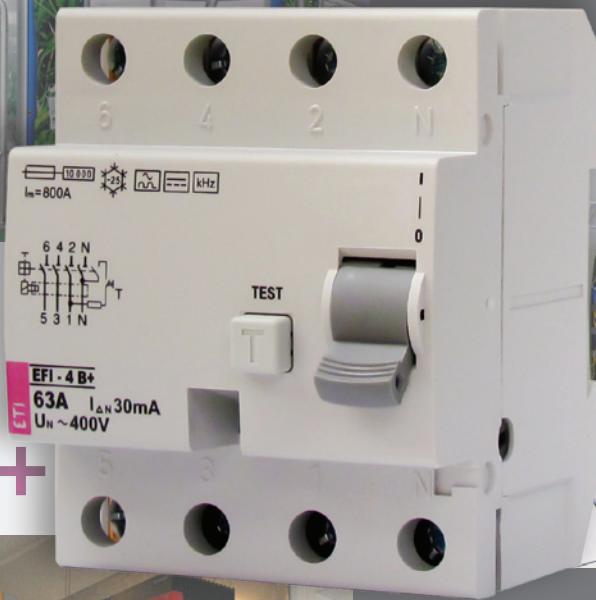


# Universal Residual Current Circuit Breakers

## Allstromsensitiver Fehlerstromschutzschalter



A type protection +  
Smooth DC +  
High Frequency AC  
Sensitivity




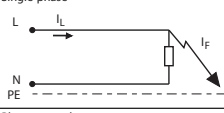
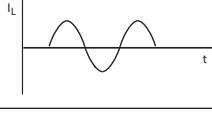
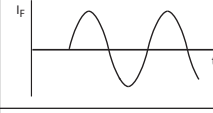
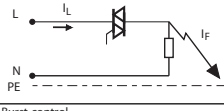
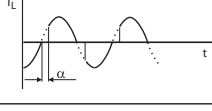
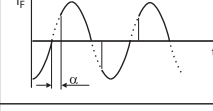
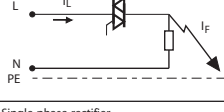
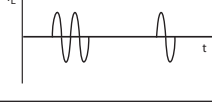
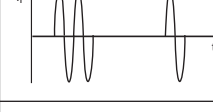
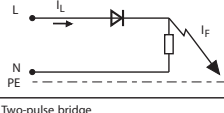
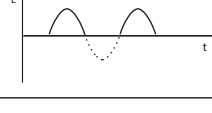

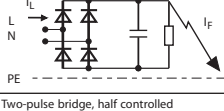
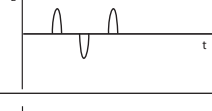
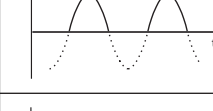
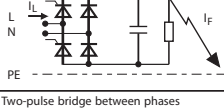
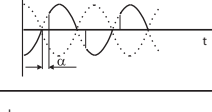
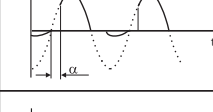
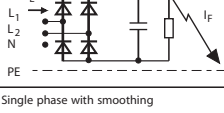
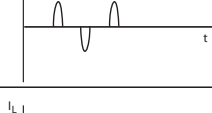
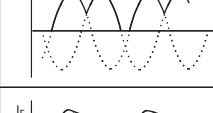
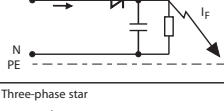

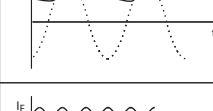
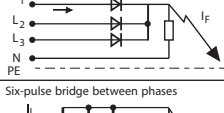
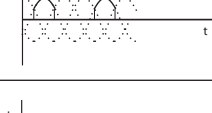
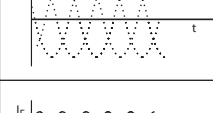
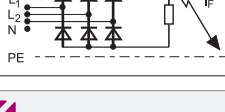
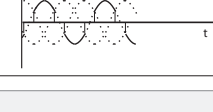
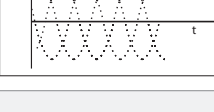


*EFI-B*  
*EFI-B+*

The most reliable  
protection of  
installations with  
incorporated power  
electronics

**ETI**

# Use of AC, A, and B type of RCCB's in case of different fault conditions

			AC	A	B, B+	
Connection						
		Normal mains current				
1	Single phase 			✓	✓	✓
2	Phase control 			✓	✓	✓
3	Burst control 			✓	✓	✓
4	Single phase rectifier 				✓	✓
5	Two-pulse bridge 				✓	✓
6	Two-pulse bridge, half controlled 				✓	✓
7	Two-pulse bridge between phases 				✓	✓
8	Single phase with smoothing 					✓
9	Three-phase star 					✓
10	Six-pulse bridge between phases 					✓

# Features and advantages of B type and B+ type RCCBs

## APPLICATION

- ✗ Fault protection (protection against indirect contact of live parts)
- ✗ Additional protection (protection in case of direct contact of live parts,  $I_{\Delta n} \leq 30\text{mA}$ )
- ✗ Fire Protection (for locations exposed to fire hazard)

## Residual current sensitivity – UNIVERSAL

AC pure sinus residual current, 50/60Hz

A sinus and pulsating direct current, 50/60Hz

**B AC + A + smooth direct current + high frequency (1 kHz)**

**B+ AC + A + smooth direct current + high frequency (20kHz)**

## Basic types

### according to rated values:

4p B  $I_n = 25\text{A}, 40\text{A}, 63\text{A}, I_{\Delta n} = 30\text{mA}, 100\text{mA}, 300\text{mA}$

4p B+  $I_n = 25\text{A}, 40\text{A}, 63\text{A}, I_{\Delta n} = 30\text{mA}, 100\text{mA}, 300\text{mA}$

### according to breaking times:

4p B, B+ instantaneous, short time delayed, selective

### according to the number of poles:

4p, 2p

## Standards

IEC/EN 61008-1

basic standard for RCCB's AC and A type

IEC/EN 62423

additional requirements for type B

VDE 0664-400 B+

VDE standard for B+ requirements (20kHz)

## Mode of operation

Pure a.c. and pulsating d.c. type residual current sensitivity, A voltage independent

Smooth d.c. current sensitivity:

B, B+ voltage dependent

Minimum operating voltage:




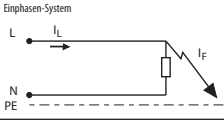
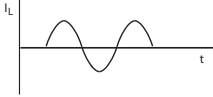
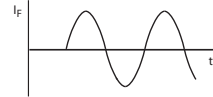
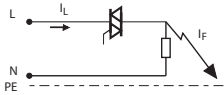
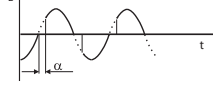
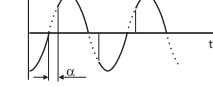
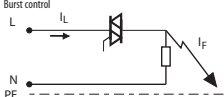
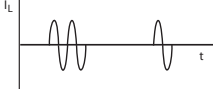
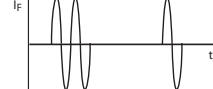
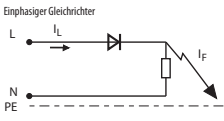
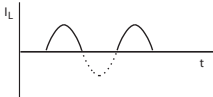

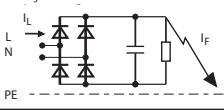
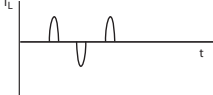
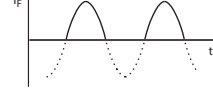
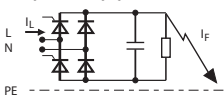
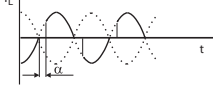
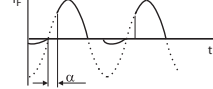
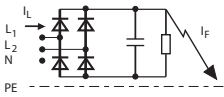
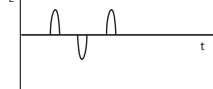
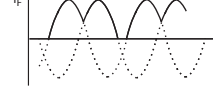
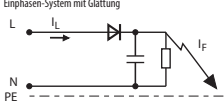

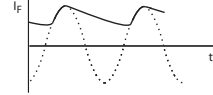
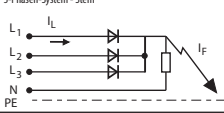
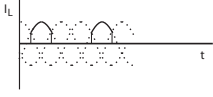
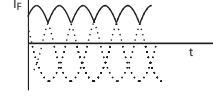
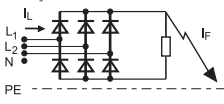
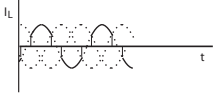
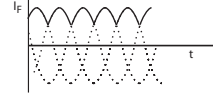
50V

## Typical applications

Which are vulnerable to smooth d.c. residual currents:

- ✗ Frequency converters,
- ✗ Photovoltaic systems, a.c. side,
- ✗ Charging stations for electric vehicles,
- ✗ Variable speed machine tools,
- ✗ UPS, computer data centres
- ✗ Elevator controls,
- ✗ Cranes of all kinds
- ✗ Electronic equipment on construction sites,
- ✗ Test set-ups in laboratories,
- ✗ Installation in general where we can expect d.c. smooth direct residual currents, etc.

# Einsatz von AC, A und B-Typen von RCCB 's bei unterschiedlichen Fehlerbedingungen

	Anschluss	normaler Hauptstrom	Fehlerstrom	AC	A	B, B+
						
1	<p>Einphasen-System</p> 			✓	✓	✓
2	<p>Phasenkontrolle</p> 			✓	✓	✓
3	<p>Burst control</p> 			✓	✓	✓
4	<p>Einphasiger Gleichrichter</p> 				✓	✓
5	<p>Brückengleichrichter</p> 				✓	✓
6	<p>Brückengleichrichter, halb geregelt</p> 				✓	✓
7	<p>Brückengleichrichter zwischen 2 Phasen</p> 				✓	✓
8	<p>Einphasen-System mit Glättung</p> 					✓
9	<p>3-Phasen-System - Stern</p> 					✓
10	<p>3 Phasengleichrichter</p> 					✓

# Merkmale und Vorteile der Allstromsensitiven RCCB B Typ und B+ Typ

## ANWENDUNG

- ✗ Fehlerschutz (Schutz vor indirektem Kontakt mit spannungsführenden Teilen)
- ✗ Zusatzschutz (Schutz im Falle eines direkten Kontaktes mit spannungsführenden Teilen,  $I_{\Delta n} \leq 30\text{mA}$ )
- ✗ Brandschutz (für Bereiche mit erhöhter Brandgefahr)

## Fehlerstromsensibilität - UNIVERSELL

AC reiner Sinus - Fehlerstrom, 50 / 60Hz

A Sinus und pulsierende Gleichströme, 50 / 60Hz

**B AC und A in Kombination mit glatten Gleichstrom und Hochfrequenz (1 KHz)**

**B+ AC und A in Kombination mit glatten Gleichstrom und Hochfrequenz (20KHz)**

## Basistypen

### entsprechend ihrer Bemessungswerte:

4p B  $I_n = 25\text{A}, 40\text{A}, 63\text{A}, I_{\Delta n} = 30\text{mA}, 100\text{mA}, 300\text{mA}$

4p B+  $I_n = 25\text{A}, 40\text{A}, 63\text{A}, I_{\Delta n} = 30\text{mA}, 100\text{mA}, 300\text{mA}$

### entsprechend ihrer Abschaltzeiten:

4p B, B+ unverzögert, kurzzeitverzögert, selektiv

### nach Polzahl:

4p, 2p

## Normung

IEC/EN 61008-1

Grundnorm für RCCB's AC und A Typ

IEC/EN 62423

zusätzliche Anforderungen an den Typ B

VDE 0664-400 B+

VDE Norm für B+ Anforderungen (20KHz)

## Betriebsweise

Fehlerstromempfindlichkeit für reine AC und pulsierende DC Ströme, Spannungsunabhängig

Empfindlichkeit für glatten DC Strom:

B, B+ spannungsabhängig

Minimale Betriebsspannung:

50V

## Typische Anwendungen

Welche durch glatte DC Fehlerströme gefährdet sind:

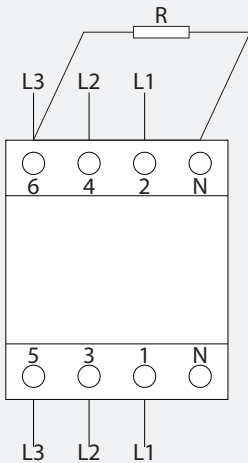
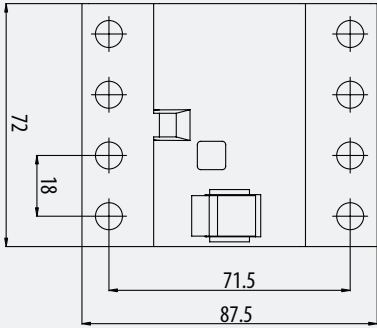
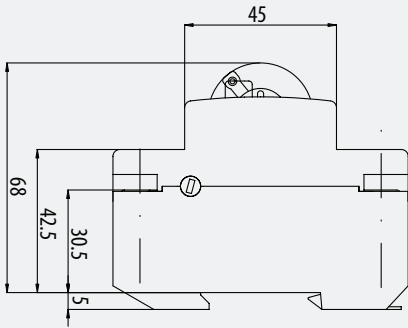
- ✗ Frequenzumrichter,
- ✗ AC-Seite von Photovoltaik Systemen,
- ✗ Ladestationen für strombetriebene Fahrzeuge,
- ✗ Werkzeugmaschinen mit variabler Drehzahl,
- ✗ UPS, Computer Datacenter,
- ✗ Fahrstuhlsteuerungen,
- ✗ Kräne aller Arten,
- ✗ Elektronische Ausrüstungen auf Baustellen,
- ✗ Testaufbauten in Labors,
- ✗ Alle Installationen, in denen man glatte Gleichfehlerströme erwarten kann, etc..

# Technical features / Technische Merkmale

## Technical data / Technische Daten

Type / Typ		B & B+
<b>Electrical / Elektrisch</b>		
Design according to	Design entspricht	IEC/EN 61008, IEC/EN 62423 B+ -> VDE 0664-400
Current test marks as printed onto the device	Prüfzeichen auf das Gerät gedruckt	
Rated voltage $U_n$	Bemessungsspannung $U_n$	230/400 V AC, 50 Hz
Mode of operation	Betriebsart	A type functionality: voltage independent B and B+ type functionality: voltage dependent / Funktions A Typ: Spannungsunabhängig B und B+ Typ: Funktion spannungsabhängig
Operation voltage electronic	Betriebsspannung	50 – 253V AC
Voltage range test circuit	Spannungsbereich des Testkreises	196 – 253V AC
Rated residual operating current $I_{\Delta n}$	Instantaneous K - short time delayed S - selective	Bemessungs- fehlerstrom $I_{\Delta n}$ unverzögert K - kurzzeitverzögert S - selektiv
Sensitivity	Empfindlichkeit	30, 100, 300 mA 30, 100, 300 mA 100, 300 mA
Rated insulation voltage $U_i$	Bemessungsisolationsspannung $U_i$	Alternating, pulsed and smooth direct currents / Sinus, pulsierende und glatte Gleichfehlerströme
Rated impulse withstand voltage $U_{imp}$	Bemessungs Impulsspannungsfestigkeit $U_{imp}$	440 V 4 kV (1.2/50µs)
Rated conditional short-circuit current $I_{cn}$	Bedingter Bemessungskurzschlussstrom $I_{cn}$	10 kA
Rated making and breaking capacity $I_m$	Bemessungsauslösestrom $I_m$	800 A
Peak withstand current	Maximal Impulsstromfestigkeit	3 kA (8/20 µs) surge current proof / Stoßstromfest
Electrical isolation	Elektrische Isolation	> 4 mm contact space / Kontaktabstand
Maximum back-up fuse $I_n = 25-63A$	Maximale Vorsicherung $I_n = 25-63A$	Short circuit and overload protection / Kurzschluss- und Überlastschutz 100 A gG/gL
Endurance (operating cycles)	electrical components mechanical components	Lebensdauer (Betriebszyklen)
	Elektrische Lebensdauer Mechanische Lebensdauer	$\geq 2000$ $\geq 4000$
<b>Mechanical / Mechanische Eigenschaften und Dimensionen</b>		
Frame size	Rahmengröße	45 mm
Device height	Höhe des Gerätes	68 mm (DIN rail acc to EN60715)
Device width	Breite des Gerätes	72 mm (4xModule Units 18mm)
Degree of protection	Schutzgrad	IP20
Upper and lower terminals	Obere und untere Anschlüsse	open mounted/lift terminals / öffnen montiert / Liftklemmen
Terminal protection finger and hand touch safe	Berührungsschutz an den Klemmen	IEC/EN 61008
Terminal capacity	Klembereich	1 - 25 mm <sup>2</sup>
Terminal screw	Anschlusschraube	M5 (Pozidrive / Kreuzschlitzschraube PZ2)
Terminal torque	Anzugsdrehmoment	2 - 2.5 Nm
Busbar thickness	Dicke der Sammelschiene	0.8 - 2 mm
Operating temperature	Betriebstemperatur	-25°C ... +55°C
Storage- and transport temperature	Lager- und Transporttemperatur	-40°C ... +70°C
Resistance to climatic conditions	Klimaverhältnisse	IEC/EN 61008
Contact position indicator	Kontakt Positionsanzeiger	mechanical red/green / mechanisch rot/grün
Supply possibility	Anschlussmöglichkeiten	top or bottom / oben oder unten

Instantaneous / unverzögert



RCD ETI Type B in 3-phase system without neutral conductor -  $U_n=400V$

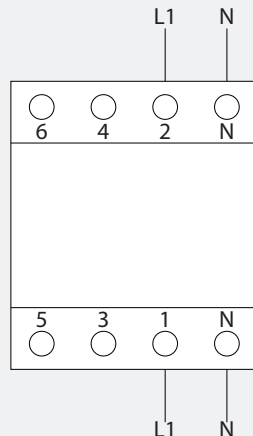
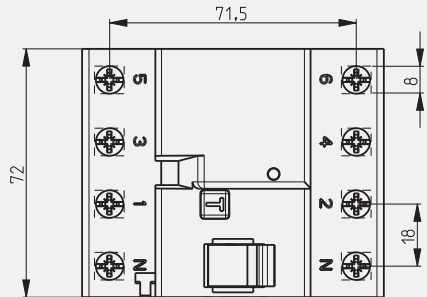
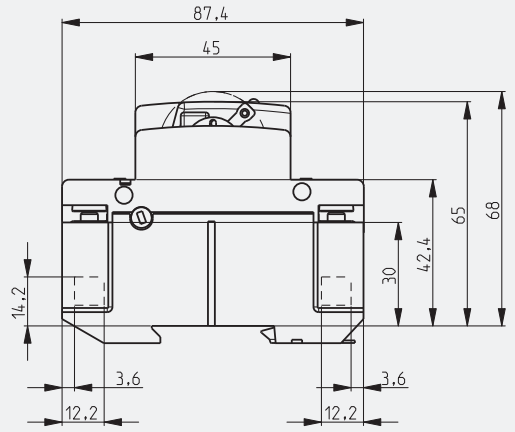
RCD ETI Typ B und B+ in 3-Phasen Systemen ohne Neutralleiter -  $U_n=400V$

30mA:  $R=2k7/1W$  (500V)

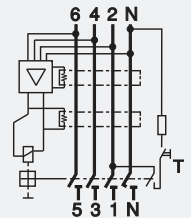
100mA:  $R=7k5/1W$  (500V)

300mA:  $R=2k7/1W$  (500V)

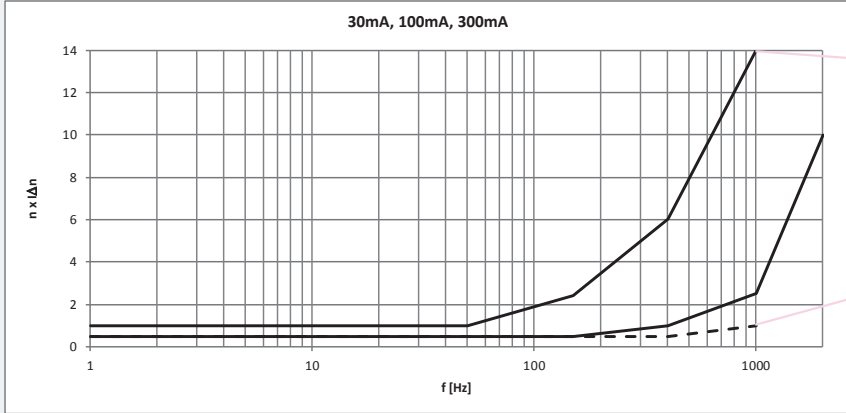
K-Short time delay / kurzzeitverzögert, S-Selective / selektiv



RCD ETI Type B in 1-phase system  
RCD ETI Typ B und B+ in 1-Phasen Systemen mit  
 $U_n=230V$



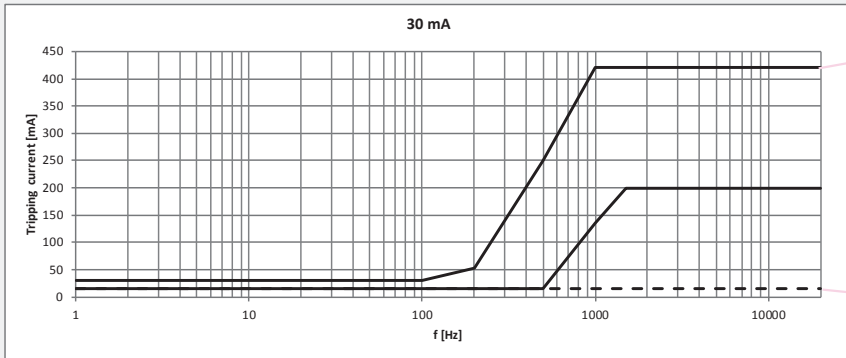
## EFI B type / Typ



Upper limit according to /  
Obergrenze entsprechend  
IEC/EN 62423

Lower limit according to /  
Untergrenze entsprechend  
IEC/EN 62423

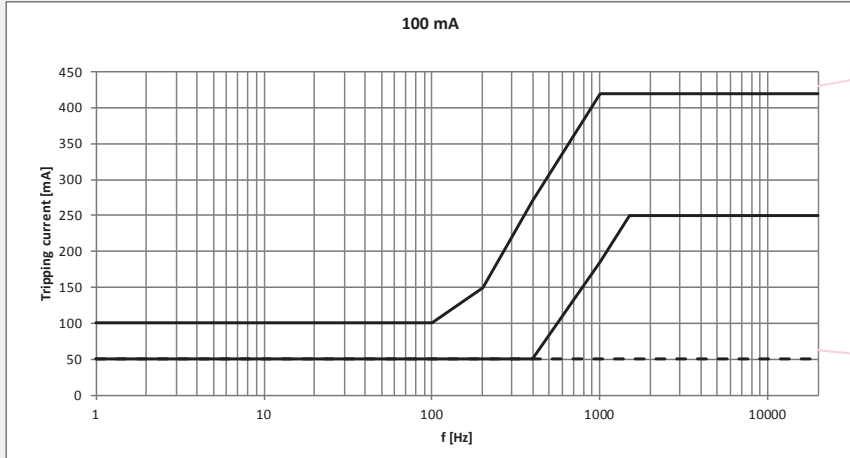
## EFI B+ type



Upper limit according to /  
Obergrenze entsprechend  
VDE 0664-400

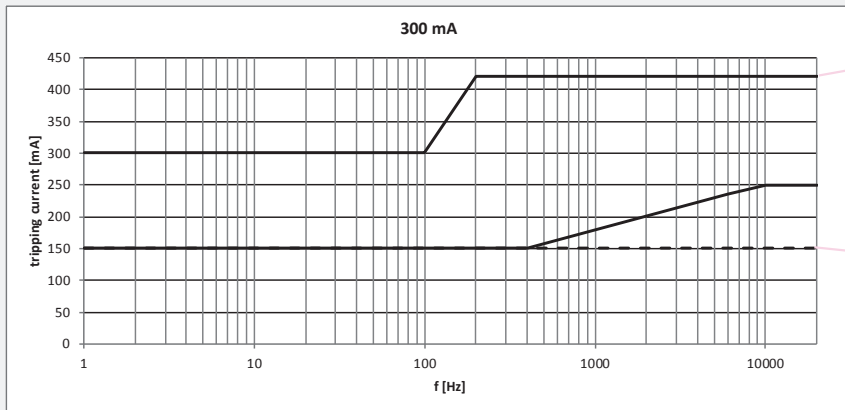
Lower limit according to /  
Untergrenze entsprechend  
VDE 0664-400





Upper limit according to /  
Obergrenze entsprechend  
VDE 0664-400

Lower limit according to /  
Untergrenze entsprechend  
VDE 0664-400



Upper limit according to /  
Obergrenze entsprechend  
VDE 0664-400

Lower limit according to /  
Untergrenze entsprechend  
VDE 0664-400

# Commercial information

## Bestellinformationen

EFI4 - B						
$I_n$ [A]	$I_{\Delta n}$ [A]	Instantaneous unverzögert	K-type K-Typ	S-type S-Typ	Weight [g]	Pack. [pcs]
25	0,03	002062642	002062652	-	340	1/27
40	0,03	002062643	002062653	-	340	
63	0,03	002062644	002062654	-	345	
25	0,1	002063642	002063652	002063662	340	
40	0,1	002063643	002063653	002063663	340	
63	0,1	002063644	002063654	002063664	345	
25	0,3	002064642	002064652	002064662	340	
40	0,3	002064643	002064653	002064663	340	
63	0,3	002064644	002064654	002064664	345	

\* K-type and S-type available in second half of 2014

\* K-Typ und S-Typ im zweiten Halbjahr 2014 verfügbar



## EFI4 - B+

$I_n$ [A]	$I_{\Delta n}$ [A]	Instantaneous unverzögert	K-type K-Typ	S-type S-Typ	Weight [g]	Pack. [pcs]
25	0,03	2062647	2062657	-	340	1/27
40	0,03	2062648	2062658	-	340	
63	0,03	2062649	2062659	-	345	
25	0,1	2063647	2063657	2063667	340	
40	0,1	2063648	2063658	2063668	340	
63	0,1	2063649	2063659	2063669	345	
25	0,3	2064647	2064657	2064667	340	
40	0,3	2064648	2064658	2064668	340	
63	0,3	2064649	2064659	2064669	345	

\* K-type and S-type available in second half of 2014

\* K-Typ und S-Typ im zweiten Halbjahr 2014 verfügbar



# ETI group



[www.etigroup.eu](http://www.etigroup.eu)

## PARENT COMPANY

**ETI d.d.**  
Obrezija 5, 1411 Izlake, Slovenia  
Phone: +386 3 5657 570  
E-mail: [eti@eti.si](mailto:eti@eti.si)  
<http://www.etigroup.eu>  
<http://www.eti.si>

## BRANCH OFFICES

**ETI Branch in Russia**  
Rublevskoe shose 36/2, Of. 321,  
121609 Moscow, Russia  
Phone: +7(4)95 415 42 29  
E-mail: [info.eti@col.ru](mailto:info.eti@col.ru)  
<http://www.etimoskva.ru>

## ASSOCIATED COMPANIES

**ITALWEBER S.p.A.**  
Via Risorgimento 84, 20017 Rho, Milano, Italy  
Phone: +39 02 939 771  
E-mail: [info@italweber.it](mailto:info@italweber.it)  
<http://www.italweber.it>

## SUBSIDIARIES

**ETI Proplast d.o.o.**  
Obrezija 5, 1411 Izlake, Slovenia  
Phone: +386 3 56 57 590  
E-mail: [etioproplast@eti.si](mailto:etioproplast@eti.si)  
<http://www.etiproplast.si>

**ETI DE GmbH**  
Dorfwiesweg 13, 63828 Kleinkahl, Germany  
Phone: +49 6024 6397-0  
E-mail: [contact@eti-de.de](mailto:contact@eti-de.de)  
<http://www.eti-de.de>

**ETI POLAM Sp. z o.o.**  
Ul. Jana Pawla II 18, 06100 Pultusk, Poland  
Phone: +48 23 691 93 00  
E-mail: [etipolam@etipolam.com.pl](mailto:etipolam@etipolam.com.pl)  
<http://www.etipolam.com.pl>

**ETI SARAJEVO d.o.o.**  
Hifzi Bjelevca 13, 71 000 Sarajevo, BiH  
Phone: +387 33 77 52 50  
E-mail: [etisa@bih.net.ba](mailto:etisa@bih.net.ba)  
<http://www.eti.ba>

**ETI ELB s.r.o.**  
Potočná 42, 90084 Báhoň, Slovakia  
Phone: +421 -33645 52 92  
E-mail: [etielb@etielb.sk](mailto:etielb@etielb.sk)  
<http://www.etielb.sk>

**ETI UKRAINE, LTD**  
Ul. Akademika Tupoleva 19a, of. 216,  
04128 Kiev, Ukraine  
Phone: +380 44 494 21 80  
E-mail: [office@eti.ua](mailto:office@eti.ua)  
<http://www.eti.ua>

**ETIBALTUS, UAB**  
Tilzes 41a, 47187 Kaunas, Lithuania  
Phone: +370 37 261 582  
E-mail: [info@etibaltus.lt](mailto:info@etibaltus.lt)  
<http://www.etibaltus.lt>

**ETI B**  
Braće Jerković 120, 11000 Belgrade,  
Serbia  
Phone: +381 (0)11 3961 688  
E-mail: [miodrag.stojkovic@etib.rs](mailto:miodrag.stojkovic@etib.rs)  
<http://www.etib.rs>

**ETI HU Elektrotechnikai, Kft.**  
Rokolya utca 25, 1131 Budapest, Hungary  
Phone: +36 1 238 0784  
E-mail: [eti@eti-hu.hu](mailto:eti@eti-hu.hu)  
<http://www.eti-hu.hu>

**ETI BULGARIA Ltd.**  
205 Alexander Stamboliyski Blvd,  
flor 1, of. 27, 1309 Sofia, Bulgaria  
Phone: +359 (0)2 81 264 93  
E-mail: [office@eti.bg](mailto:office@eti.bg)  
<http://www.eti.bg>

**ETI ROMANIA S.R.L.**  
Str. Doina, Nr. 17, Sector 5,  
Bucharest, Romania  
Phone: +40 (0)21 317 1743  
E-mail: [eti.electric@gmail.com](mailto:eti.electric@gmail.com)  
<http://www.etigroup.ro>

**ETI Elektroelement d.o.o.**  
For technical engineering and store  
of electrotechnical products  
Ljudevita Posavskog 47, Velika Gorica, Croatia  
<http://www.eti.si/hr>