / 15A	- Snap-in - Front-Side - Solder	C14 70° C	6150
 new	IEC appliance inlet C14, snap-in mounting, front side, solder/ quick connect/screw terminals	10A / 15A	- Snap-in - Front-Side - Solder/Quick-Connect/Screw	C14 70° C	6010
 new	IEC appliance inlet C18, snap-in mounting, front side, solder/ quick connect/screw terminals	10A / 15A	- Snap-in - Front-Side - Solder/Quick-Connect/Screw	C18 70° C	6015

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
 new	IEC appliance inlet C14, screw-on mounting, font/rear side, solder/quick connect/screw terminals	10A / 15A	- Screw-on - Front-/Rear-Side - Solder/Quick-Connect/Screw	C14 70° C	6048
 new	IEC appliance inlet C14, screw-on mounting, front side, solder/quick connect/PCB/screw terminals	10A / 15A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB/Screw	C14 70° C	6061
 new	IEC appliance inlet C18, screw-on mounting, front side, solder/quick connect/PCB/screw terminals	10A / 15A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB/Screw	C18 70° C	6065
 new	IEC appliance inlet C14, screw-on mounting, front side, solder/quick connect/PCB/screw terminals	10A / 15A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB/Screw	C14 70° C	6062
 new	IEC appliance inlet C18, screw-on mounting, front side, solder/quick connect/PCB/screw terminals	10A / 15A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB/Screw	C18 70° C	6066
 new	IEC appliance inlet C14, screw-on mounting, front side, solder/quick connect/PCB/screw terminals	10A / 15A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB/Screw	C14 70° C	6063
	IEC appliance inlet C14, screw-on mounting, front side, solder/quick connect/PCB/screw terminals	10A / 15A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB/Screw	C14 70° C	6067
	IEC appliance inlet C14, snap-in mounting, front side, solder terminal	10A / 15A	- Snap-in - Front-Side - PCB	C14 70° C	6130-56

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
	IEC appliance inlet C14, screw-on mounting, front side, solder terminal	10A / 10A	- Screw-on - Front-Side - Solder	C14 70° C	8843.ZP30
	IEC appliance inlet C14, screw-on mounting, front side, quick connect/screw terminals	10A / 10A	- Screw-on - Front-Side - Screw or Quick-Connect	C14 70° C	8843.FL
	IEC appliance inlet C14, screw-on mounting, front side, quick connect/screw terminals	10A / 10A	- Screw-on - Front-Side - Screw or Quick-Connect	C14 70° C	8843.FLR
	IEC appliance inlet C14 or C18, screw-on mounting, rear side, PCB-/solder terminal	10A / 15A	- Screw-on - Rear-Side - PCB	C14 70° C	GSP1
 new	IEC appliance inlet C14, screw-on mounting, rear side, PCB terminal	10A / 15A	- Screw-on - Rear-Side - PCB	C14 70° C	1001
 new	IEC appliance inlet C18, screw-on mounting, rear side, PCB terminal	10A / 15A	- Screw-on - Rear-Side - PCB	C18 70° C	1005
	IEC appliance inlet C14 or C18, sandwich mounting, PCB-/solder terminal	10A / 15A	- Sandwich - PCB	C14 70° C	GSP2
 new	IEC appliance inlet C14, insert mounting, solder/quick connect/PCB/screw terminals	10A / -	- Drop-in type - Solder/Quick-Connect/PCB/Screw	C14 70° C	6170

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
	IEC appliance inlet C16, screw-on mounting, font/rear side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	C16 120° C	6110-3
	IEC appliance inlet C16, snap-in mounting, front side, solder/ quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	C16 120° C	6110-4
 new	IEC appliance inlet C16, screw-on mounting, front side, quick connect/screw terminals	10A / 15A	- Screw-on - Front-Side - Quick-Connect or Screw	C16 120° C	0161
 new	IEC appliance inlet C16, screw-on mounting, font/rear side, quick connect/screw terminals	10A / 15A	- Screw-on - Front-/Rear-Side - Quick-Connect or Screw	C16 120° C	0163
 new	IEC appliance inlet C16, screw-on mounting, front side, screw terminals	10A / 15A	- Screw-on - Front-Side - Screw	C16 120° C	0164
 new	IEC appliance inlet C16, snap-in mounting, front side, quick connect terminals	10A / 15A	- Snap-in - Front-Side - Quick-Connect	C16 120° C	0165
	IEC appliance inlet C16A, screw-on mounting, font/rear side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-/Rear-Side - Solder or Quick-Connect	C16 A 155° C	6120-3
	IEC appliance inlet C16A, snap-in mounting, front side, solder/quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	C16 A 155° C	6120-5

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
 new	IEC appliance inlet C16A, screw-on mounting, front side, quick connect/screw terminals	10A / 15A	- Screw-on - Front-Side - Quick-Connect or Screw	C16 A 155° C	0181
 new	IEC appliance inlet C16A, screw-on mounting, front side, quick connect/screw terminals	10A / 15A	- Screw-on - Front-Side - Quick-Connect or Screw	C16 A 155° C	0181-A
 new	IEC appliance inlet C16A, screw-on mounting, font/rear side, quick connect/screw terminals	10A / 15A	- Screw-on - Front-/Rear-Side - Quick-Connect or Screw	C16 A 155° C	0183
 new	IEC appliance inlet C16A, snap-in mounting, front side, quick connect/screw terminals	10A / 15A	- Snap-in - Front-Side - Quick-Connect or Screw	C16 A 155° C	0184
	MAX. RATED CURRENT 16 A				
	IEC appliance inlet C20, screw-on mounting, front side, solder/quick connect terminal	16A / 20A	- Screw-on - Front-Side - Solder or Quick-Connect	C20 70° C	4798
	IEC appliance inlet C20, snap-in mounting, front side, solder/ quick connect terminal	16A / 20A	- Snap-in - Front-Side - Solder or Quick-Connect	C20 70° C	4793
	IEC appliance inlet C24, snap-in mounting, front side, solder/ quick connect terminal	16A / 20A	- Snap-in - Front-Side - Solder or Quick-Connect	C24 70° C	4794
 new	IEC appliance inlet C20, snap-in mounting, front side, solder/ quick connect/screw terminals	16A / 21A	- Snap-in - Front-Side - Solder/Quick-Connect/Screw	C20 70° C	1624

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
 new	IEC appliance inlet C20, screw-on mounting, rear side, PCB terminal	16 A / 21 A	- Screw-on - Rear-Side - PCB	C20 70° C	1601
 new	IEC appliance inlet C20, screw-on mounting, front side, solder/quick connect/screw terminals	16 A / 21 A	- Screw-on - Front-Side - Solder/Quick-Connect/Screw	C20 70° C	1621

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Robust Appliance Inlet for PCB Mounting

The appliance inlet GSP1 offers a proven and robust mechanical design for a power supply directly onto the circuit board.

The mechanical mounting styles include self tapping screws, metrical screws with included counter sinks or additional nuts. This assures a vast variaty of design possibilities.

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 2.5 A				
 new	IEC appliance outlet 2.5A 2-pole, insert mounting, solder terminal	2.5A / 2.5A	- Drop-in type - Solder	C7 70°C	5081
 new	IEC appliance outlet 2.5A 2-pole, screw-on mounting, font/ rear side, solder terminal	2.5A / 2.5A	- Screw-on - Front-Side - Solder	C7 70°C	5082
 new	IEC appliance outlet D, screw-on mounting, front side, solder terminal	2.5A / 4A	- Screw-on - Front-Side - Solder	D 70° C	5084
 new	IEC appliance outlet D, insert mounting, solder terminal	2.5A / 4A	- Drop-in type - Solder	D 70° C	5086
 new	IEC appliance outlet D, snap-in mounting, front side, solder terminal	2.5A / 2.5A	- Snap-in - Front-Side - Solder	D 70° C	5083
 new	IEC appliance outlet D, screw-on mounting, front side, solder terminal	2.5A / 4A	- Screw-on - Front-Side - Solder	D 70° C	5088
 new	IEC appliance outlet B, screw-on mounting, front side, solder terminal	2.5A / 2.5A	- Screw-on - Front-Side - Solder	 70° C	5888
	MAX. RATED CURRENT 6 A				
 new	IEC appliance outlet 6A 2-/3-pole, screw-on mounting, front side, solder terminal	6A / 6A	- Screw-on - Front-Side - Solder	 70° C	5177

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
 new	IEC appliance outlet 6A 2-/3-pole, screw-on mounting, front side, solder terminal	6A / 6A	- Screw-on - Front-Side - Solder	70° C	5178
	MAX. RATED CURRENT 10 A				
	IEC appliance outlet F, screw-on mounting, front side, solder/ quick connect terminal	10A / 15A	- Screw-on - Front-Side - Solder or Quick-Connect	F 70° C	6600-3
	IEC appliance outlet F, snap-in mounting, front side, solder/ quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	F 70° C	6600-4
	IEC Appliance Plug F, 70°C, fits to Felcom	10A / 15A	- Snap-in - Front-Side - Solder	F 70° C	6650
 new	IEC appliance outlet F oder H, snap-in mounting, front side, solder/quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	H 70° C	5093
 new	IEC appliance outlet F or H, snap-in mounting, front side, IDC terminal	10A / 15A	- Snap-in - Front-Side - IDC- Connect	H 70° C	6610
 new	IEC appliance outlet F oder H, screw-on mounting, front side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-Side - Solder or Quick-Connect	H 70° C	5098
	IEC appliance outlet F shuttered, screw-on mounting, front side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-Side - Solder or Quick-Connect	F 70° C	4721

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
	IEC appliance outlet F shuttered, snap-in mounting, front side, solder/quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	F 70° C	4723
	IEC appliance outlet F, screw-on mounting, front side, solder /quick connect terminal	10A / 15A	- Screw-on - Front-Side - Solder/quick-connect	F 70° C	4787
	IEC appliance outlet F, screw-on mounting, front side, solder /quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder/quick-connect	F 70° C	4788
 new	IEC appliance outlet F oder H, screw-on mounting, front side, solder/PCB/quick connect terminal	10A / 15A	- Screw-on - Front-Side - Solder/Quick-Connect/PCB	H 70° C	5091
 new	IEC appliance outlet F oder H, screw-on mounting, front side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-Side - Solder or Quick-Connect	H 70° C	5092
 new	IEC appliance outlet F, screw-on mounting, rear side, PCB-/solder terminal	10A / 15A	- Screw-on - Rear-Side - PCB	F 70° C	5001
 new	Appliance outlet "F-horizotal", snap-in mounting, front side, solder/quick connect terminal	10A / 15A	- Snap-in - Front-Side - Solder or Quick-Connect	70° C	4093
 new	Appliance outlet "F-horizotal", screw-on mounting, front side, solder/quick connect terminal	10A / 15A	- Screw-on - Front-Side - Solder or Quick-Connect	70° C	4098

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 7 A				
 new	Appliance inlet for low voltage, snap-in mounting, front side, solder/quick connect terminal	7A / -	- Snap-in - Front-Side - Solder or Quick-Connect	70° C	1201-A
 new	Appliance inlet for low voltage, snap-in mounting, front side, solder/quick connect terminal	7A / -	- Snap-in - Front-Side - Solder or Quick-Connect	70° C	1201
 new	Appliance inlet for low voltage, snap-in mounting, front side, solder/quick connect terminal	7A / -	- Snap-in - Front-Side - Solder or Quick-Connect	70° C	1200
 new	Appliance inlet for low voltage, snap-in mounting, front side, solder/quick connect terminal	7A / -	- Snap-in - Front-Side - Solder or Quick-Connect	70° C	1203
	MAX. RATED CURRENT 15 A				
	NEMA line outlet 5-15R, snap-in mounting, front side, solder terminal	15A / 15A	- Snap-in - Front-Side - Solder	-	0709
	NEMA line outlet 5-15R, snap-in mounting, front side, IDC-/quick connect terminals	15A / 15A	- Snap-in - Front-Side - IDC- Connect	-	0709-1
	NEMA line outlet 5-15R, snap-in mounting, front side, IDC-/quick connect terminals	15A / 15A	- Snap-in - Front-Side - Quick-Connect or Wire	-	0710
	NEMA line outlet 1-15R, snap-in mounting, front side, solder terminal	15A / 15A	- Snap-in - Front-Side - Solder	-	0715

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side Terminals	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 16 A				
	IEC appliance outlet J, screw-on mounting, front side, solder/ quick connect terminal	16A / 20A	- Screw-on - Front-Side - Solder or Quick-Connect	J 70° C	0723
 new	IEC appliance outlet J, snap-in/screw-on mounting, front side, solder/quick connect terminal	16A / 20A	- Snap-in or screw-on - Front-Side - Solder or Quick-Connect	J 70° C	4797
 new	IEC appliance outlet J, screw-on mounting, front side, quick connect terminals	16A / 21A	- Screw-on - Front-Side - Quick-Connect	J 70° C	5017
 new	IEC appliance outlet J, screw-on mounting, front side, quick connect terminals	16A / 21A	- Screw-on - Front-Side - Quick-Connect		5216

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see IEC Connector page 180

> Appliance Outlet Shuttered

The appliance plug 4723 with shuttered outlet is suitable for appliances with increased requirements according protection of user and against entry of dust.

The shutters of the appliance outlet type F assures protection against unintended contact to life parts in the unconnected condition. The products suits perfect to be used in distribution units.

Europe is Our Main Market

"Europe is still our main market. Other markets such as the US and the Far East deal with entirely different issues and requirements."

Hans Rudolf Schurter

Systematical employment of SIX SIGMA

SCHURTER distinguishes itself by the highest quality standards in all processes. With the methodes of SIX SIGMA, we arise the customer benefit and strengthen our position in the market continuously.

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 10 A				
	IEC plug connector E, rewirable, straight, max. cable diamteter 8.5 mm	10A / 10A	- Power Cord - Cable	E 70° C	4732
	IEC plug connector E, rewirable, straight, max. cable diameter 10 mm	10A / 15A	- Power Cord - Cable	E 70° C	4735
 new	IEC plug connector E, rewirable, straight	10A / 15A	Cable	E 70° C	9009
	IEC plug connector E, rewirable, angled, max. cable diameter 10 mm	10A / 10A	- Power Cord - Cable	E 70° C	4733
	IEC plug connector E, rewirable, angled, max. cable diameter 10 mm	10A / 15A	- Power Cord - Cable	E 70° C	4736
	IEC plug connector E, rewirable, angled	10A / 10A	- Power Cord - Cable	E 70° C	P685
 new	IEC plug connector E, rewirable, angled	10A / 15A	Cable	E 70° C	9013
	MAX. RATED CURRENT 13 A				
 new	UK line plug, rewirable, 3 pole, angled	13A / 13A	- Power Cord - Cable	-	1363

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 15 A				
 new	USA line plug, rewirable, 3 pole, straight	15A / 15A	- power mains plug - Cable	-	2867
	MAX. RATED CURRENT 16 A				
	IEC plug connector I, rewirable, straight	16A / 21A	- Power Cord - Cable	I 70° C	4796
 new	IEC plug connector I, rewirable, straight	16A / 21A	- power interconnection cord - Cable	I 70° C	0106
 new	IEC plug connector I, rewirable, angled	16A / 21A	- Power Cord - Cable	I 70° C	4789
 new	IEC plug connector I, rewirable, angled	16A / 21A	- power interconnection cord - Cable	I 70° C	1611

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General Product Information see IEC Connector page 180

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 6 A				
 new	IEC appliance outlet, rewirable appliance internal, straight, 6A	6A / 6A	- power interconnection cord - Cable	C9 70° C	3017
	MAX. RATED CURRENT 7 A				
 new	Appliance outlet, rewirable, straight, for low voltage	7A / 7A	- Power Cord - Cable	70° C	1251
	MAX. RATED CURRENT 10 A				
	IEC cord connector C13, rewirable, straight	10A / 15A	- Power Cord - Cable	C13 70° C	4782
 new	IEC cord connector C13, rewirable, straight	10A / 15A	- power mains plug - Cable	C13 70° C	4022
	IEC cord connector C13, rewirable, angled	10A / 15A	- Power Cord - Cable	C13 70° C	4785
 new	IEC cord connector C13, rewirable, angled	10A / 15A	- power mains plug - Cable	C13 70° C	4013
	IEC cord connector C13, rewirable, angled	10A / 15A	- Power Cord - Cable	C13 70° C	4300-06
 new	IEC cord connector C13, rewirable, angled	10A / 15A	- power mains plug - Cable	C13 70° C	4012

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance- Inlet/-Outlet	Web Reference or Type
	IEC cord connector C15, rewirable, straight	10A / 15A	- Power Cord - Cable	C15 120° C	4781
 new	IEC cord connector C15, rewirable, straight	10A / 15A	- power mains plug - Cable	C15 120° C	8101
	IEC cord connector C15, rewirable, angled	10A / 15A	- Power Cord - Cable	C15 120° C	4784
 new	IEC cord connector C15, rewirable, angled	10A / 15A	- power mains plug - Cable	C15 120° C	8111
 new	IEC cord connector C15A, rewirable, straight	10A / 15A	- power mains plug - Cable	C15 A 155° C	0102
 new	IEC cord connector C15A, rewirable, angled	10A / 10A	- power mains plug - Cable	C15 A 155° C	0112
	MAX. RATED CURRENT 16 A				
	IEC cord connector C19, rewirable, straight	16A / 21A	- Power Cord - Cable	C19 70° C	4795
 new	IEC cord connector C19, rewirable, straight	16A / 21A	- power mains plug - Cable	C19 70° C	0104

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance- Inlet/-Outlet	Web Reference or Type
 new	IEC cord connector C19, rewirable, straight	16A / 21A	- power mains plug - Cable	C19 70° C	1652
 new	IEC cord connector C19, rewirable, angled	16A / 21A	- Power Cord - Cable	C19 70° C	4790
 new	IEC cord connector C19, rewirable,angled	16A / 21A	- power mains plug - Cable	C19 70° C	1651

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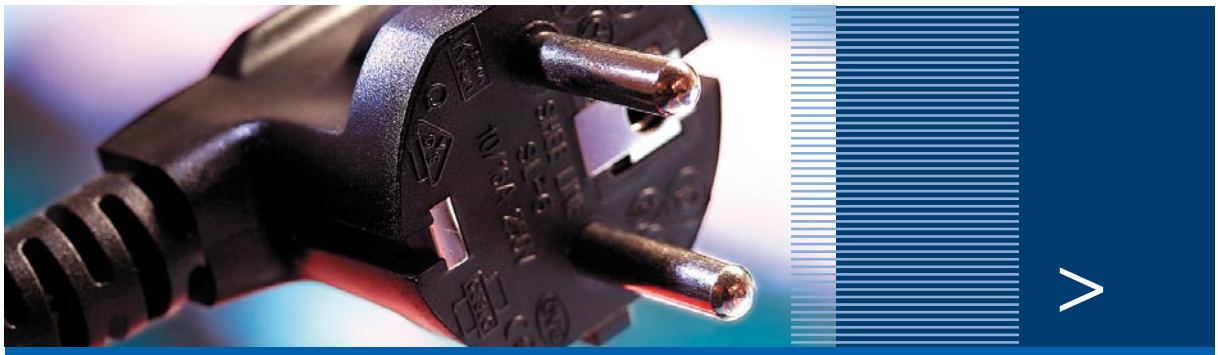

Countryspecific Cord Sets

SCHURTER offers a variety of power cord sets mating the various appliance connectors and plugs.

The several wire sizes as well as the country specific net plugs are concidered in the assortment. The products can be configured according customer requests. The customers can also order semi finished components or to use the re-wireable plug/connectors to complete the power cords.

Rewireable Cord Connector 20 A Angled

The rewireable cord connector 4790 with its angled cord entry facilitates a minimal installation depth and enables a marginal distance of the attached system to the wall.

The cord plug is designed to be used for currents up to 21A, which makes it ideal for high power consuming equipment found in IT environments, high-end household appliances, power electronics as well as industrial environments.

Intensive Customer Interaction

"So what made this thing happen was our good teamwork with their technical department and the close and continuous overall development cooperation with the customer."

Raimund Hüglin / Martin Zarges

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance-Inlet	Appliance outlet	Terminal	Web Reference or Type
	Distribution Unit for Snap Mounting with 1 IEC Appliance Connector C14 and 1 Plug F	10A / 10A	- Snap-in - Front-Side - Solder or Quick-Connect	C14 70° C	F 70° C	1 In, 1 out	0712
 new	Distribution Unit for Screw Mounting with 1 IEC Appliance Plug C14 and 1 -Connector F	10A / 15A	- Screw-on - Front-Side - Solder or Quick-Connect	C14 70° C	F 70° C	1 In, 1 out	1050
 new	Distribution Unit for Screw Mounting with 1 IEC Appliance Plug C14 and 1 -Connector F	10A / 15A	- Screw-on - Front-Side - Solder or Quick-Connect	C14 70° C	F 70° C	1 In, 1 out	1051
	IEC gender changer IEC C20 / IEC J, screw-on mounting	16A / 20A	- Screw-on - Front-/Rear-Side - Plug and Connector	C20 70° C		1 In, 1 out	4730
	Distribution Unit with 1 IEC Appliance Connector C14 and 2 Plugs F, shuttered	10A / 15A	Plug and Connector	C14 70° C	F 70° C	1 In, 2 out	4741

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance-Inlet	Appliance outlet	Terminal	Web Reference or Type
	Stripp Block for Snap Mounting with up to 7 IEC Appliance Outlets C14	10A / 15A	- Snap-in - Front-Side - Solder	-	F 70° C	7 out	0909
	Stripp Block for Snap Mounting with 4 IEC Appliance Outlets C14	10A / 15A	- Snap-in - Front-Side - Connector	-	F 70° C	4 out	4752
	Stripp Block for Snap Mounting with 4 IEC Appliance Outlets C14 and space for extra component	10A / 15A	- Snap-in - Front-Side - Plug and Connector	-	F 70° C	1 In, 4 out	4754
	Stripp Block for Snap Mounting with 4 IEC Appliance Outlets C14 and space for 2 extra components	10A / 15A	- Snap-in - Front-Side - Plug and Connector	-	F 70° C	1 In, 4 out	4758
	Distribution Unit with 1 IEC Appliance Connector C14 and 4 Plugs F	10A / 15A	Line	C14 70° C	F 70° C	1 In, 4 out	4747

	Description Approvals	Rated Current IEC/ UL	Mounting Style Mounting Side	Appliance-Inlet	Appliance outlet	Terminal	Web Reference or Type
	Distribution Unit with Power Cord and 4 IEC Appliance Plugs F	10A / 15A	Line	-	F 70° C	4 out	4748
	Distribution Unit with 1 IEC Appliance Connector C14 or Power Cord and 4 IEC Appliance Plugs F	10A / 15A	Plug and Connector	C14 70° C	F 70° C	1 In, 6 out	4740

General Product Information see IEC Connector page 180

Gender Changer 20 A

The gender changer 4730 is designed to connect rack appliances with an appliance coupler type J in a stand lone mode with a standard power cord.

The construction can either be used for screw on mounting or for stand alone installation.

Process improvement with SIX SIGMA

We deploy SIX SIGMA's systematic problem-solving method DMAIC to improve our processes. At the same time, this involves eliminating waist of any kind consequently.

SSO, our basis for excellent processes

Safety, spruceness and order (SSO) are the basis for an excellent process quality. Doing regular tours, our security people and process owners detect the current situation on safety, spruceness and order. The result is being analyzed and improvements defined.

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 2.5 A					
 new	Power Cord with IEC Appliance Plug A, angled, 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	70° C	2705
	Power Cord with IEC Appliance Connector C7, Line Plug Continental Europe, 70°C	2.5A / 2.5A	- Continental Europe - EN 50075 / DIN 49464	- H03VVH2-F - 1.5 m - 2 x 0.75 mm²	C7 70°C	CS01.0121.150
	Power Cord with IEC Appliance Connector C7, Line Plug North America, 70°C	2.5A / 2.5A	- North America - NEMA 5-15	- SPT 2x18 AWG - 1.5 m - 2 x 0.75 mm²	C7 70°C	CS01.0221.150
	Power Cord with IEC Appliance Connector C7, Line Plug North America, 70°C	2.5A / 7A	- North America - NEMA 5-15P	- 18 AWG - 1.5 m - 18 AWG	C7 polarized 70°C	CS02.0221.150
	Power Cord with IEC Appliance Connector C7, Line Plug Switzerland, 70°C	2.5A / 2.5A	- Continental Europe - EN 50075 / DIN 49464	- H03VVH2-F - 1.5 m - 2 x 0.75 mm²	C7 70°C	CS01.0321.150
	Power Cord with IEC Appliance Connector C7, Line Plug UK, 70°C	2.5A / 2.5A	- United Kingdom - BS 1363A	- H03VVH2-F - 1.5 m - 2 x 0.75 mm²	C7 70°C	CS01.0421.150
 new	Power Cord with Euro- Line Plug, straight	2.5A / 2.5A	- Continental Europe - divrese	- diverse - diverse - diverse	-	4121
 new	Power Cord with IEC Appliance Plug A without Earth Contact, angled, 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	70° C	2706

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
 new	Power Cord with IEC Appliance Plug C, angled 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	70° C	2711
 new	Power Cord with IEC Appliance Plug C, angled, 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	70° C	2712
 new	Power Cord with IEC Appliance Plug C, straight, 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	70° C	2730
 new	Power Cord with IEC Appliance Plug C, straight, 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	70° C	2731
 new	Power Cord with IEC Appliance Plug C7, angled, 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	C7 70°C	2511
 new	Power Cord with IEC Appliance Plug C7, angled, 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	C7 70°C	2514
 new	Power Cord with IEC Appliance Plug C7, straight 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	C7 70°C	2510
 new	Power Cord with IEC Appliance Plug C7, straight 70°C	2.5A / 2.5A	- diverse - divrese	- diverse - diverse - diverse	C7 70°C	4810

MAX. RATED CURRENT 6 A

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
 new	Power Cord with Appliance Plug 6A 3-pole, angled, 70°C	6A / 6A	- diverse - divrese	- diverse - diverse - diverse	70° C	6004
 new	Power Cord with Appliance Plug 6A 3pole, straight, 70°C	6A / 6A	- diverse - divrese	- diverse - diverse - diverse	70° C	6002
 new	Power Cord with Appliance Plug 6A 2pole, straight, 70°C	6A / 6A	- diverse - divrese	- SVT 2x18 AWG - diverse	70° C	602B
 new	Power Cord with IEC Appliance Plug C9, angled, 70°C	6A / 6A	- diverse - divrese	- diverse - diverse - diverse	C9 70° C	9011
 new	Power Cord with IEC Appliance Plug C9, straight, 70°C	6A / 6A	- diverse - divrese	- diverse - diverse - diverse	C9 70° C	3016
	MAX. RATED CURRENT 7 A					
	Power Cord with IEC Appliance Connector C13, Line Plug Japan, 70°C	7A / 7A	- Japan - JIS 8303	- HVCTF3G0.75 - 2.0 m - 3 x 20 AWG	C13 70° C	6047.6414
 new	Power Cord with Appliance Plug for low voltage, straight, 70°C	7A / 7A	- diverse - divrese	- diverse - diverse - diverse	70° C	1250

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 10 A					
	Power Cord with IEC Appliance Connector C13, Appliance Plug E, 70°C	10A / 10A	- IEC Appliance plug - IEC/EN 60320-2-2/E	- H05VV-F3G1.0 - 1.0 m - 3 x 18 AWG	C13 70° C	6007.0212
	Power Cord with IEC Appliance Connector C13, Line Plug Continental Europe, 70°C	10A / 10A	- Continental Europe - CEE 7 / VII / DIN 49441-R2	- H05VV-F3G1.0 - 2.5 m - 3 x 18 AWG	C13 70° C	6003.0215
	Power Cord with IEC Appliance Connector C13, Line Plug Continental Europe, 70°C	10A / 10A	- Continental Europe - CEE 7 / VII / DIN 49441-R2	- H05VV-F3G1.0 - 2.5 m - 3 x 18 AWG	C13 70° C	6004.0215
	Power Cord with IEC Appliance Connector C13, Line Plug Italy, 70°C	10A / 10A	- Italy - CEI 23-16 / VII	- H05VV-F3G1.0 - 2.5 m - 3 x 18 AWG	C13 70° C	6026.0215
	Power Cord with IEC Appliance Connector C13, Line Plug North America, 70°C	10A / 10A	- North America - NEMA 5-15	- SJT 3x18 AWG - 2.5 m - 3 x 18 AWG	C13 70° C	6009.1315
	Power Cord with IEC Appliance Connector C13, Line Plug Switzerland, 70°C	10A / 10A	- Switzerland - ASEV 1011	- H05VV-F3G1.0 - 2.5 m - 3 x 18 AWG	C13 70° C	6011.0215
	Power Cord with IEC Appliance Connector C13, uninsulated wires, 70°C	10A / 10A	- uninsulated wires	- H05VV-F3G1.0 - 2.0 m - 3 x 18 AWG	C13 70° C	6000.0214
	Power Cord with IEC Appliance Connector C13, uninsulated wires, 70°C	10A / 10A	- uninsulated wires	- H05VV-F3G1.0 - 2.0 m - 3 x 18 AWG	C13 70° C	6000.0224

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
 new	IEC Appliance Connector C8, 70°C	10A / 10A	- Australia - divrese	- diverse - diverse - diverse	-	P161
 new	Power Cord with Appliance Plug "E-horizontal", angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	70° C	0408
 new	Power Cord with CH- Line Plug 3-pole, straight	10A / 10A	- Switzerland - ASEV 1011	- diverse - diverse - diverse	-	4321
 new	Power Cord with IEC Appliance Connector C13, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	3020
 new	Power Cord with IEC Appliance Connector C13, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	0311
 new	Power Cord with IEC Appliance Connector C13, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	0312
 new	Power Cord with IEC Appliance Connector C13, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	3013
 new	Power Cord with IEC Appliance Connector C13, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	311L

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
 new	Power Cord with IEC Appliance Connector C13, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	312L
 new	Power Cord with IEC Appliance Connector C13, straight, 70°C	10A / 10A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	3030
 new	Power Cord with IEC Appliance Connector C13, straight, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C13 70° C	3027
 new	Power Cord with IEC Appliance Plug E, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	E 70° C	0607
 new	Power Cord with IEC Appliance Plug E, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	E 70° C	0608
 new	Power Cord with IEC Appliance Plug E, straight, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	E 70° C	0609
 new	Power Cord with Nema- Line Plug 3-pole, straight	10A / 10A	- North America - NEMA 5-15	- diverse - diverse - diverse	-	4390
 new	Power Cord with Appliance Plug "G-horizontal", angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	70° C	407B

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
 new	Power Cord with Appliance Plug "G-horizontal", angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	70° C	408B
 new	Power Cord with CH- Line Plug 2-pole, straight	10A / 10A	- Switzerland - ASEV 1011	- diverse - diverse - diverse	-	2225
 new	Power Cord with IEC Appliance Connector C17, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C17 70° C	3113
 new	Power Cord with IEC Appliance Connector C17, straight, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	C17 70° C	3130
 new	Power Cord with IEC Appliance Plug G, angled, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	G 70° C	608B
 new	Power Cord with IEC Appliance Plug G, straight, 70°C	10A / 15A	- diverse - divrese	- diverse - diverse - diverse	G 70° C	609B
 new	Power Cord with Nema- Line Plug 2-pole, straight	10A / 10A	- North America - NEMA 1-15	- diverse - diverse - diverse	-	4190
 new	Power Cord with Nema- Line Plug polarized, 2-pole, straight	10A / 10A	- North America - NEMA 1-15 pol.	- SVT 2x18 AWG - diverse - 18 AWG	-	4191

	Description	Rated Current IEC/ UL	Line Plug Standard	Power Cord Type Cord Lenght Conductors	Appliance-Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 13 A					
	Power Cord with IEC Appliance Connector C13, Line Plug UK, 70°C	13A / 13A	- United Kingdom - BS 1363A	- H05VV-F3G1.0 - 2.5 m - 3 x 18 AWG	C13 70° C	6044.0215
 new	Power Cord with UK- Line Plug 3-pole, angled	13A / 13A	- United Kingdom - BS 1363A	- diverse - diverse - diverse	-	2343
	MAX. RATED CURRENT 16 A					
	Power Cord with IEC Appliance Connector C19, Line Plug North America, 70°C	16A / 16A	- North America - NEMA 5-15	- SJT 3x18 AWG - 2.5 m - 3 x 14 AWG	C19 70° C	6009.5195
	Power Cord with Schuko- Line Plug, angled	16A / 16A	- CEE 7 / VII / DIN 49441-R2	- diverse - diverse - diverse	-	422u
 new	Power Cord with IEC Appliance Connector C19, straight, 70°C	16A / 16A	- diverse - divrese	- diverse - diverse - diverse	C19 70° C	1654
 new	Power Cord with Schuko- Line Plug, straight	16A / 16A	- Europlug - CEE 7 / VII / DIN 49441-R2	- diverse - diverse - diverse	-	4370
 new	IEC Appliance Connector C8, 70°C	16A / 16A	- Contour plug - divrese	- diverse - diverse - diverse	-	2228

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General Product Information see IEC Connector page 180

TA35 - Circuit Breaker for Equipment thermal, Rocker actuation, 1-3 pole

T9 - Circuit Breaker for Equipment thermal, Snap-in type, Fuseholder style, 1-pole

AS168 - Manual Motor Controller / Circuit Breaker for Equipment thermal-magnetic, 1 to 4 poles

circuit breakers

	Description Approvals	Rated Voltage	Rated Current	Pole Tripping Type Actuation Type	Mounting Style Terminals	Options	Tripping Mode	Web Reference or Type
	TRIPPING MODE THERMAL							
 new	Circuit Breaker for Equipment thermal, Threaded-neck type, 1 pole	AC 240V DC 48V	4 - 16A	- 1 - Thermal - Reset type	- Threaded neck type - Quick connect terminals 6.3 x 0.8 mm	Cover for IP65	Thermal	T9-311
 new	Circuit Breaker for Equipment thermal, Snap-in type, Fuseholder style, 1 pole	AC 240V DC 48V	4 - 16A	- 1 - Thermal - Reset type	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm	-	Thermal	T9-611
 new	Circuit Breaker for Equipment thermal, Snap-in rear side, 1 pole	AC 240V DC 48V	4 - 16A	- 1 - Thermal - Reset type	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm	-	Thermal	T9-711
	Circuit Breaker for Equipment thermal, Threaded neck type, 1 pole	AC 240V DC 48V	0.05 - 16A	- 1 - Thermal - Reset type	- Threaded neck type - Quick connect terminals 6.3 x 0.8 mm	Cover for IP54	Thermal	T11-211
	Circuit Breaker for Equipment thermal, Snap-in type, 1 pole	AC 240V DC 48V	0.05 - 16A	- 1 - Thermal - Reset type	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm	-	Thermal	T11-611
	Circuit Breaker for Equipment thermal, Drop-in type, 1 pole	AC 240V DC 48V	0.05 - 16A	- 1 - Thermal - Reset type	- Drop-in type - Quick connect terminals 6.3 x 0.8 mm	-	Thermal	T11-811
	Circuit Breaker for Equipment thermal, PCB mounting, 1 pole	AC 240V DC 48V	0.05 - 12A	- 1 - Thermal - Reset type	- Drop-in type - Solder, THT	-	Thermal	T11-818
	Circuit Breaker for Equipment thermal, Flange type, 1 pole	AC 240V DC 28V	0.05 - 16A	- 1 - Thermal - Reset type	- Flange type - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Auxiliary switch Cover for IP54	Thermal	T12-111

	Description Approvals	Rated Voltage	Rated Current	Pole Tripping Type Actuation Type	Mounting Style Terminals	Options	Tripping Mode	Web Reference or Type
	Circuit Breaker for Equipment thermal, Threaded neck type, 1 pole	AC 250V DC 28V	0.05 - 30A	- 1 - Thermal - Reset type	- Threaded neck type - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Manual ON-OFF Cover for IP54	Thermal	T13-211
	Circuit Breaker for Equipment thermal, Snap-in type, 1 pole	AC 250V DC 28V	0.05 - 30A	- 1 - Thermal - Reset type	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Manual ON-OFF Cover for IP54	Thermal	T13-611
	Circuit Breaker for Equipment, thermal, Threaded-neck type, 1 pole	AC 125/250V DC 50V	3 - 40A	- 1 - Thermal - Reset type	- Snap-in or threaded neck type - Quick Connect Terminal	-	Thermal	TS-701
	Circuit Breaker for Equipment, thermal, Threaded-neck type, 1 pole	AC 125/250V DC 32V	3 - 16A	- 1 - Thermal - Reset type	- Threaded neck type - Quick Connect Terminal	-	Thermal	TS-709
 new	Circuit Breaker for Equipment thermal, Rocker actuation, 1 pole	AC 240V DC 32V	0.05 - 20A	- 1 - Thermal - Rocker	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm	Cover for IP65	Thermal	TA35_Wippe_ 1Pol
 new	Circuit Breaker for Equipment thermal, Rocker actuation, 2 pole	AC 240V DC 60V	0.05 - 20A	- 2 - Thermal - Rocker	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm	Cover for IP65	Thermal	TA35_Wippe_ 2Pol
 new	Circuit Breaker for Equipment thermal, Rocker actuation, 3 poles	-	0.05 - 12A	- 3 - Thermal - Rocker	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm	Cover for IP65	Thermal	TA35_Wippe_ 3Pol
	Circuit Breaker for Equipment thermal, Rocker actuation, 2 poles	AC 240V DC 60V	0.05 - 20A	- 2 - Thermal - Rocker	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Undervoltage and remote trip release Auxiliary switch Cover for IP54 or IP65	Thermal	TA45 2pol Rocker

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	Description Approvals	Rated Voltage	Rated Current	Pole Tripping Type Actuation Type	Mounting Style Terminals	Options	Tripping Mode	Web Reference or Type
	Circuit Breaker for Equipment thermal, Push button actuation, 2 poles	AC 240V DC 60V	0.05 - 20A	- 2 - Thermal - Pushbutton	- Snap-in or flange mounted - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Undervoltage and remote trip release Auxiliary switch Cover for IP54 or IP65	Thermal	**TA45 2 Pol Pushbutton**
	Circuit Breaker for Equipment thermal, Rocker actuation, 3 poles	AC 400V	0.05 - 12A	- 3 - Thermal - Rocker	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Undervoltage and remote trip release Auxiliary switch Cover for IP54 or IP65	Thermal	**TA45 3Pole Rocker**
	Circuit Breaker for Equipment thermal, Push button actuation, 3 poles	AC 400V	0.05 - 12A	- 3 - Thermal - Pushbutton	- Snap-in or flange mounted - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Undervoltage and remote trip release Auxiliary switch Cover for IP54 or IP65	Thermal	**TA45 3Pol Pushbutton**

This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg17_18_19
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Circuit Breaker for Equipment with Protection Cover

The circuit breaker for equipment TA45 can be configured in millions of variants. An important version hereby is the rocker switch type with cover to be used in rough environment.

The cover I the requirements according IP54 and improves the use of the circuit breaker to be used for over current protection in rough environment.

Solid Engineering and a Customized Solutions

"What won our customer over was the combination of solid engineering and a customized solution we could offer them."

Erick Pieters

Efficient Use or Ressources

We create and safeguard secure and clean workplaces. This serves the protection of the wealth of our employees. And we preserve the environment by using ressources efficiently and reducing emissions.

Antje Stein

Description Approvals	Rated Voltage	Rated Current	Pole Tripping Type Actuation Type	Mounting Style Terminals	Options	Web Reference or Type
TRIPPING MODE THERMAL-MAGNETIC						
 Circuit Breaker for Equipment thermal-magnetic, 1 pole	AC 240V DC 28V	0.05 - 16A	- 1 - Thermal-Magnetic - Reset type	- Threaded neck type - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Auxiliary switch Cover for IP54	**TM12-211**
 Circuit Breaker for Equipment thermal-magnetic, 1 pole	AC 240V DC 28V	0.05 - 16A	- 1 - Thermal-Magnetic - Reset type	- Flange type - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Auxiliary switch Cover for IP54	**TM12-111**
 Manual Motor Controller / Circuit Breaker for Equipment thermal-magnetic, 1 to 4 poles	AC 240/420V DC 120V	0.5 - 52A	- 1-4 - Thermal-Magnetic - Handle	- DIN rail - Screw Clamp	Remote trip release Auxiliary and/or signal contact	**AS168X**

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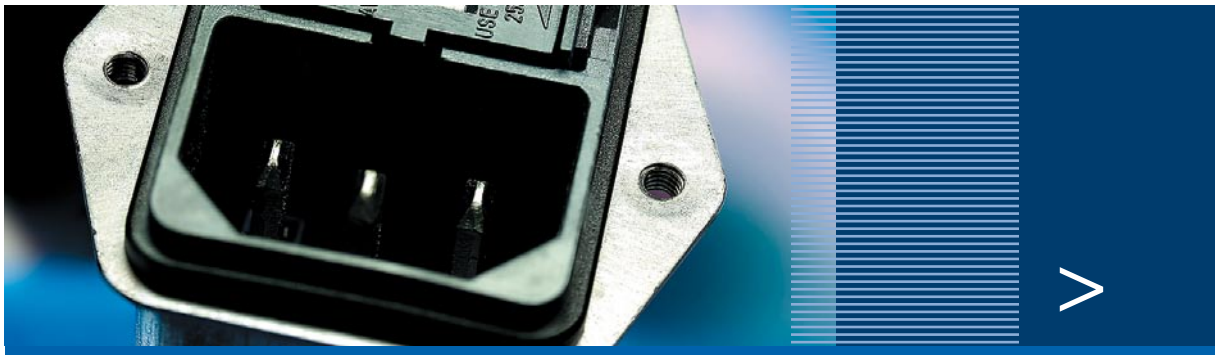

Power Entry Module with IP65 for Medical Applications

The Product 5707 with its 2 screw cap fuseholder is IP65 sealed and can be either mounted from the front or the rear side.

The Flange seals under the respect of the given mounting instruction against the cover u to IP65. The product is offered in variants to be mounted from the rear as well as from the front side. The products is ideally suitable to be used in medical applications according IEC 60601-1.

Slim single pole circuit breaker with dust and jetting water protection of IP 65

The threaded-neck type is available with an IP 65 rated cover, which provides protection against environmental conditions such as dust or jetting water.

The employees get our full attention

To be social-minded for SCHURTER means «the concerns of employees have absolute priority.» Because healthy, motivated, commited employees who are eager to learn show top p erformance and ensure the company success.

	Description Approvals	Rated Voltage	Rated Current	Pole Tripping Type Actuation Type	Mounting Style Terminals	Options	Tripping Mode	Web Reference or Type
	TRIPPING MODE UNDERVOLTAGE							
	Circuit Breaker for Equipment with undervoltage release, Rocker actuation, 2-poles	AC 240V DC 48V	0 - 20A	- 2 - Undervoltage - Rocker	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Overload protection Auxiliary switch Cover for IP65	Undervoltage	**TA45U 2pol Wippe**
	Circuit Breaker for Equipment with undervoltage release, Push button actuation, 2-poles	AC 240V DC 48V	0 - 20A	- 2 - Undervoltage - Pushbutton	- Snap-in or flange mounted - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Overload protection Auxiliary switch Cover for IP65	Undervoltage	**TA45U 2pol Drucktaster**
	Circuit Breaker for Equipment with undervoltage release, Rocker actuation, 3-poles	AC 400V	0 - 12A	- 3 - Undervoltage - Rocker	- Snap-In Version - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Overload protection Auxiliary switch Cover for IP65	Undervoltage	**TA45U 3pol Wippe**
	Circuit Breaker for Equipment with undervoltage release, Push button actuation, 3-poles	AC 400V	0 - 12A	- 3 - Undervoltage - Pushbutton	- Snap-in or flange mounted - Quick connect terminals 6.3 x 0.8 mm or screw terminals	Overload protection Auxiliary switch Cover for IP65	Undervoltage	**TA45U 3pol Drucktaster**
 new	Undervoltage protection switch, Rocker actuation, 2-poles	AC 115V AC 240V	16A	- 2 - Undervoltage - Rocker	- Snap-in or flange mounted - Quick connect terminals 6.8 x 0.8 mm	Cover for IP54	Undervoltage	**UP1_Wippe**
 new	Undervoltage protection switch, Push button actuation, 2-poles	AC 115V AC 240V	16A	- 2 - Undervoltage - Pushbutton	- Snap-in or flange mounted - Quick connect terminals 6.8 x 0.8 mm	Cover for IP54 or IP65	Undervoltage	**UP1_Druck-taste**

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Thermal circuit breaker TA35 with unique blue lightening rocker switch

The circuit breaker TA35 in 1-, 2- or 3-pole version impresses by its compactness and its skillfully designed shape. An unique version is the rocker switch type with the popular blue glow lamp. Further colors and rocker symbols are available in large varieties.

An optional protective cover gives a protection class of IP 65, making the unit suitable for applications exposed to dust or splashing water. Typical applications are laboratory equipment for chemical and medical applications, wood and masonry processing machines, construction site equipment, power generators, cleaning equipment, food-processing equipment and appliances.

Pre-compliance Information

"What I consider to be very important is getting the pre-compliance information on paper early on."

Marcel Reiter

	Description Approvals	Mounting Style Mounting Side Terminals	Line Switch	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 10 A				
	IEC Appliance Connector C14 with CBE 1- or 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	6145
	IEC Appliance Connector C14 with CBE 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	DF11
	Inlet filter, front side mounting, circuit breaker TA45 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	5145
	Inlet filter, front side mounting, deeply placed circuit breaker TA45 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	DF12
	MAX. RATED CURRENT 16 A				
	IEC Appliance Connector C20 with CBE 1- or 2-pole	- Snap-in or screw-on - Front-/Rear-Side - Quick-Connect - prewired	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C20 70° C	EF11

Description Approvals	Mounting Style Mounting Side Terminals	Line Switch	Appliance- Inlet/-Outlet	Web Reference or Type
Inlet filter, front side mounting, deeply placed circuit breaker TA45 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C20 70° C	EF12

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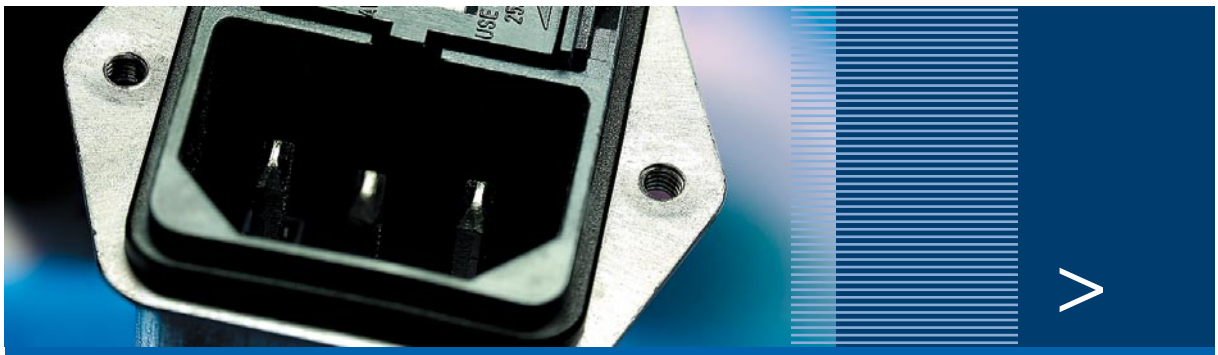
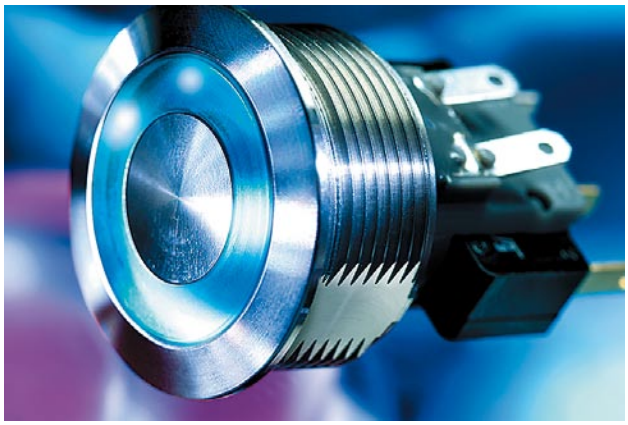


Power Entry Modules now with Metal Flange

The new metal flange versions of the SCHURTER types C20F, DC12 and KFA are suitable for mounting from the inner side of the appliance enclosures, simplifying the assembling processes.

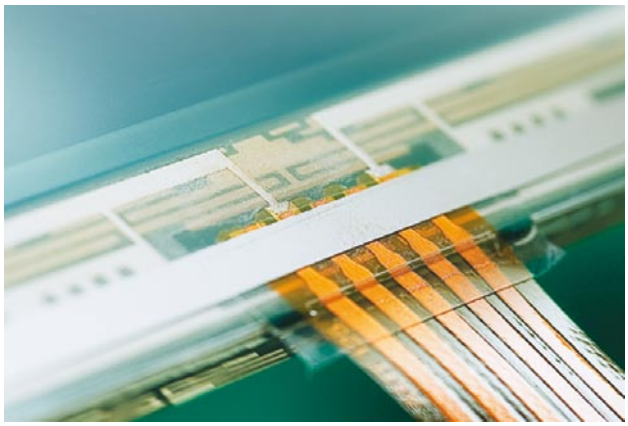
Additionally fixating nuts have also been eliminated by an optimized construction of the filter case. The electrical subassemblies, including the power supply, can now be completely tested before they are assembled into the appliance enclosure. These extensions to the product range support appliance manufacturers in their product optimizing efforts and therefore offer them significant competitive advantages.

Detailed information are available on the specific product data sheets C20F, DC12 und KFA



MSM - vandal-proof momentary action and latching action switch

PSE - piezo switch sealed and with long lifetime



Touch Screen - in analog-resistive, Matrix or capacitive technology

input systems

	Description	Illumination	Tail	Switching Function Number of Poles	Switching Voltage Switching Current	IP-Protection Class	Web Reference or Type
	SMD Switch, Short Stroke, 6 mm, Horizontal Actuator	non-illuminated	Gullwing	- N.O. - 1 pole	12 VDC, 50 mA	IP 40	**LSH**
	Printmount Switch, Short Stroke, 6 mm, Horizontal Actuator	non-illuminated	Through hole	- N.O. - 1 pole	12 VDC, 50 mA	IP 40	**LPH**
	Printmount Switch, Short Stroke, 6 mm, Square Actuator	non-illuminated	Through hole	- N.O. - 1 pole	12 VDC, 50 mA	IP 40	**LPS**
	Printmount Switch, Short Stroke, 7.5 mm, Vertical Actuator	non-illuminated	Through hole	- N.O. - 1 pole	12 VDC, 50 mA	IP 40	**LPV**
	SMD Switch, Short Stroke, 6 mm, Horizontal Actuator with Ground	non-illuminated	Gullwing	- N.O. - 1 pole	12 VDC, 50 mA	IP 40	**LSG**
	SMD Switch, Short Stroke, 11.4 mm	non-illuminated	Gullwing and J-Leads	- N.O. - 1 pole	30 VAC / 42 VDC, 50 mA	IP 40 and IP 67	**SMS**
	Print Switch, Short Stroke, 11.4 mm	non-illuminated	Through hole	- N.O. - 1 pole	30 VAC / 42 VDC, 50 mA	IP 40 and IP 67	**PMS**
	Printmount Switch, Short Stroke, 12.7 mm	non-illuminated	Through hole	- N.O. - 1 pole	24 VDC, 50 mA and 48 VDC, 125 mA	IP 40	**MTG**

	Description	Illumination	Tail	Switching Function Number of Poles	Switching Voltage Switching Current	IP-Protection Class	Web Reference or Type
	Membrane Switch, Printmount, Short Stroke, 18 mm	non-illuminated	Pins	- N.O. - 1 pole	24 VDC, 80 mA and 48 VDC, 125 mA	IP 65	**MCS 18 Print**
	Printmount Switch, Medium Stroke, small and large keycap, 10 mm	illuminated	Through hole	- N.O. - 2 pole	60 VAC / 50 VDC, 200 mA	IP 65	**HDT**
	Printmount Switch, Medium Stroke, 7.5 mm	non-illuminated	Through hole	- N.O. / N.C. - 1 pole	125 VAC / 50 VDC; Ag: 2A AC / 1.2A DC, Au: 80 mA AC/DC	IP 40	**SDK**

Printmount Switch SMS / PMS

The switches of the SMS / PMS lines are available for through hole and SMD assembly, with Gullwing or J-leads, with short or long actuator and with additional key caps as well as in a IP 40 and IP 67 degree of protection version.

The Printmount switches feature great versatility. From the low-cost version to individually designed special types, the switches are available in various designs and different illumination.

	Description	Technology	Illumination	Switching Function Number of Poles	Switching Voltage Switching Current	IP Protection Class Front Side / with Cover	Web Reference or Type
	Frontpanel Switch, Momentary Action, Medium Stroke, 10 mm	Momentary Action Switch	non-illuminated and illuminated	- N.C., N.O., N.C./N.O. - 1 pole and 2 pole	60 / 50 VAC/DC, 200 mA	IP 40	**LDT**
	Frontpanel Switch, Latching Action, Medium Stroke, 10 mm	Latching Action Switch	non-illuminated and illuminated	- N.C., N.O., N.C./N.O. - 1 pole and 2 pole	60 / 50 VAC/DC, 200 mA	IP 40	**LDS**
	Membrane Switch, Frontpanel, Short Stroke, 18 mm	Momentary Action Switch	non-illuminated	- N.O. - 1 pole	48 VDC, 125 mA or 24 VDC, 80 mA	IP 65	**MCS 18 Front**
	Membrane Switch, Frontpanel, Short Stroke, 27 mm	Momentary Action Switch	non-illuminated	- N.O. - 1 pole	50 VDC, 50 mA	IP 65	**SSM 27**
	Rocker Switch, 13 x 19 mm	Rocker Switch	non-illuminated and illuminated	- N.O. - 1 pole and 2 pole	depending on Ohm resistive load / motor load and EN / UL standards	IP 40 / IP 44 with Cover	**RSS**
	Rocker Switch, 22 x 19 mm	Rocker Switch	non-illuminated and illuminated	- N.O. - 2 pole	depending on Ohm resistive load / motor load and EN / UL standards	IP 40 / IP 44 with Cover	**RSM**
	Rocker Switch, 22 x 30 mm	Rocker Switch	non-illuminated and illuminated	- N.O. - 2 pole	depending on Ohm resistive load / motor load and EN / UL standards	IP 40 / IP 65 with Cover	**RSL**

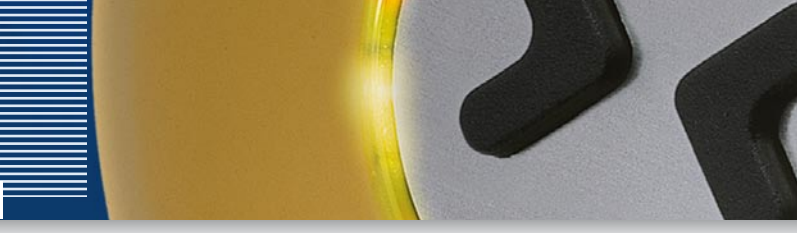
Frontpanel Switch MCS 18

The membrane switch MCS 18 with tactile feedback and extremely low mounting depth has a degree of protection of IP 65. The switch variety ranges from a round or square design, with additional soldering aids, diverse letterings as well as different colors of the bezel and the face foil.

The membrane switches can be used in diverse fields of application. Due to their extremely low mounting depth and tactile feedback the switches are particularly suitable for hand-held applications with 3 or 4 switching functions.

We life up to sustainability in a conscious and consistent way.

Sustainability at SCHURTER stands for a healthy and longterm economic development, which respects social and ecological matters.



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new

Description	Technology	Illumination Color LED	Color Actuator Overlay Cable Layout	Supply Voltage Switching Voltage Switching Current	IP Protection Class Front Side	Web Reference or Type
Switch for Public Transport Systems	Momentary Action Switch	Ring Illumination, yellow or red/ green	- nature - angled	110 V or 24 V, 137 VDC, 250 mA	IP 67	PTS

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Public Transport Switch

The Public Transport Switch is designed as a door pushbutton switch for usage in public transportation applications such as trains, buses, trams and undergrounds. Due to the user-friendly design the PTS switches can be easily operated by elderly and handicapped people.

The switching status is visually indicated through an illumination ring. A unique feature of the PTS series is the outstanding tactile feedback with a lifetime of 2 million cycles. A further advantage is the illumination with a viewing angle of 180 degree, which gives a wide-range identification of the switching status. The standard versions are available with 24 V and 110V supply voltage ratings and angled cables.

Innovation, Customer Focus and Quality form the base of our success

SCHURTER ensures economic efficiency and company success with high customer focus, innovative solutions, strong partnerships and an excellent product- and service quality.

Piezo switches with seal-tight protection meet highest standard class IP69K

By achieving the seal-tight protection class of IP69K, SCHURTER is extending the spectrum of potential applications for its already tried-and-tested PSE family of piezo switches.

The hermetically sealed piezo switches can now be used in areas, which are regularly disinfected or cleaned using high-pressure cleaners. This renders them ideal for use in applications exposed to high levels of dirt and grime such as food processing, commercial cooking and transportation. Besides the extraordinarily long lifetime of more than 20 million switching cycles, SCHURTER piezo switches also reveal a high level of robustness due to their stainless steel or aluminum housing.

Conformity to components standards, national approvals

National testing institutions are testing according to national and international standards or other generally recognized rules of technology. Their certificaiton/approval-marks confirm the observance of the safety requirements which electric appliances must fulfil.

Detailed information about approvals can be looked up here:
http://www.schurter.com/approvals

	Description	Mounting Diameter	Illumination Terminal	IP Protection Class Contact Area Front Side IK Shock Protection Class	Switching Voltage	Operating Temperature	Web Reference or Type
	Metal Switch Short Stroke	19 mm	- non-illuminated - Pins, Pins with Soldering Aid or Clip for Pins	- IP 65 - IK 05	48 VDC, 125 mA	-20 to +60 °C	**MCS 19**
	Metal Switch Short Stroke, Point Illumination	19 mm	- Point Illumination - Pins with Soldering Aid	- IP 65 - IK 05	48 VDC, 125 mA	-20 to +60 °C	**MCS 19 PI**
	Metal Switch Short Stroke, Ring Illumination	30 mm	- Ring Illumination - Wire	- IP 65 - IK 05	48 VDC, 125 mA	-25 to +60 °C	**MCS 30 RI**
	Metal Switch with Reduced Mounting Depth	30 mm	- non-illuminated - Wire	- IP 65 - IK 07	50 VDC, 50 mA	-25 to +85 °C	**SSM 30**
	Metal Switch, Medium Stroke, Switching Voltage up to 250 VAC, Ø 16 mm	16 mm	- non-illuminated - Quick Connect Terminal	- IP 67 - IK 06	30 VDC, 100 mA 125 / 250 VAC, 5 / 3 A 250 VAC, 10 A	-25 to +85 °C	**MSM 16**
	Metal Switch, Medium Stroke, Switching Voltage up to 250 VAC, Ø 19 mm	19 mm	- non-illuminated, Point Illumination, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	30 VDC, 100 mA 125 / 250 VAC, 5 / 3 A 250 VAC, 10 A	-25 to +85 °C	**MSM 19**
	Metal Switch, Medium Stroke, Switching Voltage up to 250 VAC, Ø 22 mm	22 mm	- non-illuminated, Point Illumination, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	30 VDC, 100 mA 125 / 250 VAC, 5 / 3 A 250 VAC, 10 A	-25 to +85 °C	**MSM 22**
	Metal Switch, Medium Stroke, Switching Voltage up to 250 VAC, Ø 30 mm	30 mm	- non-illuminated, Point Illumination, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	30 VDC, 100 mA 125 / 250 VAC, 5 / 3 A 250 VAC, 10 A	-25 to +85 °C	**MSM 30**

	Description	Mounting Diameter	Illumination Terminal	IP Protection Class Contact Area Front Side IK Shock Protection Class	Switching Voltage	Operating Temperature	Web Reference or Type
 new	Metal Switch, 2-pole, Switching Voltage up to 250 VAC, Ø 19 mm	19 mm	- non-illuminated, Point Illumination, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	125 / 250 VAC, 5 / 3 A	-25 to +85 °C	MSM 19 DP
 new	Metal Switch, 2-pole, Switching Voltage up to 250 VAC, Ø 22 mm	22 mm	- non-illuminated, Point Illumination, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	125 / 250 VAC, 5 / 3 A	-25 to +85 °C	MSM 22 DP
 new	Metal Switch, 2-pole, Switching Voltage up to 250 VAC, Ø 30 mm	30 mm	- non-illuminated, Point Illumination, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	125 / 250 VAC, 5 / 3 A	-25 to +85 °C	MSM 30 DP
 new	Metal Switch, Latching Action, 2-pole, Switching Voltage up to 250 VAC, Ø 19 mm	19 mm	- non-illuminated, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	250 VAC, 12 A	-40 to +85 °C	MSM 19 LA
 new	Metal Switch, Latching Action, 2-pole, Switching Voltage up to 250 VAC, Ø 22 mm	22 mm	- non-illuminated, Ring Illumination - Quick Connect Terminal	- IP 67 - IK 07	250 VAC, 12 A	-40 to +85 °C	MSM 22 LA
	Metal Switch with Snap-in Mounting	22 mm	- non-illuminated, Point Illumination - snap-in	- IP 67 - IK 07	125 / 250 VAC, 5 / 3 A	-25 to +85 °C	MSM 22 SI
	Piezo Switch N.O., Ø 16 mm	16 mm	- non-illuminated - Pins, Quick Connect Terminal	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	PSE M 16
	Piezo Switch N.O., Ø 19 mm	19 mm	- non-illuminated - Pins	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	PSE M 19

	Description	Mounting Diameter	Illumination Terminal	IP Protection Class Contact Area Front Side IK Shock Protection Class	Switching Voltage	Operating Temperature	Web Reference or Type
	Piezo Switch N.O., Ø 22 mm	22 mm	- non-illuminated - Pins	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	**PSE M 22**
	Piezo Switch N.O., Ø 22 mm, Point Illumination	22 mm	- Point Illumination - Quick Connect Terminal	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	**PSE M 22 PI**
	Piezo Switch N.O., Ø 22 mm, Ring Illumination	22 mm	- Ring Illumination - Wire, Quick Connect Terminal	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	**PSE M 22 RI**
	Piezo Switch N.O., Ø 24 mm, Ring Illumination	24 mm	- Ring Illumination - Wire	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	**PSE M 24 RI**
	Piezo Switch N.O., Ø 27 mm, Ring Illumination	27 mm	- Ring Illumination - Wire	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	**PSE M 27 RI**
	Piezo Switch N.O., Ø 30 mm, Ring Illumination	30 mm	- Ring Illumination - Wire	- IP 69K - IK 02	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	**PSE M 30 RI**
	Piezo Switch for Use in Explosive Environment	16 mm	- non-illuminated - Pins	- IP 69K - IK 02	24 VAC/DC, 40 mA	-20 to +60 °C	**PSE M 16 EX**
	Piezo Switch with Prolonged Signal	16 mm	- non-illuminated - Quick Connect Terminal	- IP 69K - IK 02	42 / 60 VAC/DC, 2,6 A	-20 to +60 °C	**PSE M 16 Prolonged Signal**

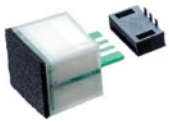
	Description	Mounting Diameter	Illumination Terminal	IP Protection Class Contact Area Front Side IK Shock Protection Class	Switching Voltage	Operating Temperature	Web Reference or Type
	Piezo Switch with Temperature Compensation	22 mm	- non-illuminated - Wire	- IP 69K - IK 02	42 / 60 VAC/DC, 2,6 A	-20 to +60 °C	**PSE M 22 Temperature Compensation**
	Piezo Switch with Extended Protection against Vandalism	27 mm	- non-illuminated - Wire	- IP 69K - IK 06	42 / 60 VAC/DC, 100 mA	-40 to +85 °C	**PSE M 27 High Impact**

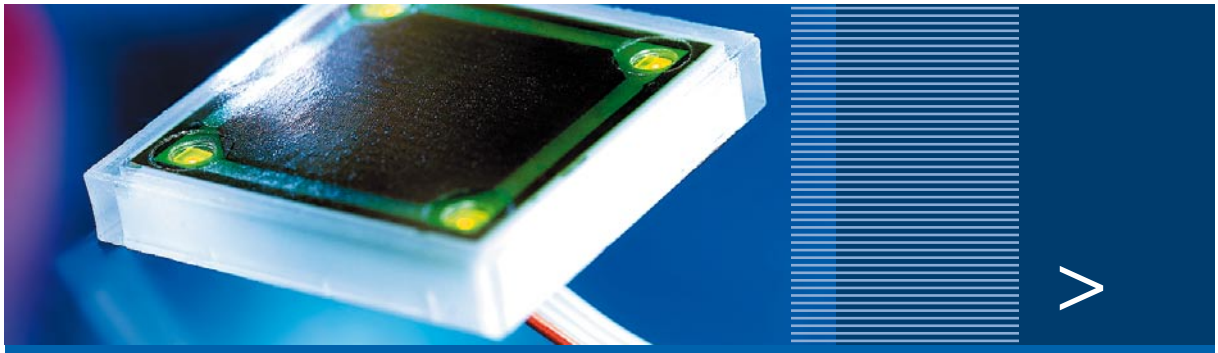
This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg70
For customer specific solutions, please contact us. www.schurter.contact

Robust Vandal-Proof Switch with Latching Action MSM LA

The robust metal switches of the existing MSM product family are now also available with a push-on, push-off latching function.

The switch position (ON / OFF) is easy to recognize from the resting position of the actuator. In the OFF state, the actuator position protrudes from the housing; in the ON state, it is depressed into the housing. This provides a user-friendly actuating function and also prevents inadvertent switching, e.g. caused by objects leaning on the switch. The switch is designed with two isolated contacts and may thus be used for single- and two-pole switching solutions.

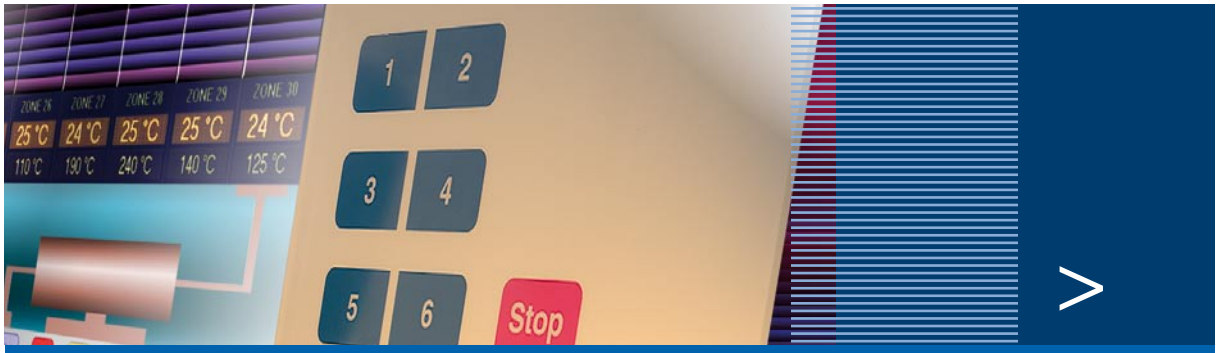
	Description	Technology	Dimensions (Width, Height)	Illumination	IP-Protection Class	Switching Voltage Switching Current	Web Reference or Type
	Capacitive Switch Element under Glass, 15 x 15 mm	Capacitive Momentary and Latching Action Switch	15 x 15 mm	non-illuminated	IP 67	24 VDC, 175 mA	**CSE 15 UG**
	Capacitive Switch Element under Glass, 25 x 25 mm	Capacitive Momentary and Latching Action Switch	25 x 25 mm	Point Illumination	IP 67	12 VDC, 175 mA	**CSE 25 UG**
	Capacitive Switch in Alu Housing M16	Capacitive Momentary and Latching Action Switch	Ø 16 mm	Ring Illumination	IP 67	24 VDC, 175 mA	**CSE 16**
	Capacitive Level Sensor for Fluid Level Controlling	Capacitive Sensor	Ø 16 mm	non-illuminated	IP 68	24 VDC, 50 mA	**CLS 16**



Capacitive Switch CSE

The CSE UG is a capacitive switch that is actuated simply through proximity or the slightest touch of a finger. Through a fine degree of sensitivity, which is set in the production process, these switches can be used behind non-conductive materials as glass, marble, granite, plastics, wood or ceramic up to 20 mm thick.

The capacitive switch is resistant against vandalism, insusceptible to wear-and-tear and is trouble-free. Operating under unfavorable conditions as dust, dirt and heat is possible. Based on its functional attributes, this switch is especially useful in critical environmental applications. The switch can be used in ticketing terminals, self-service terminals in public areas, touch sensitive exhibition displays, elevator systems as well as in POS and POI terminals.



Touch Keypad

The membrane keypad with new input technology

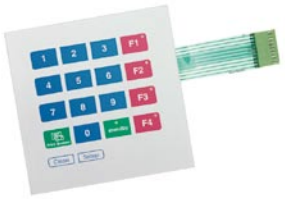
The new touch keypad of SCHURTER features a virtually force-free data entry with a slight tap. This feature allows for quick and fatigue-free actuations. By pressing the touch keypad the user feels no difference compared to a touch screen. Actuating force and travel are comparable to analog touch screens. The touch keypad is therefore ideal for vertically positioned input systems. The button sizes are variable and freely configurable. The contact areas of the keypads correspond exactly to the design area of the touch keypad. A safe actuation is possible in every point as well as in the corners of the single button. The contact area is not limited, which means no contact elements are used. Therefore, many new design possibilities can be realized. The touch keypad is very flat designed, has a close surface with a protection degree of IP65 and shows no dirt edges.

A Skilled EMC Supplier

"I am convinced that SCHURTER has a lot of skills in EMC."

David Willems

	Description	Keypad Type	Embossing Options	IP-Protection Class	Operating Temperature	Web Reference or Type
	Systeme with PCB, Housing and Decoder	Complete System	Rim Embossing, Pillow Embossing, Dome Embossing, Switching Dome	IP 65 IP 67 possible on request	-	**Complete Systems**
	Membrane Keypad without Tactile Feedback	Membrane Foil Technology	Rim Embossing optional	Front-Side IP 65	-25 to +70 °C	**Membrane Keypads - Flat Keypad**
	Membrane Keypad with Embossed Dome	Membrane Foil Technology	Switching Dome	Front-Side IP 65	-25 to +70 °C	**Membrane Keypads - Embossed Dome**
	Membrane Keypad for fast data entry by finger-touch	Without Tactile Feedback	Optional	Front-Side IP 65	-25 to +70 °C	**Touch Keypad**
	Membrane Keypads with Tactile Feedback with and without Embossing	Snap Dome Technology	Pillow Embossing, Dome Embossing, Rim Embossing optional	Front-Side IP 65	-25 to +85 °C	**Keypads in Snap Dome Technology**

	Description	Keypad Type	Embossing Options	IP-Protection Class	Operating Temperature	Web Reference or Type
	Membrane Keypad with Short Travel Switch	Modular Input System	Pillow Embossing, Rim Embossing optional	Front-Side IP 65	-25 to +70 °C	**Modular Input System**
	Membrane Keypad with Magnet Snap	Magnet Snap	Pillow Embossing, Rim Embossing optional	Front-Side IP 65 IP 67 on request	-25 to +85 °C	**Magnet Snap**
	Multi-colour Illuminated Keyboard	Luminos	Rim Embossing	Front-Side IP 65	-25 to +85 °C	**Multi-color illuminated Keyboard Luminos**
	Keyboard Decoder to connect matrix keyboards to PC systems	Keyboard Decoder PS/2 or USB	-	-	0 to +70 °C	**Keyboard Decoder PS/2 or USB**

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For customer specific solutions, please contact us. www.schurter.contact

Description	Switching mode	Interfaces	Front Material	Sensor Areas	Illumination / IP Protection Class Front Side	Web Reference or Type
Capacitive Sensor Keypad	Switch, Slider, Wheel, Touchpad	USB, I²C, SPI, RS-232, UART, bus interfaces	glass, plastics	Printed polyester foil, rigid PCB, etched ITO film	Point- and Overlay Illumination IP 67	CSK

For customer specific solutions, please contact us. www.schurter.contact

Capacitive Sensor Keypad

The capacitive sensor keypads offer the best solution for operating a device by light touch without pressure.

The keypads or slider fields can be printed according to the surface material and an individual illumination is possible. The capacitive keypad provides benefits such as vandalism-proof, wear and noise immunity as well as waterproof-sensing, that is a controlled switching at moisturization. It offers free design options regarding material, form, layout and lettering. The modular structure allows a design of exclusive systems according to customer requirements. The new capacitive keypad of SCHURTER can be used in harsh environments. It is resistant to dust, water and high humidity. The capacitive keypads are used in ticket machines, kiosk systems in public areas, industrial controls as well as in the medical industry.

Touch Panel - Integrated Solutions

Touch screens integrated in complete systems provide many possibilities regarding layout and design: due to their variable input fronts, different thicknesses of supporting glass and several mounting versions they can be readily adapted to your individual requirements.

A special coating procedure together with special foils prevent the occurence of Newton rings. Customized touch panel solutions are available with controllers or chipsets for perfect integration.

Provide the expected Product Quality

"Quality issues with other manufacturers led the customer to us - plus the support they were not getting!"

Ian McCutcheon

	Description	Technology Interface	IP Protection Class Front Side / Contact Area IK Shock Protection Class	Lifetime	Mounting	Web Reference or Type
	Metallic Trackball	- Keypad with Travel - PS/2, USB	- static - IP 65	2 mill.	Rear Mounting	**Trackball Unit**
	Numeric Metallic Keypad, 12-key keypad	- Keypad with Travel	- IP 40 - IP 65 - IK 07	1 mill.	Front or Rear Mounting	**12 key keypad**
	Numeric Metallic Keypad, 16-key keypad	- Keypad with Travel	- IP 40 - IP 65 - IK 07	1 mill.	Front or Rear Mounting	**16 key keypad**
	PC Metallic Keypad	- Keypad with Travel - PS/2, USB	- IP 40 - IP 65 - IK 07	2 mill.	Rear Mounting	**PC Keypad**
	PC Metallic Keypad with Numeric Keypad	- Keypad with Travel - PS/2, USB	- IP 40 - IP 65 - IK 07	2 mill.	Rear Mounting	**PC Keypad with Numeric Keypad**

	Description	Technology Interface	IP Protection Class Front Side / Contact Area IK Shock Protection Class	Lifetime	Mounting	Web Reference or Type
	PC Metallic Keypad with Trackball	- Keypad with Travel - PS/2, USB	- IP 40 - IP 65 - IK 07	2 mill.	Front Mounting	**PC Keypad with Trackball Unit**
	PC Metallic Keypad with Touchpad	- Keypad with Travel - PS/2, USB	- IP 40 - IP 65 - IK 07	2 mill.	Front Mounting	**PC Keypad with Touchpad**
	Piezo Keypad, 12 key and 16 key keypad	- Piezo Keypad	- IP 67 - IP 67	15 mill.	Rear Mounting	**Piezo Keypad**

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You will find additional information about the respective products on our website: www.schurter.com/pg70b
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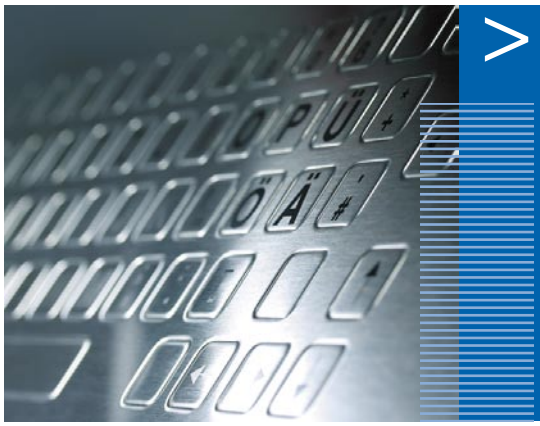

Metallic Panels offer Resistance and Convenience

SCHURTER's functional principle for the metallic panels protects the metal switches against violent destruction, yet provides high operating convenience and a pleasant touch. The metallic panels are mainly used in applications with rugged ambient conditions.

	Description	Touch Screen Type	Wire Technology Tail	Size	Controller / Chipset Type	Mounting Style	Web Reference or Type
	Touch Panel	all types possible	-	3.85" to 21.1"	-	from Front Side (IP 65) and Rear Side	**Touch Panel**
	Touch Screen analog-resistive, 4-wire	analog-resistive	-4-wire -ZIF / AMP / BERG	3.85" bis 17.0"	-	-	**1070.0432**
	Touch Screen analog-resistive, 8-wire	analog-resistive	-8-wire -ZIF / AMP / BERG	10.44" to 19.1"	-	-	**1070.0435**
	Touch Screen analog-resistive, 5-wire	analog-resistive	-5-wire -AMP	6,48" to 21,1"	-	-	**1070.0442**
	Touch Screen Matrix	Matrix - on request	-	according to customer's specifications	-	-	**Matrix**

	Description	Touch Screen Type	Wire Technology Tail	Size	Controller / Chipset Type	Mounting Style	Web Reference or Type
 new	Touch Screen capacitive	capacitive	-AMP	12.0"; 15.0"; 17.0"; 19.0"	-	-	1060.0001
	Touch Screen Controller, RS-232	analog-resistive	-4- / 5- / 8-wire	-	RS-232	-	1070.0038.01
	Touch Screen Controller, USB	analog-resistive	-4- / 5- / 8-wire	-	USB	-	1070.0047.01
 new	Combo Controller, RS-232 und USB	analog-resistive	-4- / 5- / 8-wire	-	-	-	1070.0048.01
new	Capacitive Controller, RS-232 and USB	capacitive	-	-	-	-	1070.0100

	Description	Touch Screen Type	Wire Technology Tail	Size	Controller / Chipset Type	Mounting Style	Web Reference or Type
	Touch Screen Chip, RS-232	-	-4- / 5- / 8-wire	-	RS-232	-	**1070.0029.XX**
	Touch Screen Chipset, USB	-	-4- / 5- / 8-wire	-	USB	-	**1070.0031.XX**
 new	Combo Chip, RS-232 und USB	-	-4- / 5- / 8-wire	-	-	-	**1070.0049**

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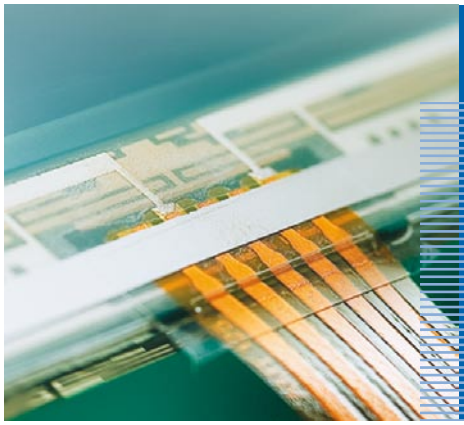
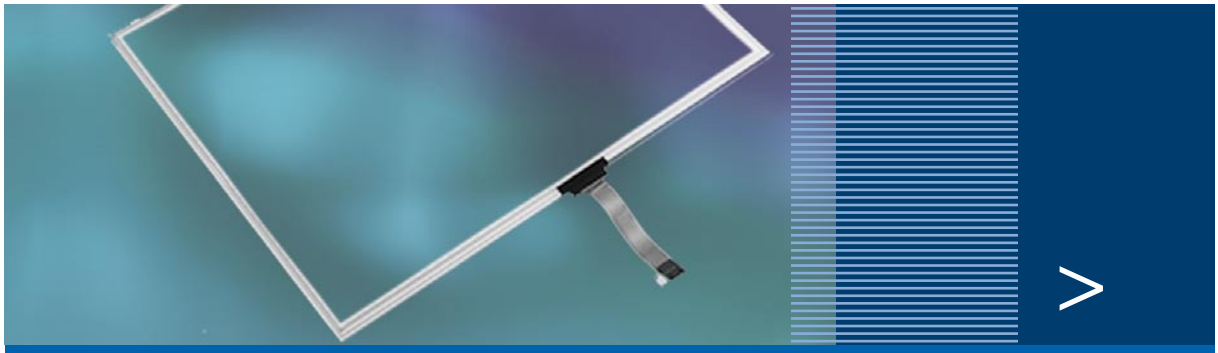
For customer specific solutions, please contact us. www.schurter.contact



Touch Screens from 2.0" to 21.1"

SCHURTER offers a wide range of analog-resistive touch screens in 4-, 5- and 8-wire technology as well as touch screens in matrix and capacitive technology. The SCHURTER Touch Screens can be used in nearly any application, including industrial automation, medical industry, automotive industry, food processing, packaging industry, POS and POI.



Capacitive Touch Screens

SCHURTER extends its touch screen series to include an analog-capacitive system.

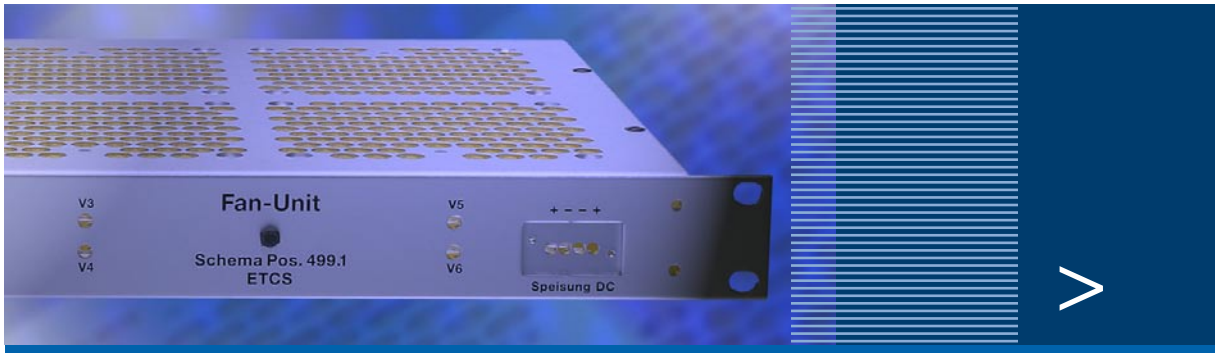
The capacitive touch panel is a robust input system for high mechanical exposure and is the optimal solution for applications in industrial and public areas. Standard sizes with 12", 15", 17" and 19" are available. Customized sizes can also be realized on request. The system is long-term stable and has an enhanced input accuracy of more than 99%. The glass has a second ITO cover which is coated on the rear side of the glass for EMI-shielding to use in medical and industrial applications. The capacitive touch system is suitable for public kiosk-terminals, ATM and ticketing machines.

We produce environment-friendly and with respect for our ressources.

A responsible attitude to the environment is a constant part of the SCHURTER corporate culture. We use our ressources efficiently, environment friendly products are of great importance to us and we also sensitize employees and partners for environmental matters.

Description	Panel Thickness	Surface Lettering	Fastening	Overlay	Machining	Material	Web Reference or Type
 Front Panels in Aluminium	1.0 - 5.0 mm	Alu natural or coloured anodising, under anodising printing technology or silk-screen printing	Threads and Countersinks, Force Fitting of thread bolt, Studs and Nuts or self-adhesive	optional with Cover Foil	Millings, Drillings, Facets	Alu. anodised	**Frontpanels Aluminium**
 Front Panels in Plastic	1.0 - 5.0 mm	Silk-screen Printing at Rear Side	Mounting Holes or self-adhesive	optional with Cover Foil	-	- Acrylic Glass, Glare - Acrylic Glass, Calendered - Polycarbonate	**Frontpanels Plastic**
 Housing Systems in Aluminium	1.0 - 5.0 mm	Lettering and Housing Surface anodised, partial anodising and alodining possible	Mounting Holes, Nuts, Threads or self-adhesive	-	CNC-Punching, Cutting or Milling, Design of Housing	Alu. anodised	**Housing Aluminium**
 Housing Systems in Steel	0.4-2.0 mm	Surface zinc-plated, varnished, powder-coated and printed with silk-screen technique	Mounting Holes, Nuts, Threads or self-adhesive	-	CNC-Punching, Cutting or Milling, Design of Housing	- Steel - Stainless Steel	**Housing Steel**

For customer specific solutions, please contact us. www.schurter.contact



Housing Systems and Frontpanels

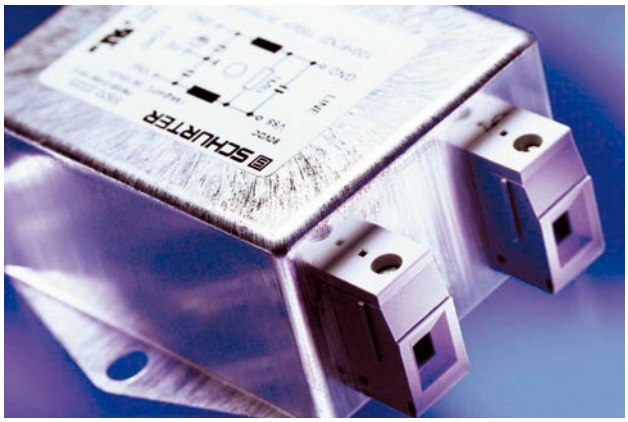
For applications in the field of housing systems, aluminum or steel is used in different strengths.

The aluminum housings can be anodised and alodined. If steel is used, the surface can be galvanized, varnished, powder coated and printed in the screen process procedure. After the CNC punching, cutting or milling or rather the mechanical machining, the housing is bent into the requested shape. For the frontpanel design, the combination of coloured anodising and two-component screen printing offers almost unlimited possibilities in designs.

Known as Technology Leader

"The customer contacted us first because they were looking for a new technology."

Ian McCutcheon



FMEB - 1-Stage Filter for DC Systems

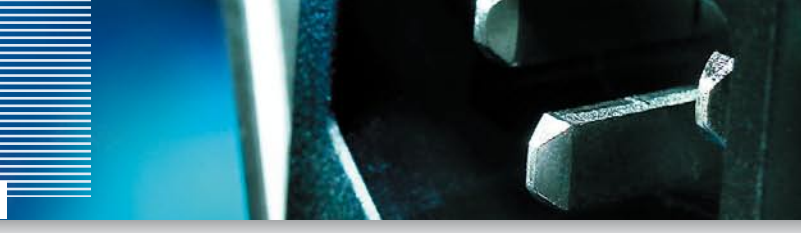
DLKP-1 - Compensated High Current Choke, 1-phase

5120 - Inlet Filter, ECO Design

emc products

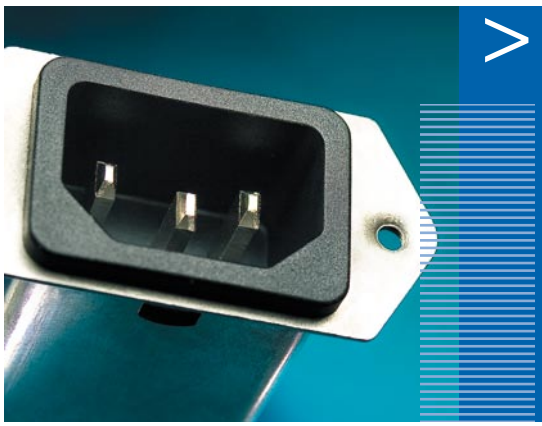
	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
 new	DC-inlet filter, ECO design, front- or rear side mounting	- Snap-in/screw-on - Front-/Rear-Side - Quick-Connect	-	-	-	5003
MAX. RATED CURRENT 10 A						
	Inlet filter, front side mounting	- Snap-in/screw-on - Front-Side - Quick-Connect - prewired	-	-	C14 70° C	5110
 new	Inlet filter, ECO design, front- or rear side mounting, protection class I or II	- Snap-in/screw-on - Front-/Rear-Side - Quick-Connect	-	-	C14 70° C	5120
 new	Inlet with high frequency filter, X2Y technology, ECO design, front- or rear side mounting	- Screw-on - Front-/Rear-Side - Quick-Connect	-	-	C14 70° C	5150
	Inlet filter, front side mounting	- Screw-on - Front-Side - Quick-Connect - prewired	-	-	C14 70° C	KFS

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance-Inlet/-Outlet	Web Reference or Type
	Inlet filter, front or rear side mounting	- Snap-in/screw-on - Front-/Rear-Side - Quick-Connect/ Wire (braid) - prewired	-	-	C14 70° C	FGS
	Inlet filter, front side mounting	- Screw-on - Front-Side - Quick-Connect - prewired	-	-	C14 70° C	KFX
	Inlet filter, rear side "lock and shield" mounting	- Snap-in - Rear-Side - Quick-Connect - prewired	-	-	C14 70° C	GRF2
	Inlet filter, rear side "lock and shield" mounting	- Snap-in - Rear-Side - Quick-Connect - prewired	-	-	C14 70° C	GRF4
	"Lock and shield" mounting, line switch, fuseh. 5x20 mm with/without voltage sel. (series-parallel)	- Snap-in - Rear-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole - jumper - optional	C14 70° C	GRM2



	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
	Filter for backpack mounting to KP01	- Sandwich/rear-side - Rear-Side - Solder - unwired	-	-	-	KPF
	MAX. RATED CURRENT 16 A					
 new	Inlet C20 with filter, ECO design, front or rear side mounting	- Snap-in/screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	-	C20 70° C	5130
	Inlet filter, front or rear side mounting	- Snap-in/screw-on - Front-/Rear-Side - Solder/quick connect/wire - prewired	-	-	C20 70° C	C20F

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see IEC Connector page 180



Best perfomance at low cost

The power entry modules series 5120 offer optimal safety regarding EMC emission and immunity. Refined for optimal performance at lowest price, the compact filter is particularly suited for power supplies used in Industial equipent, Infomration technology and Medical Devices.

DC filter provide optimal performance in data critical rquipment

The filtered power entry modules series 5003 are specially designed for DC applications particularly for DC supply of Information Technology Equipment.

The 5003 features a standard DC connector, offered in two different connector styles. The connector is encased with a 1-stage filter for currents up to 15A at 125 VDC. It provides an outstanding wide-band absorption rate in frequencies ranging from 100kHz to 30 MHz. The unit offers different mounting options.

Not Sexy but Attractive

"Admittedly, our products may not be sexy, but they certainly can be attractive."

Martin Tobler

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 8 A					
 new	Inlet with filter, IP65, front or rear mounting, fuseholder 5x20 mm, protection class I or II	- Screw-on - Front-/Rear-Side - Quick-Connect	- 5 x 20 - 1 or 2 pole	-	C18 70° C	5707
	MAX. RATED CURRENT 10 A					
	Inlet filter, front side mounting, fuseholder 5x20 mm	- Snap-in/screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 - 1 pole	-	C14 70° C	5200
	Inlet filter, front side mounting, fuseholder 5x20 mm	- Snap-in/screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 - 2-pole	-	C14 70° C	5220
	With fuseholder 5x20 mm, with or without voltage selector (step switch)	- Snap-in/screw-on - Front-/Rear-Side - Quick-Connect/ Wire (braid) - prewired	- 5 x 20 - 1 or 2 pole	- step - optional	C14 70° C	KFA
	With fuseholder 5x20 mm / 6.3x32 mm, with or without voltage selector (step switch)	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- step - optional	C14 70° C	KFC

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
	Front side mounting, fuseh. 5 x 20 mm/6.3x32 mm, with or without voltage selector (series-parallel)	- Screw-on - Front-Side - Quick-Connect - partially wired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- series-parallel	C14 70° C	CE
 new	Inlet filter, front- or rear side mounting, line switch 1-/2-pole	- Snap-in/screw-on - Front-/Rear-Side - Quick-Connect - prewired	-	- Rocker switch - 1 or 2 pole	C14 70° C	DC12
	Inlet filter, front side mounting, line switch 1-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - 1 pole	C14 70° C	KFB1
	Inlet filter, front side mounting, line switch 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - 2-pole	C14 70° C	KFB2
 new	Inlet filter, PCB mounting, line switch 1-/2-pole	- Screw-on - Rear-Side - PCB - prewired	-	- Rocker switch - 1 or 2 pole	C14 70° C	DC22

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
	Inlet filter, front side mounting, deeply placed circuit breaker TA45 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	DF12
	Inlet filter, front side mounting, circuit breaker TA45 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	5145
	Inlet filter, front side mounting, deeply placed circuit breaker TA45 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C14 70° C	DF12
MAX. RATED CURRENT 16 A						
	Inlet filter, front side mounting, line switch 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - 2-pole	C20 70° C	EC12
	Inlet filter, front side mounting, deeply placed circuit breaker TA45 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	-	- Rocker switch - Circuit Breaker for Equipment - TA45 - 2-pole	C20 70° C	EF12

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see IEC Connector page 180

A simple solution for gigahertz applications

The series 5150 is a breakthrough product, providing simple and universal EMC for high frequency applications, using X2Y® filter technology. The series possesses broadband suppression properties to 1 GHz and combines them with the most simple and universal power input.

The X2Y® filter technology combines the X and Y capacitors into a component that is in contact with the filter enclosure over a broad surface. The leads connecting the capacitors are thereby eliminated and parasitic impedances are reduced to a minimum. This results in broadband suppression into high frequency ranges. X2Y® technology has been established for quite some time in the area of signal processing. SCHURTER has now integrated this concept into safety relevant power input.

Mission Statement

Clear, direct communication. Welcoming of new ideas. Continuous productivity.

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
	MAX. RATED CURRENT 6 A					
	Line switch with/without bowden cable, fuseh. 5x20/6.3x32 mm, voltage selector	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Switch for bowdencable - 2-pole - step - optional	C14 70° C	**CD-Bowden-cable**
	With fuseholder 5x20 mm/6.3x32 mm, voltage sel. (series-parallel)	- Screw-on - Front-Side - Quick-Connect - partially wired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Switch for bowdencable - 2-pole - series-parallel	C14 70° C	**CG-Bowden-cable**
	Inlet filter, modular assembling	- Snap-in - Front-Side - Solder/quick-connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	**Felcom 54**
	MAX. RATED CURRENT 10 A					
	Inlet filter, front side mounting, line switch 2-pole, fuseholder 5x20 mm	- Snap-in - Front-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	**KMF**
 new	Inlet with filter for front side mounting, fuse 1-/2-pole, line switch 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	**DD12**

	Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
 new	Inlet with filter for PCB mounting, fuse 1-/2-pole, line switch 2-pole	- Screw-on - Rear-Side - PCB - prewired	- 5 x 20 - 1 or 2 pole	- Rocker switch - 2-pole	C14 70° C	DD22
	1-stage inlet filter, front side mounting, line switch 2-pole, fuseholder 5x20 mm 1-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 - 1 pole	- Rocker switch - 2-pole	C14 70° C	FKH
	1-stage inlet filter, front side mounting, line switch 2-pole, fuseholder 5x20 mm 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 - 2-pole	- Rocker switch - 2-pole	C14 70° C	FKI
	2-stage inlet filter, front side mounting, line switch 2-pole, fuseholder 5x20 mm 1-polig	- Screw-on - Front-Side - Quick-Connect	- 5 x 20 - 1 pole	- Rocker switch - 2-pole	C14 70° C	FKHD
	2-stage inlet filter, front side mounting, line switch 2-pole, fuseholder 5x20 mm 2-pole	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 - 2-pole	- Rocker switch - 2-pole	C14 70° C	FKID

Description Approvals	Mounting Style Mounting Side Terminals	Fuseholder Dimension Poles	Line Switch Voltage selector	Appliance- Inlet/-Outlet	Web Reference or Type
Line switch with/without bowden cable, fuseh. 5x20/6.3x32 mm, voltage selector	- Screw-on - Front-Side - Quick-Connect - prewired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Rocker switch - 2-pole - step - optional	C14 70° C	CD
Line switch with/without bowden cable, fuseh. 5x20/6.3 x 32 mm, voltage sel. (series-parallel)	- Screw-on - Front-Side - Quick-Connect - partially wired	- 5 x 20 or 6.3 x 32 - 1 or 2 pole	- Rocker switch - 2-pole - series-parallel	C14 70° C	CG

For customer specific solutions, please contact us. www.schurter.contact
General Product Information see IEC Connector page 180

Power Entry Module with Extra-Safe Fuse Drawer

The power entry module KFA with line filter and a 1- or 2-pole fuseholder is designed for rated current s from 1 to 10 A. The use of an Extra-Safe fuse drawer allows the use of the component for medical appliances according IEC 60601-1.

The product KFA offers a wide range of different variants. Different mountig stiles are available as well as a version with voltage selector. The type with metal flange is extra effective regarding EMC protection.

Customised filters for system integration

Open frame filters are sub-systems that are engineered exactly to our OEM customers specifications. Alongside suppression properties, filter geometry and system connection play a central role. Very often the area of application renders the filter housing superfluous. Additional material cost savings are thus possible.

The open frame filters are available in single- or three-phase versions. The method of electrical connection ranges from simple quick connect terminals through to completely assembled cable looms.

Let the Customer Judge the Product Quality

"First, the customer said 'Nooo! But then I showed them the product, and they were very surprised about the smaller size and the good design. They simply hadn't known that something like that existed. They needed some convincing just to look at our product, but then we won them over immediately."

Brigitte Crombez

	Description Approvals	Rated Current	Filter-Type	Attenuation Filter Stage	Application	Housing	Web Reference or Type
	MOUNTING PCB MOUNTED						
	1-phase filter for THT mounting	1 - 10A	Standard and Medical Version	-Standard -1	General purpose	Thermo-plastic	5500
	1-phase filter for THT mounting in flat aluminum housing	2 - 16A	Standard and Medical Version	-Standard -1	General purpose	Aluminum	FMAB-72
	1-phase filter for THT mounting in flat housing	0.5 - 6,5A	Standard and Medical Version	-Standard -1	General purpose	Thermo-plastic	FPP-02
	Cost optimized 1-phase filter for THT mounting	0.6 - 6A	Standard and Medical Version	-Standard -1	General purpose	Thermo-plastic	FPP-01

This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg06_1
For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Industrial Mains Filters page 186

Screw Clamps for Simple Assembly

The block filters are offered in various configuration. To highlight are for example the several connection possibilities.

The connectors can be screw clamps, quick connect terminals or with stranded wires. The restrictions are given by the current ratings. The customer may configure the design on his purpose.

Stylish Products are Key Success Factor

""In our particular case, the beautiful design of the components were just tree among many key selling factors, andalso the large selection of models we could offer to the customer, as well as the possibility to have a specific logo engraved on the part. A feature which wasn't even planned originally, but which we could provide on demand. To put it short, they loved it!"

David Vert

	Description Approvals	Rated Current	Filter-Type	Attenuation Filter Stage	Application	Housing	Web Reference or Type
	MOUNTING SCREW-ON						
	1-stage filter for 1-phase systems	1 - 10A	Standard and Medical Version	-Standard -1	General purpose	Aluminum	**FMW-41**
	1-stage filter for 1-phase systems	10 - 20A	Standard and Industrial Version	-Standard -1	General purpose	Aluminum	**FMW-55**
	1-stage filter for 1-phase systems, broad band attenuation	12 - 30A	Industrial Version	-Excellent -1	High attenuation at high loads	Metal	**FMAB**
	2-stage filter for 1-phase systems	2 - 6A	Standard Version	-High -2	For high require-ments	Aluminum	**FMW-52**
	2-stage filter for 1-phase systems, very broad band attenuation	8 - 25A	Standard and Industrial Version	-Excellent -2	High attenuation at high loads	Metal	**FMBB**

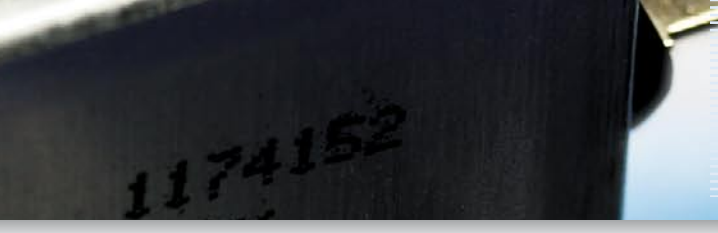
	Description Approvals	Rated Current	Filter-Type	Attenuation Filter Stage	Application	Housing	Web Reference or Type
	2-stage filter for 1-phase systems, very high symmetrical attenuation	1 - 10A	Standard and Industrial Version	-Medium -2	Especially against symmetrical interference	Aluminum	**FSS**
	3-stage filter for 1-phase systems, very high broad band attenuation	4 - 30A	Industrial Version	-Medium -3	High symmetrical and asymmetrical attenuation	Metal	**FMW-150**
	Cost optimized 1-stage filter for 1-phase systems	1 - 10A	Standard and Medical Version	-Standard -1	General purpose	Aluminum	**FMLB-41**
	Cost optimized 1-stage filter for 1-phase systems	6 - 20A	Standard and Medical Version	-Standard -1	General purpose	Aluminum	**FMLB-09**
	Cost optimized 1-stage filter for 1-phase systems	6 - 20A	Standard and Medical Version	-Standard -1	General purpose	Aluminum	**FMLB-51**

	Description Approvals	Rated Current	Filter-Type	Attenuation Filter Stage	Application	Housing	Web Reference or Type
	Cost optimized 2-stage filter for 1-phase systems, very high sym. and asym. attenuation	3 - 36A	Standard and Industrial Version	-High -2	Especially against asymmetrical interference	Alu. anodised / Stainless Steel	**FSW**
 new	1-stage filter for DC systems, dual pole, standard attenuation	5 - 30A	Industrial Version	-Standard -1	-	Alu. anodised	**FMEC**
 new	1-stage filter for DC systems, single pole, standard attenuation	5 - 30A	Industrial Version	-Standard -1	-	Alu. anodised	**FMEB**

This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg06_1
For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Industrial Mains Filters page 186

For a noise free and reliable DC power distribution

The filter series FMEB and FMEC have been specially developed for DC applications offering optimal EMC noise suppression for that range of power distribution.



The hidden Values

"Our product may have been more expensive, but then it also helped the customer save mounting and wiring costs."

Stefano Mangini

Details makes the Difference

"Nevertheless, it s also the details that count. Features like a recessed switch and robust housing were really helpful in selling the product."

Leonard Overholser

	Description Approvals	Rated Current	Attenuation Filter Stage	Application	Web Reference or Type
 new		16 - 150A / -	- Standard - 1	-	**FMAC ECO**
	1- stage filter for 3-phase systems	6 - 1100A / -	- High - 1	General purpose	**FMAC**
 new	Ultra compact and light 2-stage filter for 3-phase systems	10 - 115A / -	- Standard - 2	-	**FMBC ECO**
	Compact 2-stage bookform filter	10 - 115A / -	- Very High - 2	For high requirements	**FMBC BOOK STYLE**
	2-stage filter for 3-phase systems	8 - 64A / -	- Very High - 2	For high requirements	**FMBC**

Description Approvals	Rated Current	Attenuation Filter Stage	Application	Web Reference or Type
 1-stage filter for 3-phase systems with neutral conductor	6 - 250A / -	- High - 1	High attenuation at high loads	**FMAD**
 Compact 1-stage filter for 3-phase systems with neutral conductor	3 - 20A / -	- Standard - 1	General purpose	**FMW4-65**
 Compact 2-stage filter for 3-phase systems with neutral conductor	4 - 6A / -	- Standard - 2	-	**FMW4-81(95)**

This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg80
For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Industrial Mains Filters page 186

FMBC 3-Phase Filters

The two-stage 3-phase filters of SCHURTER's FMBC family do cover current ratings between 8 und 64 A . This filter family does have an excellent broadbandy attenuation.

For Applications with special demands regarding space we do recommend the version in book stile.

Description Approvals	Rated Current	Attenuation Filter Stage	Application	Web Reference or Type
Output filter for 3-phase frequency inverter	8 - 32 A / -	Standard	-	**FMAC-Out**

This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg80
For customer specific solutions, please contact us. www.schurter.contact
General Product Information see Industrial Mains Filters page 186

Business excellence as a SCHURTER committment

SCHURTER achieves its high level of overall enterprise quality through consistent implementation and training using the EFQM model (European Foundation for Quality Management). Quality and environmental management, social commitment and safety at work are interlinked. We use SIX SIGMA methods for continual improvement of our products and processes. As a result our customers recognise in us a reliable and longterm partner.

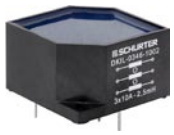
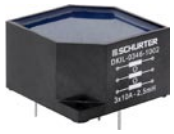
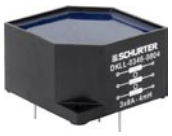
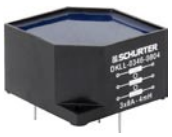
General Product Information about EMC Products

- Product Standards
- National Approvals
- Electric Protection
- Fuseholders and IEC Inlets
- Technical Data for Line Switches
- Industrial Line Filters
- Pulse Transformers
- Driver Modules

Please find details: www.schurter.com/info_emc

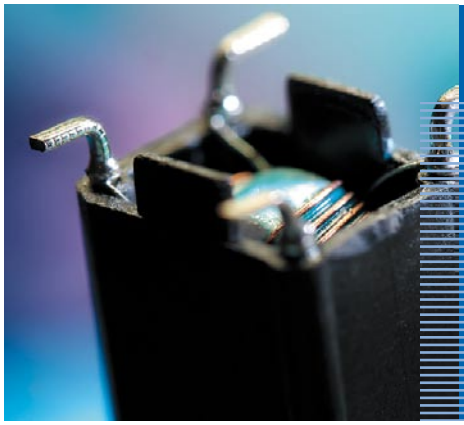
Mission Statement

SCHURTER has a team of employees who enjoy and take pride in their work and continually achieve top performances.

	Description	Rated Current Rated Voltage	Rated inductance	Mounting	Web Reference or Type
	STYLE MAGNETICALLY COMPENSATED				
	Compensated High Current Choke, 1-phase	10 - 20 A up to 540 VAC	1.1 - 12 mH Tol. -30% +50%	THT	DKIL-1
	Compensated High Current Choke, 1-phase	10 - 50 A up to 540 VAC	1.1 - 12 mH Tol. -30% +50%	Flexible wire	DKIP-1
	Compensated High Current Choke, 3-phase	10 - 20 A up to 540 VAC	0.6 - 5 mH Tol. -30% +50%	THT	DKIL-3
	Compensated High Current Choke, 3-phase	10 - 50 A up to 540 VAC	0.6 - 5 mH Tol. -30% +50%	Flexible wire	DKIP-3
	Compensated High Inductance Choke, 1-phase	4 - 7 A up to 540 VAC	14 - 60 mH Tol. -30% +50%	THT	DKLL-1
	Compensated High Inductance Choke, 1-phase	4 - 20 A up to 540 VAC	14 - 60 mH Tol. -30% +50%	Flexible wire	DKLP-1
	Compensated High Inductance Choke, 3-phase	3 - 8 A up to 540 VAC	4.0 - 50 mH Tol. -30% +50%	THT	DKLL-3
	Compensated High Inductance Choke, 3-phase	8 - 16 A up to 540 VAC	4.0 - 50 mH Tol. -30% +50%	Flexible wire	DKLP-3

	Description	Rated Current Rated Voltage	Rated inductance	Mounting	Web Reference or Type
	Magnetically Compensated Choke, 1- and 3-phase	0.5 - 15 A up to 440 VAC	1 - 20 mH Tol. -30% +50%	THT Flexible wire	**DFK**
	Magnetically Compensated Choke, 1-phase, flat design	0.4 - 6.3 A up to 440 VAC	0.6 - 40 mH Tol. -30% +50%	THT	**DFKF**
	Magnetically Compensated Choke, 1-phase, high design	0.6 - 6.3 A up to 440 VAC	0.6 - 50 mH Tol. -30% +50%	THT	**DFKH**
	STYLE SMD-TERMINALS				
	Magnetically Compensated SMD Choke, compact	0.5 - 2 A up to 250 VAC	0.5 - 4.0 mH Tol. -30% +50%	SMD	**DKFS**
	STYLE THT-TERMINALS				
	Magnetically Compensated Choke, compact	0.5 - 2 A up to 250 VAC	0.5 - 4.0 mH Tol. -30% +50%	THT	**DKFP**

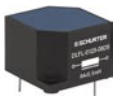
This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg81_82
For customer specific solutions, please contact us. www.schurter.contact



Current Compensated Choke for SMD Mounting

The choke DKFS is ideally suitable to be used for a discrete design of line filters.

Extreme compact circuits may be designed with the SMD style chokes for rated currents up to 2 A.

	Description	Rated Current Rated Voltage	Rated inductance	Mounting	Web Reference or Type
	STYLE THT-TERMINALS				
	Ground wire choke, open design	16A	0.04 - 4mH	THT	**DENO**
	Linear Choke, compact	0.6 - 1A	0.05 - 0.1mH Tol. ±15%	THT	**DLNP**
	Linear Choke, flat design	0.4A	0.015 - 3mH Tol. ±15%	THT	**DLF**
	Linear Choke, high design	0.45A	0.02 - 5.5mH Tol. ±15%	THT	**DLH**
	Linear/Saturating Choke	5 - 45A up to 440VAC	-	THT Flexible wire	**DLFL**
	Saturating Choke	0.8 - 10A up to 440VAC	-	THT Flexible wire	**DFSG**
	Storage Choke, compact	0.6 - 1A	0.04 - 0.1mH Tol. ±15%	THT	**DSHP**
	Storage Choke, flat design	0.4 - 6.3A	0.011 - 3.7mH Tol. ±15%	THT	**DSF**

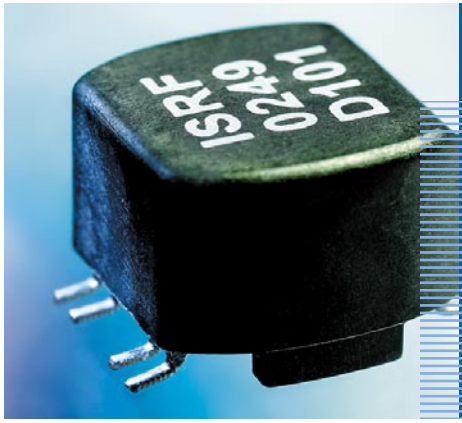
	Description	Rated Current Rated Voltage	Rated inductance	Mounting	Web Reference or Type
	Storage Choke, fully potted resign	0.5 - 16A	0.01 - 1 mH Tol. ±15%	THT	**DS**
	Storage Choke, high design	0.45 - 6.3A	0.01 - 2 mH Tol. ±15%	THT	**DSH**
	STYLE WIRE LEADS				
	Linear Choke, open version, without socket	0.45 - 7A	0.02 - 5 mH Tol. ±15%	Wire leads	**DLO**
	Storage Choke, open version, without socket	0.5 - 16A	0.01 - 1 mH Tol. ±15%	Wire leads	**DSO**
	High frequency ground wire choke, shrink hose	16 - 25A	0.02 - 4 mH Tol. ±15%	Wire leads	**DEH**
	Linear/Saturating Choke	5 - 45A up to 440 VAC	-	THT Flexible wire	**DLFP**
	Low frequency ground wire choke, fully potted resign	16 - 25A	0.02 - 4 mH	Wire leads	**DEN**

This overview only shows a selection of the current product range of SCHURTER.
You will find additional information about the respective products on our website: www.schurter.com/pg81_82
For customer specific solutions, please contact us. www.schurter.contact

www.schurter.com/pg85

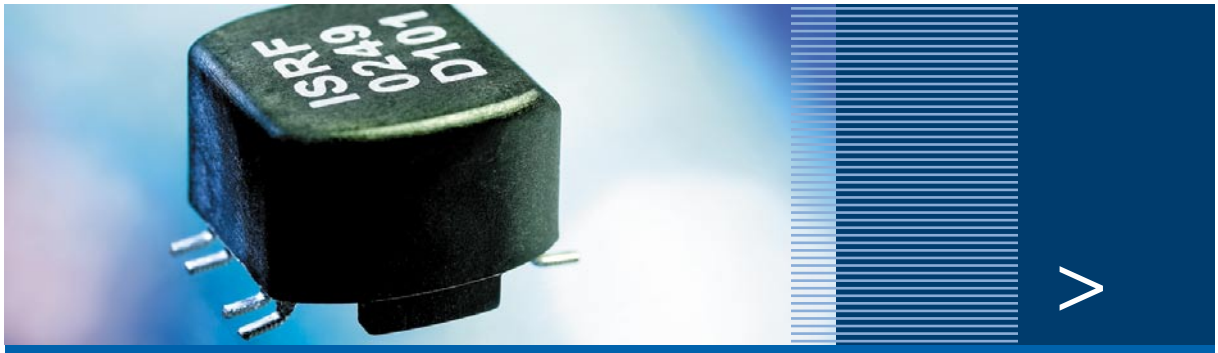
	Description	Turn Ratio	Rated Voltage	Voltage-Time Integral	Pulse Rise Time	Mounting	Web Reference or Type
	Pulse transformers for THT mounting	1:1,2:1, 1:1:1	up to 600 VAC	150 - 400 Vµs	0.05 - 1.5 µs	THT	IT
	Pulse transformers for SMD mounting	1:1,2:1, 1:1:1	up to 600 VAC	150 - 400 Vµs	0.05 - 1.5 µs	SMD	IS
	Cost optimized pulse transformers for THT mounting	1:1,1:1:1, 3:1:1	up to 500 VAC	200 - 500 Vµs	0.5 - 1.5 µs	THT	IL
	Cost optimized pulse transformers for THT mounting, short rise time	1:1,2:1,3:1, 1:1:1	up to 500 VAC	150 - 300 Vµs	0.1 - 0.3 µs	THT	ILR
	Cost optimized pulse transformer for THT mounting, up to 2W	1:1:1, 3:1:1	up to 500 VAC	500 Vµs	0.7 - 0.8 µs	THT	IX

General Product Information see Pulse transformers page 196



Pulse Transformers

The application range of pulse transofrmers is very broad. In most cases, a signal or a control pulse must be transmitted between electrically isolated circuits.



SMD Pulse Transformers of the IS Serie

Schurter's IS-Pulse transformers are base on toroid technology which reduces the leakage inductance, stray capacitance and the losses. This is why this series suits for application having high switching cycles.

Converters require a galvanic decoupling between the signal and the power section. The efficiency of the IS series help you to switch our semiconductors safe and reliable.

Reliable and Compact Designs

"We have to give the customer protection through our products reliability , while at the same time providing action through actively responding to the customer s needs. Which meant, in this particular case, allowing the customer to combine in his product maximum performance with minimum size."

Nicola Losacco

	Description	Mounting	Terminal	Material	Web Reference or Type
	DC/DC Converter for IGBT- or MOSFET Driver Modules	PCB mounted from top	Solder	Thermoplastic	**PSDM-6**
	600V IGBT/MOSFET Driver modules with integrated DC/DC converter	PCB mounted from top	Solder	Thermoplastic	**PSDM-6O / PSDM-6T**

General Product Information see Power Stage Driver Modules page 198

PSDM, the safe Driving

The PSDM (Power Stage Driver Module) has been developed for driving in a safe, reliable and easy way power IGBT or MOSFET transistors

The modules have internal circuitry to switch off and therefore to protect the power transistor in cases of fault at the output power stage, like short or reduced voltage driver. The PSDM has an isolated DC/DC converter with 2.4W output power implemented in a plastic case to supply the drive circuit. The data is transferred by a pulse transformer.

Power Stage Driver Module

DC/DC Converter Module

The PSDM-0DN1-5040 module is a DC/DC power supply converter designed to provide a galvanic isolated, regulated and monitored power to IGBT and MOSFET drivers.

This DC/DC module has a unique diagnostic output permitting the user to monitor the converter output voltage and thus to avoid damage to the power stages resulting from under voltages.

Detailed information can be looked up here:
www.schurter.com/pg86

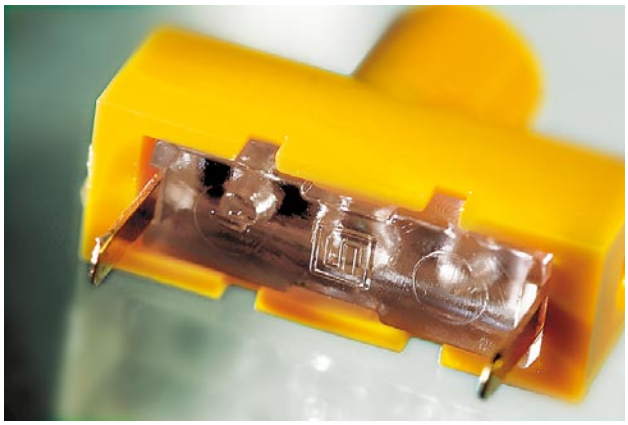
Power Stage Driver Module

IGBT Driver Modules

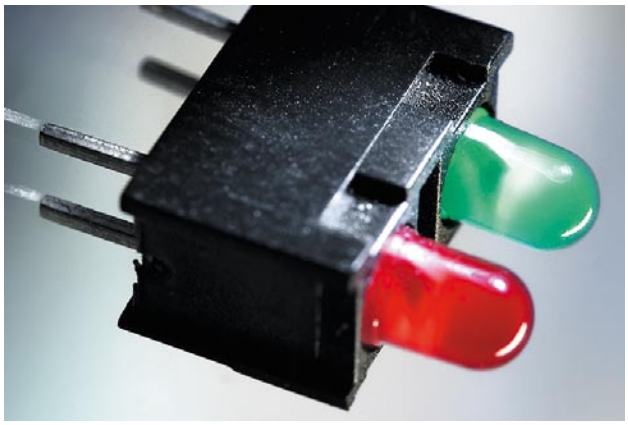
The IGBT driver modules PSDM-0DO2-5040 and PSDM-0DT2-5020 were developed to drive IGBT or MOSFET power transistors in an easy, safe and reliable way.

The modules have an internal turnoff circuit that protects the output power stage in the event of a short circuit. Commanding data is transfered by an optocoupler or a transformer.

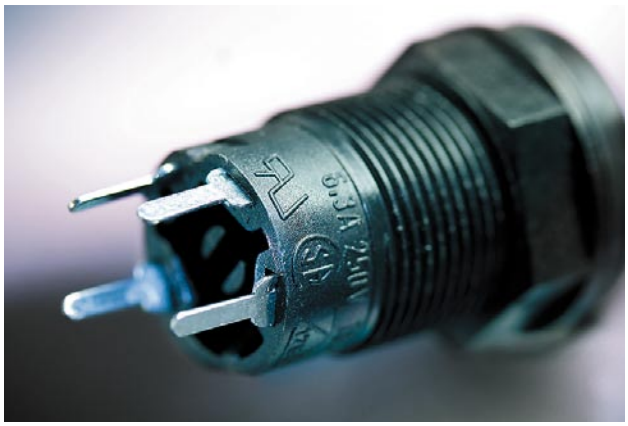
Detailed information can be looked up here:
www.schurter.com/pg86



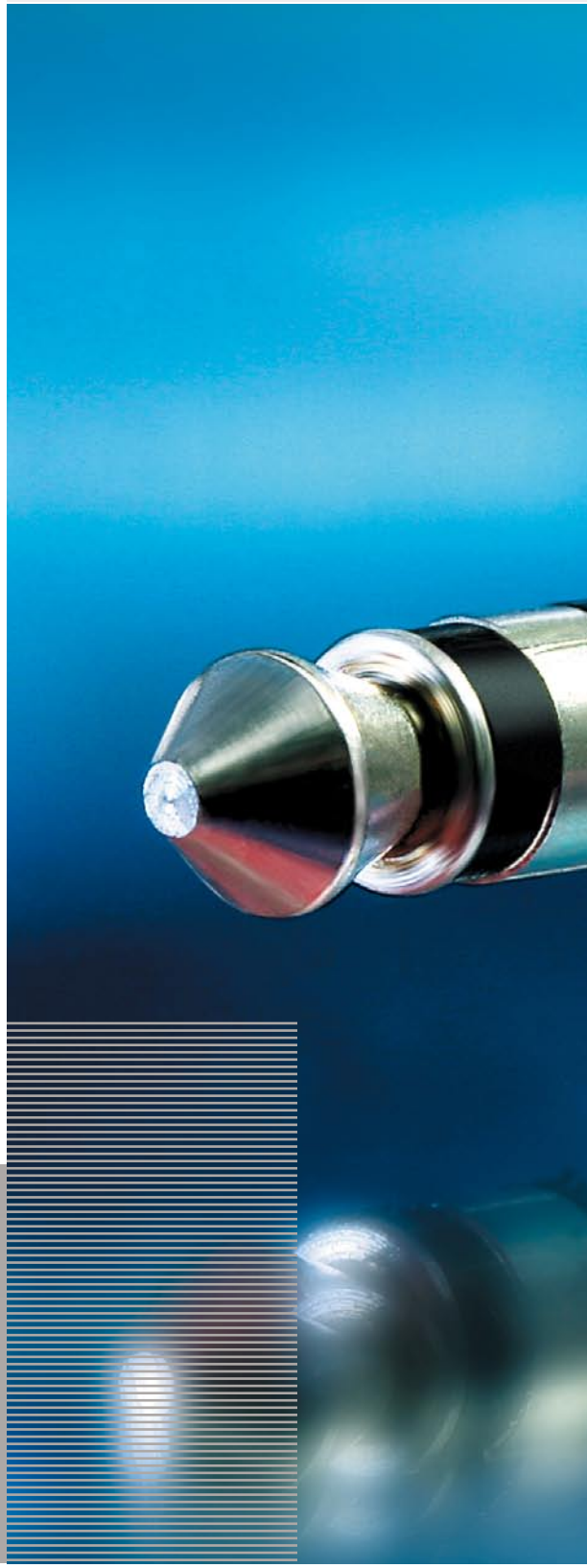
PB 1021 - Test Jack for PCB mounting



ASL - LED Holder with 3mm LED



SWA1 (Frontpl) - Voltage selector switch, 2 position, serie-parallel, panel mounting



other products

	Description Approvals	Rated Current Rated Voltage IEC/ UL	Mounting	Voltage Selector Type Steps Fuse Links	Web Reference or Type
	Voltage selector switch, 2 position, serie-parallel, panel mounting	6.3A 250VAC	Flange type	- Series-parallel connections - 2 positions - None	SWA1 (Frontpl)
	Voltage selector switch, 2 position, serie-parallel, PCB mounting	6.3A 250VAC	PCB mounted	- Series-parallel connections - 2 positions - None	SWA2 (Print)
	Voltage selector switch, 3 position, step switch, panel mounting	6.3/10A 250VAC	Flange type	- Step switch - 3 positions - None	SWM1 (Frontpl)
	Voltage selector switch, 3 position, step switch, PCB mounting	6.3/10A 250VAC	PCB mounted	- Step switch - 3 positions - None	SWM2 (Print)
	Voltage selector switch, 6 position, serie-parallel, panel mounting	6.3/10A 250VAC	Flange type	- Series-parallel connections - 6 positions - None	SWZ1 (Frontpl)
	Voltage selector switch, 6 position, serie-parallel, PCB mounting	6.3/10A 250VAC	PCB mounted	- Series-parallel connections - 6 positions - None	SWZ2 (Print)
	Voltage selector switch, 6 position, step switch, panel mounting	6.3/10A 250VAC	Flange type	- Step switch - 6 positions - None	SWP
	Voltage selector switch with fuseholder, 6 position, serie-parallel, panel mounting	6.3/10A 250VAC	Flange type	- Series-parallel connections - 6 positions - 5x20 mm	SWS

	Description Approvals	Rated Current Rated Voltage IEC/ UL	Mounting	Voltage Selector Type Steps Fuse Links	Web Reference or Type
	Voltage selector switch with fuseholder, 6 position, step switch, panel mounting	6.3/10A 250VAC	Flange type	- Step switch - 6 positions - 5x20 mm	SWK
	Voltage selector switch with fuseholder, 6 position, step switch, panel mounting	6.3/10A 250VAC	Flange type	- Step switch - 6 positions - 5x20 or 6.3x32 mm	SWG

Voltage Selector with integrated Fuseholder

The voltage selector SWK with integrated fuseholder for fuse links 5 x 20 mm with its 6 switch positions is suitable to be used for international used appliances with a transformer power supply.

The step switching is made by positioning of the selection part. The used fuseholder with screw head fulfils the requirements according IEC 60601-1. It is therefore perfectly suited to be used in medical applications.

	Description	Type	Mounting	Rated Current	Web Reference or Type
	Test Jack, Front Panel Mounting, single pluggable	Test Jack	Panel Mounting	6.3A	**PBF 1031**
	Test Jack, PCB Mounting, single pluggable	Test Jack	PCB Mounting	10A	**PB 1011**
	Test Jack, PCB Mounting, triple pluggable	Test Jack	PCB Mounting	6.3A	**PB 1021**
	Test Jack, PCB Mounting, double pluggable, double side	Test Jack	PCB Mounting	6.3A	**PB 1071**
	Test Jack, PCB Mounting, double pluggable, front side	Test Jack	PCB Mounting	6.3A	**PB 1151**
	Test Jack, PCB Mounting, single pluggable, Au terminals	Test Jack	PCB Mounting	6.3A	**PBD 1211**
	Test Jack, PCB Mounting, single pluggable, tin terminals	Test Jack	PCB Mounting	6.3A	**PBD 1281**
	Test Probe, single pluggable, Ni contacts	Test Probe	-	6.3A	**PS 1141**

	Description	Type	Mounting	Rated Current	Web Reference or Type
	Test Probe, single pluggable, Au contacts	Test Probe	-	6.3A	PS 1061
	Test Probe, double pluggable	Test Probe	-	6.3A	PS 1161

Power Entry Module new with Wires

The power entry modules C20F are newly abavilable with strandard wires. This eliminates a connection operation and the mounting depth can be reduced as well.

The standard wires are available in the standard sizes according to the rated currents and are offered upon customer requirements.

	Description	Indicator Type	Mounting	Illumination	Number of Holders Arrangement	Web Reference or Type
	LED Holder for 3 mm and 5 mm LED	LED-Holder	PCB Mounting	without LED	-1-8 -in-line and in blocks	**AST**
	LED Holder with 3 mm LED	LED-Holder	PCB Mounting	with 3 mm LED	-1-8 -in-line and in blocks	**ASL**
	LED Holder round for 3 mm LED	LED-Holder	Frontpanel and PCB Mounting	with 3 mm LED	-	**LML**
	LED Holder straight with 3 mm and 5 mm LED	LED-Holder	Frontpanel and PCB Mounting	with 3 mm and 5 mm LED	-	**SRL**
	LED Holder angled with 3 mm LED	LED-Holder	PCB Mounting	with 3 mm LED	-	**PBL**
	LED Reflector Holder round with 3 mm and 5 mm LED	LED Reflector Holder	Panel Mounting	with 3 mm and 5 mm LED	-	**LFM**
	Signal Lamps Holder for Incandescent and Neon Lamps	Signal Lamp	Screw-on / Rivet Fixing and PCB Mounting	Incandescent Lamp / Neon Lamp	-	**BF**

Indicators Type ASL

The Indicator Type ASL is available for 3 mm LED with different illumination colors of the LED, with straight or angled terminals, arranged in-line or in blocks and equipped with 1-8 LED's.

SCHURTER offers a wide range of indicator variants: LED-Holders, LED Indicator Lamps or Signal Lamps for Frontpanel and PCB mounting and with different LED illuminations.

Listening to the Customer

"Listening to the customer, getting the right information, is a key factor in strategic account management."

Roland Schmid

	Description	Ratings	Plug / Connector	Contact Housing	Web Reference or Type
	Data and Signal connectors, Diameter 2.5 mm, 2 pole	0.65A 12V	Plug/ Socket 2.5mm 2-pole	Solder Insulated/ Screened	**4801 UK-Stecker, D=2,5mm**
	Data and Signal connectors, Diameter 3.5 mm, 2 and 3 pole	1A 12V	Plug/ Socket 3.5mm 2-pole	Solder Insulated/ Screened	**4802 UK-Stecker, D=3,5mm**
	Data and Signal connectors, Diameter 6.3 mm, 2 and 3 pole	2A 12V	Plug/Socket (Line) 6.3mm 2-/ 3-pole	Solder Insulated/ Screened	**4803 UK-Stecker, D=6,5mm**
	Data and Signal connectors, Diameter 7.5 mm, 4 and 6 pole	2A 12V	Plug/ Socket 7.5mm 4-/ 6-pole	Solder Insulated/ Screened	**4804 UK-Stecker, D=7,5mm**
	Audio connectors, Diameter 2.5 mm, 2 and 3 pole	0.5A 30V	Plug/ Socket 2.5mm 2-/ 3-pole	Solder Insulated/ Screened	**4831 Audio-Stecker, D=2,5mm**
	Audio connectors, Diameter 3.5 mm, 2 and 3Vpole	0.5A 30V	Plug/Socket (Line) 3.5mm 2-/ 3-pole	Solder Insulated/ Screened	**4832 Audio-Stecker, D=3,5mm**
	Audio connectors, Diameter 6.3 mm, 2 and 3 pole	1A 30V	Plug/Socket (Line) 6.3mm 2-/ 3-pole	Solder Insulated/ Screened	**4833 Audio-Stecker, D=6,3mm**
	DC plugs and sockets for low voltage power supplies	0.5A 18V	Plug/ Socket 2-/ 3-pole	Solder	**4840 DC-Stecker, verschiedene**

Description	Ratings	Plug / Connector	Contact Housing	Web Reference or Type
DIN plugs and sockets 3 to 8 poles	2A 12V	Plug/Socket (Line) 3- to 8-pole	Solder	**4850 DIN-Stecker, verschiedene**

For customer specific solutions, please contact us. www.schurter.contact

Data and Signal Connectors 2- 6 Pole

Most plugs are available with either insulated handles or fully screened for ground contiunity. The range consist of 2.5 mm, 3.5 mm, 6.5 mm and 7.5 mm sizes in 2 up to 6 switched poles.

Every unit is manufactured using nickel-plated brass for the connectors and thermoplastics for the insulation. The cable terminations are silver-plated for improved solderability.

Common understanding leads to Business

"If they realize that you support the customer, they will call you."

Marcel Reiter

general product information

PRODUCT STANDARD - EQUIPMENT STANDARD

The product standard only contains minimum requirements. Attention is drawn to the fact that appliance specifications might contain requirements additional to or deviating from those specified in the relevant product standards.

COMMENTS ON DEFINITIONS USED

Please be aware that the specifications nominal value used in the German part of the SCHURTER catalogue and the data sheets, is synonymous with rated value.
The difference between these two values is a pure matter of definition. In order to avoid any unnecessary complications we will continue to use the specifications nominal value.

CE MARKING CE ACC. TO EU-DIRECTIVES

CE marking is the only marking which indicates that a product conforms to the relevant EU-directive.
This means that the CE-mark is no quality or standard conformity mark but only an administration mark.
SCHURTER products are covered by the low voltage directives 72/23/EEC and 93/68/EEC. Those are valid for equipment and appliances with rated voltage values between AC 50 V to AC 1000 V as well as DC 75 V to DC 1500 V.
The CE marking of SCHURTER parts will be found on the label of the smallest packing unit. On request we will submitt a CE conformity statement for each component. CE conformity statements and approvals can also be retrieved from the internet under www.schurter.com.

CONFORMITY TO COMPONENT STANDARDS, NATIONAL APPROVALS

National testing institutions are testing according to national and international standards or other generally recognized rules of technology. Their certification/approval-marks confirm the observance of the safety requirements which electric appliances must fulfil.

NATIONAL APPROVALS

(Mark)	European Norms Electrical Certification	
(Mark)	VDE	Verband Deutscher Elektrotechniker
(Certificate of conformity with factory surveillance)		
	UMF	Universal Modular Fuse meets the standard IEC 60127-4
(Recognition)	UL	Underwriters Laboratories (USA, Canada)
(Listing)	UL	Underwriters Laboratories (USA, Canada)
(Recognition)	UL	Underwriters Laboratories (USA)

(Listing)	UL	Underwriters Laboratories (USA, Canada)
	CSA	Canadian Standard Association, Component Acceptance Service
	CSA	Canadian Standard Association
	CCC	China Compulsory Certification
	PSE	Japan Electrical Safety & Environment technology Laboratories
	KTL	Korea Testing Laboratory
	TÜV	Technischer Überwachungs Verein
	NF	Norme française
NNO	NNO	Numéro de nomenclature Otan (OTAN = NATO = North Atlantic Treaty Organisation)
GAM T1	GAM T1	Liste interarmées AIR MER TERRE de composants électroniques
	SEV	Schweizerischer Elektrotechnischer Verein
	BSI	British Standard Institute
	SEMKO	Svenska Elektriska Materielkontrollanstalten
	NEMKO	Norges Elektriske Materiellkontroll
	DEMKO	Danmarks Elektriske Materielkontrol
	FIMKO	Finnish Electrical Inspectorate
	ÖVE	Österreichischer Verband für Elektrotechnik
KEMA KEUR	KEMA	Keuring van Elektrotechnische Materialien
	IMQ	Instituto italiano del marchio di qualità

In addition to the combined UL/CSA approvals, most of the SCHURTER components are also approved by one of the European Certification Bodies like VDE (Germany), Electrosuisse (Switzerland) or SEMKO (Sweden). The safety testing of all these European Certification Bodies are based on the commen European Safety Standards. With the harmonisation effort in Europe, the different National European Certification Bodies have lost their importance and SCHURTER has decided to maintain only one European approval (e.g. VDE, SEV or SEMKO) in future. The others will not be renewed once they have expired.

Because UL and CSA are not members of the CENELEC, the standards of UL and CSA are not harmonised yet with the European Standards. However, UL and CSA are trying to harmonize their standards with each other. Where possible, SCHURTER will apply for the combined cULus or cURus approval.

Further to development in Asia, SCHURTER has obtained national approvals from China, Japan and Korea.

IP DEGREES OF PROTECTION PROVIDED BY ENCLOSURES (IP CODE)

Standards IEC 60529; EN 60529

Scope

These standards apply to the classification of degrees of protection provided by enclosures for electrical equipment with a rated voltage not exceeding 72,5 kV.

Object

The object of these standards is to give:
a) Definitions for degrees of protection provided by enclosures of electrical equipment as regards:
1. Protection of persons against access to hazardous parts inside the enclosure.
2. Protection of the equipment inside the enclosure against ingress of solid foreign objects
3. Protection of the equipment inside the enclosure against harmful effects due to the ingress of water.

b) Designations for these degrees of protection.
c) Requirements for each designation.
d) Tests to be performed to verify that the enclosure meets the requirements of these standards.

Designations

The degree of protection provided by an enclosure is indicated by the IP Code.

Elements of the IP Code and their meanings

A brief description of the IP Code elements is given in the following table.

IP xy	Meaning for the protection of equipment	Meaning for the protection of persons
	Against ingress of solid foreign objectif	**Against access to hazardous parts with**
x = 0	(non-protected)	(non-protected)
x = 1	50 mm diameter	back of hand
x = 2	12.5 mm diameter	finger
x = 3	2.5 mm diameter	tool
x = 4	1.0 mm diameter	wire
x = 5	dust-protected	wire
x = 6	dust-tight	wire
	Against ingress of water with harmful effects	
y = 0	(non protected)	
y = 1	vertically dripping	
y = 2	dripping (15° tilted)	
y = 3	spraying	
y = 4	splashing	
y = 5	jetting	
y = 6	powerful jetting	
y = 7	temporary immersion	
y = 8	continuous immersion	

PROTECTION AGAINST ELECTRIC SHOCK

1. Protection against direct and indirect contact General terms

The protection against electric shock on electric equipment as well as their components are divided into the following parts:

- Protection against direct contact with live parts concerns all measures for the protection of human beings and animals against hazards which result from direct contact with live parts of electric equipment and their components.
- Protection against indirect contact is the protection of human beings and animals against hazards which result from contact of live parts 1 of electric equipment as well as components thereof, which have become live due to an insulation failure.

[1)] Accessible, conductive part, which is not conductive normally but which may be conductive due to a failure.

2. Protection against direct contact with live parts e.g. of a fuseholder

The data sheets of the relevant components inform about the taken measures.

3. Protection against indirect contact

Measures for the protection against indirect contact on electrical equipment are defined according to IEC 61140 by the 4 protection classes 0, I, II, III. Each protection class includes two protection measures. Even if one of these measures should fail, no electric shocks will occur.

Protection class	Main protective measures
0	1. Basic insulation between live parts and accessible conductive parts. 2. Earth-free location, non-conducting environment.
I 	1. Basic insulation between live parts and accessible conductive parts. 2. Means are provided for the connection of accessible conductive parts of the equipment to the protective (earthing) conductor in the fixed wiring of the installation in such a way that accessible conductive parts cannot become live in the event of a failure of the basic insulation.
II 	1. Basic insulation between live parts and accessible conductive parts. 2. Additional insulation. Basic and supplementary insulation are summarised under the term "double insulation". Under certain circumstances also a "reinforced insulation» (single insulation system) may guarantee an equivalent protection against electric shock as a "double-insulation" does. No terminal for a protective conductor is allowable. A possibly existing protective conductor must not be connected and has to be insulated like any live part.
III 	1. Functional insulation. 2. Supply at safety extra-low voltage SELV (the circuit is isolated from the mains supply by such means as a safety isolating transformer). The protection against electric shock is in this case completely based on the supplying by SELV-circuits (U ≤ 42 V). Higher voltages are not generated in the equipment. No terminal for a protective conductor is allowable.

MINIATURE FUSE LINKS

Explanations, application notes

The design engineer of electrical equipment is responsible for its safety and functioning to humans, animals and real values. Above all, it is his task to make sure that the state of the art as well as the valid national and international standards and regulations be observed.

The following information about fuse-links and their application are to be taken into consideration when selecting a fuse-link.

In view of the product liability of electrical equipment the selection of the most suitable fuse-link is of great importance.

1. Fuse

A fuse is a self-acting device that, by the fusing of one of its specially designed and proportioned components, opens the circuit in which it is inserted by breaking the current when this exceeds a given value for a sufficient time.

Definition according to IEC 60127:
The fuse comprises all the parts that form the complete device, that means fuseholder and fuse-link.

Definition according to UL 248-1:
A North American fuse is an IEC fuse-link. An IEC fuse is a North American fuse with a fuse-holder.

2. Fuse-link (IEC 60127)

The part of a fuse including the fuse-element intended to be replaced after the fuse has operated. Fuse-links according to IEC 60127 relate to miniature fuses for the protection of electric appliances, electronic equipment and components thereof normally intended to be used indoors. These fuse-links are not permitted for equipment, which has to operate under special circumstances, e.g. in a corrosive or explosive environment.

3. Miniature fuse-link (IEC 60127)

An enclosed fuse-link of rated breaking capacity not exceeding 2 kA and which has at least one of its principal dimensions exceeding 10 mm.

4. Sub-miniature fuse-link (IEC 60127)

A miniature fuse-link of which the case (body) has no principal dimensions exceeding 10 mm.
Sub-miniature fuse-links are especially suitable for printed circuit boards. They are available for the through hole technique and surface mounting technique (SMT).

5. Standards for fuse-links

IEC 60127	Miniature fuses (general title)	
IEC 60127-1	Part 1:	Definitions for miniature fuses and general requirements for miniature fuse-links
IEC 60127-2	Part 2:	Cartridge fuse-links
IEC 60127-3	Part 3:	Sub-miniature fuse-links
IEC 60127-4	Part 4:	Universal modular fuse-links
IEC 60127-5	Part 5:	Guidelines for quality assessment for miniature fuse-links
NF C 93435		Cartridge Fuses with improved characteristics
UL 248-1		Low-Voltage Fuses: General requirements
UL 248-14		Low-Voltage Fuses: Supplemental Fuses
CSA/C22.2 No. 248.1		Low-Voltage Fuses: General requirements
CSA/C22.2 No. 248.14		Low Voltage Fuses: Supplemental Fuses

6. Rated voltage U_n

The rated voltage is the voltage up to which the fuse-link correctly interrupts an overcurrent.

The rated voltage of a fuse-link must be greater than or equal to the operating voltage of the equipment which is to be protected.

The use during operating voltages below the rated voltage of the fuse-link is permitted only, when the instructions regarding voltage drop (pos. 8) are taken into consideration.

The fuse-links are on principle suitable for use at alternating and direct voltage. The breaking capacity at direct-voltage is however considerably lower than the one at alternating voltage. The performance of the fuse-link at direct-voltage mainly depends on the size of the time-constant **T** = L/R of the load circuit.

7. Rated current I_n

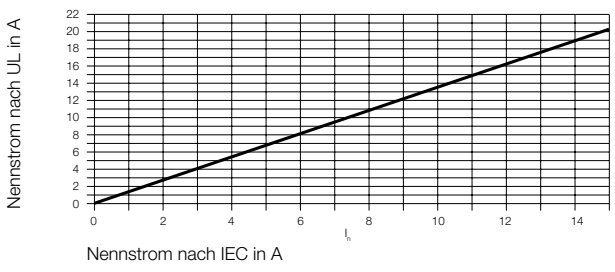
The rated current of the fuse-link corresponds to the operating current of the equipment to be protected. Basically there are two different rated current definitions:

a) On fuse-links according to IEC 60127 and EN 60127 the rated current corresponds to the current, which the fuse-link can be exposed to continually, according to the standardized regulations, without interrupting the fuse-link.

b) On fuse-links according to UL 248-14 however, the rated current corresponds to the current, which would interrupt the fuse-link already after a few hours. The current, which according to IEC, can flow constantly without interrupting the fuse-link, is approx. $0.7 \cdot I_n$.

Regarding influences of ambient air temperatures > 23 °C on the rated current see pos. 1

Correlation between the rated current of fuse-links according to IEC and UL:



8. Voltage drop

The voltage drop across a fuse-link is measured at an ambient air temperature of 23 °C, when the fuse-link has carried its rated current for a time sufficient to reach temperature stability. Attention is drawn to the fact that problems can arise when fuse-links are used at operating voltages considerably lower than their rated voltage. Due to the increase of the voltage drop when the element of a fuse-link approaches its melting point, care should be taken to ensure that there is sufficient circuit voltage available to cause the fuselink to interrupt the current when an electrical fault occurs. Furthermore, fuse-links of the same type and rating may, due to difference in design or element material, have different voltage drops and may therefore not be interchangeable in practice when used in applications with low circuit voltages, especially in combination with fuse-links of lower rated currents.

9. Non fusing current I_{nf}

A value of an over-current specified as that which the fuse-link is capable of carrying for a specified time (typical 1 hour) without melting.

10. Pre-arcing time/current characteristic (at T_a 23 °C)

The time-current-characteristic indicates the relation of the pre-arcing time (melting time) to the fault current.

The pre-arcing time is the interval of time between the beginning of a current large enough to cause a break in the fuse-element and the instant when an arc is initiated.

The arcing time is the interval of time between the instant of the initiation of the arc and the instant of final arc extinction. The arcing time is not considered in the time-current-characteristic.

The operating time (total clearing time) is the sum of the pre-arcing time and the arcing time.

The time-current-characteristics are shown as an envelope for all mentioned rated currents.

Usual time-current-characteristic and their symbols:

FF: denoting very quick acting
F: denoting quick acting
M: denoting medium time-lag
T: denoting time-lag
TT: denoting long time-lag

UL fuse-links are normally divided into:

- Non Time Delay fuse-links. These fuse-links are sometimes also referred to as Normal blow or Quick acting types.
- Time Delay fuse-links. These fuse-links are sometimes also refered to as Slow blow or Surge proof types.

Application notes for the various characteristics:

FF: Super-quick-acting fuse-links
Protection of semiconductors (thyristors, triacs, diodes).
This fuse type tolerates small overcurrents only during a short period of time and limits the current at small short circuit currents. Current limiting even with low short circuit currents.
F: Quick-acting fuse-links
Protection of semiconductors and of an equipment with no current surge when operating or switching on and also for such devices where high overcurrent or high short-circuit current must be interrupted quickly.
M: Medium time lag fuse-links
Protection devices subjected to moderate in-rush currents and/or overcurrent peaks for a short time. Low voltage drop.
T: Time-lag fuse-links
Protection of devices subjected to high in rush currents and/or overcurrent peaks which decrease only slowly (e.g. transformers and motors).
TT: Super time-lag fuse-links
Protection of devices subjected to longer lasting in-rush currents and/or high overcurrent peaks.

11. Breaking capacity of a fuse-link (UL: interrupting rating IR)

A value (r.m.s. for alternating current) of prospective current that a fuse-link is capable of breaking at a stated voltage under prescribed conditions of use and behaviour.

The max. short-circuit current, which can occur in electric circuit of an equipment, due to fault conditions, may not exceed the breaking capacity of the fuse-link. Non-compliance of this rule can cause the danger of explosions and fire.

At direct current the breaking capacity of a fuse-link is lower than at alternating current. Values are given on request.

IEC 60127 miniature fuse-links are classified into two categories (for sub-miniature fuse-links other breaking capacities are defined).
Fuse-links with Low Breaking Capacity, symbol L.

Typically, the fuse-element of this type of fuse-link is visible. The insulation tube consists of transparent material, normally glass. There is no extinguishing medium, the arc is quenched in air.

The breaking capacity is:
250 VAC/35A or 10.In p.f.1 whichever is greater.

Fuse-links with High Breaking Capacity, symbol H.

Typically, the fuse-element of this type of fuse-link is not visible. The insulation tube normally is of ceramic material or glass. To quench the arc, there is often an extinguishing medium.

The breaking capacity is:
250 VAC 1500A p.f. 0.7 to 0.8

UL's and CSA's short circuit requirements (interrupting rating IR) are different as relates to IEC.

Interrupting ratings at 125 VAC = 10 000 A } p.f. 0.7-0.8
250 VAC = 35 to 1500 A
depending on rated current of the fuse-link.

12. Power dissipations

12.1 Max. sustained power dissipation

a) Fuse-links according to IEC 60127:

The test is carried out according to a standardised test procedure (open fuse-holder, room temperature).

The power dissipation produced by the non fusing current I_{nf} after one hour is determined.

Non fusing currents are different and depend on the fuse-link type.

In the SCHURTER catalogue you will usually find two values of sustained power dissipation, namely:

- the maximum sustained power dissipation i.e. according to IEC 60127.
- The typical sustained power dissipation of the SCHURTER fuse-links.

These values are mostly lower than the standardised ones.

b) Fuse-links according to UL 248-14:

UL does not, like IEC, determine the sustained power dissipation, but measures the maximum permissible temperature increase from 75 °C at 1 · I_n on the outer surface of the fuse-link according to the UL standard.

12.2 Rated power dissipation

The power dissipation caused by the rated current (over a long period). With respect to the power acceptance for the selection of a suitable fuseholder this rated power dissipation is considered.

13. I^2t-value (joule integral)

The integral of the square of the current over a given time interval. The I^2t-value is a measure of the energy required to disrupt the fuselink. That means for heating up the fuse-element to its melting temperature, for melting the fuse-element and for interruption of the current via an arcing period. Normally, distinction is made between.

- the pre-arcing I^2t (or fusing I^2t)
  is the I^2t integral extended over the pre-arcing time of the fuse-link. It represents the energy for heating up and melting the fuseelement. At high over-currents with melting times <10 ms the prearcing I^2t remains constant (adiabatic conditions). Sometimes the pre-arcing I^2t is determined by 10.times the rated current, based on the time-current-characteristic. The pre-arcing I^2t is a characteristic value of a fuse-link and informs about his resistance to pulses and in-rush-currents.

- the arcing I^2t
  is the I^2t integral extended over the arcing time of the fuse-links. It represents the arc-energy. The arcing I^2t depends on the electrical circuit parameters (e.g. operation voltage, power factor, closing angle etc.) of an electrical circuit.

- The operating I^2t (or: total I^2t)
  is the sum of pre-arcing and arcing I^2t. This value is an important parameter for the application of a fuse-link. It characterises the energy exposed to the object (let-through-energy) to be protected by the fuse-link in case of a fault current.

Application notes:

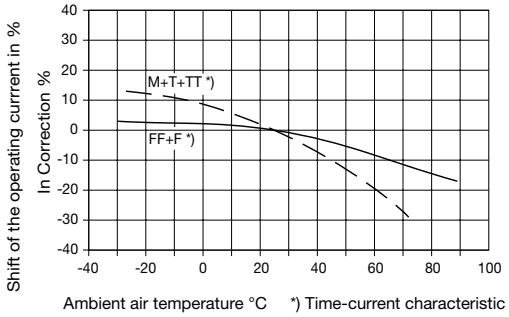
In order to choose the right fuse-link, the permitted I^2t-value of the component or component group to be protected, has to be known.

Selection criteria: The electric circuit to be protected contains:

- Components, which can cause in-rush currents, e.g. transformers. In this case, a fuse-link has to be chosen with a pre-arcing I^2t-value which is higher than the one of the in-rush-current.

- Components, which are sensitive to current impulses, e.g. semiconductors. In this case a fuse-link has to be chosen, with an operating I^2t-value which is lower than the one of the components to be protected.

Shift of the operating current as a function of ambient air temperature



14. Ambient air temperatures

The standardised current carrying capacity tests (IEC and UL) of fuse-links are performed at 23 °C and 25 °C respectively. In practical applications, the fuse-link s ambient temperature may be significantly higher, especially if the fuse-link is used in an unexposed fuseholder or mounted near other heat generating components. For such applications, the shift of the operating current according to the following diagram has to be considered.

15. Marking of the fuse-links

Marking according to IEC 127

Example: T[1] 200 mA[2] L[3] 250 V[4] [5]
Additional marking: approval marks

[1] symbol, denoting the relative pre-arcing time-current-characteristic
[2] rated current in mA or A
[3] symbol, denoting the rated breaking capacity
[4] rated voltage in V
[5] SCHURTER Logo
Additional marking: approval marks

16. Interchangeability of IEC- by UL fuse-links and Vice Versa

Fuse-links according to IEC und UL have different features and are on principle not interchangeable. However, after a thorough check of the technical data it may be possible to interchange, when the following, most important requirements are met.

- The rated currents must be adapted (see pos.7)
- The breaking capacity must be compatible.
- The time-current characteristic and voltage drop must be roughly the same.

17. Exchange of fuse-links under load

A fuseholder with an installed fuse-link shall not be used as a «switch» for turning power "on" and "off".

An opening and closing of electric-circuits may cause current- and voltage surges, depending on the dimension of the electric circuit. Such current or voltage peaks produce an arc between the contact points, which causes an increase of the contact resistance. In order to prevent the fuseholder from permanent damage, a fuselink shall only be exchanged when power in an electric circuit is switched off.

18. Quality assessment of fuse-links

SCHURTER fuse-links meet with the requirements according to IEC 60127-5 and EN 60127-5.
More detailled information is available on request.

19. Reliability of fuse-link (MIL-HDBK-217F)

The reliability modeling of fuses presents a unique problem. Unlike most other components, there is very little correlation between the number of fuse replacements and actual fuse failures. Generally when a fuse opens, or "blows" something else in the circuit has created an overload condition and the fuse is simply functioning as designed.

FUSE-LINK SELECTION GUIDE

1. The operating voltage U_B of the equipment to be protected defines the rated voltage U_N of the fuse-link (see pos. 6) $U_N \geq U_B$ For $U_B << U_N$ please refer to the remarks regarding voltage drop (see pos. 8).

2. The max. operating current of the equipment to be protected defines the rated current of the fuse-link. The different definitions for rated current according to IEC or UL as well as the influence of higher ambient temperatures are to be taken into consideration (pos. 6 and 14).

3. The possible fault current as well as its permitted operating times in the electric circuit of the equipment to be protected define the time-current-characteristic of the fuse-link (see pos. 10).

4. The necessary breaking capacity of the fuse-link depends on the max. short-circuit current, which can occur under fault conditions in the electric circuit of the equipment to be protected. It must be lower than the max. current which can be interrupted by the fuse-link. (see pos. 11)

5. The rated power dissipation of the fuse-link is of importance for the selection of the suitable fuseholder (see pos. 12.2).

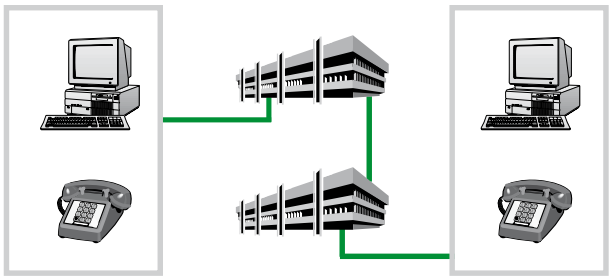
6. If current impulses occur in the electric circuit of the equipment to be protected, which may not interrupt the fuse-link under any circumstances or if the let-through-energy of the fuse-link may only reach a certain value (eg. protection of semi-conductors) the I^2t values have to be taken into consideration accordingly (see pos. 13).

7. The necessary approvals are mostly defined by national and international standards for equipment. SCHURTER fuse-links are according to international standards and were approved by the different agencies (refer to data sheets for the individual fuse-links).

8. It is essential that the selected fuse-links/fuse-holders that are fitted to the equipment to be protected, are being tested under normal and fault conditions, even if all relevant criteria for selection have been taken into consideration.

TELECOM FUSES

Introduction
Telecommunication equipments serve for data exchange between a variety of subscribers. Communication takes place in various ways, e. g. per telephone, FAX etc.
This gives rise to the following classical network topology:

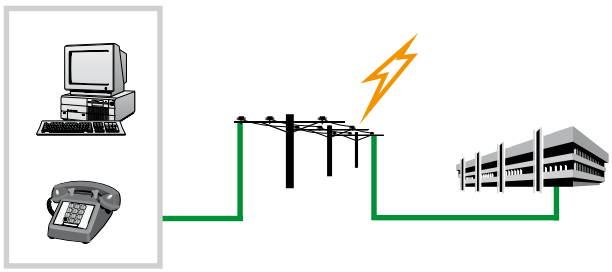


There can be extremely diverse distances between individual subscribers (man, machine). This means that network connections (overhead lines, signal cables) can be subject to various interference sources.

- Atmospheric interference, (lightning discharge, switching operations)
- Interference by power induction (equalizing currents, vicinity of power cables)
- Direct contact with energy network (short-circuits)

Interference sources

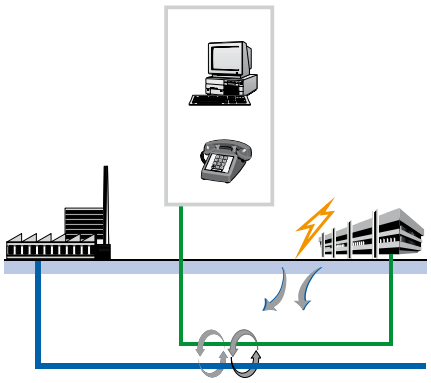
Atmospheric interference (Lightning Surge)



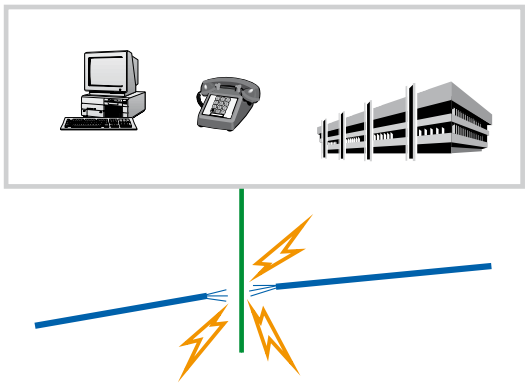
Interference through atmospheric discharge is very frequent. Occurring voltages are of the order of 100 kV with discharge currents up to 150 kA. Effects due to direct lightning stroke are principally to be expected on exposed signal lines (overhead lines).

Interference by induction (Power Induction)

Induction voltages occurring as interference on telecom lines are usually a result of circulating or equalizing currents in the earth or are produced by strong currents in adjacent power cables.



Direct contact with the power network (Power Contact)



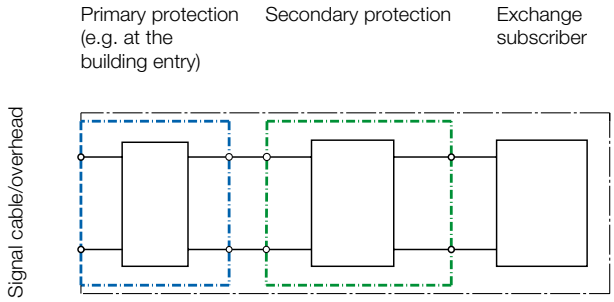
The highest intensity and usually long duration influence on a telephone line (a few seconds to several minutes) is by direct contact with the power network, e.g. short-circuit with an adjacent power cable.

PROTECTION EQUIPMENT

Regardless of which interference acts on the telecom equipment, it must be guaranteed at all times that no damage occurs, or only limited damage whose effects can be calculated.

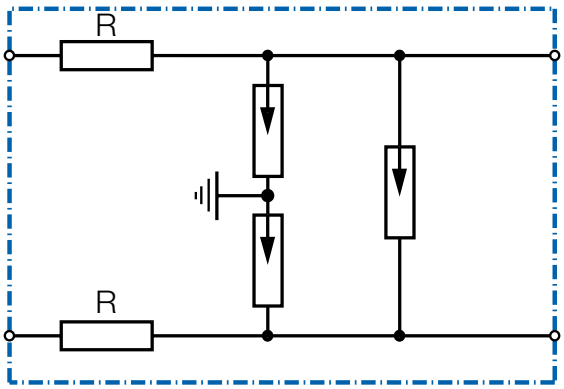
As shown below, this requirement can be satsified by the use of appropriate protection circuits.

Protection circuits in the telecom branch are usually designed on the two-stage principle. They comprise a primary and secondary protection.



Primary protection

Primary protection frequently comprises a combination of resistors and surge arrestors and is usually located at the «building entry» interface.
The task of the illustrated primary protection circuit is to sufficiently reduce the high-energy interference distortion so that they can be safely absorbed by the following secondary protection.



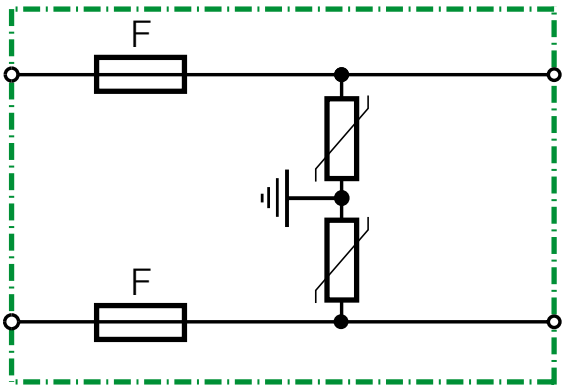
The secondary protection

The secondary protection is normally located directly at the appliance entry of the telecom equipment and has two objectives.

1. It operates as a voltage limiter which ensures that interference up to a defined amplitude, not yet capable of activating the primary protection, is absorbed or reduced to a level harmless for the telecom equipment.
2. It effectively suppresses high energy level interferences, which can no longer be adequately absorbed by the primary protection (e.g. in case of direct contact between the signal lines and the power network), by galvanic decoupling of the circuit. This prevents the occurrence of serious damage, even fire, in the telecom equipment.

The following schematic diagram shows a frequently used and extremely reliable protection circuit for this purpose. The circuit, which in its simplest form comprises two fuse-links and two varistors, is characterised by an extremely attractive cost-benefit ratio. The varistors limit the interference voltage peaks to a level compatible for the telephone exchange, respectively subscriber circuit. Under these normal conditions, the fuse-links remain intact.

Under worst-case conditions, e.g. direct contact with the power network, where both the telecom equipment components and the varistors in the protection circuit would be seriously damaged or destroyed, the fuse-links interrupt the circuit, thus effectively and reliably protecting the telecom equipment.



Introduction

Several standards have been etablished for the Telecom application field, all of which are aimed at combining the interference influences, Lightning Surge, Power Induction, Power Contact, previously described under the title "Application Note" together with the associated safety aspects, and to derive suitable testing methods for the components in question.

Various kinds of loads have been defined and standardised as testing criteria. They can be simulated with the aid of an appropriate test circuit. This provides circuit designers with the facility for optimally adapting the stages of a protection circuit to one another.

The presently relevant standards are:

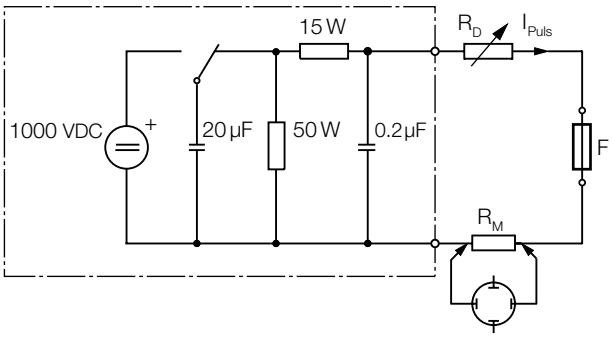
ITU-T K.20	International Telecommunication Union
UL 60950	UL Standard for Safety for Information Technology Equipment
IEC 60950	IEC Standard for Safety for Information Technology Equipment
Telcordia GR-1089	Telcordia Technologies
TIA-968-A	Telecommunications Industry Association

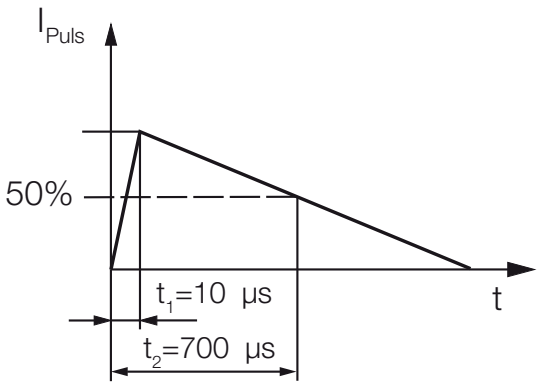
(The list is not exhaustive)

Tests:
SCHURTER fuselinks have been tested according to the following standards and testing criteria:

1. ITU-T K.20

Lightning Surge: Test circuit
Test:
1. The pulse amplitude (generator no-load) is set to 1000 V and the pulse shape to 10 µs / 700 µs.





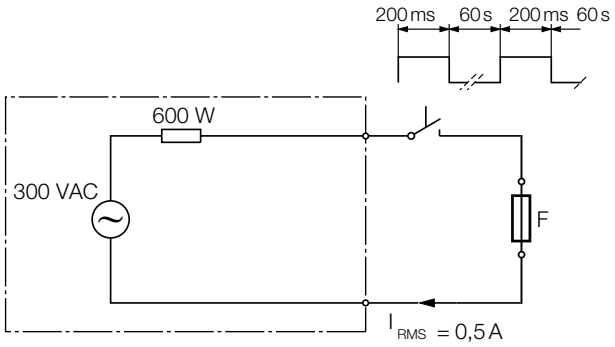
2. The pulse current I_{puls} is set to the value I_{puls} max. stated in the

3. Test mode : 10 single pulses, at an interval of 60 sec. alternating polarity.

Requirement: The fuse shall not interrupt the circuit.

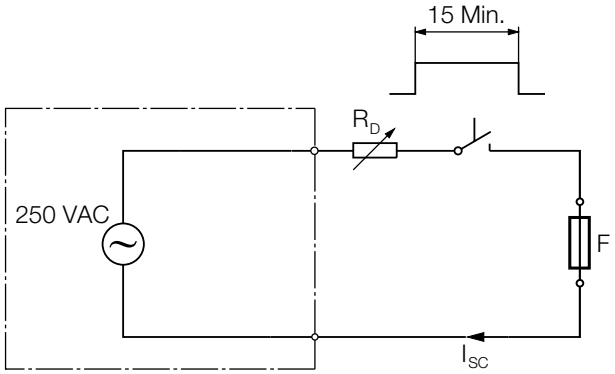
1) Note:
With a charge voltage of UC = 1000 V, the standardized pulse generator in Para. 1 supplies a maximum pulse current Ipuls = 67 A, providing the current limiting resistor is R_D = 0Ω. The shunt R_M for the current monitoring has a very low resistance and has therfore no notable influence to the current amplitude. This means that the data sheet current 67 A (1) does not represent the maximum permissible pulse amplitude of the fuselink in question, but the maximum current amplitude which can be supplied by the pulse generator. If a max. current higher than 67 A is to be expected in a circuit, the I^2t-values of the fuse-link can be calculated using the formula $I^2t = 0.72 \times I^2_{peak} \times t^2$, as a good approximation in order that the selected fuse-link can accept the expected current pulse without interrupting the circuit.

Power induction: Test circuit



Test: The fuse-link in the test circuit AC 300 V / 50 Hz is loaded 5 times with I_{eff} = 0.5 A for 200 ms at intervals of 60 sec.
Requirement: The fuse-link shall not interrupt the circuit.

Power Contact: Test circuit

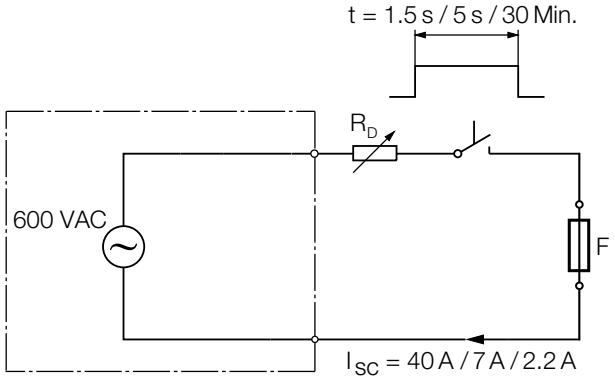


Test: The fuselink in the test circuit AC 250 V / 50 Hz is loaded with the current value I_{SC} stated in the data sheet. The supply voltage is maintained for 15 minutes.

Requirement: The fuse-link shall interrupt the circuit.

2. UL 60950/IEC 60950

Test circuit



Test 1
The fuse-link in the test current circuit is loaded with a test current of I_{SC} = 40 A .
The AC 600 V / 50 Hz source voltage is applied for a total of 1.5 sec.

Requirement: The fuse-link shall interrupt the circuit.

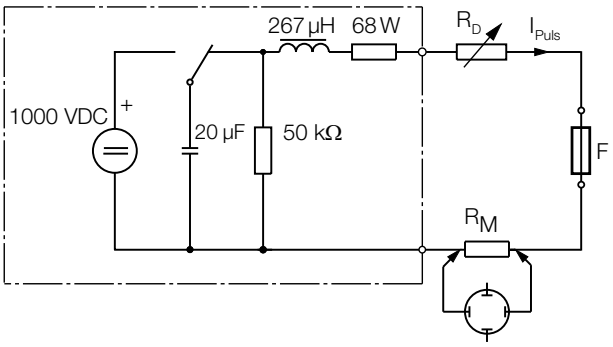
Test 2
The fuse-link in the test current circuit is loaded with a test current of I_{SC} = 7 A .
The AC 600 V / 50 Hz source voltage is applied for a total of 5 sec.

Requirement: The fuse-link shall interrupt the circuit.

Test 3
The fuse-link in the test current circuit is loaded with a test current of I_{SC} = 2.2 A .
The AC 600 V / 50Hz source voltage is applied for at least 30 minutes, or until stable thermal conditions are achieved in the telecom unit or until the fuse-link interrupts the circuit. This test is performed together with the equipment in which the fuse-link is installed.

3. Telcordia GR-1089

3.1 Lightning Surge
Test circuit



Test:
1. The pulse amplitude (generator no-load) is set to 1000 V and the pulse shape to 10 µs / 1000 µs.
2. The pulse current Ipuls is set to the value $I_{puls\ max.}$ stated in the data sheet with limiting resistor RD.
3. Test mode: 50 single pulses, at an interval of 60 sec. alternating polarity.

Requirement: The fuse shall not interrupt the circuit.

5) Note: With a charge voltage of U_C = 1000 V, the standardized pulse generator in Para. 3.1 supplies a maximum pulse current I_{puls} = 14 A, providing the current limiting resistor is R_D = 0Ω . The shunt R_M for the current monitoring has a very low resistance and has no notable influence to the current amplitude. This
means that the data sheet current 14 A does not represent the maximum permissible pulse amplitude of the fuse-link in question, but the maximum current amplitude which can be supplied by the pulse generator. If a max. current higher than 14 A is to be expected in a circuit, the I^2t- values of the fuse-link can be calculated using the formula $I^2t = 0.72 \times I^2_{peak} \times t^2$, as a good approximation in order that the selected fuse-link can accept the expected current pulse without interrupting the circuit.

3.2 Power Cross

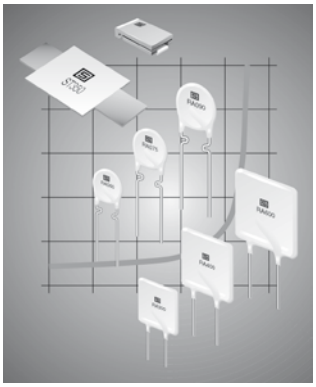
Test circuit see UL 60950/IEC 60950
Test 2, Second Level (only TF 600)

The fuse-link in the test current circuit is loaded with a test current of ISC = 60 A .
The AC 600 V / 50 Hz source voltage is applied for a total of 5 sec.

Requirement: The fuse-link shall interrupt the circuit.

PTC-CIRCUIT PROTECTION

When it comes to Polymeric Positive Temperature Coefficient (PPTC) circuit protection, you now have a choice. If you need a reliable source, look to SCHURTER Resettable Overcurrent Protectors. SCHURTER S PTC products are made from a conductive plastic formed into thin sheets, with electrodes attached to either side. The conductive plastic is manufactured from a nonconductive crystalline polymer and a highly conductive carbon black. The electrodes ensure even distribution of power through the device, and provide a surface for leads to be attached or for custom mounting.
The phenomenon that allows conductive plastic materials to be used for resettable overcurrent protection devices is that they exhibit a very large non-linear Positive Temperature Coefficient (PTC) effect when heated. PTC is a characteristic that many materials exhibit whereby resistance increases with temperature. What makes the SCHURTER PTC conductive plastic material unique is the magnitude of its resistance increase. At a specific transition temperature, the increase in resistance is so great that it is typically expressed on a log scale.



HOW SCHURTER RESETTABLE OVERCURRENT PROTECTORS WORK

The conductive carbon black filler material in the PTC fuse device is dispersed in a polymer that has a crystalline structure. The crystalline structure densely packs the carbon particles into its crystalline boundary so they are close enough together to allow current to flow through the polymer insulator via these carbon "chains".

When the conductive plastic material is at normal room temperature, there are numerous carbon chains forming conductive paths through the material.

Under fault conditions, excessive current flows through the PTC fuse device. I^2R heating causes the conductive plastic material's temperature to rise. As this self heating continues, the material's temperature continues to rise until it exceeds its phase transformation temperature.

As the material passes through this phase transformation temperature, the densely packed crystalline polymer matrix changes to an amorphous structure. This phase change is accompanied by a small expansion. As the conductive particles move apart from each other, most of them no longer conduct current and the resistance of the device increases sharply.

The material will stay "hot", remaining in this high resistance state as long as the power is applied. The device will remain latched, providing continuous protection, until the fault is cleared and the power is removed. Reversing the phase transformation allows the carbon chains to re-form as the polymer re-crystallizes. The resistance quickly returns to its original value.

PRODUCT SELECTION

To select the correct SCHURTER PTC circuit protection device, complete the information listed below for the application and then refer to the resettable overcurrent protector data sheets.

1. Determine the normal operating current:
   _____ amps

2. Determine the maximum circuit voltage
   (V_{max}): _____ volts

3. Determine the fault current (I_{max}):
   _____ amps

4. Determine the operating temperature range:
   Minimum Temperature: _____ °C
   Maximum Temperature: _____ °C

5. Select a product family so that the maximum rating for V_{max} and I_{max} is higher than the maximum circuit voltage and fault current in the application.

6. Using the I_{hold} vs. Temperature Table on the product family data sheet, select the SCHURTER PTC device at the maximum operating temperature with an I_{hold} greater than or equal to the normal operating current.

7. Verify that the selected device will trip under fault conditions by checking in the I_{trip} table that the fault current is greater than I_{trip} for the selected device, at the lowest operating temperature.

8. Order samples and test in application.

APPLICATIONS

The benefits of SCHURTER Resettable Overcurrent Protectors are being recognized by more and more design engineers and new applications are being discovered every day.
The use of polymeric fuses has been widely accepted in the following applications and industries:

- **Personal computers**
- **Laptop computers**
- **Personal digital assistants**
- **Transformers**
- **Small and medium electric motor**
- **Audio equipment and speakers**
- **Test and measurement equipment**
- **Security and fire alarm systems**
- **Medical electronic**
- **Personal care products**
- **Point-of-sale equipment**
- **Industrial controls**
- **Automotive electronics and harness protection**
- **Marine electronic**
- **Battery-operated toys**
- **Telecom Electronics**

FUSEHOLDERS

Explanations, thermal requirements, selection criteria

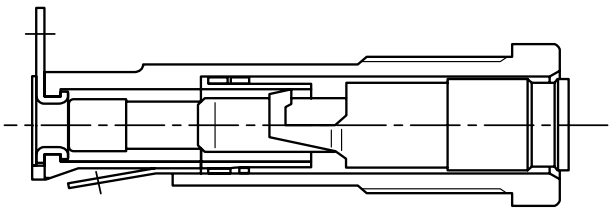
1. Protection against electric shock (against direct contact with live parts), for fuseholders

The assessment of the protection against electric shock assumes that the fuseholder is properly assembled, installed and operated as in normal use, e.g. on the front panel of the equipment.

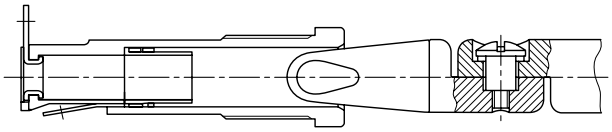
IEC 60127-6 and EN 60127-6 divides into three categories:

Category	Features
PC1	**Fuseholders without integral protection against electric shock.** They are only suitable for applications where corresponding additional means are provided to protect against electric shock.
PC2	**Fuseholders with integral protection against electric shock** live part is not accessible: - when the fuseholder is closed - after the fuse carrier (incl. fuse-link) has been removed - either during insertion or removal of the fuse carrier (incl. fuse-link) Compliance is checked by using the standard test finger specified in IEC 60529.
PC3	**Fuseholder with enhanced integral protection against electric shock** The requirements for this category are the same as those for category PC2, with the exception that the testing is carried out with a rigid test wire of 1 mm diameter accor ding to IEC 60529, table VI, instead of the standard test finger.

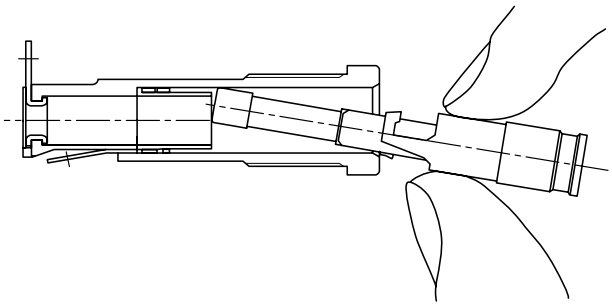
a) Closed fuseholder



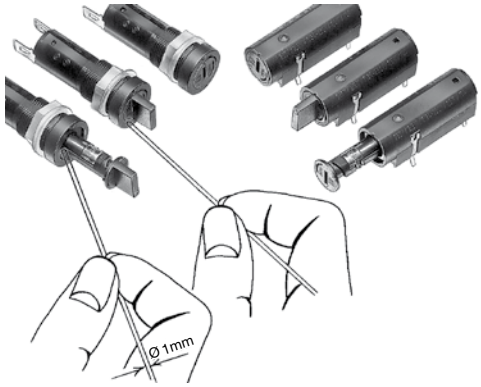
b) When the fuse carrier is removed, no live parts can be touched.



c) During insertion or removal of a fuse-link no live parts can be touched neither through the fuse-link nor the fuse carrier.



Remarks on PC 3



2. Thermal requirements of the fuseholder

2.1. Influencing factors
The design engineer of electrical equipment is responsible for its safety and functioning to humans, animals and real values. Above all, it is his task to make sure that the state of the art as well as the valid national and international standards and regulations be observed.

In view of the safety of electrical equipment the selection of the most suitable fuseholder is of great importance. Among other parameters, one has to make sure that the maximum admissible power acceptances and temperatures defined by the manufacturer are followed. Differing definitions and requirements in the most important standards for fuse-links and fuseholders are time and again origin for the incorrect selection of fuseholders.

To equate the rated current of a fuse-link with the rated current of the fuseholder, may, especially at higher currents, cause high, not admissible temperatures, when the influence of the power dissipation in the contacts of the fuseholder was not taken into consideration.

For a correct selection the follwing influence factors depending on the application and mounting method, have to be taken into consideration.
It is recommended testing the fuseholder with the choosen fuse-link in the worst case operating condition.

1. Rated power dissipation of the suitable fuse-link.
2. Admissible power acceptance, operating current and temperatures of the suitable fuseholder.
3. Differing ambient air temperature outside and inside of the equipment.
4. Electrical load alternation
5. Long time (> 500 h) operation with load > 0.7 I_n.
6. Heat dissipation/cooling and ventilation. Heat influence of adjacent components.
7. Length and cross section of the connecting wire.

2.2 Rated current of a fuseholder

The value of current assigned by the manufacturer of the fuseholder and to which the rated power acceptance is referred.

2.3 Rated power dissipation of the fuse-link

(power dissipation at rated current)

2.4 Rated power acceptance and admissible temperatures of a fuseholder.

The rated power acceptance of a fuseholder is determined by a standardised testing procedure according to IEC 60127-6. It is intended to be the power dissipation caused by the inserted dummy fuse-link at the rated current of the fuseholder and at an ambient air temperature of $T_{A1} = T_{A2} = 23$ °C (over a long period). During this test the following temperatures must not be exceeded on the surface of the fuseholder:

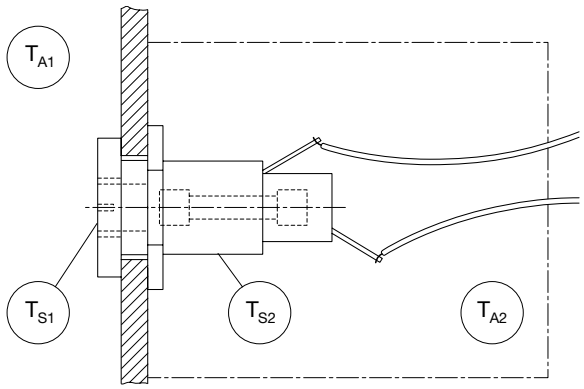
Fuseholder surface area	Maximum allowable temperature measuring points (see figure 1)	°C
1. Accessible parts [1]	T_{S1}	85
2. Inaccessible parts [1] Insulating parts	T_{S2}	[2]

Notes:

[1] When the fuese-holder is properly assembled, installed and operated as in normal use, e.g. on the front panel of equipment.

[2] The maximum allowable temperature of the used insulating materials corresponds to the Relative Temperature Index (RTI) according to IEC 60216-1 or UL 746 B.

Illustration of temperatures experienced in practice

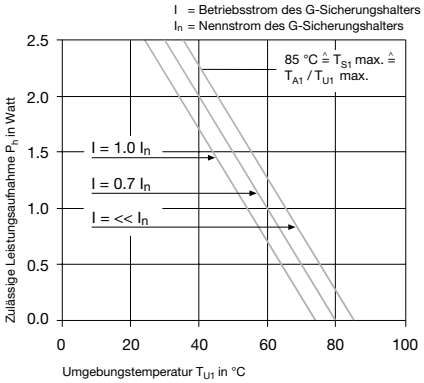


T_{A1} = ambient air temperature, surrounding the equipment
T_{A2} = ambient air temperature in the equipment
T_{S1} = temperature of accessible parts on fuseholder surface
T_{S2} = temperature of inaccessible parts on fuseholder surface

2.5 Correlation between operating current I, ambient air temperature T_{A1} and the power acceptance P_h of the fuseholder.

This correlation is demonstrated by derating curves.

Example of a derating curve



I = operating current of the fuseholder
I_n = rated current of the fuseholder

The derating curves demonstrate the admissible power acceptance of a fuseholder depending on the ambient air temperature T_{A1} for the following fuseholder operating currents: $I << I_n$, $I = 0.7 \cdot I_n$ and $I = 1.0 \cdot I_n$. This power acceptance corresponds to the max. admissible power dissipation of a fuse-link.
The corresponding values for other operating currents can be interpolated between the existing curves or calculated as follows:

$$P_h = P_o - P_c = P_o - (R_c \cdot I^2)$$

P_h= admissible power acceptance in watt of the fuseholder, depending on T_{A1}.
P_o= admissible power acceptance in watt of a fuseholder at $I << I_n$, depending on T_{A1}. The values can be taken from the derating curve $I << I_n$ of the corresponding fuseholder.
P_c= power dissipation in watt in the fuseholder contacts at the operating current in ampere.
I = operating current in ampere of the fuseholder.
R_c= contact resistance in ohm between the fuseholder terminals according to SCHURTER s catalogue.

3. Selection of a suitable fuseholder with respect to the power acceptance at the corresponding ambient air temperature.

Summary

The adherence to the limits, indicated by SCHURTER, in particular the power acceptance limits at the corresponding ambient air temperatures and mounting conditions of the fuseholder, is important for the safety of the product. It is therefore necessary to observe the following two steps:

Step 1

Selection of the fuseholder based on the power acceptance P_h at operating current I and maximum ambient air temperature T_{A1}.

$P_f \leq P_h = P_o - P_c = P_o - (R_c \cdot I^2)$
P_f = rated power dissipation in watt of the fuse-link, calculated from (I_n . U), whereas:
I_n = rated current in ampere of the fuse-link
ΔU= voltage drop in volt at I_n; values according to SCHURTER's catalogue.
P_h, P_o, P_c, R_c = see pos. 2.5

Step 2

The reduction of the power acceptance of the fuseholder (from step 1) based on the different conditions at the mounting place etc. have to be determined by the design engineer responsible.

Examples:
- ambient air temperature is considerably higher inside of an equipment than outside ($T_{A2} > T_{A1}$)
- cross-section of the conductor, unfavourable heat dissipation
- heat influence of adjacent components

Therefore, temperature measurements on the appliance under normal and faulty conditions are absolutely necessary.

4. Example

4.1 What's given?
- Fuse-link FSF 0034.1523, rated current I_n = 5 A. Voltage drop ΔU at I_n = 80 mV, typ. Rated power dissipation P_f = (In · Δ) = (5 A · 0.08 V) = 0.4 W.
- Fuseholder FEF 0031.1081, rated current I_n = 10 A
  Rated power acceptance at T_{A1} 23 °C = 3.2 W.
- Ambient air temperature = 50 °C.
  Admissible power acceptance P_h at an ambient air temperature T_{A1} 50 °C according to the derating curve:

P_h at I << I_n = 2,5W
I = 0.7 · I_n = 7 A = 2.2W
I = 1.0 · I_n = 10 A = 2 W

- Contact resistance R_c = 5 mΩ

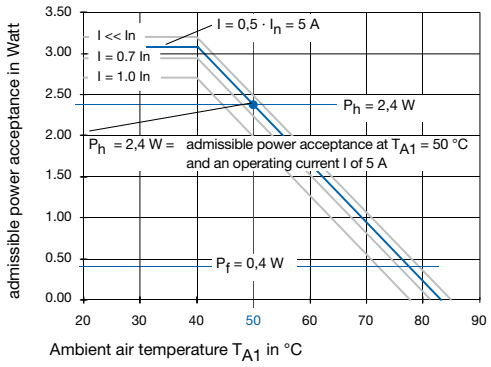
4.2 What is the admissible power acceptance P_h of the fuseholder?

Solutions

4.2.1 The result of the interpolation for the rated current I = 5 A is a P_h of approx. 2,4 W.

4.2.2 The result of the calculation is
$P_h = P_o$ (R_c · I2) = 2.5 (0.005 · 52) = 2.37 W P≈2.4 W.

4.3 Derating curves of the fuseholder, type FEF, rated current I_n = 10 A



4.4 Verification of the thermal requirements

Step 1
The following condition must be fulfilled:
P_f P_h this means: the rated power dissipation Pf of the fuse-link must be less/equal than the admissible power acceptance Ph of the fuseholder.

P_f = 0.4 W; P_h = 2.4 W at T_{A1} = 50 °C

Step 2
To consider the different conditions at the mounting place

4.5 Conclusion (without consideration of step 2)

- The value P_f is less than P_h. The condition according to formula is fulfilled. It has been chosen a suitable fuseholder.
- If the value P_f were greater than P_h the condition wouldn't be fulfilled. In that case, do select another fuseholder with a higher power acceptance or change the thermal conditions at the fuseholder mounting place.

5. Standards for fuseholders

IEC 60127-6	Fuseholders for miniature fuse-links
NF C93-436	Fuseholders for professional purposes
UL 512	Fuseholders
CSA C22.2 no. 39	Fuseholder assemblies

IEC: International Electrotechnical Commission
UL: Underwriters Laboratories Inc. USA
CSA: Canadian Standards Association
NF: French Standard

6. Explanation to the main fuseholder standards

As mentioned in section 2, the most relevant standards define rated current and rated power acceptance differently. This lead in the past often to confusion or even to a wrong fuseholder design-in.

For example the standard UL 512 does not define a maximum power acceptance value, but sets a certain value of temperature rise for the fuseholder. For this reason the marked amperage values on the fuseholder, defined by UL and CSA, are not suggested to be used except in special cases.

In order to eliminate such confusion, SCHURTER new decided to define the rated current and rated power acceptance values according to IEC 60127-6 and EN 60127-6.
The most important definitions are to be found in section 2.

Conclusion

- The high UL and CSA current ratings are replaced by more realistic rated currents defined by SCHURTER.
- Focused on the new fuseholder standard IEC 60127-6 and EN 60127-6, the power acceptance of several fuseholders had to be reduced.
- The design-in procedure and in particular to choose the correct fuseholder in terms of thermal requirements (refer to section 2-4) is now made much easier.

Your advantages:
- **More security for your equipment**
- **Faster and much easier selection of the correct fuseholder**

IEC CONNECTORS

Appliance couplers approved according IEC 60320 are designed as two pole appliance couplers for alternate current with or without protective conductor with a rated voltage of 250 V and a rated current of 16A for technical application that are desired for interconnection to flexible cords of electrical equipment for power supply of 50Hz or 60Hz.

Appliance couplers according mentioned standard are suitable for operation under environmental temperatures of normally 25° C and do not have to exceed 35° C.

Appliance couplers are designed for use without especial moisture protection. So the design of the appliance needs to assure ingress protection if it is designed to be used under these circumstances.

Following figures need to be respected in order to meet standard IEC 60320:
- Rated voltage: 250 VAC
- Rated current according type: 0,2A, 2.5A, 6A, 10A, 16A

The appliance couplers are separated according the maximum operation temperature at the base of the connector pin:
- Pin temperature up to 70°C: Appliance couplers for cold condition
- Pin temperature up to 120°C: Appliance couplers for warm condition
- Pin temperature up to 155°C: Appliance couplers for hot condition

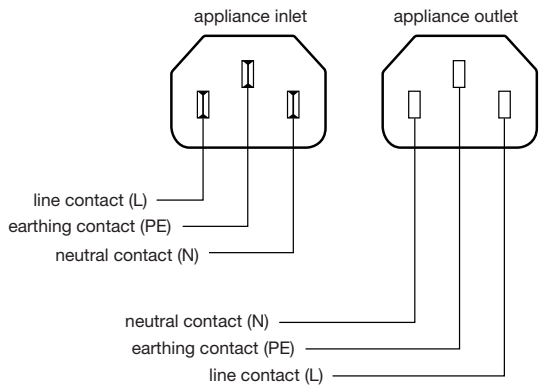
Their outlines are coded in a way, that appliance couplers for hot conditions may also be used under cold conditions and appliance couplers for very hot conditions may also be used under cold or hot conditions.

The Appliance couplers are separated according the categories of equipment:
- Appliance couplers for appliances according protection class I
- Appliance couplers for appliances according protection class II
- The protection classes are described in standard IEC 61140

Appliance couplers will be additionally separated according the connection method to a flexible cord:
- Rewireable connectors
- Non-Rewireable connectors

Contact positions

In non-reversible connectors, the contact positions shall be established by looking at the engagement face of the connectors and their disposition shall be as follows:



Definitions

Appliance couplers:

Enabling the connection and disconnection at will, of a flexible cable or cord to an appliance or other equipment. It consists of two parts:
· Connector
· Appliance inlet

Rewirable connector:

are constructed that the flexible cable or cord can be replaced.

Non-rewirable connector:

are constructed to be an integral unit with the flexible cable or cord.

Cord set:

is an assembly consisting of a flexible cable or cord complete with a non-rewirable mains plug and a non-rewirable connector, for connecting an appliance or other equipment with power.

Power interconnection:

is an assembly consisting of a flexible cable or cord with a non-rewirable plug connector and a nonrewirable cord connector, for connecting and disconnecting of any unit or equipment with a power cord to an other unit or equipment.

The SCHURTER power mains plugs, power interconnection plugs, and cord connectors displayed in this catalogue are designed and manufactured in accordance with national and international standards. These standard have been published to create a worldwide understanding about basic dimensions and safety targets of coupler systems. This way a high degree of compatibility of components of different origins has been achived.

Power mains plugs are designed to the relevant national standards whereas appliance couplers meet the standards as followes: DIN VDE 0625, EN 60320, IEC320 "Appliance couplers for household and similar general purposes, Part 2: interconnection couplers for household and similar equipment".

For different reasons you might consider or be forced to use **a coupler system on your application that does not mate or interchange with standardized couplers**:

· The **applicable standard for your appliance defines a certain coupleer system or provides a certain restriction concerning couplers that can be used**. For example IEC335-1 "Safety of household and similar electrical appliances, Part 1: General requirements" states in §24.5:
"Plugs and socket-outlets and other connecting devices on flexible cord, used for an intermediate connection between different parts of an appliance, shall not be interchangeable (...) with connectors and appliance inlets complying with the standard sheets of IEC 60320, if direct supply of these parts from the mains could cause danger to persons or surroundings, or danger to the appliance".

· For marketing reasons it might be desirable to **use a unique and non-interchangeable coupler system for your appliance or appliance family**.

Down-sizing of housing is an aspect that is ever more important for design of new appliances. You might consider a modification of standard or non-standard **coupler systems that perfectly adapts your mounting requirements**. The broad range of SCHURTER's standardized interconnection plugs and connectors is constantly being extended by new variations. When it comes to a special cord end terminations a high number of variations is available.

All SCHURTER standard and non-standard coupler systems meet the

relevant requirements of product safety proved by multiple approval markings of international testing agencies.

comparison chart metric-AWG wire sizes

AWG	CSA in mm²	closest stdd. equivalent in mm²
30	0.0503	0.05
29	0.0646	-
28	0.0804	-
27	0.102	0.1
26	0.128	0.14
25	0.163	-
24	0.205	0.2
23	0.259	0.25
22	0.325	-
21	0.412	-
20	0.519	0.5
19	0.653	-
18	0.823	0.75
17	1.04	1
16	1.31	-
15	1.65	1.5
14	2.08	-
13	2.63	2.5
12	3.13	-
11	4.15	4
10	5.27	-
9	6.62	6
8	8.35	-
7	10.6	10
6	13.3	-
5	16.8	16
4	21.2	-
3	26.7	25
2	33.6	35
1	42.4	-
0	53.4	50
2/0	67.5	70
3/0	85	95
4/0	107.2	120
5/0	135.1	150
6/0	170.3	185

type and min. nominal cross-sectional area for flexible cords or cables

type of connector	types of flexible cords or cable	nominal cross-sectional area (mm²)

type and min. nominal cross-sectional area for flexible cords or cables

2.5 A	for class-I-equipment	60227 IEC 52	0.75
2.5 A	for class-II-equipment	60227 IEC 52	0.75*
6 A		60227 IEC 52	0.75
10 A	for cold conditions	60227 IEC 53 or 60245 IEC 53	0.75**
10 A	for hot conditions		

FUSEHOLDERS, PART OF A POWER ENTRY MODULE

Explanations, thermal requirements, selection criteria

1. Protection against electric shock (against direct contact with live parts) for fuseholders

The assessment of the protection against electric shock assumes that the fuseholder is properly assembled, installed and operated as in normal use, e.g. on the front panel of the equipment. IEC 60127-6 and EN 60127-6 divides into three categories:

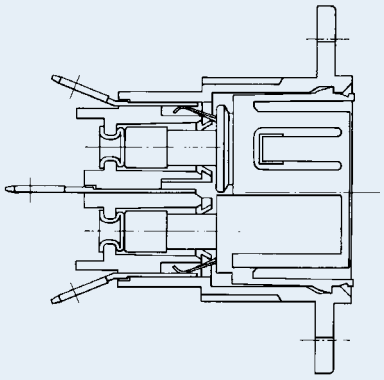
Category	Features
PC1	**Fuseholders without integral protection against electric shock.** They are only suitable for applications where corresponding additional means are provided to protect against electric shock.
PC2	**Fuseholders with integral protection against electric shock** live part is not accessible: - when the fuseholder is closed - after the fuse carrier (incl. fuse-link) has been removed - either during insertion or removal of the fuse carrier (incl. fuse-link) Compliance is checked by using the standard test finger specified in IEC 60529.
PC3	**Fuseholder with enhanced integral protection against electric shock** The requirements for this category are the same as those for category PC2, with the exception that the testing is carried out with a rigid test wire of 1 mm diameter accor ding to IEC 60529, table VI, instead of the standard test finger.

Extra-safe handling with SCHURTER power entry modules

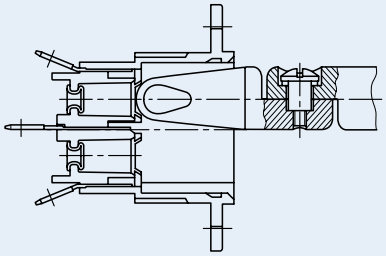
Protection against contact with live parts is an important aspect when dealing with electrical connecting devices. Both your customers and your servicing engineers will appreciate the greatest possible protection against accidental contact with live parts something which can easily happen as a result of inappropriate use, or during servicing or repair work.
In particular, our "shock-safe", "extra-Safe fuse-drawers" and "protective covers" precautions are effective ways of protecting against accidental contact when using the power entry modules.

Example:
Power entry module with fuseholder, shocksafe category PC2

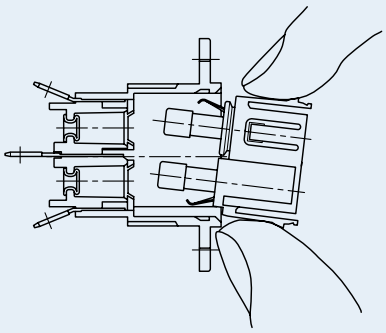
Closed fuseholder and appliance inlet.



It is not possible to touch any live parts on the SCHURTER fuseholders when the fuse-carrier is extracted.



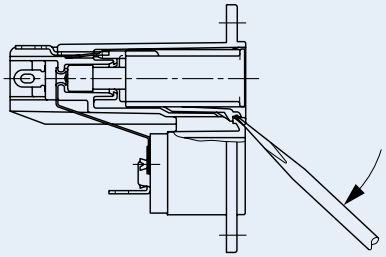
When a fuse-link 5 x 20 mm or 6,3 x 32 mm (1/4'' x 11/4'') is inserted or replaced, neither the fuse nor the fuse-carrier can come in contact with any live parts.



The **Extra-Safe versions** of shock-safe power entry modules are now available.

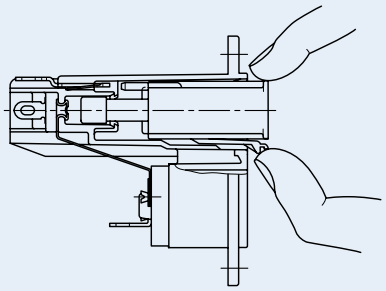
They are thus also able to satisfy requirements of the following standard: IEC 60601-1 (medical equipments)

The drawer can only be extracted with the aid of a tool (e.g. screwdriver) so that opening by hand is quite impossible.



With some types it is also necessary to pull out the mains outlet first. Only then can the drawer be removed from the socket.

The drawer can the be inserted by hand.



2. Thermal requirements of the fuseholder

2.1. Influencing factors

The design engineer of electrical equipment is responsible for its safety and functioning to humans, animals and real values. Above all, it is his task to make sure that the state of the art as well as the valid national and international standards and regulations be observed.

In view of the safety of electrical equipment the selection of the most suitable fuseholder is of great importance. Among other parameters, one has to make sure that the maximum admissible power acceptances and temperatures defined by the manufacturer are followed. Differing definitions and requirements in the most important standards for fuse-links and fuseholders are time and again origin for the incorrect selection of fuseholders.

To equate the rated current of a fuse-link with the rated current of the fuseholder, may, especially at higher currents, cause high, not admissible temperatures, when the influence of the power dissipation in the contacts of the fuseholder was not taken into consideration.

For a correct selection the following influence factors depending on the application and mounting method, have to be followed:

1. Rated power dissipation of the suitable fuse-link.
2. Admissible power acceptance, operating current and temperatures of the suitable fuseholder.
3. Differing ambient air temperatures outside and inside of the equipment.
4. Length and cross section of the connecting wire.
5. Heat dissipation/cooling, ventilation. Heat influence of adjacent components.
6. Frequency of electrical load alternation
7. Long time operation (>500 h) with load >0,7 I_N

2.2 Rated current of a fuseholder

The value of current assigned by the manufacturer of the fuseholder and to which the rated power acceptance is referred.

2.3 Rated power dissipation of the fuse-link

(power dissipation at rated current)
See sep. catalogue "fuses".

2.4 Rated power acceptance and admissible temperatures of a fuseholder.

The rated power acceptance of a fuseholder is determined by a standardised testing procedure according to IEC 60127-6. It is intended to be the power dissipation caused by the inserted dummy fuse-link at the rated current of the fuseholder and at an ambient air temperature of T_{A1}= T_{A2} = 23 °C (over a long period). During this test the following temperatures must not be exceeded on the surface of the fuseholder:

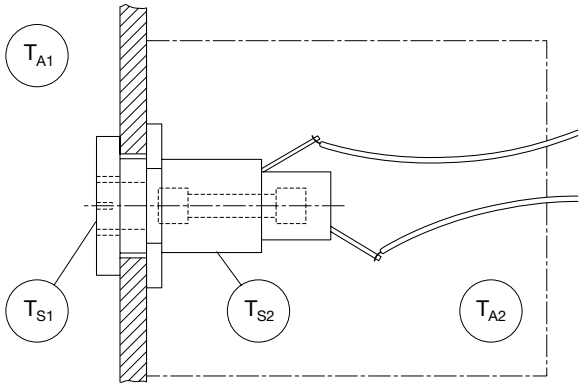
Fuseholder surface area	Maximum allowable temperature measuring points (see figure 1)	°C
1. Accessible parts [1]	T_{S1}	85
2. Inaccessible parts [1] Insulating parts	T_{S2}	[2]

Notes:

[1] When the fuse-holder is properly assembled, installed and operated as in normal use, e.g. on the front panel of equipment.

[2] The maximum allowable temperature of the used insulating materials corresponds to the Relative Temperature Index (RTI) according to IEC 60216-1 or UL 746 B.

Illustration of temperatures experienced in practice



T_{A1} = ambient air temperature, surrounding the equipment
T_{A2} = ambient air temperature in the equipment
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T_{S2} = temperature of inaccessible parts on fuseholder surface

2.5 Correlation between operating current I, ambient air temperature T_{A1} and the power acceptance P_h of the fuseholder.

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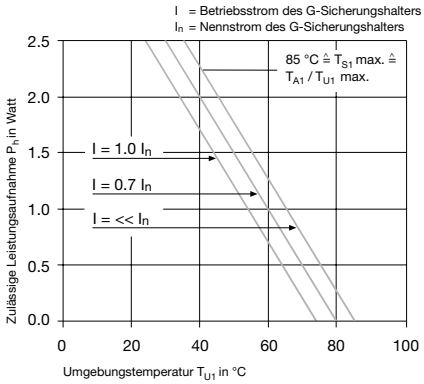
Example of a derating curve



I = operating current of the fuseholder
I_n = rated current of the fuseholder

The derating curves demonstrate the admissible power acceptance of a fuseholder depending on the ambient air temperature T_{A1} for the following fuseholder operating currents: I << I_n, I = 0.7 · I_n and I = 1.0 · I_n. This power acceptance corresponds to the max. admissible power dissipation of a fuse-link.

TECHNICAL DATA TO LINE SWITCHES

Line switch used by type	Technical data	
CMF1, CMF2, CMF3, CMF4	Electrical rating acc. to IEC/EN 61058-1	10 (4) A / 250 VAC, 10 000 switch operations 6 (4) A / 250 VAC, 50 000 switch operations
		Statement in ( ) at inductive load with p. f. 0.6
	Electrical rating acc. to UL 1054	6 A, 125250 VAC, 6000 switch operations (1⁄4) HP, 125 VAC (1⁄2) HP, 250 VAC
		Statement in ( ) at inductive load with p. f. 0.45
	Inrush current acc. to IEC/EN 61058-1	capacitive 70 A, 34 ms continuous current 5 A 10 000 switch operations
	Contact gap	≥3 mm
KM, KMF, PMM, GRM1, GRM2, GRM4	Electrical rating acc. to IEC/EN 61058-1	10 (4) A / 250 VAC, 10 000 switch operations 6 (4) A / 250 VAC, 50 000 switch operations
		Statement in ( ) at inductive load with p. f. 0.6
	Electrical rating acc. to UL 1054	12 A, 125250 VAC, 6000 switch operations (1⁄3) HP, 125 VAC (1⁄2) HP, 250 VAC
		Statement in ( ) at inductive load with p. f. 0.45
		Meets switching current test acc. to UL 1054, TV-3
	Inrush current acc. to IEC/EN 61058-1	capacitive 100 A, 34 ms continuous current 5 A 10 000 switch operations
	Contact gap	≥3 mm
KEB1, KFB1	Electrical rating acc. to DIN/VDE 0630	12 (3) A / 250 VAC, 10 000 switch operations
		Statement in ( ) at inductive load with p. f. 0.6
	Inrush current acc. to	capacitive 20 A, < 5 ms continuous current 5 A
	IEC/EN 61058-1	10 000 switch operations
	Contact gap	≥3 mm
DC11, DC12, DC21, DC22, DD11, DD12, DD21, DD22	Electrical rating acc. to IEC/EN 61058-1	16 (4) A / 250 VAC, 10 000 switch operations 10 (4) A / 250 VAC, 50 000 switch operations Statement in ( ) at inductive load with p. f. 0.6
	Electrical rating acc. to UL 1054	16 A / 125250 VAC, 6000 switch operations (1) HP 125 VAC / (2) HP 250 VAC Statement in ( ) at inductive load with p. f. 0.45
	Inrush current acc. to IEC/EN 61058-1	capacitive 100 A, 3-4 ms 100 A, 3-4 ms continuos current 5 A
KP (Schalter), KEB2, KFB2, KD, CD, KG, CG, Felcom 54, Felcom 64, FKH, FKI, FKHD, FKID	Electrical rating acc. to IEC/EN 61058-1	12 (4) A / 250 VAC, 10 000 switch operations 8 (8) A / 250 VAC, 50 000 switch operations
		Statement in ( ) at inductive load with p. f. 0.6
	Electrical rating acc. to UL 1054	15 A, 125250 VAC, 6000 switch operations (3⁄4) HP, 125 VAC (1 1⁄2) HP, 250 VAC
		Statement in ( ) at inductive load with p. f. 0.45
		Meets switching current test acc. to UL 1054, TV-3
	Inrush current acc. to IEC/EN 61058-1	capacitive 70 A, 34 ms continuous current 5 A 10 000 switch operations
	Contact gap	≥3 mm
KD Bowden cable, CD Bowden cable, KG Bowden cable, CG Bowden cable	Electrical rating acc. to IEC/EN 61058-1	6 (4) A / 250 VAC, 10 000 switch operations
		Statement in ( ) at inductive load with p. f. 0.6
	Electrical rating acc. to UL 1054	6 A, 250 VAC, 10 000 switch operations 8 A, 125 VAC, 10 000 switch operations
	Inrush current acc. to IEC/EN 61058-1	capacitive 36 A, < 5 ms continuous current 6 A 6000 switch operations
	Contact gap	≥3 mm

TECHNICAL DATA TO LINE SWITCHES

Line switch used by type	Technical data	
EC11, EC12	Electrical rating acc. to IEC/EN 61058-1	16 (4) A / 250 VAC, 10 000 switch operations 10 (4) A / 250 VAC, 50 000 switch operations
		Statement in ( ) at inductive load with p. f. 0.6
	Electrical rating acc. to UL 1054	20 A, 125250 VAC, 6000 switch operations (1) HP, 125 VAC (2) HP, 250 VAC
		Statement in ( ) at inductive load with p. f. 0.45
		Meets switching current test acc. to UL 1054, TV-3
	Inrush current acc. to IEC/EN 61058-1	capacitive 100 A, 34 ms continuous current 5 A 10 000 switch operations
	Contact gap	≥3 mm

INDUSTRIAL MAINS FILTERS

Frequency range 0.01 MHz ... 1000 MHz

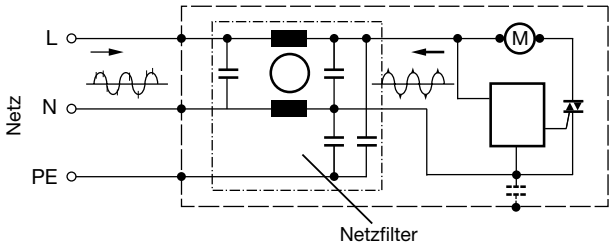
General Information

Electromagnetic Compatibility (EMC) is the capability of electrical equipment (installations, devices, assemblies) to operate effectively in its electromagnetic environment (Immunity), without in turn irresponsibly affecting this environment (Emission).

Mains filters of various types are used for the protection of electronic circuits, components and equipment against transients or similar interference, on the mains power supply. A suitable filter can be selected from the existing product range for each equipment type in accordance with electromagnetic conditions of its environment.

Mains interference can be classified into four categories:
A) Fluctuations in the industrial mains supply
(magnetic voltage stabilizer)
B) Harmonic wave interference in the frequency range 100 Hz ... 2 kHz
(filter type selective harmonic)
C) Transient interference signals in the frequency range up to
300 MHz (filter type low-pass)
D) Sinusoidal interference signals in the frequency range up to
1 GHz (filter type broad band, low-pass)

In practice, however, interference is mainly found in the last three categories B, C and D. Superimposed on the high-voltage mains supply, such interference can affect the performance of electronic circuits, or even cause them damage. An optimally-designed mains filter can perform a double function:



Function 1

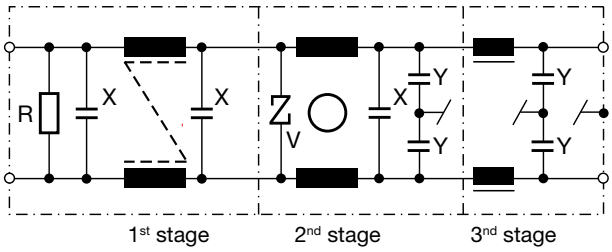
The filter protects an electronic control circuit from voltage spikes in the mains supply, which may be generated, for example, by electromechanical switches and relays.

Function 2

The same filter also acts simultaneously in the opposite direction. The HF interference generated in the unit by thyristor control is attenuated such that the boundary values Class B, (EN 55011/55022) are maintained.

Filters are usually made up of capacitors and inductance coils. Components such as leakage resistors, surge dissipators and VHF chokes can also be integrated into the filter. Broad band filters which meet the highest requirements are often composed of 2 or 3 single stages put together to make one filter unit:

3-stage filter



1st stage

A differential mode acting filter with high energy absorption. Discharging resistors are normally used for Cx capacitors > 100 nF. The capacitors are tested and approved as so-called Class X noise suppression capacitors. The 1st stage serves as dI/dt limitation.

2nd stage

A common mode acting filter with a high, broad band attenuation ratio. A ZNR varistor surge serves as the overvoltage suppression component. The earthed capacitors are tested and approved as so-called Class Y noise suppression capacitors.

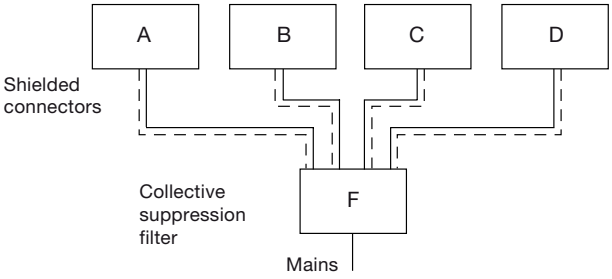
3rd stage

Common mode as well as differential mode acting filter in the HF range up to 300 MHz. Feedthrough capacitors make high attenuation values possible up to the gigahertz range. These capacitors are also Class Y type. SCHURTER uses only approved noise suppression capacitors according to EN 132400.

Filter Assemblies

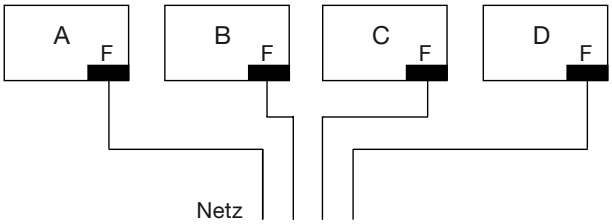
Three types of mains noise suppression filter assemblies are used in practice:

Collective Suppressor



The collective suppressor principle results in one filter per plant. This has to cope with the entire power input. In addition, all of the connecting cables have to be shielded. Furthermore interference generated by «A» device can reach other devices for instance «B» or «C» through the connecting cables. The following example promises to be a more economical solution. In many cases, the single suppressor principle is the most economical solution.

Single Suppressors



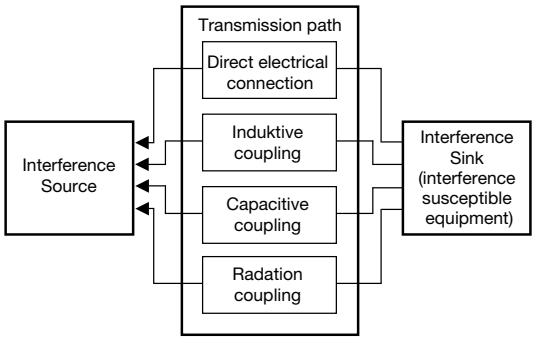
Combined Single and Collective Suppressor

From the technical point of view, only the combined application of both suppression techniques can result in a significant improvement.

Interference Propagation

In the field of interference and RF suppression, the most significant means of transmission is the direct electrical connection, i.e. the connecting wiring. The radiation coupling is also important from the electromagnetic compatibility (EMC) point of view; it cannot, however, be dealt with here.

Interference Propagation



Propagation and Coupling Paths

The capacitive and inductive coupling effects occur inside the case. These could be:
- Capacitive coupling through the coupling capacity of a mains transformer.
- Inductive coupling through control system wiring in parallel.

The introduction briefly mentioned the possibility of the mains filter operating with a double function. Depending on the main area of application, these filters are designated as either RF SUPPRESSION FILTERS or INTERFERENCE SUPPRESSION FILTERS.

The one filter may, therefore, appear under two references in the documentation. A filter is also classified by its mechanical design as well as its electrical data.

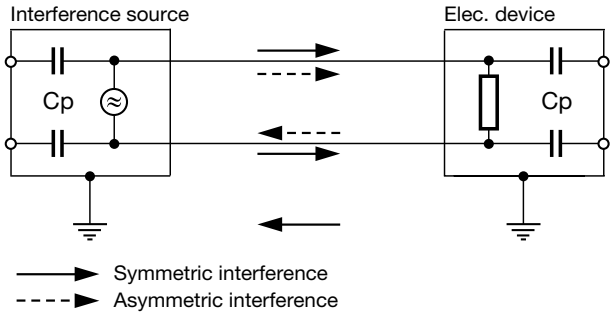
RF SUPPRESSION FILTERS impede the propagation of RF interference, generated by an electronic or electrical device into the mains. They also ensure an interference-free radio reception in the immediate vicinity.

INTERFERENCE SUPPRESSION FILTERS prevent mains interference from affecting electronic equipment. They enable an interference- free operation even in the case of a power supply badly affected by mains interference.

It is common to operate the mains filter in both directions in the one piece of equipment, allowing it to fulfil its double function as both interference and RF suppression filters as specified.

Common- and differential Mode Interference

Filter engineering differentiates between common and differential mode interference originating from supply lines.



In the case of a non-earthed interference source, interference at first only propagates along the connecting lines. Like the mains AC current, the parasitic current flows to the user on one lead, and returns to the interference source on the other. Both these currents are in differential mode. This type of interference is therefore referred to as differential mode interference.

Due to the mechanical configuration and its parasitic capacitance, parasitic currents are also generated in the earthing circuit. This parasitic current flows on both connecting leads to the user and over an earthed lead back to the interference source. Both currents on the connecting lead are in common mode. This type of interference is therefore referred to as common mode interference.

RF Suppression Chokes Conforming to IEC60938

All SCHURTER filters are fitted with chokes which satisfy the guidelines set down by international and national standards organizations.

The most important test data for RF suppression chokes are:

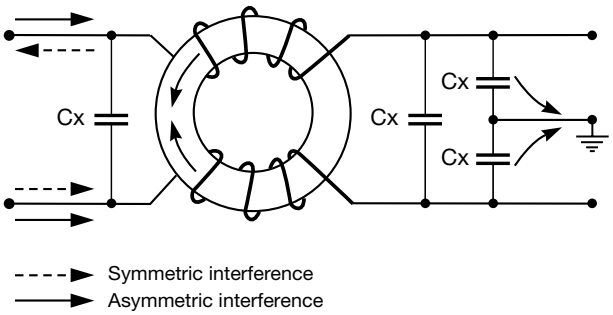
Maximum variation of inductance:	30% / +50% for compensated 15% / +15% for linear and storage
Test frequency	1MHz ± 20% at L 10 µH 100kHz ± 20% at 10 µH < L 1 mH 10kHz ± 20% at 1 mH < L 50 mH 50 to 120 Hz ± 20% at L > 50 mH
Test current:	0.1 mA
Test temperature:	25°C ± 3°C
Insulation resistance R_{is}:	6000 MOhm

Test voltages

Chokes for	Between connections	Inner and outer insulation
AC	4.3 U_R VDC	2 U_R + 1500 VAC, but at least 2000 VAC
DC	3 U_R VDC	2 U_R + 1500 VDC

Temperature rise at nominal current: ΔT = 60°C
Short-circuit strength:
EN and VDE: not applicable
SEV→: 25 x I_N (2 half-waves)

CURRENT COMPENSATED CHOKES IN INTERFERENCE SUPPRESSION FILTERS



The main type of choke used in suppression filter engineering is the current compensated choke. This mainly damps the common mode interference. The differential mode parasitic current, or rather the magnetic flux they produce in the core, is compensated by means of a special type of winding. The relatively small attenuation of the differential mode parasitic currents can be balanced through the large, symmetrically connected capacitance C_x between the lines. Only the leakage inductance L_s of the choke is then of any importance.

$$L_{leakage} \approx \frac{L_{nominal}}{50} \text{ to } \frac{L_{nominal}}{100}$$

The high nominal inductance L_N active for common mode parasitic currents allows the insertion of small, earthed capacitances C_Y in a filter circuit. These capacitances are regulated by international standards for leakage currents.

RF Suppression Capacitors:

General Information

All SCHURTER filters are fitted with Class X or Y R_F suppression capacitors in accordance with international standards (IEC, EN). These are mainly self-healing metallized paper or polyester types, tested against the standards of major countries around the world and approved as noise suppression capacitors. Class X capacitors are capacitors with unlimited capacity for those applications in which a failure caused by a short circuit cannot result in a dangerous electrical shock. Class Y capacitors are capacitors intended for an operating voltage V_{eff} = 250 V with increased electrical and mechanical safety and limited capacitance.

RF Suppression Capacitor Complying with IEC 60384-14

All SCHURTER filters are equipped with components which have been tested and approved as R_F suppression capacitors.
The most important test data for R_F suppression capacitors are:
Capacitance C_x, C_y ± 20% for fM = 1 kHz

Insulation resistance Ris between the capacitor terminals:
for C > 0.33 µF: R_{is} x C > 2000 s (time constant)
for C 0.33 µF: R_{is} > 6000 MOhm

Major voltage test and standards for C_X and C_Y capacitors

Country	Standard	C	Rigidity	Pulse Test 1.2/50 µs
Europe	EN 132400	X1	4.3 UR VAC	4.0 kV
	IEC 60384-14.2	X2	4.3 UR VAC	2.5 kV
		Y1	4.0 kVAC	8.0 kV
		Y2	2.5 kVAC	5.0 kV
	IEC 60950	X1	2700 V_{DC}, 60s	4.0 kV
	(Equipment Standard)	X2	2121 V_{DC}, 60s	2.5 kV
USA	UL 1414		2121 V_{DC}, 60s	50 Pulse, 10 kV, 1000 W
	UL 1283		2121 VDC, 60s 2545 VDC, 1s	-
Switzerland	SEV 1055	x	4.3 UR VAC	3.0 kV
		y	2(100 + 2 UR) min. 2250 VAC	5.0 kV

X2Y® - filter:

X2Y® filter combines the X and Y capacitors into a component that is in contact with the filter enclosure over a broad surface. The leads connecting the capacitors are thereby eliminated and parasitic impedances are reduced to a minimum. This results in broadband suppression into high frequency ranges.

General notes

a) Leakage current according to IEC 60335-1

The leakage current of a device is mainly determined by the capacity value of the Y-capacitor. According to international standards (IEC 60335-1) the following regulations with respect to leakage current can be assumed:

Type of appliance	Protection class	I_L max. (mA)	U(V)	f(Hz)
Portable appliances	I	0.75	250	50
Stationary motor appliances *	I	3.5	250	50
Stationary heating appliances	I	0.75/kW (max. 5.0)	250	50
Appliances	II	0.25	250	50
Appliances	I, OI, III	0.5	250	50

* Stationary appliances fixed or weighing in excess of 18 kg (without carrying handle).

For other applications:

Ref.	Laboratory	Medical	IT	Test equipment
UL	0.5 mA (UL 1262)	0.1 mA (UL 544)	3.5 mA (UL 1950)	5.0 mA (UL 1244)
IEC		0.1 mA (IEC 60601-1)	3.5 mA (IEC 60950)	3.5 mA (IEC 61010-1)

Filter classification

For easy reading of the catalogue data, SCHURTER uses the following simplified filter classification:

Differential Mode and Common Mode Attenuation

Attenuation value			
Standard	Medium	High	Excellent
20-50 dB	40-70 dB	60-80 dB	70-95 dB

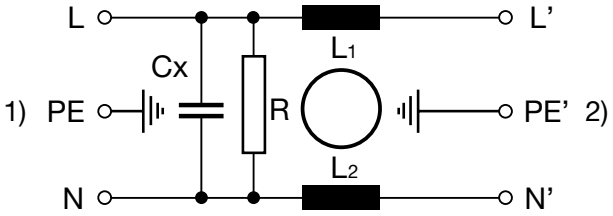
Leakage Current Classification

Operating leakage current			
Medical	Standard	Industrial	Other
<0.1 mA	<0.5 mA	<5 mA	>5 mA

Medical filter

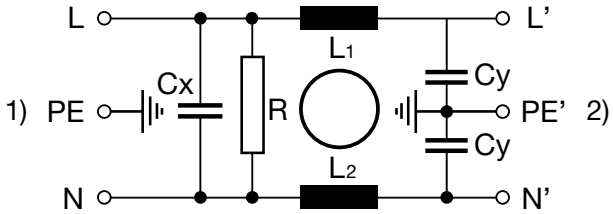
SCHURTER medical filters comply with UL544 and IEC 60601-1 standard specifications and are available in two versions, which differ in terms of their leakage current values.

Medical filter (M5)



1) Line
2) Load

Medical filter (M80)



1) Line
2) Load

Standard medical filters for direct person contact supplied by SCHURTER have a leakage current value of <5 µA (M5). This can only be achieved without C_y. Here, a common mode fault current against earth is not attenuated and the filter acts only on differential mode fault currents. In addition, an inlet in protection class II can be used here, as no earth connection exists. However, if an earth connection is desired, Type (M80) can be used for indirect person contact; this has a leakage current of <80 µA which is below the required limit value of 0.1 mA. Type (M80) is manufactured to special order.

Bleed resistor

Medical filters and filters with a X-capacitor >100 nF have a bleed resistor so that no inadmissible rest voltage occurs at the touchable pins of the inlet.

EMC requirements in Europe

Household, Luminaries and Telecommunication Residential, commercial and light industrial	**Class Industrial** (ISM) Industrial, Scientific and Medical
Emission IEC 61000-6-3 (EN 50081-1) EN 55022 ITE Information technology equipment EN 55014 Household Applications and Tools Harmonic (IEC 61000-3-2) Voltage fluctuations (IEC 61000-3-3)	**Emission** IEC 61000-6-4(EN 50081-2) EN 55011 Harmonics (IEC 61000-3-2) Voltage fluctuation (IEC 61000-3-3)
Immunity IEC 61000-6-1 (EN 50082-1) IEC 61000-4-2 ESD IEC 61000-4-3 HF-Field IEC 61000-4-4 Burst IEC 61000-4-5 Surge	**Immunity** IEC 61000-6-2 (EN 50082-2) IEC 61000-4-2 ESD IEC 61000-4-3 Inducted HF-Field (enclosure) IEC 61000-4-6 Inducted HF-Field (lines) IEC 61000-4-4 Burst IEC 61000-4-5 Surge IEC 61000-4-8 NF Magnetic Field (only for magnetic devices)

ELECTRICAL SAFETY REGULATIONS

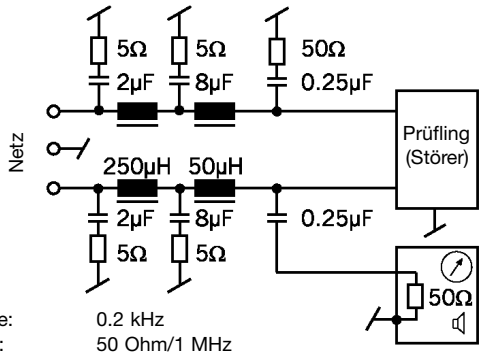
The most important safety standards for equipment/installations are listed in the following:

IEC 60950 Safety of Information Technology Equipment including Electrical Business Equipment
IEC 60335 Safety of Household and similar Electrical Appliances
IEC 61010-1 Safety requirements for Electronic Measuring Apparatus
IEC 60601 Safety requirements for Electro-medical Equipment
UL 1950 Safety requirements for Information Technology Equipment
UL 544 Electric Medical and Dental Equipment

Interference Emissions

There are basically 2 types of emitted disturbances: conducted and radiated. Line interferences are high frequency noise signals which are superimposed on the useful signals on input and output lines. Interference signals can be of common- or differential mode type. The significance of line interference is reduced dramatically above a frequency of 30 MHz. From here radiated interference increases greatly. On the following pages we will nevertheless deal with conducted interference only.

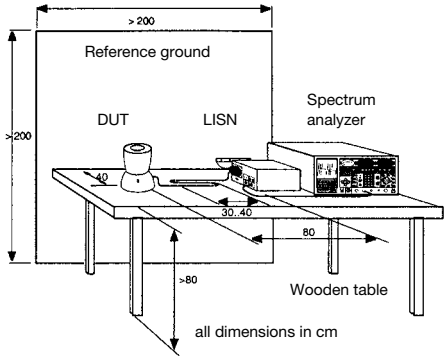
Measuring Technique CISPR 3



Bandbreite: 0.2 kHz
Impedanz: 50 Ohm/1 MHz
Frequenzbereich: 10 kHz–30 MHz

Mess-Empfänger

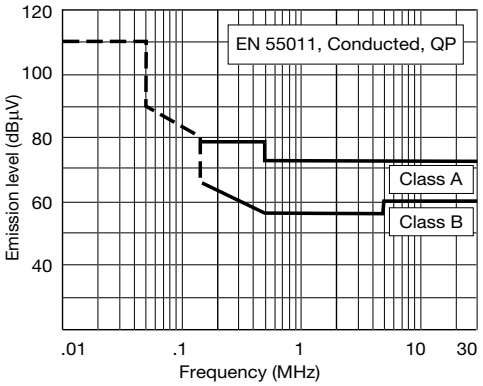
RADIO FREQUENCY INTERFERENCE BOUNDARY VALUES



RFI testing station

EN 55011: Boundary values and measuring systems for R_F suppression for industrial, scientific and medical high frequency equipment (ISM), 1991 (see also CISPR 11 or VDE 0871)

Boundary values complying with EN 55011



Quasipeak (QP) and Average (AV) are two limits, neither of which must be exceeded and which are measured by two different test receivers. The test arrangement remains the same. These boundary values replace the boundary values given by the old standards for broadband and narrowband noise generators.

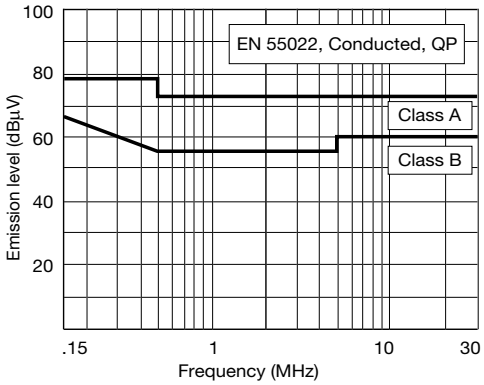
Boundary values are divided into Class A and B.

Into Class A fall those devices which should not be operated in residential buildings and should not be connected to power supplies which also supply these areas. Class A boundary values shall not be exceeded.

Into Class B fall devices for which above restrictions do not apply. Class B boundary values shall not be exceeded.

EN 55022: Boundary values and measuring systems for RF suppression for information technology installations (Telecommunications) 1987 (see also CISPR 22 or VDE 0878).

Boundary values complying with EN 55022



Into Class A fall all units which should be used in a commercial environment and should be used with a safety distance of 30 m to other units.
Into Class B fall all units which have no restrictions on their use.

EN 55013: Boundary value and measuring techniques for RF suppression characteristics of radio receivers and connected applications.

EN 55014: Boundary values and measuring systems for RF suppression for electrical household appliances, handheld electrical tools and similar electrical products, 1993 (see also CISPR 14)

EN 55015: Boundary values and measuring systems for RF suppression for fluorescent lamps and lighting, 1993 (see also CISPR 13)

Harmonics

(EN 61000-3-2, IEC 61000-3-2)
Current harmonics represent a distortion of the normal sine wave provided by the utility. When a product such as an SCR switched load or a switching power supply distorts the current, harmonics at multiples of the power line frequency are generated. Two significant consequences arise as a result of harmonic generation. First, because of finite impedances of power lines, voltage variations are generated that other equipment on the line must tolerate. Second, when generated in a three-phase system, harmonics may cause overheating of neutral lines.

Power line harmonics are generated when a load draws a non linear current from a sinusoidal voltage. The harmonic component is an element of a Fourier series which can be used to define any periodic waveshape. The harmonic order or number is the integral number defined by the ratio of the frequency of the harmonic to the fundamental

frequency (e.g., 150 Hz is the third harmonic of 50 Hz; n = 150/50).

After multiple postponement finishes at 1.1. 2001 the transition-period for the EN 61000-3-2, frequently called "PFC-Norm". It applies to all electrical and electronic devices with input current up to max. 16 A per phase, which are designed to connect to the general lowvoltage mains. Limits are set only for 220/380 V, 230/400 V and 240/415 V at 50 Hz.

This standard distinguishes four classes of equipment.

Class	Equipment
A	Simmetric three phase equipment and all other equipment not in other classes
B	Portable tools
C	Lighting equipment
D	Equipment having special Waveshape (see EN 61000-3-2, paragraph 4 picture 1)

A harmonics test to conform to the standards must include an analysis of the incoming current up to the 40th harmonic (for f_N = 50 Hz, f_H = 2 kHz).
The IEC 61642 "Industrial a.c. networks affected by harmonics- Application of filters and shunt capacitors" give guidance for the use of passive a.c. harmonic filters and shunt capacitors for the limitation of harmonics and power factor correction intended to be used in industrial applications, at low and high voltages.

Voltage Fluctuations (Flicker)

(EN61000-3-3, IEC 61000-3-3, IEC 61000-3-5)
The appearance of flicker effects and voltage fluctuations on the mains supply is caused by varying loads connected to the mains. The most critical are the effects of voltage fluctuations on equipment such as lights and illumination. Here the light output and thereby the intensity is an exponential function of the supplied voltage. This fluctuation in light intensity is called flicker. Many people experience dizziness and headaches as a result.

There are various limit values depending on the type of voltage fluctuation (square, sinusoidal and mixed or erratic voltage fluctuation).

Flickers are measured by so-called flicker meters (arranged in compliance with EN 60808).

Immunity

ESD (Electrostatic Discharge)

(EN 61000-4-2, IEC 61000-4-2)
One of the main interference sources, along with switching through radio interference , is electrostatic discharge from people and equipment.

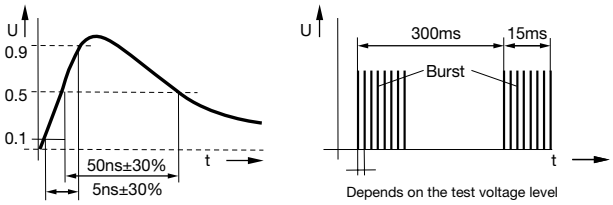
Burst

(EN 61000-4-4, IEC 61000-4-4)
One of the most common and most dangerous sources of interference are transient disturbances such as those originating from switching transients (interruption of inductive loads, relay contact bounce, etc.). The burst test measures the resistance of the device to repetitive fast transients.

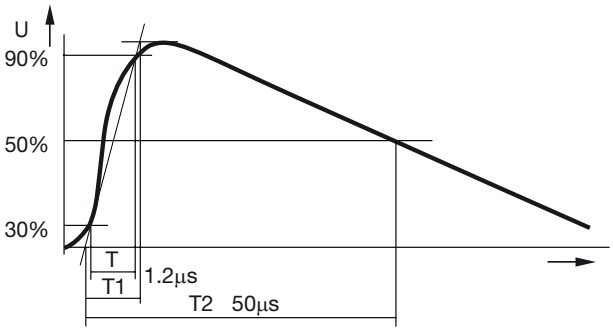
Surge

(EN 61000-4-5, IEC 61000-4-5)
This test procedure measures the behaviour of a device when subjected to high-energy pulses. Sources of such pulses are switching events due to lightning strikes, short-circuits, or switching cycles which vary in time and place. Surge test on SCHURTER filters are according to EN 133200.

Specification of the Burst test impulse



Surge voltage form in open circuit



Guideline for the selection of ESD test levels

Class	Relative ambient humidity as low as [%]	Antistatic material (floor)	Synthetic material (floor)	Level air discharge (kV)	Level contact discharge (kV)
Class 1	35	x		2.00	2.00
Class 2	10	x		4.00	4.00
Class 3	50		x	8.00	6.00
Class 4	10		x	15.00	8.00

Recommended test levels for Fast Transient/Burst

Test levels	The installation is characterized by following attributes	Voltage peak: [kV]		Repetition rate [kHz]
		Power supply	Signal ports	
Level 1 Well-protected environment	Suppression of all EFT/B* in the switched power supply circuits Separation between power supply lines and control and measurement circuits Shielded power supply cables with the screens earthed at both ends	0.50	0.25	5.0
Level 2 Protected environment	Partial suppression of EFT/B* in the power supply and control circuits Separation of all the circuits from other circuits associated with environments of higher severity levels Physical separation of unshielded power supply and control cable from signal and communication cables	1.00	0.50	5.0
Level 3 Typical industrial environment	No suppression of EFT/B* in the power supply and control circuits Poor separation of the industrial circuits from other circuits Dedicated cables for power supply, control, signal and communication lines Poor separation between power supply, control, signal and communication cables	2.00	1.00	5.0
Level 4 Severe industrial environment	No Suppression of EFT/B* in the power supply and control and power circuits No separation between power supply, control, signal and communication cables Use of multicore cables in common for control and signal lines	4.00	2.00	2.5

*EFT/B: Electrical Fast Transient/Burst

Installation classification for Surge Immunity test

Class	Environment definition	Voltage peak [kV]	
		L → N [2Ω]	L/N → PE [12Ω]
Class 0 well-protected environment	- All cables with overvoltage protection - Well-designed earthing system - Surge voltage may not exceed 25 V	-	-
Class 1 Partly protected environment	- All cables with overvoltage protection, well interconnected earth line network - Power supply completely separated from the other equipment - Surge voltage may not exceed 500 V	0.50	-
Class 2	- Separate earth line to earthing system - The power supply is separated from other circuits - Non-protected circuits are in the installation, but well separated and in restricted numbers - Surge voltage may not exceed 1000 V	1.00	0.50
Class 3	- The installation is earthed to the common earthing system - Protected electronic equipment and less sensitive electric equipment on the same power supply network - Unsuppressed inductive loads are in the installation	2.00	1.00
Class 4	- The installation is connected to the earthing system for the power installation - Current in the kA range due to earth faults - The power supply network can be the same for both the electronic and the electrical equipment - Surge voltages may not exceed 2000 V	4.00	2.00

General Technical Data - Filter parameters

Rated voltage U_R (U_{max})

The rated voltage U_R is the maximum RMS alternating line to line voltage (U_{max}) which may be applied continuosly to the terminals of the filter. The rated voltage is the nominal voltage including 10% tolerances.

Example:

Filter with U_R = 440 VAC is made for a power system with nominal voltage 400 VAC +10%.
For standard three phase filters the voltage between phase and earth is intended $U_R/\sqrt{3}$ (example 440/250 VAC).

Filters made for IT power systems withstand a voltage between phase and earth equal to U_R.

SCHURTER filters for IT systems have code endingwith "I": ex. FMAC-0932-2512I.

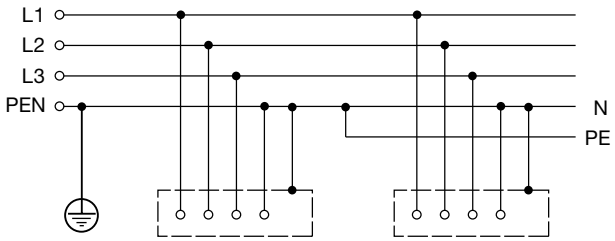
The line frequency f_N (50/60 Hz) may be exceeded under certain conditions. We recommend the users to consult in any case our technical department. DC power operation is possible in most cases.

Power distribution system

There are three main types of power distribution systems according to IEC 60950 (1.2.12): TN, TT, IT.

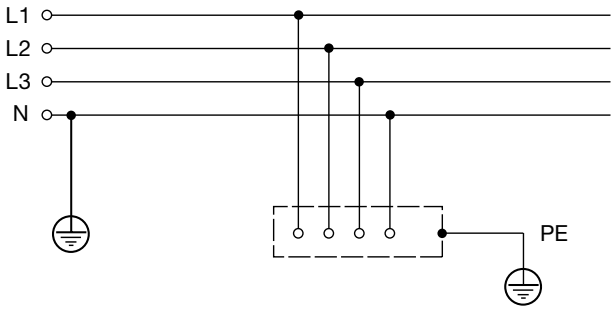
The TN POWER SYSTEM is a power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to that point by protective earth conductors. Three types of TN POWER SYSTEMS are recognized according to the arrangement of neutral and protective earth conductors: TN-S, TN-C-S, TN-C.

Example of a TN-C-S system



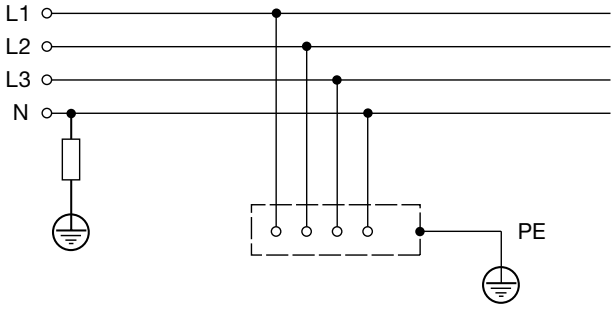
TN-C-S is in a system which neutral and protective functions are combined in a single conductors in a part of the system.

Example of a TT system



A TT POWER SYSTEM is a power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to earth electrodes electrically indipendent of the earth electrodes of the power system.

Example of a IT system



The IT POWER SYSTEM is a power distribution system having no direct connection to earth, the exposed conductive parts of the electrical installation being earthed. In this case the voltage between phase and earth can reach the line to line voltage.

Nominal Current I_N

The technical data gives the max continuous supply current in function of the ambient temperature I_N/ a. The SCHURTER range generally differentiates between two types of filters:

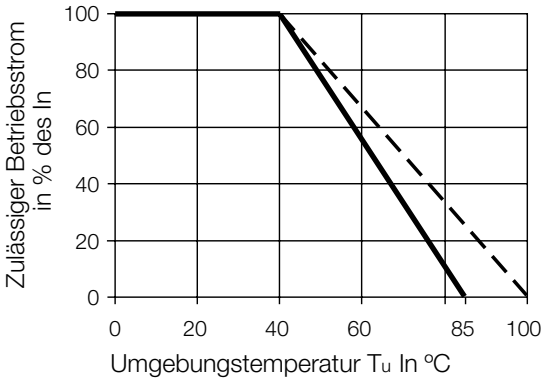
- High-current filter: a at I_N = 40°C
  a_{max} = 100°C
- All other filters: a at I_N = 40°C
  a_{max} = 85°C

The permissible working current at higher ambient temperatures can be read from the following graph.

Permissible Working Current as a Function of Ambient Temperature

Up to the approved nominal ambient temperature a the filter can be operated continuously at its nominal current. Above this temperature
the square of the nominal current drops off linearly and
reaches its zero point at Tmax (85 or 100 °C).

Derating curve (approx.)



Formula:

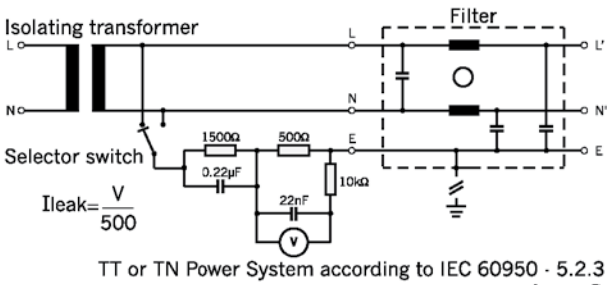
$$I = I_n \sqrt{\frac{T_{max} - T_a}{T_{max} - T_n}}$$

I = admissible operating current at elevated ambient air temperature
I_n = rated current
T_{max} = max. allowable ambient air temperature T_a (85 °C)
T_a = ambient air temperature
T_n = allowable ambient air temperature at rated current (40 °C)

Leakage Current

(see also Chapter 1.6 RF Suppression Capacitors: General information)
1-Phase measuring Techniques
Measurement of the leakage current (simplified).
The leakage current is measured from every pole of the network:
- to all accessible metal parts
- to metal parts of protection class II equipment which is separated only by the base material from parts under voltage.

The test is made with AC at 250 V / 50 Hz.
Measurements are made in both switch positions (see diagram).



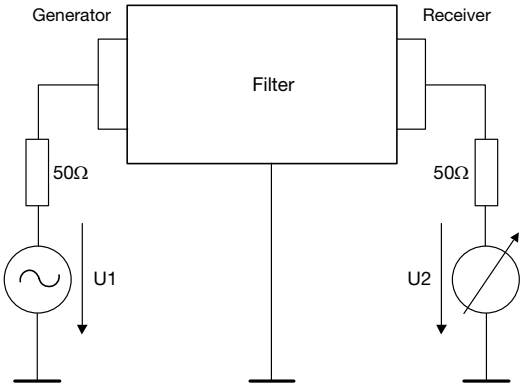
TT or TN Power System according to IEC 60950 - 5.2.3 - Annex D

Protection Class I:

Devices are fitted with a special grounding conductor to provide protection against electrical shocks (L,N,PE wire cable). SCHURTER filters correspond to Protection Class I.

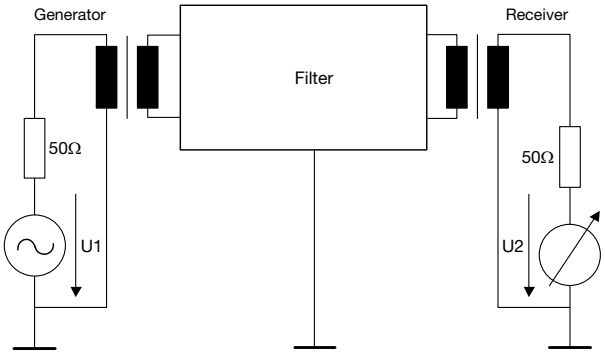
Insertion loss acc. CISPR 17 (common- and differential mode)

Asymmetrical measurement



In common mode measurements, the line and neutral conductors are measured with respect to earth.
Line (L) and neutral (N) are measured to earth (E).

Symmetrical measurement



In differential mode measurements, the insertion transmission loss is measured between line and neutral through a balancing transformer; the earth wire is not used.
4-pole network with integrated balancing transformer for the measurement of insertion transmission loss in the symmetric case.

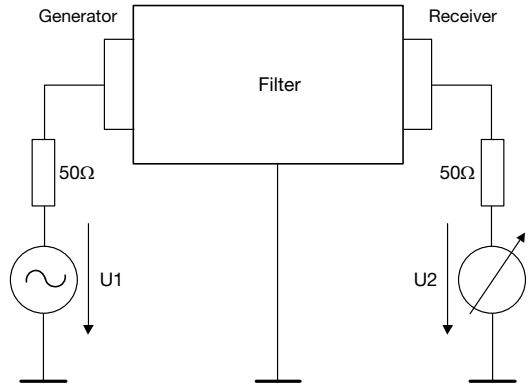
Measurement Method

The insertion loss D is defined as that loss which results when a four-pole network is inserted into an existing layout, having a surge impedance Z, assuming that the LHS and the RHS terminal impedances of the four-pole network are equal in magnitude and real, the insertion transmission loss and the overall loss are the same.
The insertion transmission loss, in decibels, can be obtained as follows:

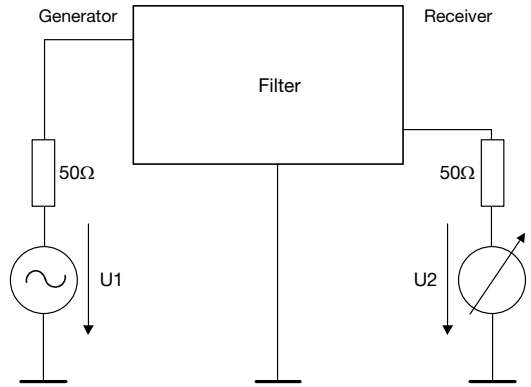
$$D_{dB} = \frac{20 \log (U_G)}{2\ U_2}$$

Insertion loss "Alternate Test Method"

Asymmetrical measurement



Symmetrical measurement



The Alternate Test Method allows the measurement in the GHz frequency range whereas the CISPR 17 method does not cover frequencies above 30MHz. The insertion loss is measured in a throughput method (common mode) and a cross coupled method (differential mode). The differential mode measurement of the alternate test method is not directly comparable to the conventional measurement acc. CISPR 17.

Voltage tests on noise suppression filters complying to IEC 60939-2

IEC 60939-2

Nominal voltage connections	Between	Inner and outer insulation	
		C*≤ 1 µF	C*> 1 µF
150 ≤ U_R ≤ 250 VAC	4.3 U_R VDC	1500 VAC or 2250 VDC	4.3 U_R VDC
250 ≤ U_R ≤ 500 VAC	4.3 U_R VDC	2 kVAC or 3 kVDC	4.3 U_R VDC
500 ≤ U_R ≤ 760 VAC	4.3 U_R VDC	3 kVAC or 4 kVDC	4.3 U_R VDC

*) C is the capacity measured between the connection block to which the high voltage is connected for test.

UL 1283
(Appliance filters)

Nominal voltage	Between connection	Between connection and case
UR ≤ 250 VAC	1250 VAC or 1768 VDC	1500 VAC or 2121 VDC

In compliance to the known standards of the IEC, EN, VDE and UL, the filters are tested as follows. In principle, these tests correspond to those of the RF suppression capacitors.

TEST DURATION

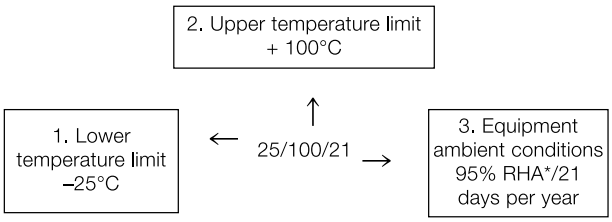
- 2 sec for production test
- 60 sec for types test

The SCHURTER final production test has a duration of 2 sec. This test may not be repeated more than one time (i.e. incoming inspection at the customer). Any filter that has been under test for 60 sec. can not be commercially used (reduced life cycle).

Application Classes (IEC 60068-1)

The aim of this standard is to create a basis for classification of telecommunication engineering electrical components according to application classes which correspond to their climatic and mechanical suitability.

Example:



* relative humidity

MTBF
The high reliability of the filters can be excelled from MTBF (Meantime between failures). These values are according MIL-HB-217-F class C_{TB} at an ambient temperatur 40°C at rated voltage and current.

PULSE TRANSFORMERS

Introduction

The application range of pulse transformers is very broad. In most cases, a signal or a control pulse must be transmitted between electrically isolated circuits. This problem exists in the activation of thyristors and triacs, or in the operation of FETs or IGBTs in highpower switching circuits. Another application involves electrical isolation in telephone switchboards and data transfer systems.

High Insulation Rating

When used in power electronics, the secondary side of pulse transformers is normally at a high voltage potential. This requires a high insulation strength for pulse transformers.

Complying with VDE 110 b, Part 1, the following test voltages between the primary and the secondary circuits are required for transformers of Protection Class I and choke coils, as a function of the working voltage:

Working Voltage [V]	Test Voltage U_{isol} [V]
250	1500
500	2500
1000	3000

Test Voltage U_{isol}

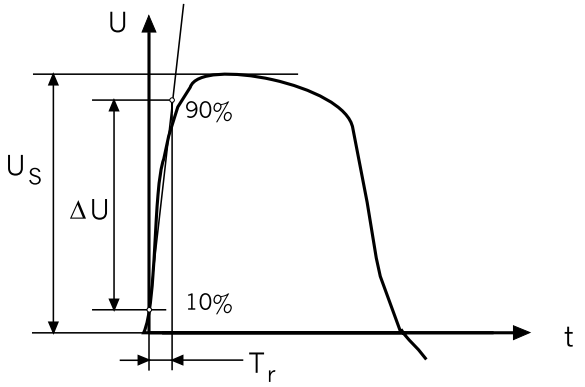
The test voltage for SCHURTER pulse transformers depend on the type of winding and coating on the coil wire. Exact information concerning each type is available in the technical specifications. The test voltage is in each case considerably higher than that prescribed by VDE 110 b.

Partial Discharge Voltage U_e

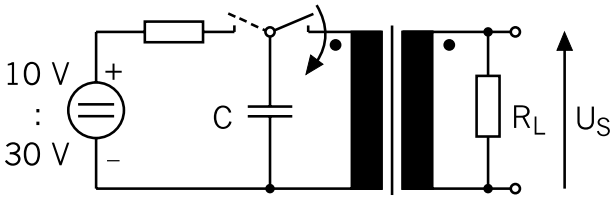
Partial discharges during normal operation have little effect on the operation of the circuit, but can accelerate the ageing of the pulse transformer. The glow discharge and the intermittent voltages are at least 50% higher than the approved working voltages for all SCHURTER pulse transformers. This provides the best assurance against long-term damage.

Definition of the Rise Time T_r

Over the almost straight-line in the lower 2/3 of the rise curve, i.e. in the area where the semiconductor is triggered with certainty, we draw a line and measure the time from 10% to 90% of the overall pulse height.



The measurement is made with the following circuit. The load resistance R_L is given for each type.



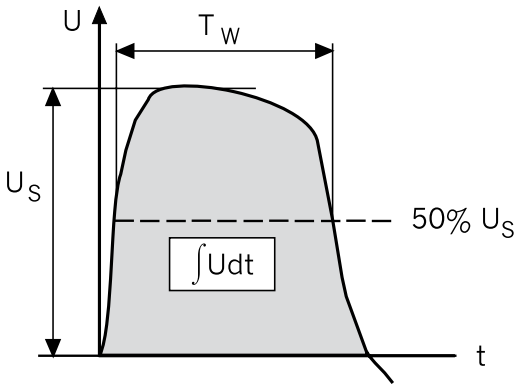
For a turn ratio of 1:1, the test voltage is 10V;
For a turn ratio of 2:1, the test voltage is 20V, and so on.

Trigger Current I_{ign}

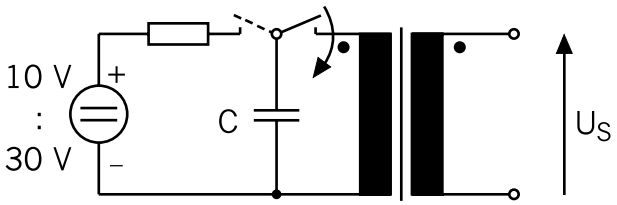
The maximum trigger current is a guide value. For a given current, the drop in voltage over the secondary winding resistance is smaller than one volt.

The Voltage-Time integral $U_s \cdot t_w$

The voltage-time integral is the product of the pulse height and width, measured at half pulse height. The voltage-time area is measured on the secondary side during operation under no load.



The voltage-time integral $U_s \cdot T_w$ is measured according to the principle of the following circuit. The same voltages as used for measuring the rise time are used.



Primary and Secondary Inductances L_p, L_s

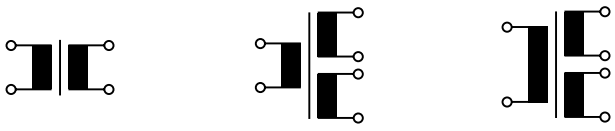
Primary and secondary inductances are measured with a low-power signal of 0.1 mA/10 kHz at 25°C. The tolerance is -30% / +50%. The measured value can also vary up to ± 25% under temperature variation in the range 0°C to 70°C.

Coupling Capacity C_c

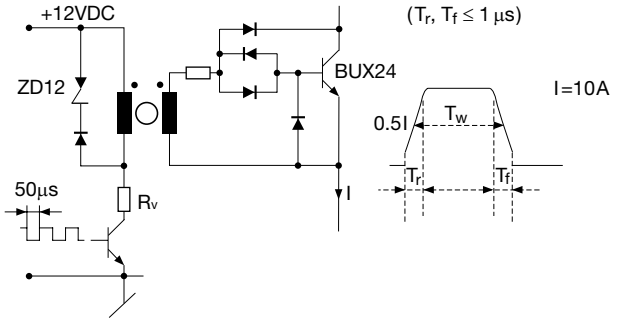
The coupling capacity is measured between the primary and one secondary winding. This value varies depending on the type of winding. Bifilar windings, designed for models with faster rise times, have higher coupling capacitances than the layer or selection windings.
In general, this value is not important with regards transmission properties. To guarantee effective interference protection from the control electronics, however, the smallest possible coupling capacity is desired.

Turn Ratio N

In the given turn ratios, the first figure always refers to the primary winding. Hence a «1:1» pulse transformer has the same number of winding on both the primary and the secondary windings. The turn ratio «3:1:1» stands for one primary and two secondary windings with a transformation ratio of three to one between the primary and the secondary windings.



Example of application



Power transistor in pulse operation

UL-Approbation

The plastic cases and the potting resin of all SCHURTER pulse transformers are fire resistant in compliance with UL 94 V-0.

Abbreviations used in the technical data

$\int$Udt	Voltage-time integral ($U_s \cdot T_w$)
T_r	Pulse rise time
P_m	Power dissipation at ambient 50°C
P	Power dissipation at elevated temperature
ϑa	Ambient temperature
I_{ign}	Trigger current
C_c	Coupling capacity
R_L	Test load resistance (secondary)
R_p	Primary resistance
R_s	Secondary resistance
L_p	Primary inductance = L_s x N^2
L_s	Secondary inductance
U_{eff}	Working voltage primary-secondary in $_{VRMS}$
U_{isol}	Test voltage
N	Turns ratio

Code

I[1] T[2] N[3] F[4] - 0[5] 2[6] 35[7] - D1[8] 03[9]

1) Pulse transf.
2) T.. conventional
   S.. SMD
3) N.. normal
   R.. small rise time
4) A.. 1:1 / B.. 2:1/C.. 3:1
   F.. 1:1:1 / H.. 3:1:1
5) Brandlabel SCHURTER
6) C_K:1..≤10pF / 2..>10..≤100pF
7) Case code
8) Trigger current
9) Inductance

POWER STAGE DRIVER MODULE

DC/DC Converter Module

The PSDM-0DN1-5040 module is a DC/DC power supply converter designed to provide a galvanic isolated, regulated and monitored power to IGBT and MOSFET drivers. The module requires an input voltage of $12V_{DC}$ ± 10% and has dual outputs of 15V and 4V with a maximum supply current of 140 mA. This DC/DC module has a unique diagnostic output permitting the user to monitor the converter output voltage and thus to avoid damage to the power stages resulting from under voltages.

IGBT Driver Modules

The IGBT driver modules PSDM-0DO2-5040 and PSDM-0DT2-5020 were developed to drive IGBT or MOSFET power transistors in an easy, safe and reliable way. The modules have an internal turnoff circuit that protects the output power stage in the event of a short circuit. The PSDM has an isolated DC/DC converter with a 2.4W output power for the drive circuit supply. (see PSDM-0DN1-5040). Data is transfered by an optocoupler or a transformer.

Connection Description

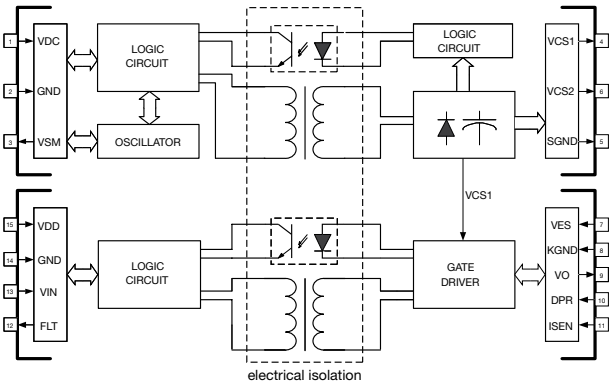


fig. 1: PSDM

PIN1: V_{DC}
A stabilised voltage supply between 10V and 15V with respect to GND.

PIN2: GND
GND is connected to the frame of the electronic power supply.

PIN3: V_{SM}
This output refelects the output voltage of the DC/DC converter. When more current is needed at the output stage, the voltage across V_{SM} decreases. When V_{SM} reaches the value of the DC/DC converter power supply, then the DC/DC converter has reached the maximum transfer current.

PIN4: V_{CS1}
VCS1 is the isolated positive output power supply for the driver logic.

PIN5: SGND
SGND is the electrically isolated output ground from the DC/DC converter.

PIN6: VC_{S2}
VCS2 is the isolated negative output power supply for the driver logic.

PIN7: V_{ES}
VES is the external power supply for the driver logic. V_{ES} is connected to V_{CS2} to turn off the MOSFET/IGBT connected to the module.

PIN8: KGND
KGND is the isolated Kelvin ground that is connected to SGND.

PIN9: V_O
Output V_O is the signal output for the IGBT gate drive. In order to permit the switching speed to be set independently during turn-on and turn-off, two gate resistors and a diode must be used (for example, R_{g1} = 22 Ω and R_{g2} = 100 Ω).

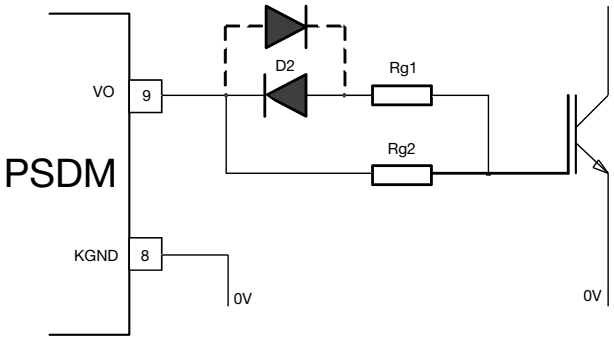


fig. 2: Gate Driver

PIN10: D_{PR}
This connection is used to monitor the voltage drop across the turned-on current transistor, so as to provide protection against short circuits and overloading on the IGBT. This involves monitoring the collector voltage and turning off the power transistor if this voltage rises above a certain threshold value. The best method of detecting an excess threshold value is through the use of an external fast or super-fast high voltage diode D1 (for example 1N4937) and an internal comparitor. The PSDM has power transistor supervision, which monitors the collector voltage on the IGBT. Under normal operating conditions when the IGBT is turned on and saturated, the voltage across DPR is kept low. When the IGBT is no longer saturated or turned off, the internal current source (270 µA) will trip out the comparitor. The comparitor threshold value is typically 6.5 V (D_{PRth}). Resistor RRV is required to protect the PSDM from reverse voltage transients and should not be larger than 1kΩ. The fault event is transferred to the output pin FLT by an internal optocoupler.

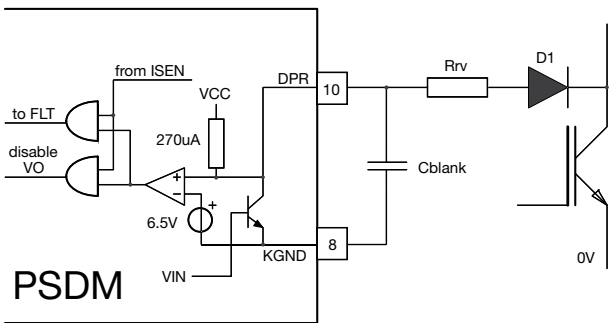


fig. 3: Power Transistor Supervision D_{pr}

PIN11: I_{SEN}
Input I_{SEN} is required to check the supply current across Risen, serving thus as a protection against short circuits and overvoltages on the IGBT. An RC filter is used across pins 8 and 11 to attenuate any high frerquency noise. If an overcurrent (V_{ISOC} > 65 mV) takes place across Risen, IGBT will be turned off by an internal circuit. The signal fault is reset when another impulse appears at the signal input V_{IN}. In the

event of a short circuit across the output (V_{ISSC} > 130 mV), inductance will be very small. Measured across resistor R_{isen}, the short circuit signal is transfered by an internal optocoupler to the output pin FLT. If a short circuit is detected, the IGBT remains turned off until the next impulse (V_{in}).

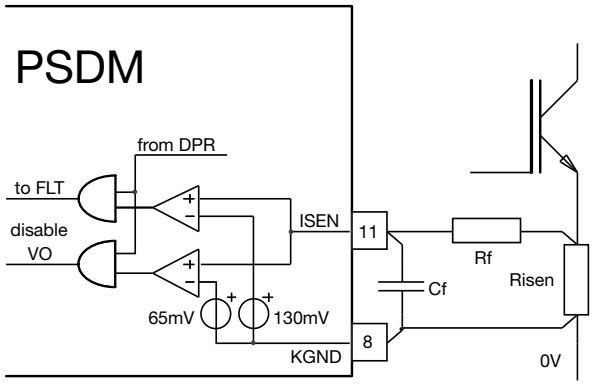


fig. 4: Fault Current Detection I_{sen}

PIN12: FLT
The PSDM has an active fault output. This fault output is internally interfaced to an optocoupler. In a turned-on state, the current range of the optocoupler is between 10 to 20 mA, possessing a high impedance in the turned-off state. The integrated circuit is shown below.

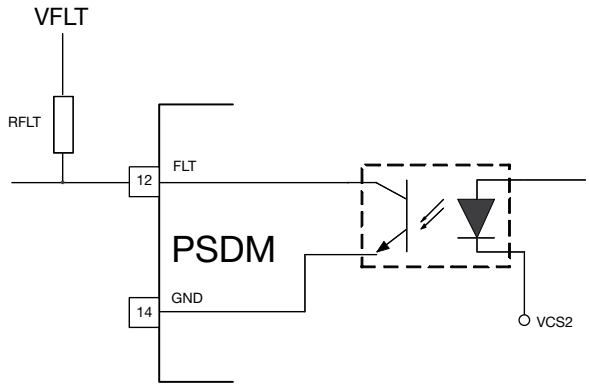


fig. 5: Fault Output

The FLT pin is only enabled when it is used together with a D_{PR} or I_{SEN} signal. Voltage V_{FLT} can be taken from 5V to 15V with a resistor. The supply current permitted is 10mA. In the event of a fault, output FLT is switched to GND.

PIN13: V_{IN}
This input has a SchmittTrigger characteristic. HIGH level turns the power transistor on, LOW turns it off.

PIN15: V_{DD}
A stabilised voltage supply between 4.5V and 5.5V with respect to GND.

Application Example: Power Supply 0-15V (fig. 6)

With this circuitry example, an output voltage of 0-15V is generated at V_0. The two functions fault current detection (ISEN) and power transistor supervision (D_{PR}) are inactively switched for this application. With this, SGND is connected to I_{SEN}, D_{PR}, V_{ES} and KGND. If necessary, a seprate resistor can be connected between V_0 and IGBT in order to optimize the turning on and off of the semi-conductor.

POWER STAGE DRIVER MODULE

Application Example: Power Supply 415V (fig. 7)

With this circuitry example, an output voltage of 415V is generated at V_0. The two functions fault current detection (I_{SEN}) and power transistor supervision (D_{PR}) are inactively switched for this application. With this, SGND is connected to I_{SEN}, D_{PR}, V_{ES} and KGND. If necessary, a seprate resistor can be connected between V0 and IGBT in order to optimize the turning on and off of the semi-conductor.

Application Example: Power Transistor Supervision (fig. 8)

In this example, power transistor supervision is presented for the IGBTs. For this, output V_{CS2} (-4V) is connected to V_{ES}. Supervision is actively switched with the connection of V_{CS1} to I_{SEN}. In addition, a high voltage diode is connected in series to a resistor between D_{PR} and the IGBT collector. The capacitor is switched from D_{PR} to SGND.

Application Example: Fault Current Detection (fig.9)

With this example, a fault current detection circuitry is presented for the IGBTs. For this, output V_{CS2} (-4V) is connected to V_{ES}. A resistor R_{Isen} is connected between I_{SEN} and KGND. An RC filter is used to attenuate high frequency noise. A capacitor is needed between D_{PR} and KGND.

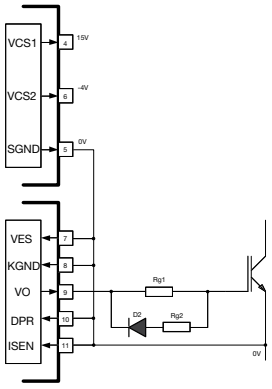


fig. 6: Power Supply 0-15V

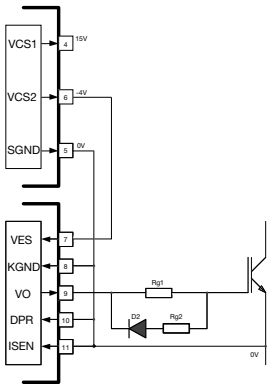


fig. 7: Power Supply -4-15V

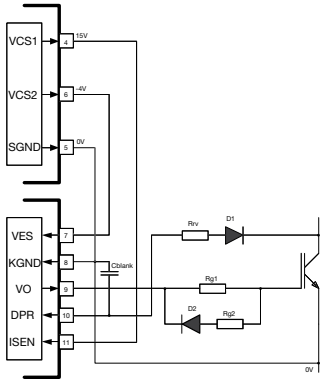


fig. 8: Power Transistor Supervision

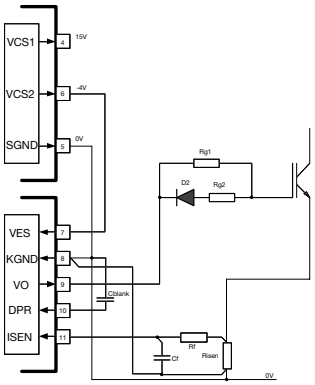


fig. 9: Fault Current Detection

AUTOMATIC UNDERVOLTAGE TURN-OFF

The PSDM module is equipped with undervoltage protection for the gate drive of the IGBT/MOSFET. Should the gate voltage be too low, the IGBT can quickly overheat; to avoid this, the undervoltage protection is arranged such that when the voltage drops below 10V, the gate voltage on the PSDM is turned off.

Layout and Wiring (fig. 10)

The driver module should be placed as close as possible to the power transistor so that the wiring is kept short. Long wiring connections should be avoided; it is recommended to twist the wires here.

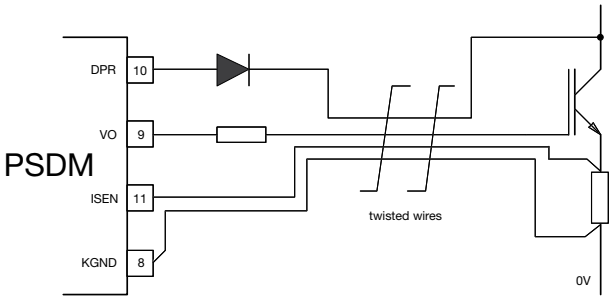


fig. 10: Wiring

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0001.2501.PT	0001.2516.TR	SPT 5x20 Pigtail	16
0001.2521	0001.2539	SPT 6.3x32	18
0001.2704.11	0001.2716.22	SMD-SPT	12
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- National Approvals
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TA35

switching and overload protection in one compact housing

Thermal circuit breaker for equipment in 1-, 2- or 3-pole

- current ratings range from 0.05A up to 20A @ 240VAC/32-60VDC, 3-pole up to 12A @ 415VAC
- illuminated and non-illuminated rocker switch in several colors incl. popular blue
- actuation & splashguard accessories
- conforms to IEC, UL, CSA standards

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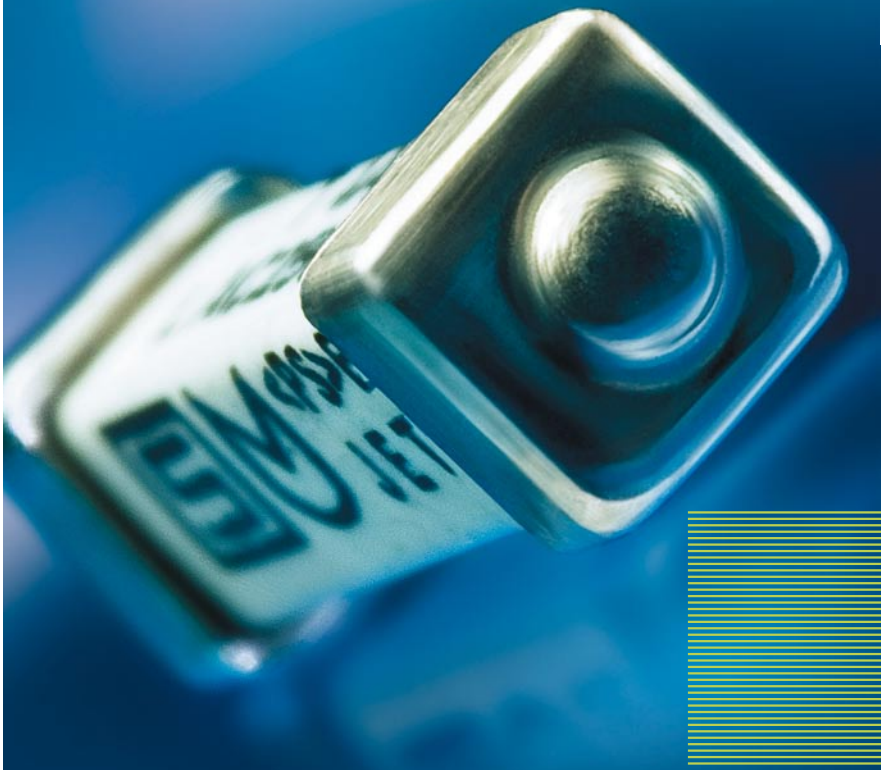
ELECTRONIC COMPONENTS

UMT 250

fusibile per protezione di sovracorrente primaria e secondaria



Fusibile industriale standard a 250 VAC in SMD con clip portafusibile opzionali

- fusibile (UMT 250); fusibile e clip portafusibile (UMZ 250)
- ampia gamma di correnti di intervento da 80 mA a 10 A
- fusibile ritardato conforme alla normativa IEC 60127-4
- alta capacità di rottura sino a 200 A @ 250 VAC
- conforme alle normative IEC, UL, CSA, CQC (Cina), METI (Giappone) e KTL (Corea del Sud)

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