

**Приложение № 8**

До „ЧЕЗ Разпределение България“ АД  
бул. „Цариградско шосе“ № 159,  
БенчМарк Бизнес Център,  
гр. София – 1784

**ПРЕДЛОЖЕНИЕ ЗА ИЗПЪЛНЕНИЕ НА ПОРЪЧКАТА**  
чрез събиране на оферти с обява с предмет:  
**“ Доставка на линейни защитно-комутационни апарати ниско напрежение (НН) за**  
**вертикален закрит монтаж”, реф. № PPD 17-162**

От: „ФИЛКАБ“ АД, със седалище: град Пловдив, ул. „Коматевско шосе“ № 92 и адрес за кореспонденция: град Пловдив, ул. „Коматевско шосе“ № 92, тел.: 032 277 171, факс: 032 671 133, e-mail: [office@filkab.com](mailto:office@filkab.com),

**Уважаеми госпожи и господа,**

аз долуподписаният Атанас Иванов Танчев, в качеството си на Изпълнителен директор на „Филкаб“ АД с ЕИК 115328801, Ви представям нашето предложение за изпълнение на поръчката.

**Предметът на поръчката ще изпълним в съответствие с изискванията и условията на документацията за участие.**

**ДЕКЛАРИРАМ, ЧЕ:**

1. Запознат съм и приемам изискванията на Възложителя, като представям техническите спецификации от раздел II на документацията за участие с попълнени всички изисквани стойности за всички позиции от предмета на поръчката.
2. Представям всички изисквани данни и документи, посочени в Приложение 2 от настоящото техническо предложение. Запознат съм с изискването, че представените документи трябва да бъдат на български език или с превод на български език, придружени с оригиналните документи, с изключение на протоколите от типовите изпитвания, които могат да се представят и само на английски език.
3. Запознат съм, че представените от нас технически документи (протоколи от изпитания, каталози и др.) са доказателство за декларираните от мен технически данни и параметри в техническите спецификации на стоката.
4. Потвърждавам, че представяните от нас стоки, описани в Техническото ни предложение, ще отговарят на посочените от Възложителя стандарти или на еквивалентни. В случай, че даден материал отговаря на стандарт, еквивалентен на посочения, се задължаваме да го отразим в отделен документ и да представим доказателства за еквивалентността на двата стандарта.
5. Всички стойности, попълнени в колона „Гарантирано предложение“ на приложените таблици от Технически спецификации от раздел II от документацията за участие, са точни и истински.
6. Предлагам следният гаранционен срок за предлаганите стоки – 24 месеца (словом: двадесет и четири месеца), от датата на приемо - предавателен протокол за получаване на стоката от Възложителя.
7. Приемам количества със срокове за доставка на стоката, съгласно Приложение 3 към настоящото Техническо предложение.

8. Приемам, че в срок до \_\_\_\_\_ (не повече от 14 дни) от датата на подписване на договора, ще сключа договор с посоченият/те в офертата подизпълнител/и (попълва се, ако участникът е декларирал, че ще използва подизпълнител/и).

9. Запознат съм, че изборът на изпълнител при определяне на икономически най-изгодната оферта ще бъде направен по критерий „най-ниска цена“.

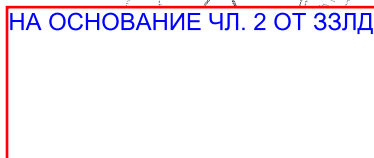
**Приложения към настоящото техническо предложение:**

1. Технически изисквания и спецификации за изпълнение на поръчката – раздел IV от документацията за участие – попълнени на съответните места;
2. Изисквани документи от Технически изисквания и спецификации;
3. Срокове за доставка.

Дата: 02.02.2018 г.

ПОДПИС И ПЕЧАТ:

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД



Изпълнителен директор  
Филкаб АД

**Приложение 1 към Техническо предложение**

**ТЕХНИЧЕСКИ ИЗИСКВАНИЯ И СПЕЦИФИКАЦИИ**

**Наименование на материала:** Вертикален предпазител-разединител НН 400 А, с триполюсно управление

**Съкратено наименование на материала:** ВПР НН, 400 А, 3-полюсно управление

**Област:** Н – Трансформаторни постове      **Категория:** 16 - Предпазители, основи за предпазители и предпазител-разединители

**Мерна единица:** Брой

**Аварийни запаси:** Да

**Характеристика на материала:**

Триполюсен предпазител-разединител с вертикална конструкция, с обявен работен ток 400 А, с общо управление на полюсите, за директен монтаж върху събирателни шини с междуосово разстояние 185 mm, за високомощни предпазители със стопяема вложка НН, система А (НН система), с характеристика gG, размер 2, съответстващи на БДС EN 60269-1 и БДС HD 60269-2 или еквивалентно/и.

**Използване:**

Вертикалният предпазител-разединител е предназначен за включване, изключване, разединяване и защита на кабелни линии НН.

**Съответствие на предлаганото изпълнение с нормативно-техническите документи:**

Триполюсният вертикален предпазител-разединител за 400 А, с общо управление на полюсите трябва да отговаря на приложимите български и международни стандарти или еквивалентно/и и на техните валидни изменения и поправки:

- БДС EN 60947-1:2007 „Комутационни апарати за ниско напрежение. Част 1: Общи правила (IEC 60947-1:2007)“ или еквивалентно/и; и
  - БДС EN 60947-3:2009 „Комутационни апарати за ниско напрежение. Част 3: Товарови прекъсвачи, разединители, товарови прекъсвач-разединители и апарати комбинирани със стопяеми предпазители (IEC 60947-3:2008)“ или еквивалентно/и;
  - БДС EN 60269-1:2007 „Стопяеми предпазители за ниско напрежение. Част 1: Общи изисквания (IEC 60269-1:2006)“ или еквивалентно/и;
  - БДС HD 60269-2:2013 „Стопяеми предпазители за ниско напрежение. Част 2: Допълнителни изисквания за стопяеми предпазители, предназначени за използване от квалифицирани лица (стопяеми предпазители предимно за промишлено приложение). Примери за стандартизирани системи за стопяеми предпазители от А до К (IEC 60269-2:2013, с промени)“ или еквивалентно/и;
  - БДС EN 60664-1:2007 „Координация на изолацията за съоръжения в електроразпределителни мрежи за ниско напрежение. Част 1: Правила, изисквания и изпитвания (IEC 60664-1:2007)“ или еквивалентно/и;
  - БДС EN 60529+A1:2004 „Степени на защита, осигурени от обвивката (IP код) (IEC 60529:1989 + A1:1999) или еквивалентно/и“
- и

да бъде оценен положително по реда и при условията на Наредбата за съществените изисквания и оценяване на съответствието на електрически съоръжения, предназначени за използване в определени граници на напрежението, приета с ПМС № 182 от 6.07.2001 г., обн., ДВ, бр. 62 от 13.07.2001 г. ....

### Изисквания към документацията и изпитванията

№ по ред	Документ	Приложение № или текст
1.	Точно означение на типа, производителя и страната на производство (произход) и последно издание на каталога на производителя	ВПР НН, 400 А, 3-полюсно управление тип 438.62.24.58.00, Pronutec, S.A.u., Испания <b>Приложение 1</b> - Каталог
2.	Техническо описание и чертежи с нанесени на тях размери	<b>Приложение 1</b> – Каталог <b>Приложение 2</b> – Техническо описание
3.	Протоколи от типови изпитвания на английски или български език, проведени от независима изпитвателна лаборатория – заверени копия, с приложен списък на отделните изпитвания на български език	<b>Приложение 3</b> - Заверени копия на протоколи от типови изпитвания. Списък на изпитванията на български език
4.	Сертификат/акредитация на независимата изпитвателна лаборатория, провела типовите изпитвания по т. 3 – заверено копие	<b>Приложение 5</b> - Заверено копие на Сертификата на независимата изпитвателна лаборатория
5.	ЕО декларация за съответствие	<b>Приложение 6</b> - Декларация за съответствие
6.	Декларация за съответствие на предлаганото изпълнение с изискванията на техническата спецификация на този стандарт за материал, вкл. на параграфи „Характеристика на материала“ и „Съответствие на предложеното изпълнение с нормативно-техническите документи“ по-горе	<b>Приложение 7</b> - Декларация за съответствие на предлаганото изпълнение
7.	Инструкции за транспортиране, складиране, монтиране, поддържане и експлоатация	<b>Приложение 8</b> – Инструкция за правилно съхранение, транспорт, монтаж и експлоатация

**Забележка:** Всички оригинални документи трябва да бъдат на български език или с превод на български език. (Каталозите и протоколите от проверките и изпитванията могат да бъдат и само на английски.)

### Технически данни:

#### 1. Характеристики на работната среда

№ по ред	Наименование	Стойност
1.1	Място на монтиране	На закрито
1.2	Максимална температура на въздуха в околната среда	+ 40°C
1.3	Минимална температура на въздуха в околната среда	Минус 5°C

№ по ред	Наименование	Стойност
1.4	Максимална средна температура на въздуха в околната среда за период от 24 ч.	+ 35°C
1.5	Относителна влажност (при 20°C)	До 90 %
1.6	Степен на замърсяване	3
1.7	Надморска височина	До 2000 m

## 2. Параметри на електроразпределителната мрежата НН

№ по ред	Наименование	Стойност
2.1	Номинално напрежение	400 / 230 V
2.2	Максимално напрежение	440 / 253 V
2.3	Номинална честота	50 Hz
2.4	Електроразпределителна мрежа	4 проводна мрежа (L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> , PEN)
2.5	Схема на електроразпределителната мрежа	TN-C

## 3. Технически параметри и други данни

№ по ред	Технически характеристики	Изискване	Гарантирано предложение
3.1	Обявено работно напрежение, U <sub>e</sub>	min 690 (500) V AC	690 (500) V AC
3.2	Брой на полюсите	3	3
3.3	Обявена честота	50 Hz	40-60 Hz
3.4	Категория по пренапрежение съгласно БДС EN 60664-1 или еквивалентно/и	IV	IV
3.5	Обявено издържано импулсно напрежение, U <sub>imp</sub>	8 kV	20 kV
3.6	Обявено напрежение на изолацията, U <sub>i</sub> AC	min 800 V	1000 V
3.7	Обявен работен ток, I <sub>e</sub>	400 A	400 A
3.8	Термичен ток със стопяема вложка, I <sub>th</sub>	400 A	400 A
3.9	Условен ток на късо съединение (ефективна стойност) при 400 V AC	min 50 kA	120 kA
3.10	Размер на стопяемите вложки (съгласно серията БДС EN 60269 или еквивалентно/и)	2	2
3.11	Максимален обявен ток на стопяемите вложки, I <sub>n</sub>	400 A	400 A
3.12	Категория на приложение (при 400 V AC)	AC 22 В или по висока	AC 22 В

№ по ред	Технически характеристики	Изискване	Гарантирано предложение
3.13	Механична износоустойчивост, брой на комутационните цикли	min 800	800
3.14	Електрическа износоустойчивост, брой на комутационните цикли	min 200	200
3.15	Управление	Триполюсно (едновременно включване и изключване на трите полюса)	Триполюсно (едновременно включване и изключване на трите полюса)
3.16	Основни размери:	-	-
3.16a	широчина	max 100 mm	100 mm
3.16b	височина (измерена от края на клемните съединения)	680 mm - информативно	665 mm
3.17	Разстояние между осите на събирателните шини	185 mm	185 mm
3.18	Присъединяване към събирателните шини	Клеми за свързване без необходимост от пробиване на шините	Клеми за свързване без необходимост от пробиване на шините
3.19	Степен на защита срещу проникване на твърди тела и вода във вътрешността и допир до части под напрежение от лицевата страна съгласно БДС EN 60529+A1 или еквивалентно/и.	min IP20	IP30
3.20	Клемови съединения за токопроводимите жила на присъединяваните кабелни линии	Вертикалните предпазител-разединители трябва да бъдат съоръжени с V-съединителна арматура за свързване на токопроводими кабелни жила в диапазона най-малко от 35 mm <sup>2</sup> re до 185 mm <sup>2</sup> sm.	Вертикалните предпазител-разединители са съоръжени с V-съединителна арматура за свързване на токопроводими кабелни жила в диапазона от 35 mm <sup>2</sup> re до 240 mm <sup>2</sup> sm.
3.21	Маркировка	Вертикалните предпазител-разединители трябва да бъдат маркирани с информацията съгласно т. 5.2 от БДС EN 60947-3 или еквивалентно/и и инициалите „CE“.	Вертикалните предпазител-разединители са маркирани с информацията съгласно т. 5.2 от БДС EN 60947-3 и инициалите „CE“.

№ по ред	Технически характеристики	Изискване	Гарантирано предложение
3.22	Тегло, kg	Да се посочи	4,75 kg

**Наименование на материала:** Вертикален предпазител-разединител НН 630 А, с триполюсно управление

**Съкратено наименование на материала:** ВПР НН, 630 А, 3-полюсно управление

**Област:** Н – Трансформаторни постове

**Категория:** 16 - Предпазители, основи за предпазители и предпазител-разединители

**Мерна единица:** Брой

**Аварийни запаси:** Да

**Характеристика на материала:**

Триполюсен предпазител-разединител с вертикална конструкция, с обявен работен ток 630 А, с общо управление на полюсите, за директен монтаж върху събирателни шини с междуосово разстояние 185 mm, за високомощни предпазители със стопяема вложка НН, система А (NH система), с характеристика gG, размер 3, съответстващи на БДС EN 60269-1 и БДС HD 60269-2 или еквивалентно/и.

**Използване:**

Вертикалният предпазител-разединител е предназначен за включване, изключване, разединяване и защита на кабелни линии НН.

**Съответствие на предлаганото изпълнение с нормативно-техническите документи:**

Триполюсният вертикален предпазител-разединител за 630 А, с общо управление на полюсите трябва да отговаря най-малко на посочените по-долу стандарти или еквивалентно/и и на техните валидни изменения и допълнения:

- БДС EN 60947-1:2007 „Комутационни апарати за ниско напрежение. Част 1: Общи правила (IEC 60947-1:2007)“ или еквивалентно/и;
- БДС EN 60947-3:2009 „Комутационни апарати за ниско напрежение. Част 3: Товари прекъсвачи, разединители, товари прекъсвач-разединители и апарати комбинирани със стопяеми предпазители (IEC 60947-3:2008)“ или еквивалентно/и;
- БДС EN 60269-1:2007 „Стопяеми предпазители за ниско напрежение. Част 1: Общи изисквания (IEC 60269-1:2006)“ или еквивалентно/и;
- БДС HD 60269-2:2013 „Стопяеми предпазители за ниско напрежение. Част 2: Допълнителни изисквания за стопяеми предпазители, предназначени за използване от квалифицирани лица (стопяеми предпазители предимно за промишлено приложение). Примери за стандартизирани системи за стопяеми предпазители от А до К (IEC 60269-2:2013, с промени) или еквивалентно/и“;
- БДС EN 60664-1:2007 „Координация на изолацията за съоръжения в електроразпределителни мрежи за ниско напрежение. Част 1: Правила, изисквания и изпитвания (IEC 60664-1:2007)“;
- БДС EN 60529+A1:2004 „Степени на защита, осигурени от обвивката (IP код) (IEC 60529:1989 + A1:1999) или еквивалентно/и“

и

да бъде оценен положително по реда и при условията на Наредбата за съществените изисквания и оценяване на съответствието на електрически съоръжения, предназначени за използване в определени граници на напрежението, приета с ПМС № 182 от 6.07.2001 г., обн., ДВ, бр. 62 от 13.07.2001 г. ....

## Изисквания към документацията и изпитванията

№ по ред	Документ	Приложение № или текст
1.	Точно означение на типа, производителя и страната на производство (произход) и последно издание на каталога на производителя	ВПР НН, 630 А, 3-полюсно управление тип 438.63.24.58.00, Pronutec, S.A.u., Испания <b>Приложение 1</b> – Каталог
2.	Техническо описание и чертежи с нанесени на тях размери	<b>Приложение 1</b> – Каталог <b>Приложение 2</b> – Техническо описание
3.	Протоколи от типови изпитвания на английски или български език, проведени от независима изпитвателна лаборатория – заверени копия, с приложен списък на отделните изпитвания на български език	<b>Приложение 4</b> - Заверени копия на протоколи от типови изпитвания. Списък на изпитванията на български език
4.	Сертификат/акредитация на независимата изпитвателна лаборатория, провела типовите изпитвания по т. 3 – заверено копие	<b>Приложение 5</b> - Заверено копие на Сертификата на независимата изпитвателна лаборатория
5.	ЕО декларация за съответствие	<b>Приложение 6</b> - Декларация за съответствие
6.	Декларация за съответствие на предлаганото изпълнение с изискванията на техническата спецификация на този стандарт за материал, вкл. на параграфи „Характеристика на материала“ и „Съответствие на предложеното изпълнение с нормативно-техническите документи“ по-горе	<b>Приложение 7</b> - Декларация за съответствие на предлаганото изпълнение

**Забележка:** Всички оригинални документи трябва да бъдат на български език или с превод на български език. (Каталозите и протоколите от проверките и изпитванията могат да бъдат и само на английски.)

### Технически данни:

#### 3. Характеристики на работната среда

№ по ред	Наименование	Стойност
1.1	Място на монтиране	На закрито
1.2	Максимална температура на въздуха в околната среда	+ 40°C
1.3	Минимална температура на въздуха в околната среда	Минус 5°C
1.4	Максимална средна температура на въздуха в околната среда за период от 24 ч.	+ 35°C
1.5	Относителна влажност (при 20°C)	До 90 %
1.6	Степен на замърсяване	3
1.7	Надморска височина	До 2000 m



**4. Параметри на електроразпределителната мрежата НН**

№ по ред	Наименование	Стойност
2.1	Номинално напрежение	400 / 230 V
2.2	Максимално напрежение	440 / 253 V
2.3	Номинална честота	50 Hz
2.4	Електроразпределителна мрежа	4 проводна мрежа (L <sub>1</sub> , L <sub>2</sub> , L <sub>3</sub> , PEN)
2.5	Схема на електроразпределителната мрежа	TN-C

**3. Технически параметри и други данни**

№ по ред	Технически характеристики	Изискване	Гарантирано предложение
3.1	Обявено работно напрежение, U <sub>e</sub>	690 (500) V AC	690 (500) V AC
3.2	Брой на полюсите	3	3
3.3	Обявена честота	50 Hz	40-60 Hz
3.4	Категория по пренапрежение съгласно БДС EN 60664-1 или еквивалентно/и	IV	IV
3.5	Обявено издържано импулсно напрежение, U <sub>imp</sub>	8 kV	20 kV
3.6	Обявено напрежение на изолацията, U <sub>i</sub> AC	min 800 V	1000 V
3.7	Обявен работен ток, I <sub>e</sub>	630 A	630 A
3.8	Термичен ток със стопяема вложка, I <sub>th</sub>	630 A	630 A
3.9	Условен ток на късо съединение (ефективна стойност) при 400 V AC	min 50 kA	120 kA
3.10	Размер на стопяемите вложки (съгласно серията БДС EN(HD) 60269 или еквивалентно/и)	3	3
3.11	Максимален обявен ток на стопяемите вложки, I <sub>n</sub>	630 A	630 A
3.12	Категория на приложение (при 400 V AC)	AC 22 В или по-висока	AC 22 В
3.13	Механична износоустойчивост, брой на комутационните цикли	min 800	800
3.14	Електрическа износоустойчивост, брой на комутационните цикли	min 200	200
3.15	Управление	Триполюсно (едновременно включване и изключване на трите полюса)	Триполюсно (едновременно включване и изключване на трите полюса)
3.16	Основни размери:	-	-

№ по ред	Технически характеристики	Изискване	Гарантирано предложение
3.16a	широчина	max 100 mm	100 mm
3.16b	височина (измерена от края на клемните съединения)	680 mm - информативно	665 mm
3.17	Разстояние между осите на събирателните шини	185 mm	185 mm
3.18	Присъединяване към събирателните шини	Клеми за свързване без необходимост от пробиване на шините	Клеми за свързване без необходимост от пробиване на шините
3.19	Степен на защита срещу проникване на твърди тела и вода във вътрешността и допир до части под напрежение от лицевата страна съгласно БДС EN 60529+A1 или еквивалентно/и.	min IP20	IP30
3.20	Клемови съединения за токопроводимите жила на присъединяваните кабелни линии	Вертикалните предпазител-разединители трябва да бъдат съоръжени с V-съединителна арматура за свързване на токопроводими кабелни жила в диапазона най-малко от 35 mm <sup>2</sup> re до 185 mm <sup>2</sup> sm.	Вертикалните предпазител-разединители са съоръжени с V-съединителна арматура за свързване на токопроводими кабелни жила в диапазона от 35 mm <sup>2</sup> re до 240 mm <sup>2</sup> sm.
3.21	Маркировка	Вертикалните предпазител-разединители трябва да бъде маркирани с информацията съгласно т. 5.2 от БДС EN 60947-3 или еквивалентно/о и инициалите „СЕ”.	Вертикалните предпазител-разединители са маркирани с информацията съгласно т. 5.2 от БДС EN 60947-3 и инициалите „СЕ”.
3.22	Тегло, kg	Да се посочи	5,6 Kg

Дата: 02.02.2018 г.

ПОДПИС И ПЕЧАТ:

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

Изпълнителен директор  
Филкаб АД



*Приложение 2 към Техническо предложение*

**ИЗИСКВАНИ ДОКУМЕНТИ ОТ  
ТЕХНИЧЕСКИ ИЗИСКВАНИЯ И  
СПЕЦИФИКАЦИИ**

**3 Pole vertical design fuse switches, 185mm busbar spacing**  
**3-polige NH-Sicherungslastschaltleisten, 185mm Sammelschienenabstand**  
**(BTVC/BTVC-DU)**

Range / Produktpalette

Reference Artikelnummer	Type Typ	Current Nennstrom	Switching schaltbar	Connections Anschluss	Fuse-link Sicherungseinsatz	Busbar spacing Sammelschienenabstand
438.51.10.XX.YY	BTVC	250A	One pole einpolig	Top/Bottom reversible Oben / Unten	NH-1	185mm
438.52.10.XX.YY	BTVC	400A	One pole einpolig	Top/Bottom reversible Oben / Unten	NH-2	185mm
438.53.10.XX.YY	BTVC	630A	One pole einpolig	Top/Bottom reversible Oben / Unten	NH-3	185mm
438.51.18.XX.YY	BTVC-DU	250A	One pole einpolig	Top/Bottom reversible Oben / Unten	NH-1	210mm
438.52.18.XX.YY	BTVC-DU	400A	One pole einpolig	Top/Bottom reversible Oben / Unten	NH-2	210mm
438.53.18.XX.YY	BTVC-DU	630A	One pole einpolig	Top/Bottom reversible Oben / Unten	NH-3	210mm

**BTVC / BTVC-DU**



Terminals / Anschlüsse XX Code: Page / Seite 60  
 Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten: Page / Seite 178-179  
 Dimensions drawings / Abmessungen: Page / Seite 67

**3 Pole vertical design fuse switches (BTVC-DT), 2 handles**

**A** 250|400|630

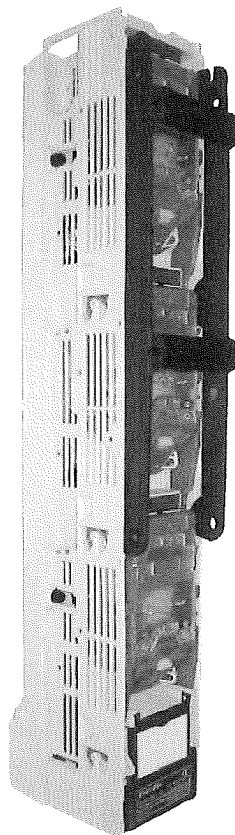
**3-polige NH-Sicherungslastschaltleisten (BTVC-DT), 2 hand betrieben**

Range / Produktpalette

2

Reference Artikelnummer	Type Typ	Current Nennstrom	Switching schaltbar	Connections Anschluss	Fuse-link Sicherungseinsatz	Busbar spacing Sammelschienenabstand
438.61.10.XX.YY	BTVC-DT 2 handles BTVC-DT 2 hand betrieben	250A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-1	185mm
438.62.10.XX.YY	BTVC-DT 2 handles BTVC-DT 2 hand betrieben	400A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-2	185mm
438.63.10.XX.YY	BTVC-DT 2 handles BTVC-DT 2 hand betrieben	630A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-3	185mm
438.61.18.XX.YY	BTVC-DT 2 handles BTVC-DT 2 hand betrieben	250A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-1	210mm
438.62.18.XX.YY	BTVC-DT 2 handles BTVC-DT 2 hand betrieben	400A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-2	210mm
438.63.18.XX.YY	BTVC-DT 2 handles BTVC-DT 2 hand betrieben	630A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-3	210mm

**BTVC-DT 2 HANDLES / BTVC-DT 2 HAND BETRIEBEN**



Terminals / Anschlüsse XX Code: Page / Seite 60  
Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten: Page / Seite 178-179  
Dimensions drawings / Abmessungen: Page / Seite 67

### 3 Pole vertical design fuse switches (BTVC-DT), 1 handle 3-polige NH-Sicherungslastschaltleisten (BTVC-DT), 1 hand betrieben

## Range / Produktpalette

Reference Artikelnummer	Type Typ	Current Nennstrom	Switching schaltbar	Connections Anschluss	Fuse-link Sicherungseinsatz	Busbar spacing Sammelschienenabstand
438.71.10.XX.YY	BTVC-DT 1 handle BTVC-DT 1 hand betrieben	250A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-1	185mm
438.72.10.XX.YY	BTVC-DT 1 handle BTVC-DT 1 hand betrieben	400A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-2	185mm
438.73.10.XX.YY	BTVC-DT 1 handle BTVC-DT 1 hand betrieben	630A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-3	185mm
438.71.18.XX.YY	BTVC-DT 1 handle BTVC-DT 1 hand betrieben	250A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-1	210mm
438.72.18.XX.YY	BTVC-DT 1 handle BTVC-DT 1 hand betrieben	400A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-2	210mm
438.73.18.XX.YY	BTVC-DT 1 handle BTVC-DT 1 hand betrieben	630A	Three pole dreipolig	Top/Bottom reversible Oben / Unten	NH-3	210mm

2

## BTVC-DT 1 HANDLE / 1 HAND BETRIEBEN



Terminals / Anschlüsse XX Code: Page / Seite 60  
Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten: Page / Seite 178-179  
Dimensions drawings / Abmessungen: Page / Seite 68

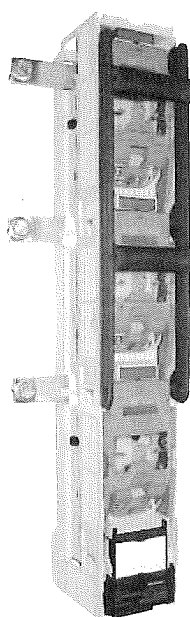
**3 Pole vertical design fuse switches (BTVC / BTVC-DT), lateral incoming **A** 250|400|630**  
**3-polige NH-Sicherungslastschaltleisten (BTVC / BTVC-DT), seitlicher Einspeisung**

Range / Produktpalette

2

Reference Artikelnummer	Type Typ	Current Nennstrom	Switching schaltbar	Connections Anschluss	Fuse-link Sicherungseinsatz	Busbar spacing Sammelschienenabstand
438.51.62.XX.YY	BTVC lateral incoming	250A	One pole einpölig	Right side rechte Seite	NH-1	N/A
438.52.62.XX.YY	BTVC seitliche Einspeisung	400A			NH-2	N/A
438.53.62.XX.YY		630A			NH-3	N/A
438.51.63.XX.YY	BTVC lateral incoming	250A	One pole einpölig	Left side linke Seite	NH-1	N/A
438.52.63.XX.YY	BTVC seitliche Einspeisung	400A			NH-2	N/A
438.53.63.XX.YY		630A			NH-3	N/A
438.61.62.03.YY	BTVC-DT 2 handles lateral incoming	250 A	Three pole dreipölig	Right side rechte Seite	NH-1	N/A
438.62.62.03.YY	BTVC-DT 2 hand betrieben, seitliche Einspeisung	400 A			NH-2	N/A
438.63.62.03.YY		630 A			NH-3	N/A
438.61.63.03.YY	BTVC-DT 2 handles lateral incoming	250 A	Three pole dreipölig	Left side linke Seite	NH-1	N/A
438.62.63.03.YY	BTVC-DT 2 hand betrieben, seitliche Einspeisung	400 A			NH-2	N/A
438.63.63.03.YY		630 A			NH-3	N/A
438.71.62.03.YY	BTVC-DT 1 handle lateral incoming	250 A	Three pole dreipölig	Right side rechte Seite	NH-1	N/A
438.72.62.03.YY	BTVC-DT 1 hand betrieben, seitliche Einspeisung	400 A			NH-2	N/A
438.73.62.03.YY		630 A			NH-3	N/A
438.71.63.03.YY	BTVC-DT 1 handle lateral incoming	250 A	Three pole dreipölig	Left side linke Seite	NH-1	N/A
438.72.63.03.YY	BTVC-DT 1 hand betrieben, seitliche Einspeisung	400 A			NH-2	N/A
438.73.63.03.YY		630 A			NH-3	N/A

**BTVC-DT, 2 HANDLES, LATERAL INCOMING**  
**BTVC-DT, 2 HAND BETRIEBEN, SEITICHE EINSPEISUNG**



Terminals /Anschlüsse XX Code: Page / Seite 60  
 Accessories /Zubehör YY Code: Page / Seite 63-65

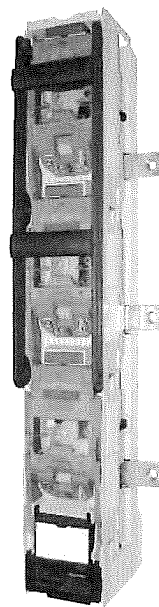
Technical Data / Technische Daten: Page / Seite 178-179  
 Dimension drawings and wiring diagrams /  
 Abmessungen und Schaltplan: Page / Seite 68

**A 250 400 630 3 Pole vertical design fuse switches (BTVC / BTVC-DT), lateral output**  
**3-polige NH-Sicherungslastschaltleisten (BTVC / BTVC-DT), seitlicher Abgang**

## Range / Produktpalette

Reference Artikelnummer	Type Typ	Current Nennstrom	Switching schaltbar	Connections Anschluss	Fuse-link Sicherungseinsatz	Busbar spacing Sammelschienenabstand
438.51.60.XX.YY	BTVC lateral output	250A	One pole einpolig	Right side rechte Seite	NH-1	185mm
438.52.60.XX.YY	BTVC seitlicher Abgang	400A			NH-2	185mm
438.53.60.XX.YY		630A			NH-3	185mm
438.51.61.XX.YY	BTVC lateral output	250A	One pole einpolig	Left side linke Seite	NH-1	185mm
438.52.61.XX.YY	BTVC seitlicher Abgang	400A			NH-2	185mm
438.53.61.XX.YY		630A			NH-3	185mm
438.61.60.XX.YY	BTVC-DT 2 handles lateral output	250 A	Three pole dreipolig	Right side rechte Seite	NH-1	185mm
438.62.60.XX.YY	BTVC-DT 2 hand betrieben, seitlicher Abgang	400 A			NH-2	185mm
438.63.60.XX.YY		630 A			NH-3	185mm
438.61.61.XX.YY	BTVC-DT 2 handles lateral output	250 A	Three pole dreipolig	Left side linke Seite	NH-1	185mm
438.62.61.XX.YY	BTVC-DT 2 hand betrieben, seitlicher Abgang	400 A			NH-2	185mm
438.63.61.XX.YY		630 A			NH-3	185mm
438.71.60.XX.YY	BTVC-DT 1 handle lateral output	250 A	Three pole dreipolig	Right side rechte Seite	NH-1	185mm
438.72.60.XX.YY	BTVC-DT 1 hand betrieben, seitlicher Abgang	400 A			NH-2	185mm
438.73.60.XX.YY		630 A			NH-3	185mm
438.71.61.XX.YY	BTVC-DT 1 handle lateral output	250 A	Three pole dreipolig	Left side linke Seite	NH-1	185mm
438.72.61.XX.YY	BTVC-DT 1 hand betrieben, seitlicher Abgang	400 A			NH-2	185mm
438.73.61.XX.YY		630 A			NH-3	185mm

**BTVC-DT, 2 HANDLES, LATERAL OUTPUT**  
**BTVC-DT, 2 HAND BETRIEBEN, SEITICHER ABGANG**



Terminals / Anschlüsse XX Code: Page / Seite 61-62  
 Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten: Page / Seite 178-179  
 Dimension drawings and wiring diagrams /  
 Abmessungen und Schaltplan: Page / Seite 69



**3 Pole vertical design fuse switches (BTVC/BTVC-DT)**  
**3-polige NH-Sicherungslastschaltleisten (BTVC/BTVC-DT)**

**A**

**910**

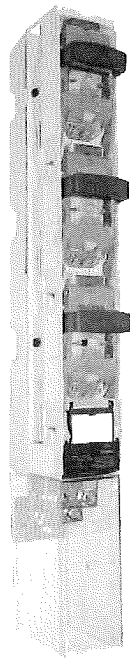
Range / Produktpalette

2

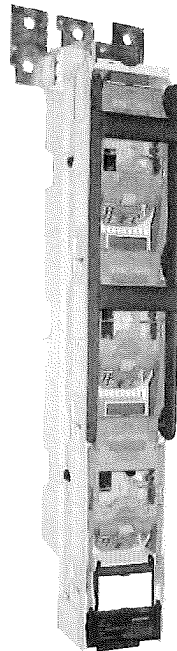
Reference Artikelnummer	Type Typ	Current Nennstrom	Switching schaltbar	Terminal type Anschlussausführung	Connections Anschluss	Fuse-link Sicherungseinsatz
438.58.13.04.02*		910 A	One pole einpölig	M12 inserted nut / M12 Einpressmutter	Top / Bottom reversible Oben / Unten	NH-3 gTr
438.58.13.36.00	BTVC	910 A	One pole einpölig	Ø 14 upper incoming / M14 Bohrung	Top / Oben	NH-3 gTr
438.58.16.08.00		910 A	One pole einpölig	Ø 14 rear plate / M14 Bohrung	Rear / Hinten	NH-3 gTr
438.68.13.04.02*	BTVC-DT 2 handles	910 A	Three pole dreipölig	M12 inserted nut / M12 Einpressmutter	Top / Bottom reversible Oben / Unten	NH-3 gTr
438.68.13.36.00	BTVC-DT 2 hand betrieben	910 A	Three pole dreipölig	Ø 14 upper incoming / M14 Bohrung	Top / Oben	NH-3 gTr
438.68.16.08.00		910 A	Three pole dreipölig	Ø 14 rear plate / M14 Bohrung	Rear / Hinten	NH-3 gTr
438.78.13.04.02*	BTVC-DT 1 handle	910 A	Three pole dreipölig	M12 inserted nut / M12 Einpressmutter	Top / Bottom reversible Oben / Unten	NH-3 gTr
438.78.13.36.00	BTVC-DT 1 hand betrieben	910 A	Three pole dreipölig	Ø 14 upper incoming / M14 Bohrung	Top / Oben	NH-3 gTr
438.78.16.08.00		910 A	Three pole dreipölig	Ø 14 rear plate / M14 Bohrung	Rear / Hinten	NH-3 gTr

\* With connection cover / mit Anschlussraumabdeckung

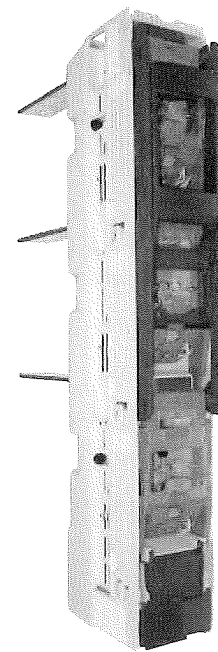
**BTVC STANDARD**



**BTVC-DT, 2 HANDLES, UPPER INCOMING**  
 BTVC-DT, 2 HAND BETRIEBEN,  
 EINSPEISUNG OBEN



**BTVC-DT, 1 HANDLE, REAR CONNECTION**  
 BTVC-DT, 1 HAND BETRIEBEN,  
 EINSPEISUNG HINTEN



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Terminals / Anschlüsse XX Code: Page / Seite 61-62  
 Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten: Page / Seite 178-179  
 Dimensions drawings / Abmessungen: Page / Seite 69-70

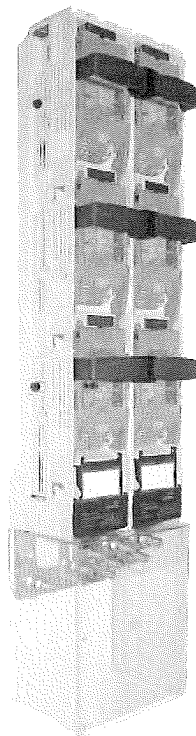
**3 Pole vertical design double fuse switches (BTVC-D)**  
**3-polige NH-Doppel-Sicherungslastschaltleisten (BTVC-D)**

Range / Produktpalette

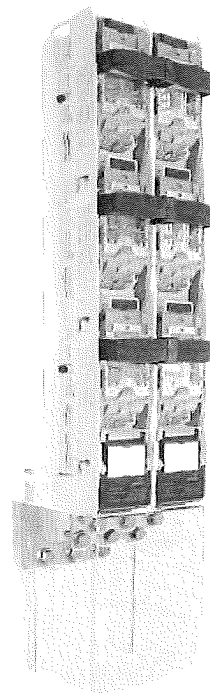
Reference Artikelnummer	Type Typ	Current Nennstrom	BFixation Fixierung	Terminal type Anschlussausführung	Connections Anschluss	Fuse-link Sicherungsseinsatz
438.54.70.XX.YY	BTVC-D	800 A	100			NH-2
438.54.71.XX.YY	BTVC-D	800 A	105	M-12 bolt		NH-2
438.54.72.XX.YY	BTVC-D	800 A	110	M-12 bolt stainless steel M-12 nut stainless steel	Top / Bottom reversible Oben / Unten	NH-2
438.54.84.XX.YY	BTVC-D FS	800 A	100	M-12 Stehbolzen M-12 Stehbolzen Edelstahl		NH-2
438.54.82.XX.YY	BTVC-D FS	800 A	110	M-12 Einpressmutter mit Schraube Edelstahl		NH-2
438.56.70.XX.YY	BTVC-D	1260 A	100			NH-3
438.56.71.XX.YY	BTVC-D	1260 A	105	M-12 bolt		NH-3
438.56.72.XX.YY	BTVC-D	1260 A	110	M-12 bolt stainless steel M-12 nut stainless steel	Top / Bottom reversible Oben / Unten	NH-3
438.56.84.XX.YY	BTVC-D FS	1260 A	100	M-12 Stehbolzen M-12 Stehbolzen Edelstahl		NH-3
438.56.82.XX.YY	BTVC-D FS	1260 A	110	M-12 Einpressmutter mit Schraube Edelstahl		NH-3

2

**BTVC-D FS**



**BTVC-D**



Terminals / Anschlüsse XX Code: Page / Seite 61-62  
 Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten: Page / Seite 180-181  
 Dimensions drawings / Abmessungen: Page / Seite 71

**3 Pole vertical design disconnectors (BTVC-S)**  
**3-polige NH-Trennleisten (BTVC-S)**

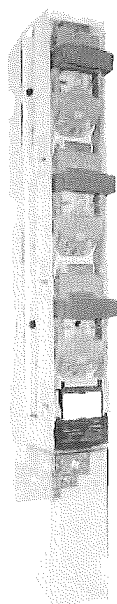
**A** 400 | 630 | 1000

Range / Produktpalette

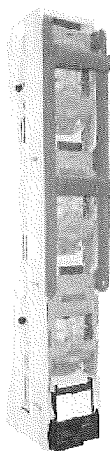
Reference Artikelnummer	Type Typ	Current Nennstrom	Disconnection schaltbar	Terminal type Anschlussausführung	Connections Anschluss	Solid Links Trennmesser
438.52.12.XX.02*	BTVC	400 A	One pole einpoleig	XX Code Terminal / XX Code Anschlüsse	Top / Bottom Oben / Unten	NH-2
438.53.12.XX.02*		630 A	One pole einpoleig	XX Code Terminal / XX Code Anschlüsse	Top / Bottom Oben / Unten	NH-3
438.55.12.04.02*		1000 A	One pole einpoleig	M12 inserted nut stainless steel M12 Einpressmutter mit Schraube Edelstahl	Top / Bottom reversible Oben / Unten	NH-3
438.55.13.36.00		1000 A	One pole einpoleig	Ø 14 upper incoming / M14 Bohrung	Top / Oben	NH-3
438.62.12.XX.02*	BTVC-SDT 1 handle BTVC-DT 1 hand betrieben	400 A	Three pole dreipoleig	XX Code Terminal / XX Code Anschlüsse	Top / Bottom Oben / Unten	NH-2
438.63.12.XX.02*		630 A	Three pole dreipoleig	XX Code Terminal / XX Code Anschlüsse	Top / Bottom Oben / Unten	NH-3
438.65.12.04.02*		1000 A	Three pole dreipoleig	M12 inserted nut stainless steel M12 Einpressmutter mit Schraube Edelstahl	Top / Bottom reversible Oben / Unten	NH-3
438.65.12.36.00		1000 A	Three pole dreipoleig	Ø 14 upper incoming / M14 Bohrung	Top / Oben	NH-3
438.72.12.XX.02*	BTVC-SDT 2 handles BTVC-DT 2 hand betrieben	400 A	Three pole dreipoleig	XX Code Terminal / XX Code Anschlüsse	Top / Bottom Oben / Unten	NH-2
438.73.12.XX.02*		630 A	Three pole dreipoleig	XX Code Terminal / XX Code Anschlüsse	Top / Bottom Oben / Unten	NH-3
438.75.12.04.02*		1000 A	Three pole dreipoleig	M12 inserted nut stainless steel M12 Einpressmutter mit Schraube Edelstahl	Top / Bottom reversible Oben / Unten	NH-3
438.75.12.36.00		1000 A	Three pole dreipoleig	Ø 14 upper incoming / M14 Bohrung	Top / Oben	NH-3

\* With connection cover / mit Anschlussraumabdeckung

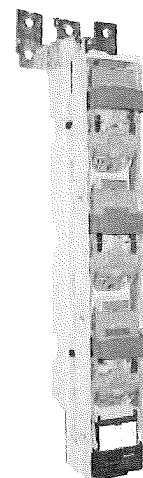
**BTVC-S**



**BTVC-SDT 2 HANDLES  
BTVC-SDT 2 HAND BETRIEBEN**



**BTVC-S TOP CONNECTION / UPPER INCOMING  
BTVC-S EINSPEISUNG OBEN/BOHRUNG**



Terminals /Anschlüsse XX Code: Page / Seite 61-62  
 Accessories /Zubehör YY Code: Page / Seite 63-65

Technical Data /Technische Daten : Page / Seite 182-183  
 Dimensions drawings and wiring diagrams : page 72-73  
 Abmessungen und Schaltplan : Seite 72-73

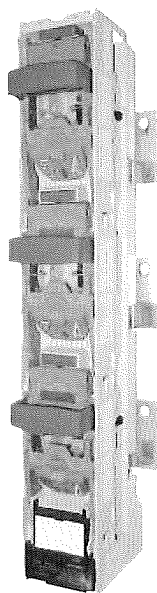
### 3 Pole vertical design disconnectors, busbar connection (BTVC-S) 3-polige NH-Trennleisten, Kuppelleiste (BTVC-S)

## Range / Produktpalette

Reference Artikelnummer	Type Typ	Current Nennstrom	Disconnection schaltbar	Terminal type Anschlussführung	Connections Anschluss	Solid Links Trennmesser
438.52.65.08.00	BTVC-S	400 A	One pole einpölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-2
438.53.65.08.00		630 A	One pole einpölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-3
438.55.65.08.00		1000 A	One pole einpölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-3
438.62.65.08.00	BTVC-SDT 2 handles	400 A	Three pole dreipölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-2
438.63.65.08.00		630 A	Three pole dreipölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-3
438.65.65.08.00	BTVC-SDT 2 hand betrieben	1000 A	Three pole dreipölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-3
438.72.65.08.00	BTVC-SDT 1 handle	400 A	Three pole dreipölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-2
438.73.65.08.00		630 A	Three pole dreipölig	Ø 14mm diameter / 14mm Bohrung	Busbar connection Kuppelleiste	NH-3
438.75.65.08.00	BTVC-SDT 1 hand betrieben	1000 A	Three pole dreipölig	Ø 14mm diameter / 14mm Bohrung	Top / Bottom Oben / Unten	NH-3

2

#### BTVC-S BUSBAR CONNECTION BTVC-S KUPPELLEISTE



Terminals / Anschlüsse XX Code: Page / Seite 61-62  
Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten: Page / Seite 182-183  
Dimensions drawings and wiring diagrams: page 73  
Abmessungen und Schaltplan: Seite 73

**3 Pole vertical design NH-Double Disconnectors (BTVC-DS)**  
**3-polige NH-Doppel Trennleisten (BTVC-DS)**

**A** 2000

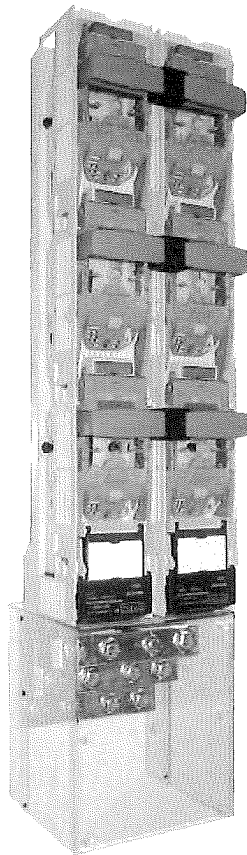
Range / Produktpalette

2

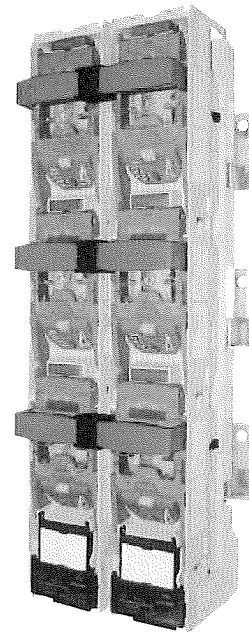
Reference Artikelnummer	Type Typ	Current Nennstrom	Fuse switch distance(mm) Breite (mm)	Terminal type Anschlussausführung	Connections Anschluss	Solid Links Trennmesser
438.57.70.04.02*	BTVC-DS	2000 A	100	M12 inserted nut stainless steel M12 Einpressmutter mit Schraube Edelstahl	Top / Bottom reversible Oben / Unten	NH-3
438.57.71.04.02*	BTVC-DS	2000 A	105	M12 inserted nut stainless steel M12 Einpressmutter mit Schraube Edelstahl	Top / Bottom reversible Oben / Unten	NH-3
438.57.13.07.02	BTVC-DS	2000 A	110	2 x M14 / M14 Bohrung	Top / Bottom reversible Oben / Unten	NH-3
438.57.80.04.00	BTVC-DS	2000 A	100	M12 inserted nut stainless steel M12 Einpressmutter mit Schraube Edelstahl	Busbar connection Kuppelleiste	NH-3

\*With connection cover / mit Anschlussraumabdeckung

**BTVC-DS TOP/BOTTOM REVERSIBLE**  
**BTVC-DS OBEN/UNTEN**



**BTVC-DS 2000 A BUSBAR CONNECTION**  
**BTVC-DS 2000A KUPPELLEISTE**



Terminals / Anschlüsse XX Code: Page / Seite 61-62  
 Accessories / Zubehör YY Code: Page / Seite 63-65

Technical Data / Technische Daten : Page / Seite 182-183  
 Dimensions drawings and wiring diagrams : page 74  
 Abmessungen und Schaltplan : Seite 74

**Switch disconnecter able to withstand High Short circuit currents**  
**NH-Trennleiste mit erhöhter Kurzschlussfestigkeit**  
**(BTVC-S/BTVC-DS)**

**Range / Produktpalette**

Suitable for applications next to distribution transformers, where the possibilities of short circuit are greater and a higher breaking capacity is required.

A new accessory has been developed and successfully tested according to IEC 60947 – 3.2008 to integrate into Pronutec's single and double switch disconnectors, in order to withstand **25 kA/1s** and **31 kA/3s** respectively.

Für Anwendungen nahe dem Transformator, wo eine erhöhte Kurzschlussfestigkeit erforderlich ist.

Die neu entwickelte Option erhöhte Kurzschlussfestigkeit **25kA während 1 Sekunde und 31kA während 3 Sekunden** ist gemäß IEC 60947-3.2008 typgeprüft und steht für die einzelnen und doppelten Pronutec NH-Trennleisten zur Verfügung.

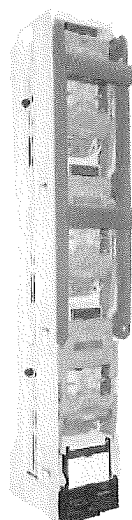
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Reference* Artikelnummer*	Type Typ	Current Nennstrom	Disconnections Schaltbar	Terminal type Anschlussausführung
438.55.12.04.02	BTVC-S	1000 A	One pole 1-polig	M12 inserted nut stainless Steel M12 Einpressmutter mit Schraube Edelstahl
438.57.70.04.02	BTVC-DS	2000 A	One pole 1-polig	M12 inserted nut stainless Steel M12 Einpressmutter mit Schraube Edelstahl
438.65.12.04.02	BTVC-SDT 2 Handles BTVC-SDT 2-Hand-Betrieben	1000 A	Three pole 3-polig	M12 inserted nut stainless Steel M12 Einpressmutter mit Schraube Edelstahl

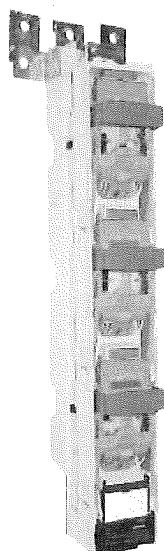
\*For more references check the pages 56,57,58 / Weitere Varianten finden Sie im Seiten 56, 57, 58

**NH-Disconnectors / NH- Trennleisten**

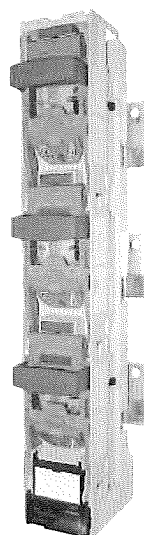
**NH- Double Disconnectors  
NH-Doppel-Trennleisten**



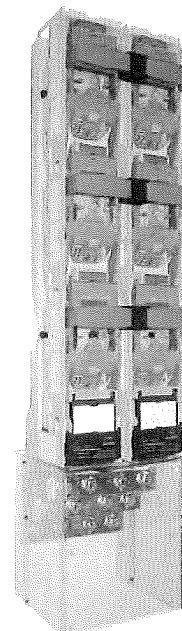
**Bottom connection**  
Einspeisung von unten



**Top connection**  
Einspeisung von oben



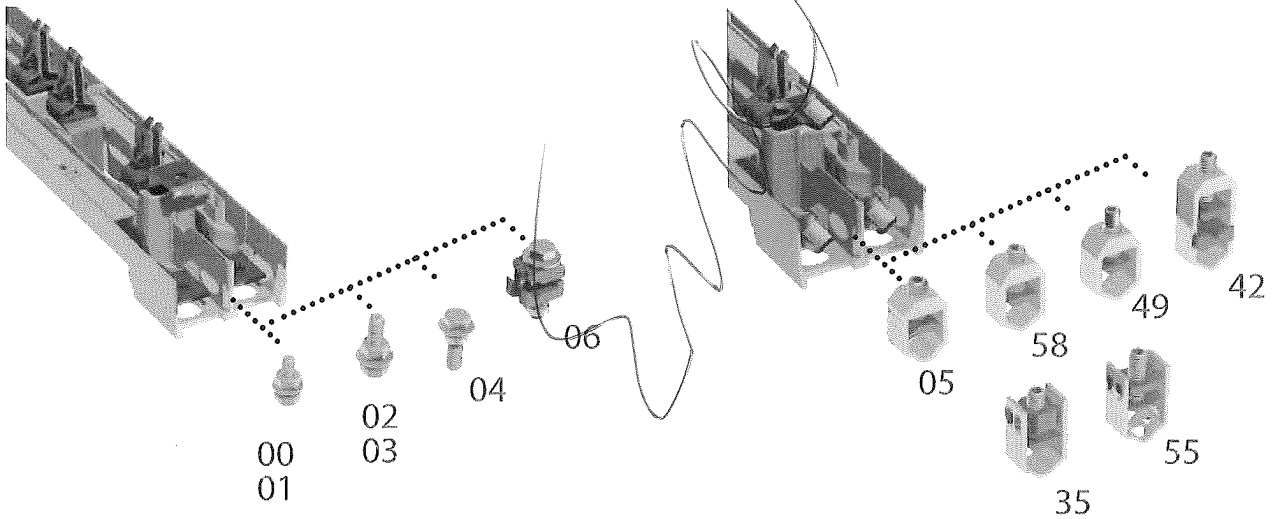
**Busbar connection**  
Kuppelleiste



**3 Pole vertical design fuse switches, lateral incoming (BTVC/BTVC-DS)**  
**3-polige NH-Sicherungslastschaltleisten, seitliche anspeisung (BTVC/BTVC-DS)**

Terminals XX Code / Anschlüsse XX Code

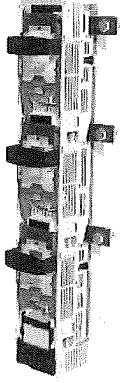
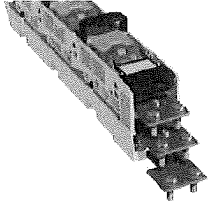
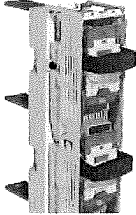
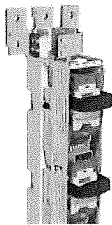
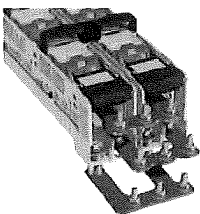
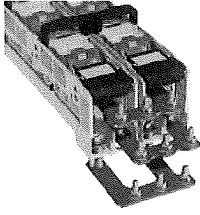
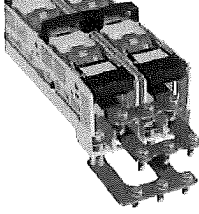
2



XX Code XX Code	References Artikelnummer	Type of clamp Anschlussvarianten	Torque Anzugsdrehmoment (Nm)	Cross section / Klemmenquerschnitt (mm²)			
				rm	re	sm	se
00	-	M10 Bolt M10-Stehbolzen	32				
01	-	M10 Bolt Stainless Steel M10-Stehbolzen Edelstahl	32				
02	-	M12 Bolt M12-Stehbolzen	40				
03	-	M12 Bolt Stainless Steel M12-Stehbolzen Edelstahl	40				
04	-	M12 Nut Stainless Steel M12-Einpressmutter Mit Schraube Edelstahl	40				
06	101.01.33	Direct Terminal Flachdirektanschlussklemme	32	35-70	50	35-150	50-185
05	101.01.103	Aluminum V-terminal with reversible pressure pad V-Klemme, Aluminium, mit wendbarem Druckkissen	25	16-185	16-240	35-240	35-300
58	101.01.110	Aluminum V-terminal V-Klemme, Aluminium	25	35-240	35-150	35-240	50-240
49	101.01.109	Aluminum V-terminal with shear head screw V-Klemme, Aluminium, mit Scherkopfschraube	25	25-240	35-150	25-240	50-240
42	101.01.14	Aluminum Double V-terminal Doppel-V-Klemme, Aluminium, mit	25	50-185	70-240	50-185	70-240
35	101.01.66	Steel V terminal V-Stahlrahmenklemme	40	35-120	35-150	50-185	50-240
55	101.01.120	Steel V terminal V-Stahlrahmenklemme	35	35-300	35-185	35-240	50-300

*Handwritten notes and scribbles:*  
 Cable lugs DIN 46235  
 Kabelschuhe DIN 46235  
 2x25mm² – 300mm²  
 (max width / breite 43mm)  
 [Handwritten signature]

**Terminals for special fuse switches (BTVC/BTVC-DT/BTVC-D)**  
**Anschlüsse für spezielle NH-Sicherungslastschaltleisten (BTVC/BTVC-DT/BTVC-D)**

Picture Bild	Fuse switch NH-Sicherungs- lastschaltleiste	XX Code XXcode	Type of terminal Anschluss	Torque Anzugsdrehmoment	Cross section Klemmenquerschnitt (mm <sup>2</sup> )
	BTVC / BTVC-DT Lateral Output BTVC / BTVC-DT seitlicher Abgang	04	M12 Inserted nut stainless steel M12-Einpressmutter mit schraube edels- tahl	40	
	BTVC / BTVC-DT 910A	04	M12 Inserted nut stainless steel M12-Einpressmutter mit schraube edels- tahl	40	
	BTVC / BTVC-DT 910A	08	M14 rear plate M14 Bohrung	40	
	BTVC / BTVC-DT 910A	08	M14 upper incoming M14 Bohrung	40	
	BTVC-D 800 / 1260 A	02	M12 Bolt M14 Stehbolzen	40	
	BTVC-D 800 / 1260 A	03	M12 bolt stainless steel M12 Stehbolzen edelstahl	40	
	BTVC-D 800 / 1260 A	04	M12 inserted nut stainless steel M12-Einpressmutter mit schraube edels- tahl	40	

Cable lugs DIN 46235  
 Kabelschuhe DIN 46235  
 2x25mm<sup>2</sup> – 300mm<sup>2</sup>  
 (max width / breite 43mm)

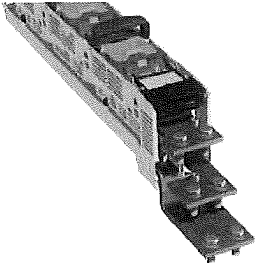
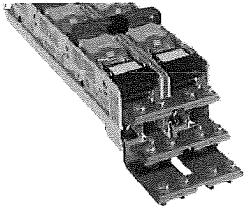
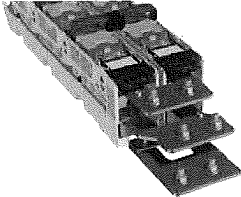
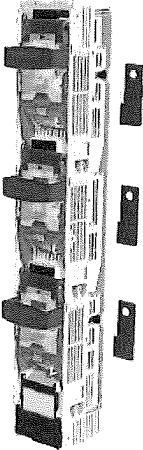
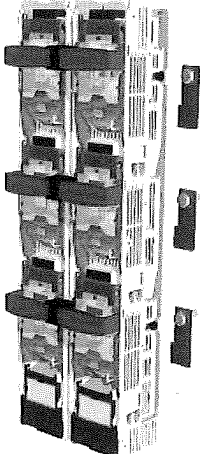
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Terminals for special fuse switches (BTVC-S/BTVC-DS)

Anschlüsse für spezielle NH-Sicherungslastschaltleisten (BTVC-S/BTVC-DS)

2

Picture Bild	Fuse switch NH-Si- cherungslasts- chaltleiste	XX Code XXcode	Type of terminal Anschluss	Torque Anzugsdrehmoment	Cross section Klemmenquerschnitt (mm <sup>2</sup> )
	BTVC-S 1000 A	04	M12 inserted nut stainless steel M12-Einpressmut- ter mit schraube edelstahl	40	
	BTVC-DS 2000 A	04	M12 inserted nut stainless steel M12-Einpressmut- ter mit schraube edelstahl	40	
	BTVC-DS 2000 A	07	M 14 bolt M14 Stehbolzen	-	
	BTVC-S 1000 A busbar connection Kuppelleiste	04	M 12 inserted nut stainless steel M12-Einpressmut- ter mit schraube edelstahl	40	Cable lugs DIN 46235 Kabelschuhe DIN 46235 2x25mm <sup>2</sup> – 300mm <sup>2</sup> (max width / breite 43mm)
	BTVC-S 2000 A busbar connection Kuppelleiste	08	14 mm hole diameter 14 mm Bohrung	40	

*[Handwritten signature]*

*[Handwritten signature]*

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438 Type / Typ

NH-1/2/3 | 185mm

**A** 250|400|630|800|910  
|1000|1260|2000

**3 Pole vertical design fuse switches (BTVC/BTVC-D/BTVC-S)**  
**3-polige NH-Sicherungslastschaltleisten (BTVC/BTVC-D/BTVC-S)**

2

Item Abbildung	Description Beschreibung	YY Code	Reference Artikelnummer
		00= No Accessories 00= Kein Zubehör	
	Blown fuse indicator (LED) Leuchtdiodenanzeige (LED)	01	
	Connection cover for NH-1/2/3 BTVC & BTVC-DT/ BTVC-S 400/ 630A Anschlussraumabdeckung für NH-1/2/3 BTVC & BTVC-DT/ BTVC-S 400/ 630A	02	4380425
	Connection cover for BTVC 910A and top outgoing terminals Anschlussraumabdeckung für BTVC 910A und bei Anschluss oben	02	42804103
	Connection cover for BTVC-S 1000A Anschlussraumabdeckung für BTVC-S 1000A	02	42801027
	Connection cover for Double BTVC-D and BTVC-DS 2000 A (100mm) Anschlussraumabdeckung für Doppel BTVC-D und BTVC-DS 2000 A (100mm)	02	STD 42801028 FS 42804100
	Connection cover for Double BTVC-D (100mm) and BTVC-DS 2000 A (105 mm) Anschlussraumabdeckung für Doppel BTVC (100mm) und BTVC-DS 2000 A (105mm)	02	STD 42801029 FS 42804100
	Connection cover for Double BTVC-D (110 mm) Anschlussraumabdeckung für Doppel BTVC -D (110mm)	02	STD 42801030 FS 4280485
	Code 01+code 02 / Teil 1 +Teil 2	04	
	Short connection cover for NH-1/2/3 BTVC & BTVC-DT Kurze Anschlussraumabdeckung für NH-1/2/3 BTVC & BTVC-DT	12	4280410





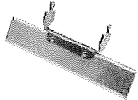
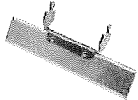
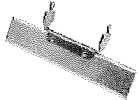
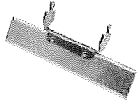
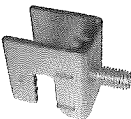

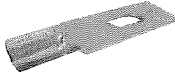
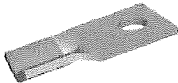


Item Abbildung	Description Beschreibung	Reference Artikelnummer
	Slip on fuse Huckepacksicherung	4280810
	Front cover for busbars: 100mm width with fixing brackets Blindabdeckung 100mm breit mit seitlichen Abdeckungshaltern	4150804
	Front cover for busbars: 100mm width Leerfeldabdeckung 100mm breit zur Befestigung auf den Sammelschienen inkl. fixierschrauben	4150807
	Protecting polyester strip left / right angle seitliche Blendauflage	4150808S
	Micro.switch (open/closed indicator) Microschalter für Schaltzustandsanzeige (offen/geschlossen)	1013406

**3 Pole vertical design fuse switches (BTVC/BTVC-D/BTVC-S)**  
**3-polige NH-Sicherungslastschaltleisten (BTVC/BTVC-D/BTVC-S)**

**A** 250|400|630|800|910  
 |1000|1260|2000




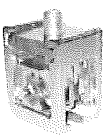
Accessories / Zubehör

2

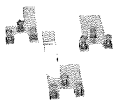


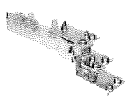
Item Abbildung	Description Beschreibung	Reference Artikelnummer
	Fixing bracket for front cover for NH-1/2/3 BTVC & BTVC-DT Seitliche Abdeckungshalter für NH-1/2/3 BTVC & BTVC-DT	4150420
	Central barrier for outgoing terminals : 80 mm Mittentrennwand Anschlussbereich : 80 mm	4150426
	Earthing device NH-1/2/3 Erdungsgarnitur NH- 1/2/3	42808104
	Central barrier for outgoing terminals : 120 mm Mittentrennwand Anschlussbereich : 120 mm	42804115
	Solid link for NH1 BTVC & BTVC-DT (250 A) Trennmesser für NH1 BTVC & BTVC-DT (250 A)	2400302
	Solid link for NH2 BTVC & BTVC-DT / BTVC-S (400 A) Trennmesser für NH2 BTVC & BTVC-DT / BTVC-S (400 A)	2400402
	Solid link for NH3 BTVC & BTVC-DT / BTVC-S (630 A) Trennmesser für NH3 BTVC & BTVC-DT / BTVC-S (630 A)	2400502
	Solid link for NH3 BTVC-S (1000 A) Trennmesser für NH3 BTVC-S (1000 A)	2400506
	Hook-on clamp (set of 3) Set-Krallenklemmen zur Befestigung ohne Bohrung auf Sammelschienensystem (3 Stück)	4380824
	Plate for "V" Neutral link "V" PEN-Lasche verdrehungssicher	4280538
	Flat plate for "V" Neutral link Standard "V" PEN-Lasche	4280547
	Flat Plate for "V" Neutral Link / Standard "V" PEN-Lasche	1010137
	Kit for double one pole switching for BTVC-D (2 pieces x 3 poles = 6 pieces) Kit für doppel 1-polig schaltbar für BTVC-D (2 Stücke x 3 polig = 6 Stücke)	100mm 4380801 105mm 4380802 110mm 4380803
	Card holder for Double V-Terminals. Accessorie reference, consult specific reference with each fuse switch. Bezeichnungsschildträger für Doppel V-Klemme, Anfrage der spezifischen Artikelnummer zu der entsprechenden NH-Sicherungslastschaltleiste NH-1/2/3	4280480

**A** 250|400|630|800|910  
|1000|1260|2000

### 3 Pole vertical design fuse switches (BTVC/BTVC-D/BTVC-S) 3-polige NH-Sicherungslastschaltleisten (BTVC/BTVC-D/BTVC-S)

Item Abbildung	Description Beschreibung	Reference Artikelnummer
	Busbar support 185mm, 3 pole for drilled flat busbars Sammelschienen träger für gebohrte Flachschienen	4380811
	Universal busbar support 185mm, 3 pole for undrilled flat busbars 30...120x10mm Universal-Sammelschienenenträger für ungebohrte Flachschienen 30-120x10 und Doppel-T und Dreifach-T Profilschienen	4380812
	Cover, for busbar ends for reference 4380812 Endabdeckung für Art. – Nr. 4380812	4380813
	Connection terminal for busbars 30 x 10, and cable connection 95-300 mm <sup>2</sup> Anschlussklemme für Rund-/Sektorleiter 30x10, Doppel-T- und Dreifach-T-Profil 95-300mm <sup>2</sup>	4230812

### Terminal accessories / Klemme Zubehör

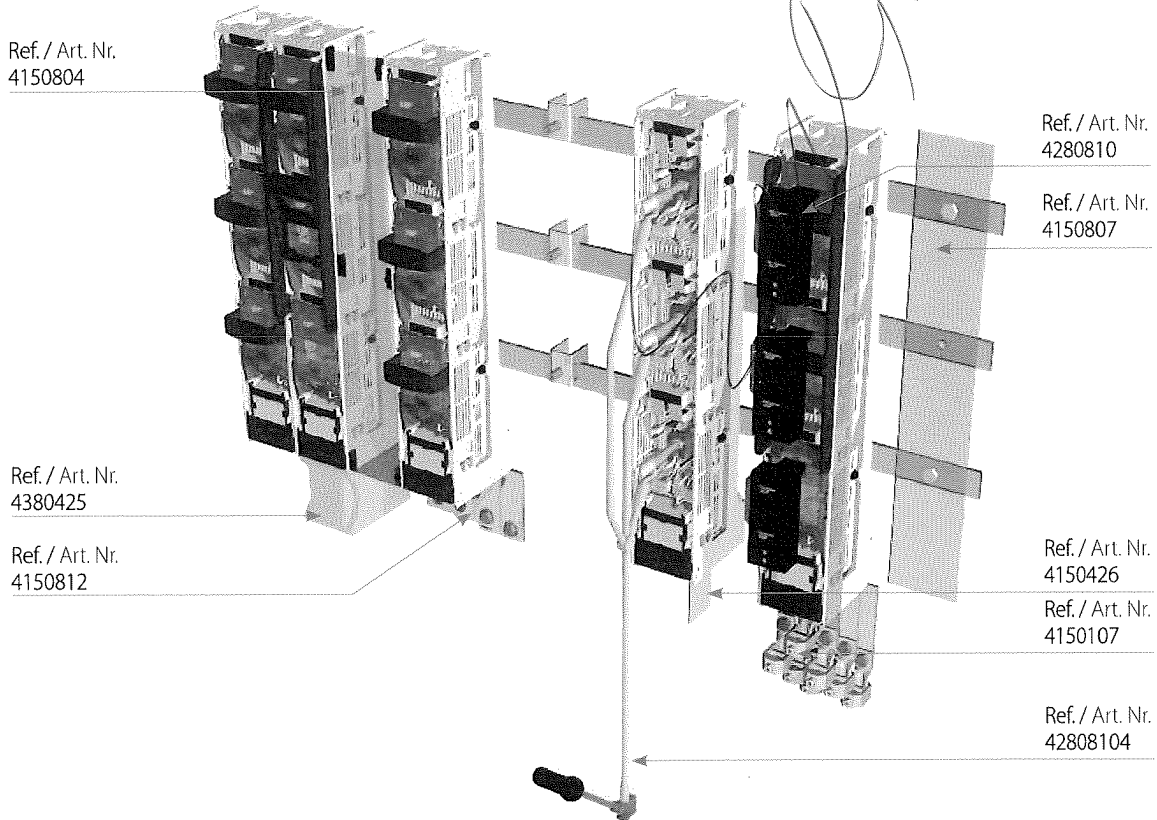
Item Abbildung	Description Beschreibung	Reference Artikelnummer
	Set of 3 adaptor plates to connect 3 cables lugs M12 stainless steel per phase Dreifachanschluss, 100mm breit, mit M12 Schraubanschluss	4150126
	Set of 3 adaptor plates to connect 3 V-terminals per phase Dreifachanschluss, 100mm breit, V-Klemmen	4150107
	Insulating cover for V-terminal Einzelklemmenabdeckung für V-Klemmen	1010135
	Adaptor plates to connect 2 cable lugs M12 stainless steel per phase Doppelanschluss 100mm breit M12-Schraubanschluss	4150812

**3 Pole vertical design fuse switches (BTVC/BTVC-D/BTVC-S)**  
**3-polige NH-Sicherungslastschaltleisten (BTVC/BTVC-D/BTVC-S)**

**A** 250|400|630|800|910  
 |1000|1260|2000

Assembly drawing / Aufbauzeichnung

2



Ref. / Art. Nr. 4150804 Front cover for busbars: 100 mm width with fixing brackets  
 Blindabdeckung 100mm breit mit seitlichen Abdeckungshaltern für BTVC

Ref. / Art. Nr. 4380425 Connection cover for NH-1/2/3 BTVC & BTVC-DT / BTVC-S 400/ 630 A  
 Anschlussraumabdeckung für NH-1/2/3 BTVC & BTVC-DT / BTVC-S 400/ 630A

Ref. / Art. Nr. 4150812 Adaptor plates to connect 2 cable lugs M12 stainless steel per phase  
 Doppelanschluss 100mm breit M12-Schraubanschluss

Ref. / Art. Nr. 4280810 Slip on fuse  
 Huckepacksicherung

Ref. / Art. Nr. 4150807 Front cover for busbars: 100 mm width with nylon bolts for busbar fixing  
 Leerfeldabdeckung 100mm breit zur Befestigung auf den Sammelschienen inkl. Fixierschrauben

Ref. / Art. Nr. 4150426 Central barrier for outgoing terminals  
 Mittentrenwand Anschlussbereich

Ref. / Art. Nr. 4150107 Set of 3 adaptor plates to connect 3 V-terminals per phase  
 Dreifachanschluss, 100mm breit, mit V-Klemmen

Ref. / Art. Nr. 42808104 Earthing device NH-1/2/3  
 Erdungsgarnitur NH-1/2/3

**3 Pole vertical design fuse switches (BTVC/BTVC-DU/BTVC-DT)**  
**3-polige NH-Sicherungslastschaltleisten (BTVC/BTVC-DU/BTVC-DT)**

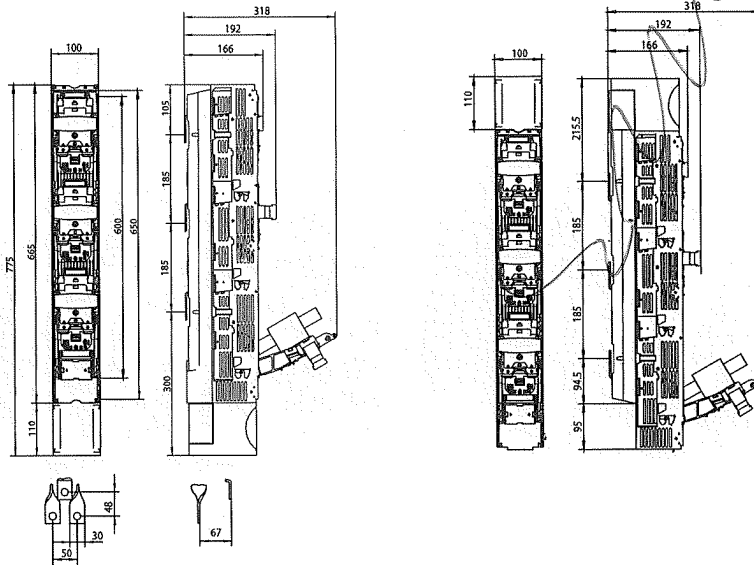
Dimensions / Abmessungen

2

**BTVC 1 pole switching / BTVC einpolig schaltbar**

Bottom connection / Anschluss Unten

Top connection / Anschluss Oben

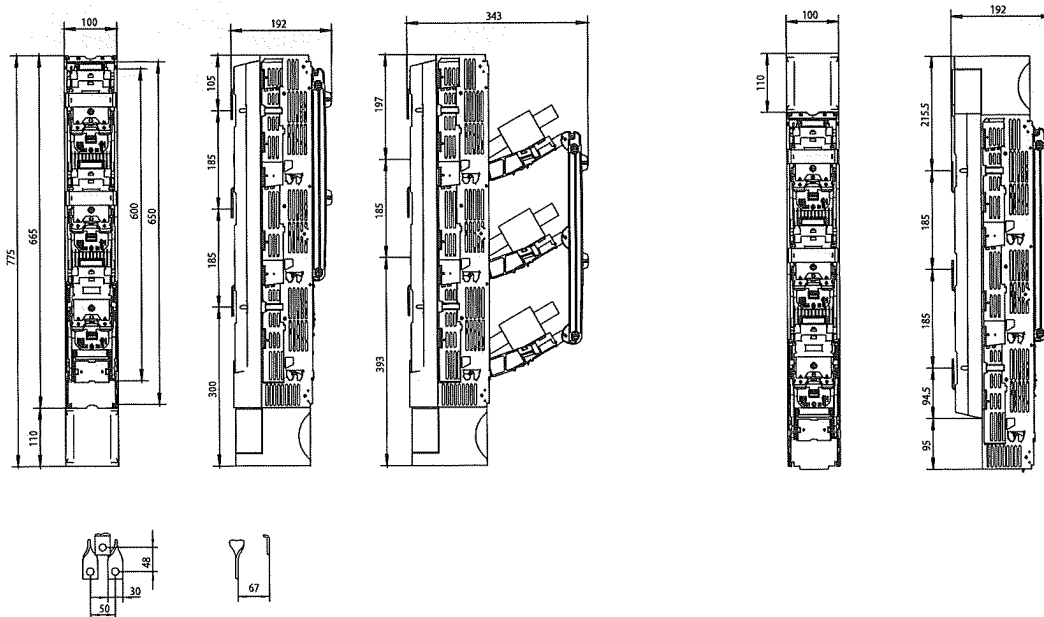


\* Busbar distance may also be 210mm / Auch mit 210 mm Sammelschienenabstand verfügbar

**BTVC-DT 2 handles 3 pole switching / BTVC-DT dreipolig schaltbar 2 hand betrieben**

Bottom connection / Anschluss Unten

Top connection / Anschluss Oben



\* Busbar distance may also be 210mm / Auch mit 210 mm Sammelschienenabstand verfügbar

NH-1/2/3 | 185/210mm

438 Type / Typ

### 3 Pole vertical design fuse switches (BTVC-DT) 3-polige NH-Sicherungslastschaltleisten (BTVC-DT)

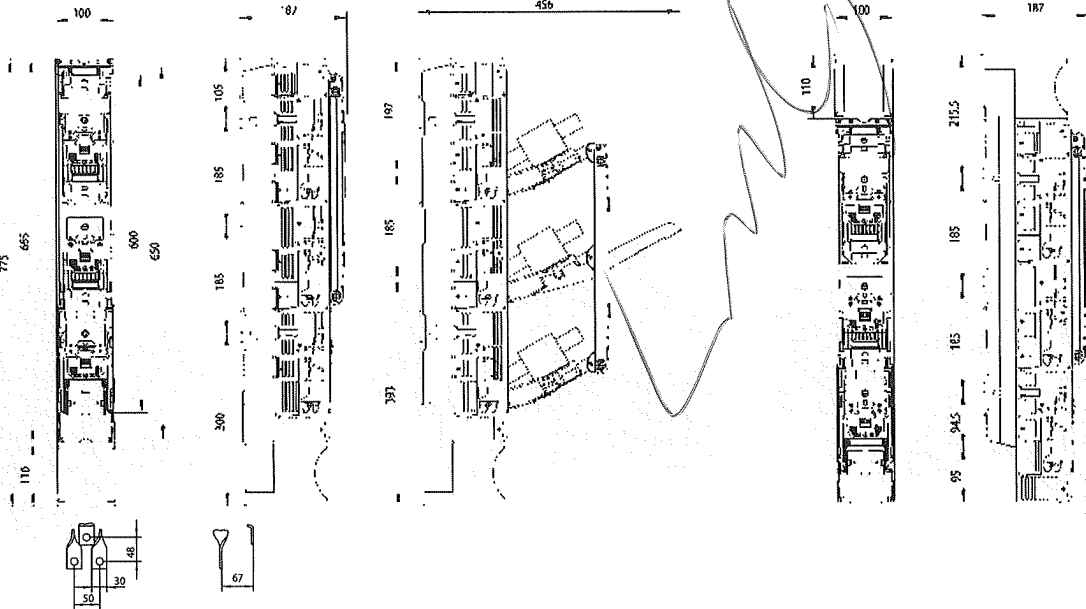
A 250|400|630

#### Dimensions / Abmessungen

BTVC-DT 1 handle 3 pole switching / BTVC-DT dreipolig schaltbar - 1 hand betrieben

Bottom connection / Anschluss Unten

Top connection / Anschluss Oben



\* Busbar distance may also be 210mm / Auch mit 210 mm Sammelschienenabstand verfügbar

NH-1/2/3 | 185mm

438 Type / Typ

### 3 pole vertical design fuse switches (BTVC/BTVC-DT) 3-polige NH-Sicherungslastschaltleisten (BTVC/BTVC-DT)

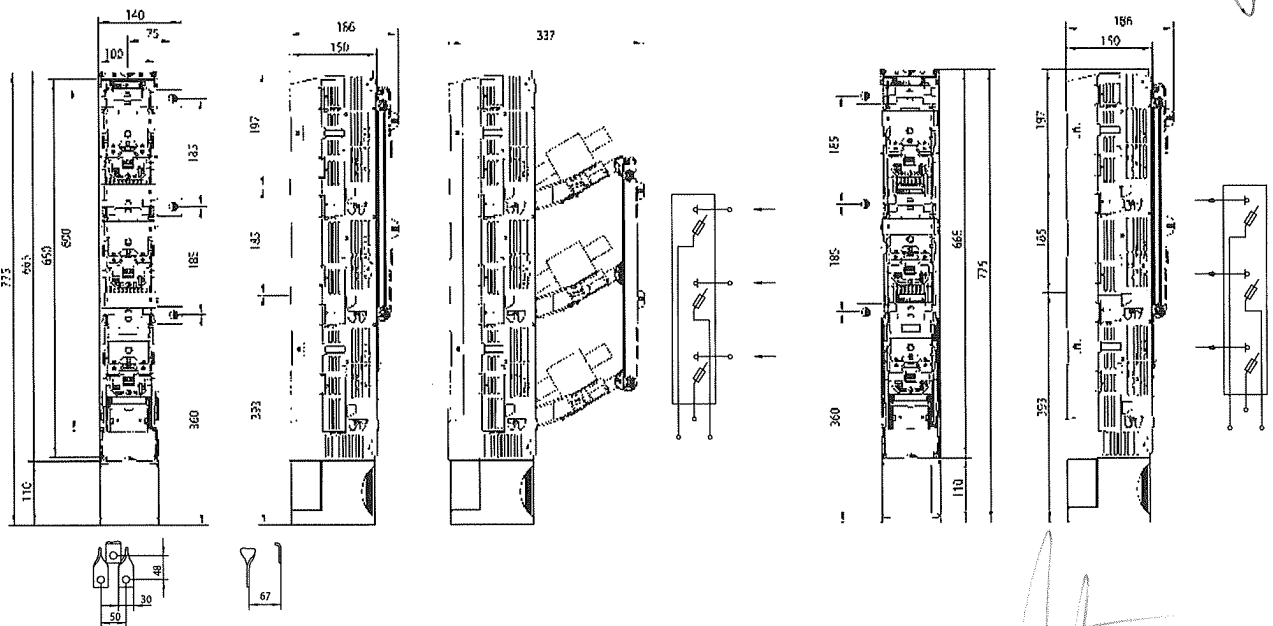
A 250|400|630

#### Dimensions Abmessungen

BTVC-DT lateral incoming / BTVC-DT seitliche Einspeisung

Right side / rechte Seite

Left side / linke Seite







3 Pole vertical design fuse switches, Upper incoming (BTVC-DT)

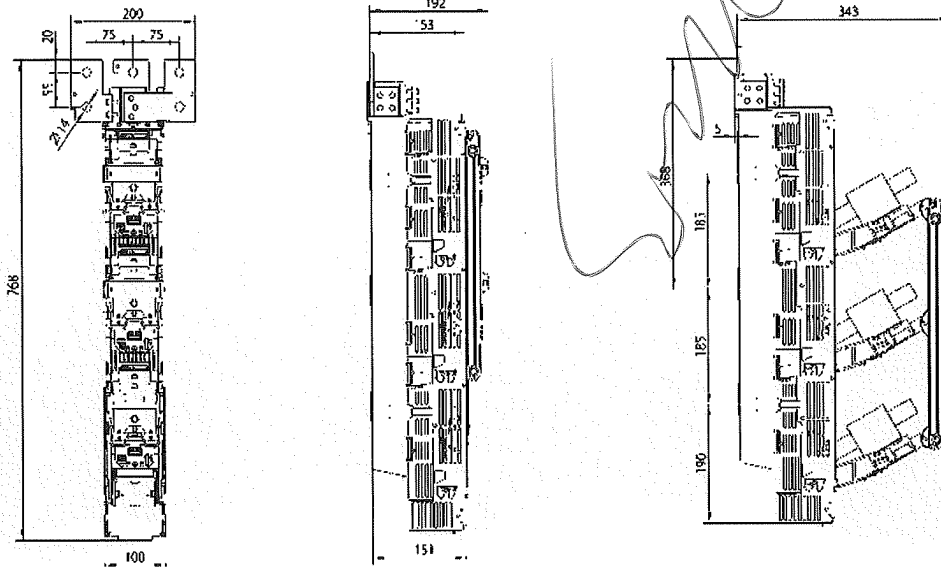
A

910

3-polige NH-Sicherungslastschaltleisten, Bohrung (BTVC-DT)

Dimensions / Abmessungen

BTVC-DT 2 handles / BTVC-DT 2 hand betrieben



3 Pole vertical design fuse switches, Rear input (BTVC-DT)

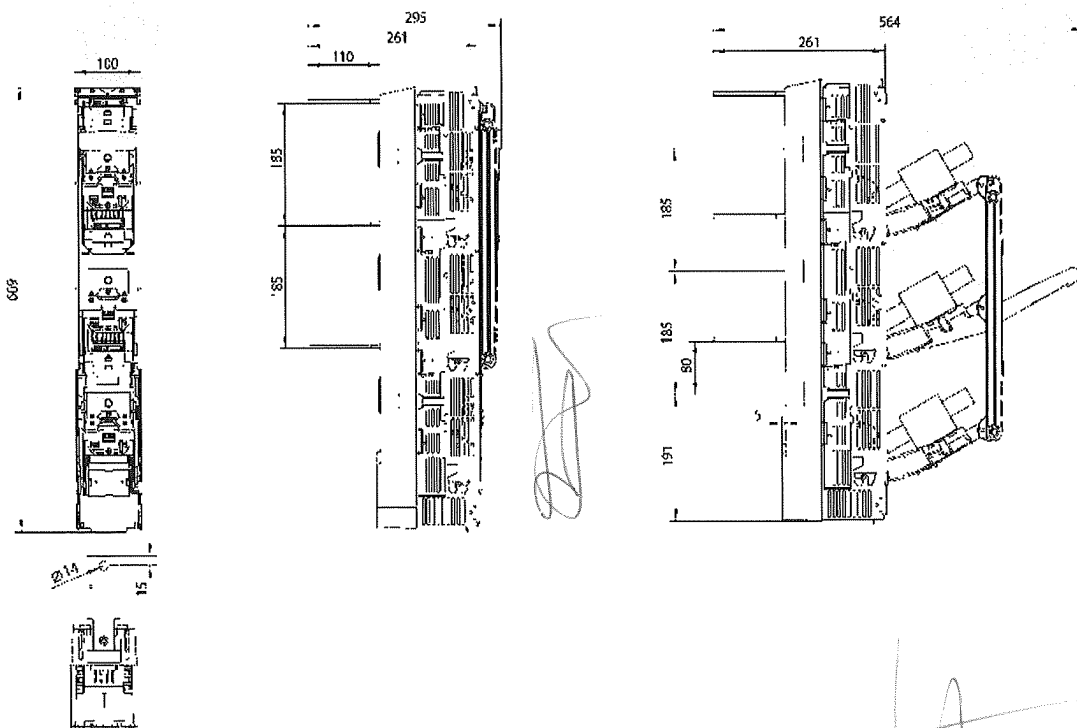
A

910

3-polige NH-Sicherungslastschaltleisten, Einspeisung hinten (BTVC-DT)

Dimensions / Abmessungen

BTVC-DT 1 handle / BTVC-DT 1 hand betrieben





3 Pole vertical design disconnectors Standard (BTVC-S)

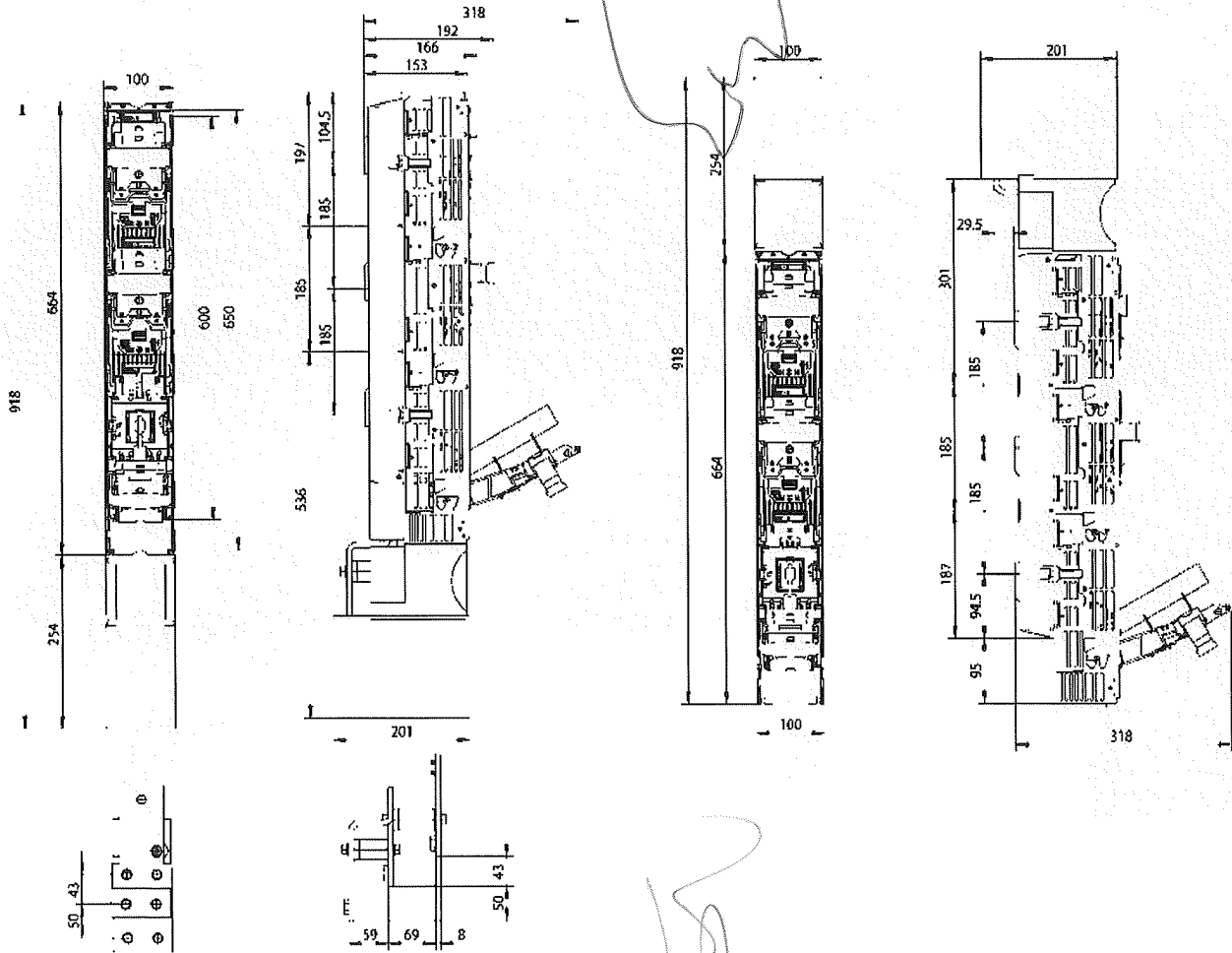
A 400|630|1000

3-polige NH-Trennleisten, Standard (BTVC-S)

Dimensions / Abmessungen

BTVC-S 1 pole disconnection / BTVC-S einpolig NH-Trennleisten

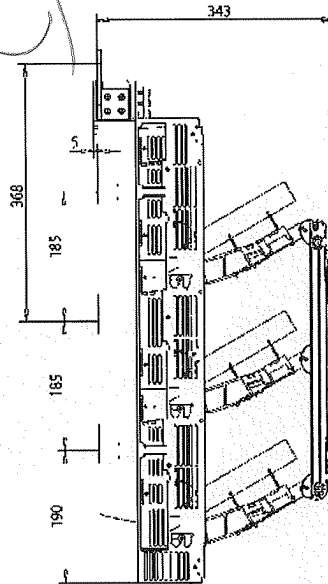
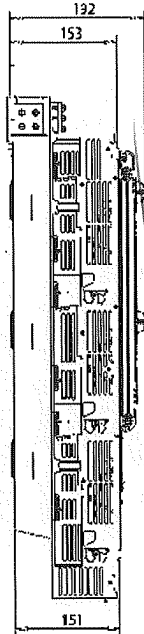
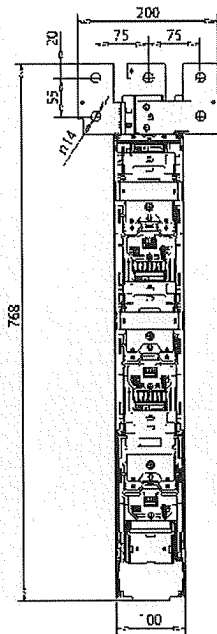
2



3 Pole vertical design disconnectors, Upper incoming (BTVC-S)  
3-polige NH-Trennleisten, Bohrung (BTVC-S)

Dimensions / Abmessungen

BTVC-SDT 2 handles / BTVC-SDT 2 hand betrieben

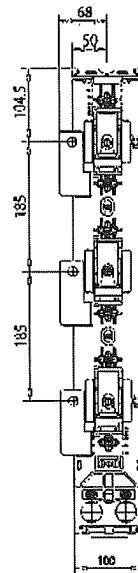
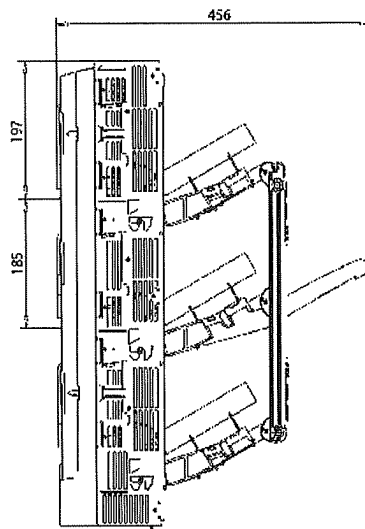
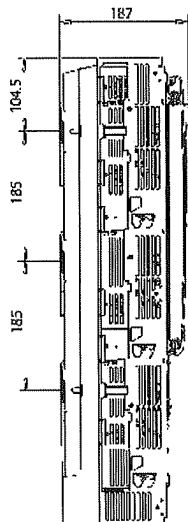
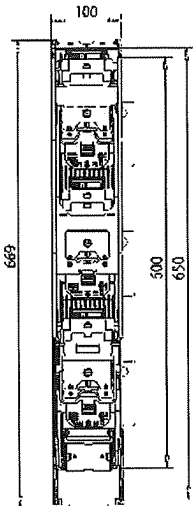


2

3 Pole vertical design disconnectors, busbar connection  
3-polige NH-Trennleisten, zur Sammelschienentrennung

Dimensions / Abmessungen

BTVC-SDT 1 handle / BTVC-SDT 1 hand betrieben

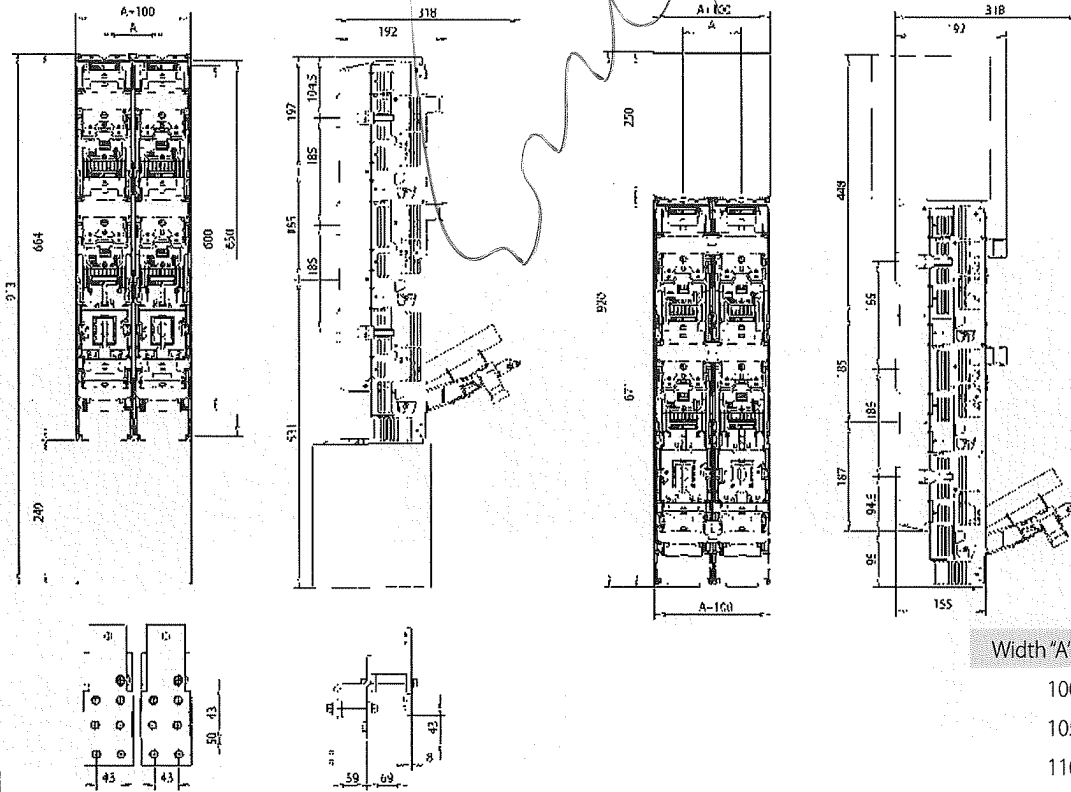


**3 Pole vertical design disconnectors, (BTVC-DS)**  
**3-polige NH-Trennleisten, (BTVC-DS)**

**A** 2000

Dimensions / Abmessungen

BTVC-DS 1 pole disconnection / BTVC-DS einpolig NH-Trennleisten



Width "A" / Breite "A"

- 100 mm
- 105 mm
- 110 mm

*Handwritten signature*

NH-3

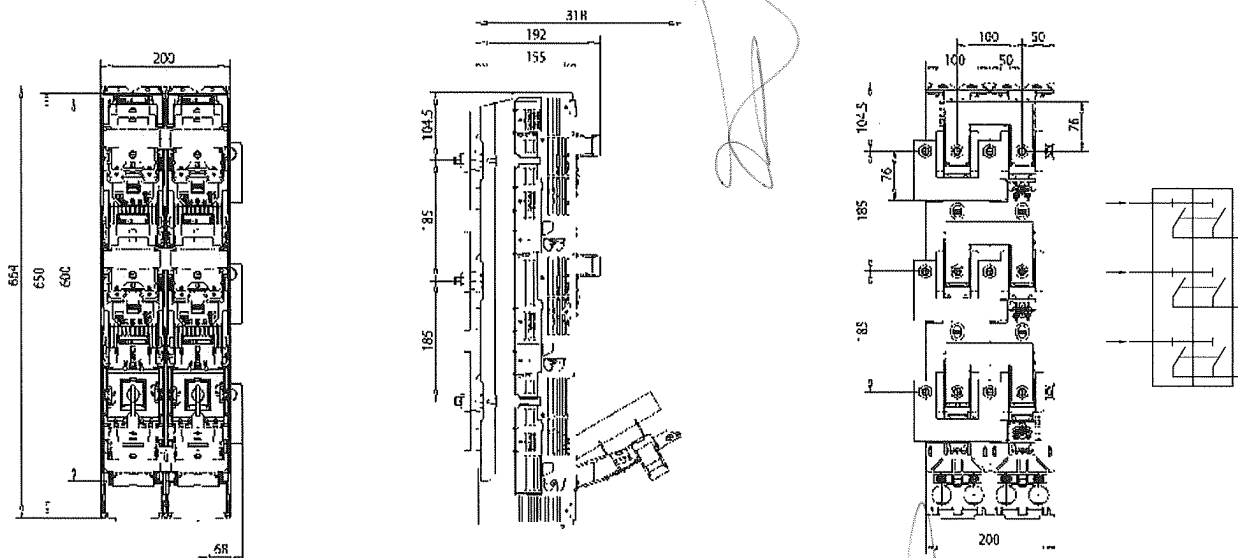
**3 Pole vertical design disconnectors, busbar connection (BTVC-DS)**  
**3-polige NH-Trennleisten, Sammelschienentrennung (BTVC-DS)**

438 Type / Typ

**A** 2000

Dimensions / Abmessungen

BTVC-DS 1 pole disconnection / BTVC-DS einpolig NH-Trennleisten



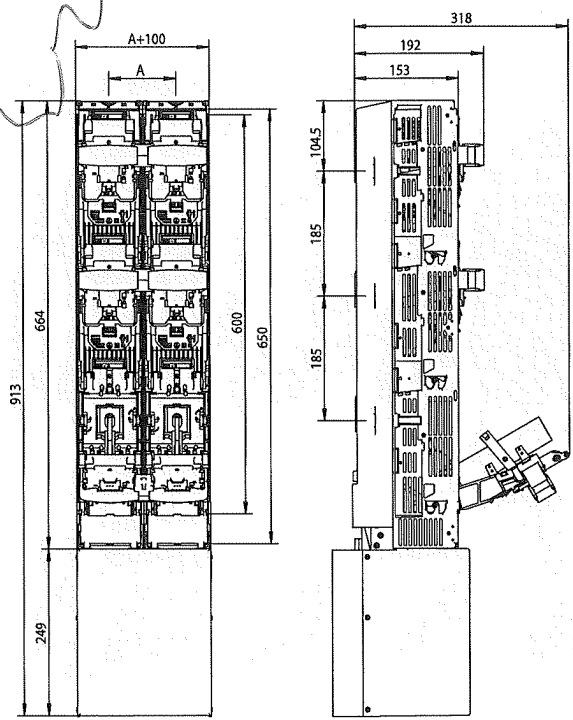
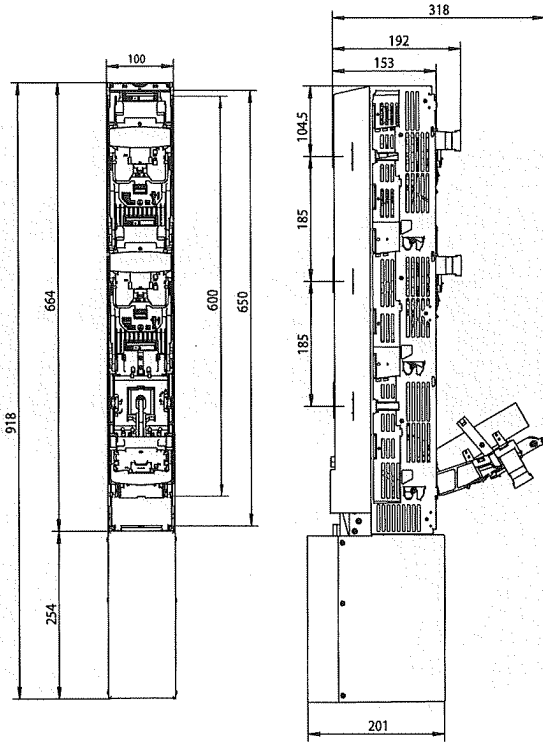
Switch disconnecter able to withstand High Short circuit currents  
 NH-trennleiste mit erhöhter Kurzschlussfestigkeit  
 (BTVC-S/BTVC-DS/BTVC-SDT)

Dimensions / Abmessungen

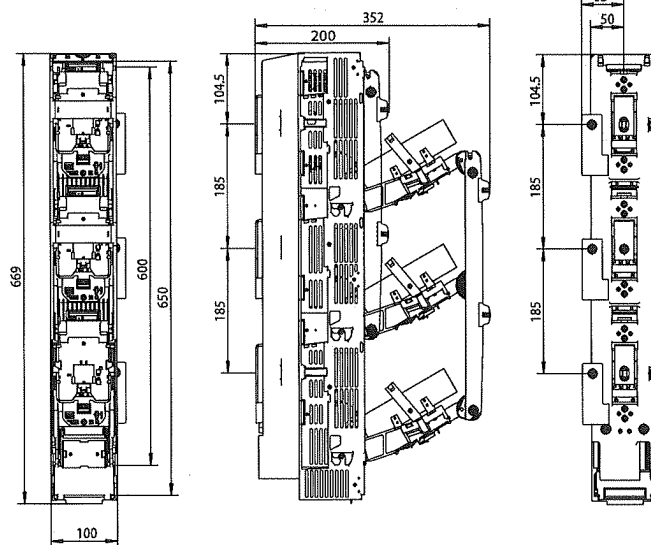
**BTVC-S 1 pole disconnection**  
 BTVC-S 1-polig-schaltbar

**BTVC-DS 1 pole disconnection**  
 BTVC-DS 1-polig-schaltbar

2



**BTVC-SDT 2 handles**  
 BTVC-SDT 2-hand-betrieben



- Width "A" / Breite "A"
- 100 mm
  - 105 mm
  - 110 mm

3 Pole vertical design fuse switches, 185-210 busbar spacing

**A** 250 400 630

3-polige NH-Sicherungslastchaltleisten, 185-210 Sammelschienenabstand (BTVC/BTVC-DT)

IEC / EN 60947-3	Type / Typ →	BTVC / BTVC-DT Type / Typ 438									
		250 A			400 A			630 A			
Electrical characteristics Elektrische Kenngrößen	Rated operational voltage Bemessungsbetriebsspannung	U <sub>e</sub> (V)	AC 400	AC 500	AC 690	AC 400	AC 500	AC 690	AC 400	AC 500	AC 690
	Rated operational current Bemessungsbetriebsstrom	I <sub>e</sub> (A)	250			400			630		
	Conventional free air thermal current with fuses Konventioneller thermischer Strom mit Sicherungen	I <sub>th</sub> (A)	250	250	250	400			630		
	Conventional free air thermal current with solid links Konventioneller thermischer Strom mit Trennmessern	I <sub>th</sub> (A)	400	400		510	510		800		
	Rated frequency Bemessungsfrequenz	(Hz)				40-60					
	Rated insulation voltage Bemessungsisolationsspannung	U <sub>i</sub> (V)				1000					
	Rated conditional short-circuit current Bedingter Bemessungskurzschlussstrom	(kA <sub>crit</sub> )	80			120			120		
	Utilization category Gebrauchskategorie	--	AC-23B	AC-22B		AC-23B	AC-22B		AC-23B	AC-22B	AC-22B
	Rated making capacity Bemessungseinschaltvermögen	(A)	2500	750		4000	1200		1890		
	Rated breaking capacity Bemessungsausschaltvermögen	(A)	2000	750		3200	1200		1890		
	Rated impulse withstand voltage Bemessungsstossspannung	U <sub>imp</sub> (kV)				20kV					
	Operating cycles with current Elektrische Lebensdauer (Schaltspiele)	--				200					
	Total power loss at I <sub>th</sub> (without fuse) Ges. Verlustleistung bei I <sub>th</sub> (ohne NH-SE)	P <sub>v</sub> (W)	25			52			120		
Mechanical characteristics Mechanische Kenngrößen	Weight Gewicht	(kg)	4,250			4,750			5,600		
	Busbar distance Sammelschienenabstand	(mm)				185 / 210					
	Panel front opening Abmessungen fuer Fronttafeleinbau	(mm)				600/650					
	Operating cycles without current Mechanische Lebensdauer (Schaltspiele)	--	1400			800			800		
Fuse links Sicherungseinsetze	Size to IEC / EN 60269 Baugroesse nach IEC / EN 60269	--	1			2			3		
	Max. rated current (gL/gG) Max. Bemessungsstrom (gL/gG)	I <sub>n</sub> (A)	250	250	200	400	400	315	630	630	500
	Max. permis. power loss per fuse-link Max. zul. Verlustleistung pro NH-SE	P <sub>v</sub> (W)	23			34			48		

**3 Pole vertical design fuse switches, 185-210 busbar spacing**  
**3-polige NH-Sicherungslastchaltleisten, 185-210 Sammelschienenabstand**  
**(BTVC/BTVC-DT)**

10

IEC / EN 60947-3	Type / Typ →	BTVC / BTVC-DT Type / Typ 438			
		250 A	400 A	630 A	
Terminals Kabelanschlüsse	Diameter Durchmesser	--	M10/M12		
	Bolt terminal Flachanschluss	Cable lug (S/DIN 46235) Kabelschuhe (S/DIN 46235)	(mm <sup>2</sup> )	2x25-300	
	V-terminal V-Klemme	Torque Anzugsdrehmoment	(Nm)	32	
		Terminal cross section Klemmenquerschnitt	(mm <sup>2</sup> )	50-300	
	Bimetallic terminal Flachdirekt anschlussklemme	Torque Anzugsdrehmoment	(Nm)	25	
		Terminal cross section Klemmenquerschnitt	(mm <sup>2</sup> )	35-185	
Protection degree Schutzart	Torque Anzugsdrehmoment	(Nm)	32		
	Front operated switchgear fitted Frontseitig, Gerät eingebaut	--	IP30		
Operating Conditions Betriebs- bedingungen	Ambient temperature Umgebungstemperatur	(°C)	-25 to +55 *(1)		
	Rated operating mode Bemessungsbetriebsart	--	continuous operation Dauerbetrieb		
	Actuation Betätigung	--	dependant manual operation Abhängige Handbetätigung		
	Altitude Höhenlage	(m)	up to 2000 bis 2000		
	Pollution degree Verschmutzungsgrad	--	3		
	Overvoltage category Überspannungskategorie	--	IV		

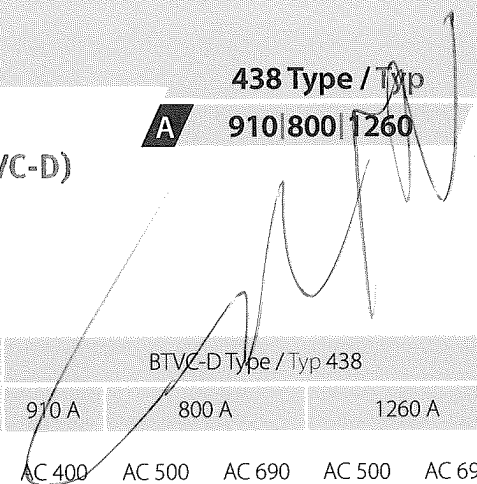
\*(1) 35°C normal temperature, at 55°C with reduced operating current. / \*(1) 35°C normale Umgebungstemperatur, bei 55°C mit reduziertem Betriebsstrom.



**3 Pole vertical design (double) fuse switches (BTVC-D)**  
**3-polige NH-(Doppel) Sicherungslastschaltleisten (BTVC-D)**

**A** 910 | 800 | 1260

IEC / EN 60947-3	Type / Typ →	BTVC-D Type / Typ 438						
		910 A	800 A		1260 A			
Electrical characteristics Elektrische Kenngrößen	Rated operational voltage Bemessungsbetriebsspannung	U <sub>e</sub> (V)	AC 400	AC 500	AC 690	AC 500	AC 690	
	Rated operational current Bemessungsbetriebsstrom	I <sub>e</sub> (A)	910	800	630	1260	1000	
	Conventional free air thermal current with fuses Konventioneller thermischer Strom mit Sicherungen	I <sub>th</sub> (A)	910	800	630	1260	1000	
	Conventional free air thermal current with solid links Konventioneller thermischer Strom mit Trennmessern	I <sub>th</sub> (A)	1250	960	750	1500	1200	
	Rated frequency Bemessungsfrequenz	(Hz)	50			40-60		
	Rated insulation voltage Bemessungsisolationsspannung	U <sub>i</sub> (V)	1000			1000		
	Rated conditional short-circuit current Bedingter Bemessungskurzschlussstrom	(kA <sub>eff</sub> )	50			50		
	Utilization category Gebrauchskategorie	--	AC-22B	AC-22B	AC-21B	AC-21B	AC-20B	
	Rated making capacity Bemessungseinschaltvermögen	(A)	2730	2400	945	2400	--	
	Rated breaking capacity Bemessungsausschaltvermögen	(A)	2730	2400	945	2400	--	
	Rated impulse withstand voltage Bemessungsstossspannung	U <sub>imp</sub> (kV)	20			20	20	
	Operating cycles with current Elektrische Lebensdauer (Schaltspiele)	--	100			100	--	
	Total power loss at I <sub>th</sub> (without fuse) Ges. Verlustleistung bei I <sub>th</sub> (ohne NH-SE)	P <sub>v</sub> (W)	200	110	70	200	130	
	Mechanical characteristics Mechanische Kenngrößen	Weight Gewicht	(kg)	12,974		14,536		15,722
		Busbar distance Sammelschienenabstand	(mm)	185			185	
Panel front opening Abmessungen fuer Fronttafeleinbau		(mm)				600 / 650		
Fuse links Sicherungsein-saetze	Operating cycles without current Mechanische Lebensdauer (Schaltspiele)	--				500		
	Size to IEC / EN 60269 Baugroesse nach IEC / EN 60269	--	3		2		3	
	Max. rated current (gL/gG) Max. Bemessungsstrom (gL/gG)	I <sub>n</sub> (A)	910(gTr)	400	315	630	500	
	Max. permis. power loss per fuse-link Max. zul. Verlustleistung pro NH-SE	P <sub>v</sub> (W)	70	34	45	48	60	



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*Handwritten signature or mark.*

*Handwritten signature or mark.*

**3 Pole vertical design (double) fuse switches (BTVC-D)**  
**3-polige NH-(Doppel) Sicherungslastschaltleisten (BTVC-D)**

10

IEC / EN 60947-3	Type / Typ →	BTVC-D Type / Typ 438		
		910 A	800 A	1260 A
	Diameter / Durchmesser	-	M12	M12
Terminals / Kabelanschlüsse	Bolt terminal / Flachanschluss			
	Cable lug (S/DIN 46235) / Kabelschuhe (S/DIN 46235)	(mm <sup>2</sup> )	2x95-300	3x95-300
	Torque / Anzugsdrehmoment	(Nm)	32	32
Protection degree / Schutzart	Front operated switchgear fitted / Frontseitig, Gerät eingebaut	--		IP30
	Ambient temperature / Umgebungstemperatur	(°C)		-25 to +55 *(1)
Operating Conditions / Betriebsbedingungen	Rated operating mode / Bemessungsbetriebsart	--		continuous operation / Dauerbetrieb
	Actuation / Betätigung	--		dependant manual operation / Abhängige Handbetätigung
	Altitude / Höhenlage	(m)		up to 2000 / bis 2000
	Pollution degree / Verschmutzungsgrad	--		3
	Overvoltage category / Überspannungskategorie	--		IV

\*(1) 35°C normal temperature, at 55°C with reduced operating current / \*(1) 35°C normale Umgebungstemperatur, bei 55°C mit reduziertem Betriebsstrom

**3 Pole vertical design disconnectors (BTVC-S / BTVC-DS)**  
**3-polige Trennleisten (BTVC-S / BTVC-DS)**

438 Type / Typ

**A** 400 630 1000 2000

IEC / EN 60947-3	Type / Typ →	BTVC / BTVC-DS Type / Typ 438						
		400 A	630 A	1000 A	2000 A			
Electrical characteristics Elektrische Kenngrößen	Rated operational voltage Bemessungsbetriebsspannung	U <sub>e</sub> (V)	AC 500 / 690	AC	AC	AC	AC	500 / 690
	Rated operational current Bemessungsbetriebsstrom	I <sub>e</sub> (A)	400	630	1000	2000		
	Conventional free air thermal current with solid links Konventioneller thermischer Strom mit Trennmessern	I <sub>th</sub> (A)	400	630	1000	2000		
	Rated frequency Bemessungsfrequenz	(Hz)			40 - 60			
	Rated insulation voltage Bemessungsisolationsspannung	U <sub>i</sub> (V)			1000			
	Rated short-time withstand current (1sec) Bemessungskurzzeitstrom (1sec)	(kA <sub>eff</sub> )		15* (1)		11* (1)		11* (2)
	Utilization category Gebrauchskategorie	--	AC-20B	AC-20B	AC-23B	AC-22B		AC-20B
	Rated making capacity Bemessungseinschaltvermögen	(A)	-	-	10000	3000		-
	Rated breaking capacity Bemessungsausschaltvermögen	(A)	-	-	8000	3000		-
	Rated impulse withstand voltage Bemessungsstossspannung	U <sub>imp</sub> (kV)			20			
Mechanical characteristics Mechanische Kenngrößen	Total power loss at I <sub>th</sub> (without fuse) Ges. Verlustleistung bei I <sub>th</sub> (ohne Trennmessse)	P <sub>v</sub> (W)	52	98	280	600		
	Weight Gewicht	(kg)	4,750	5,750	8,750	20,010		
	Busbar distance Sammelschienenabstand	(mm)			185			
Fuse links Trennmesser	Panel front opening Abmessungen fuer Fronttafeleinbau	(mm)			600/650			
	Size to IEC / EN 60269 Baugroesse nach IEC EN 60269	--	2		3			
	Max. rated current Max. Bemessungsstrom	I <sub>n</sub> (A)	400	630	1000			

\*(1) 25 kA / 1s - 1000 A with special accessory / \*(1) 25kA / 1s - 1000 A auf Anfrage  
 \*(2) 31 kA / 3s - 2000 A with special accessory / \*(2) 31 kA / 3s - 2000 A auf Anfrage

**3 Pole vertical design disconnectors (BTVC-S / BTVC-DS)**  
**3-polige Trennleisten (BTVC-S / BTVC-DS)**

10

IEC / EN 60947-3	Type / Typ →	BTVC / BTVC-DS Type / Typ 438				
		400 A	630 A	1000 A	2000 A	
Terminals Kabelanschlüsse	Diameter Durchmesser	M10/M12		M12		
	Bolt terminal Flachanschluss	Cable lug (S/DIN 46235) Kabelschuhe (S/DIN 46235)	(mm <sup>2</sup> )	2x25-300	2x95-300	4x95-300
		Torque Anzugsdrehmoment	(Nm)	32		
Protection degree Schutzart	Front operated switchgear fitted Frontseitig, Gerät eingebaut		--	IP30		
Operating Conditions Betriebs- bedingungen	Ambient temperature Umgebungstemperatur	(°C)	-25 to +55 *(1)			
	Rated operating mode Bemessungsbetriebsart	--	continuous operation Dauerbetrieb			
	Actuation Betätigung	--	dependant manual operation Abhängige Handbetätigung			
	Altitude Höhenlage	(m)	up to 2000 / bis 2000			
	Pollution degree Verschmutzungsgrad	--	3			
	Overvoltage category Überspannungskategorie	--	IV			

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Independent, accredited testing station · Member laboratory of STL and LOVAG

# TYPE TEST REPORT

NO. 2270.2100870.0579

PRONUTEC, S. A  
Parque Empresarial Boroa  
Parcela 2C-1  
48340 Amorebieta (Vizcaya)  
SPAIN

CLIENT

PRONUTEC, S. A

MANUFACTURER

Three pole LV HRC fuse-switch-disconnector in vertical design

TEST OBJECT

BTVC 400A NH2 DU  
Single-pole operated

TYPE

Samples of series production

SERIAL NO.

Rated operational voltage (AC)	500 V	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated insulation voltage (AC)	1000 V	
Rated impulse withstand voltage	8 kV	
Rated operational current	400 A	
Conventional free air thermal current	400 A	
Rated frequency	50 Hz	
Rated conditional short-circuit current	50 kA	
Utilization category	AC-22B	

IEC 60947-3: 2008-08

NORMATIVE DOCUMENT

Test sequence I: General performance characteristics  
Test sequence II: Operational performance capability  
Test sequence IV: Conditional short-circuit current  
Test sequence V: Overload performance

RANGE OF TESTS PERFORMED

17 August to 16 September 2010

DATE OF TEST

The ratings of the test object related to the scope of tests have been proved.  
The tests have been PASSED.

TEST RESULT

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

STEFAN SCHWANCK  
Head of Centre of Competence  
Low-Voltage & Railway Equipment  
Berlin, 02 November 2010

RAINER BORCHERT  
Test engineer in charge




Independent test laboratory, accredited by Deutsche Akkreditierungsstelle Technik (DATech) e.V. in the fields of h.v. apparatus and switchgear, power cables and power cable accessories, l.v. apparatus and switchgear, installation equipment and switching and control equipment.  
Institut „Prüffeld für elektrische Hochleistungstechnik“ GmbH (PH Berlin) is a subsidiary of CESI S.p.A, Milan.



DAT - P - 019/92

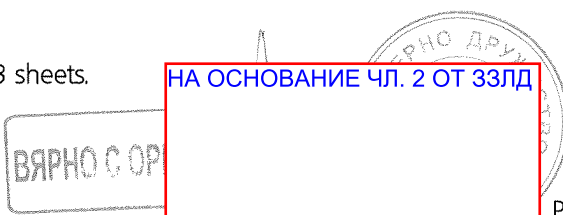
**Contents**

	Sheet
<b>1. Present at the test</b> .....	<b>3</b>
<b>2. Test performed</b> .....	<b>3</b>
<b>3. Identity of the test object</b> .....	<b>4</b>
3.1 Technical data and characteristics.....	4
3.2 Identity documents.....	5
<b>4. Test sequence I: General performance characteristics</b> .....	<b>6</b>
4.1 Temperature-rise.....	6
4.2 Dielectric properties.....	9
4.3 Making and breaking capacities.....	11
4.4 Dielectric verification.....	15
4.5 Leakage current.....	16
4.6 Temperature-rise verification.....	17
4.7 Strength of actuator mechanism.....	20
4.8 Evaluation of test sequence I.....	21
<b>5. Test sequence II: Operational performance capability</b> .....	<b>22</b>
5.1 Operational performance without current.....	22
5.2 Operational performance with current.....	23
5.3 Dielectric verification.....	27
5.4 Leakage current.....	28
5.5 Temperature-rise verification.....	29
5.6 Evaluation of test sequence II.....	31
<b>6. Test sequence IV: Conditional short-circuit current</b> .....	<b>32</b>
6.1 Fuse-protected short-circuit withstand/making.....	32
6.2 Dielectric verification.....	36
6.3 Leakage current.....	37
6.4 Temperature-rise verification.....	38
6.5 Evaluation of test sequence IV.....	40
<b>7. Test sequence V: Overload performance</b> .....	<b>41</b>
7.1 Overload test.....	41
7.2 Dielectric verification.....	43
7.3 Leakage current.....	44
7.4 Temperature-rise verification.....	45
7.5 Evaluation of test sequence V.....	47
<b>8. Photos</b> .....	<b>48</b>
<b>9. Oscillograms</b> .....	<b>51</b>
<b>10. Drawing</b> .....	<b>73</b>

This test document comprises 73 sheets.

Distribution

Copy No. 1 in English:



Copy No. 1

PRONUTEC, S. A.

The test results relate only to the object tested.

This document is confidential. Its transfer to third parties as well as its reproduction in extracts require the consent of the client.

TYPE TEST REPORT NO. 2270.2100870.0579

**1. Present at the test**

Mr.	Rainer Borchert	IPH test engineer in charge
Mr.	Jens Haring	IPH test engineer
Mrs.	Esther Plasencia Alonso	PRONUTEC, S. A.

**2. Test performed**

Test sequence I: General performance characteristics

- Temperature-rise
- Dielectric properties
- Making and breaking capacities
- Dielectric verification
- Leakage current
- Temperature-rise verification
- Strength of actuator mechanism

Test sequence II: Operational performance capability

- Operational performance
- Dielectric verification
- Leakage current
- Temperature-rise verification

Test sequence IV: Conditional short-circuit current

- Test of fuse-protected short-circuit withstand
- Test of fuse-protected short-circuit making
- Dielectric verification
- Leakage current
- Temperature-rise verification

Test sequence V: Overload performance

- Overload test
- Dielectric verification
- Leakage current
- Temperature-rise verification

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛОМ

### 3. Identity of the test object

#### 3.1 Technical data and characteristics

The technical data and characteristics of the test object are defined by the following parameters and specified by the client

Test object:	Three pole LV HRC fuse-switch-disconnector in vertical design	
Type:	BTVC 400A NH2 DU Single-pole operated	
Size:	NH2	
Manufacturer:	PRONUTEC, S. A.	
Serial No.:	Sample of series production	
Year of manufacture:	2010	
Data:	Rated operational voltage	500 V AC
	Rated insulation voltage	1000 V AC
	Rated impulse withstand voltage	8 kV
	Rated operational current	400 A
	Conventional free air thermal current	400 A
	Rated frequency	50 Hz
	Rated conditional short-circuit current	50 kA
	Rated duty	Uninterrupted
	Utilization category	AC-22B
	Degree of pollution	3
	Material group	III
	Overvoltage class	4
Characteristics:	Fuses used	
	Manufacturer	SIBA
	Type	20 004 13
	Size/char.	NH2-gG
	Rated voltage/current	500V/400A
	Torque	32 Nm
Material:	Material of enclosure	BMC
	Material of cover	PBT
	Material of actuator mechanism	PA
	Material of outgoing bars	Cu tin-coated
	Material of contact	Cu silver-coated
	Material of compression spring	Stainless steel

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С С



### 3.2 Identity documents

The manufacturer confirms that the test object has been manufactured in compliance with the drawings given in this document. IPH did not verify this compliance in detail. The identity of the test object is fixed by the following drawings and data submitted by the client:

Name of drawing	Drawing No.	Date of drawing	Author	Notes
BTVC 400A TRIVER 2010	E-438.002	09-08-10	pronutec gorian team	Sheet 73

Entry of test objects at IPH: 16 August 2010

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛУ

ПЛОВДИВ

**4. Test sequence I: General performance characteristics**

**4.1 Temperature-rise**

**Test laboratory**

Low-voltage test laboratory, test room 7

**Normative document**

IEC 60947-3: 2008-08

**Required test parameters**

Test current: 400 A, three-phase

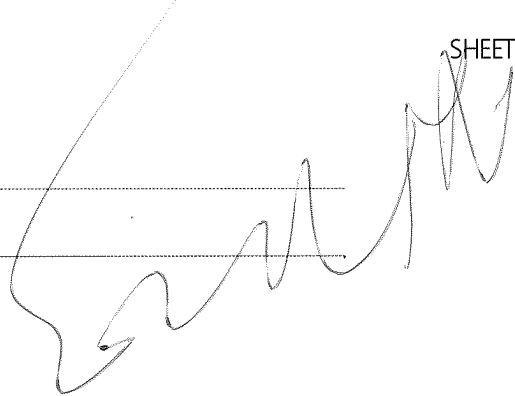
Test frequency: 50 Hz

**Test arrangement**

According to IEC 60947-3: 2008-08

The test object was mounted, as specified by the manufacturer, in vertical position of use and in free air to a 1000-mm copper bar system with a cross-section of 2 x 30 mm x 5 mm per phase. The load terminals were connected by a 3-m insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase. The neutral point was on the outgoing side.

The torque of the screws at the terminals was 32 Nm.



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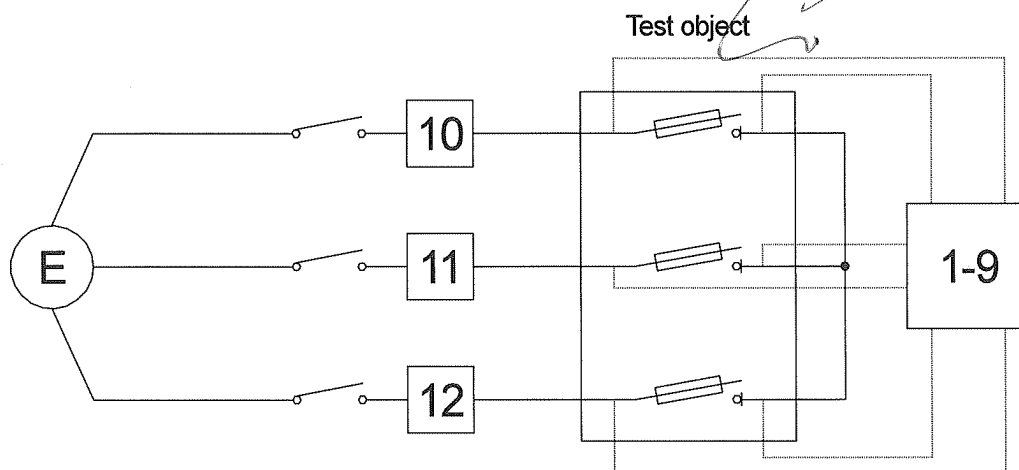
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НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛА

ПЛОВДИВ

Test and measuring circuits



- E Power supply
- 1 - 9 Points of temperature measurement
- 10 - 12 Points of current measurement

Figure 1: Circuit for the temperature-rise test

Technical data of measuring circuits

Measuring point	Measured quantity	Measuring sensor
1 - 9	Temperature	Cu/constantan thermocouples
10	Test current L1	Current transformer with burden
11	Test current L2	Current transformer with burden
12	Test current L3	Current transformer with burden
Measuring instruments: Measuring points 1 - 9: MV-logger Therm 8032-8M Measuring points 10 - 12: Digital Display SPE		

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОПИСАНИЕ

**Test results**

The temperature-rise test done before the test of making and breaking capacities was carried out using LV HRC fuse-links of size 2.

Technical data of fuses used

Manufacturer: SIBA  
 Type: 20 004 13  
 Rated current: 400 A/gG  
 Rated voltage: 500 V

Date of test: 16.09.2010  
 Test current: 401 A  
 Test frequency: 50 Hz

Condition of test object: New

Meas. point/ Phase	Designation	Classification	Material	Temperature-rise limit permitted [K]	Final temperature measured [°C]	Final temperature rise [K]	
1	L1	Busbar terminals	Copper tin-coated	65	58.8	37.6	
2	L2				59.2	38.0	
3	L3				56.5	35.3	
4	L1	Cable terminals	Copper tin-coated	65	61.4	40.2	
5	L2				61.6	40.4	
6	L3				65.8	44.6	
7	-	Enclosure	Exposed part	Insulating material	50	48.6	27.4
8	-	Actuator	Manual actuator	Insulating material	25	26.3	5.1
9	-	Ambient air	-	-	-	21.2	-

The final temperature-rise values measured did not exceed the temperature-rise limits defined by IEC 60947-1, Tables 2 and 3.

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

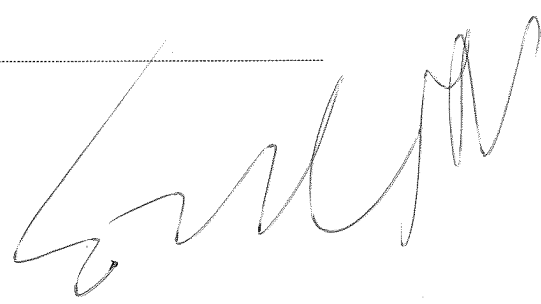
ВЯРНО С ОР

ПЛОВДИВ

**4.2 Dielectric properties**

**Test laboratory**

Low-voltage test laboratory, test room 7



**Normative document**

IEC 60947-3: 2008-08

**Required test parameters**

- Verification of impulse withstand voltage
 

Lightning impulse voltage 1.2/50 $\mu$ s:	12.3 kV	Insulation of isolating distances
Lightning impulse voltage 1.2/50 $\mu$ s:	9.8 kV	Phase-to-phase insulation and phase-to-earth insulation
  
- No. of tests: 5 each
- Polarity: Positive und negative to earth
  
- Power-frequency withstand verification of solid insulation
 

50 Hz AC test voltage:	2200 V
Duration of test:	5 each s
  
- Verification of creepage distances
 

Minimum creepage distance:	12.5 mm	(Degree of pollution 3)
----------------------------	---------	-------------------------
  
- Leakage current
 

Test voltage:	550 V (1.1 x 500 V)
Test frequency:	50 Hz



**Test arrangement**

According to IEC 60947-3: 2008-08



ЕРНО ДР  
**НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД**

ВЯРНО С ОРИГИНАЛ

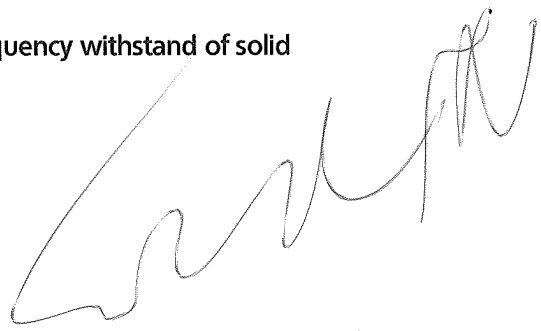
**Test results**

- **Verification of impulse withstand voltage and of power-frequency withstand of solid insulation**

Date of test: 16.09.2010

Atmospheric conditions during test

Air temperature: 20.4 °C  
 Air pressure: 1024 mbar  
 Air humidity: 35 %



Test arrangement			Applied test voltage 1.2/50 μs	Results	Applied 50-Hz test voltage	Results
Switching state of the test object	Voltage applied to	Earthed				
			kV	No. of impulses/ disruptive discharges	kV	Disruptive discharges
Closed	A,a	B,b,C,c,G	± 9.8	5 each/0	2.2	0
Closed	B,b	A,a,C,c,G	± 9.8	5 each/0	2.2	0
Closed	C,c	A,a,B,b,G	± 9.8	5 each/0	2.2	0
Closed	A,B,C,a,b,c	G	± 9.8	5 each/0	2.2	0
Open	A	a,B,b,C,c,G	± 9.8	5 each/0	2.2	0
Open	B	A,a,b,C,c,G	± 9.8	5 each/0	2.2	0
Open	C	A,a,B,b,c,G	± 9.8	5 each/0	2.2	0
Open	a	A,B,b,C,c,G	± 9.8	5 each/0	2.2	0
Open	b	A,a,B,C,c,G	± 9.8	5 each/0	2.2	0
Open	c	A,a,B,b,C,G	± 9.8	5 each/0	2.2	0
Open	A,B,C	a,b,c	± 12.3	5 each/0	-	-

- **Verification of creepage distances**

The minimum creepage distance measured to Annex G is 17 mm. The required minimum creepage distance limit has been observed.

- **Leakage current**

The leakage current of max. 3 μA measured, was smaller than the permissible value of 0.5 mA.

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛОМ

Stamp area with a red border

### 4.3 Making and breaking capacities

#### Test laboratory

Low-voltage test laboratory, test room 1

#### Normative document

IEC 60947-3: 2008-08



#### Required test parameters

	AC-22B
Test voltage:	525 V (1.05 x 500 V)
Test making current:	1200 A
Test breaking current:	1200 A
Power factor:	0.65
Test frequency:	50 Hz

#### Test arrangement

According to IEC 60947-3: 2008-08

The test object was mounted, as specified by the manufacturer, in vertical position of use and in free air to a 500-mm copper bar system with a cross-section of 1 x 30 mm x 10 mm per phase. This copper bar system was connected to the test current source by a 1.5-m insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase. On its outgoing side, the test object was connected to the load circuit by a 1.5-m insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase. The distance to the metallic grid was 50 mm (left/right/top).



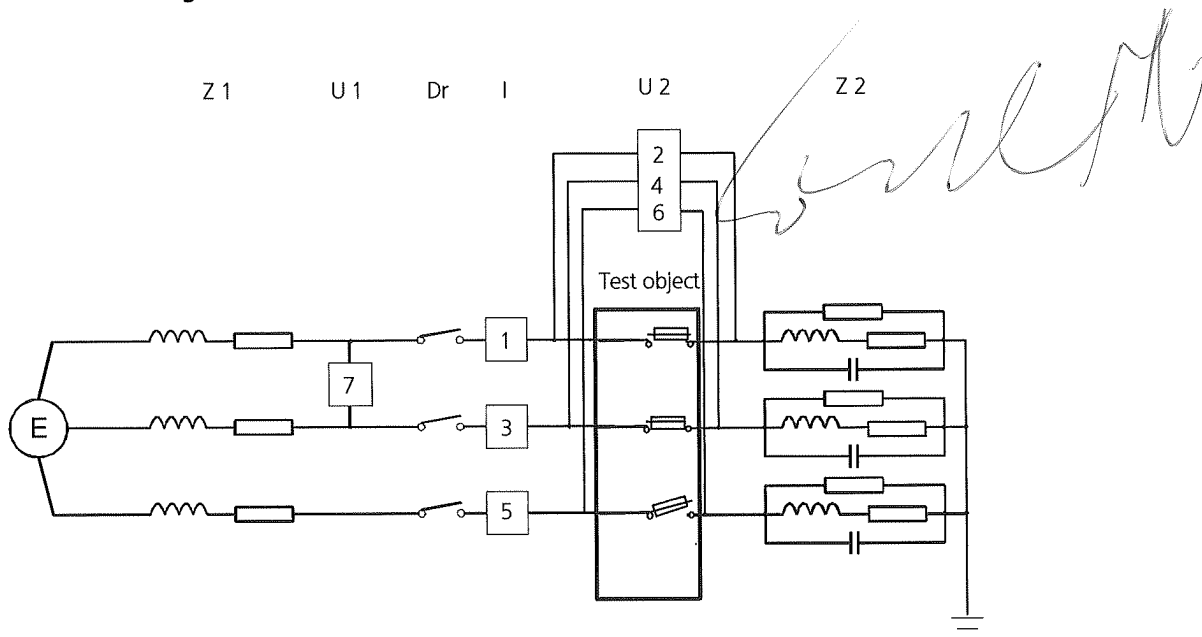
The torque of the screws at the terminals was 32 Nm.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГ

Test and measuring circuits



- |        |                        |       |                               |
|--------|------------------------|-------|-------------------------------|
| E      | Power supply           | U1    | Test voltage measurement      |
| Dr     | Making switch          | U2    | Switching voltage measurement |
| Z1, Z2 | Test circuit impedance | I     | Current measurement           |
|        |                        | 1 - 7 | Measuring points              |

Figure 2: Circuit for the test of making and breaking capacities AC-22B

Technical data of measuring circuits

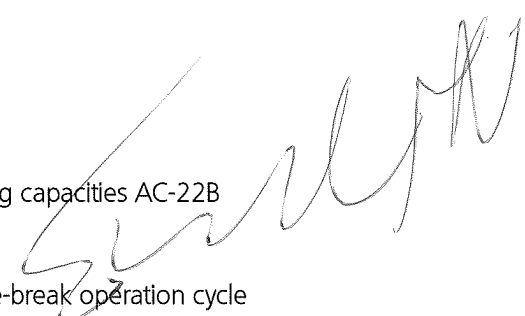
Test No.	Measuring point	Measured quantity	Measuring sensor
210 3745 to 210 3754	1	Current L1	Shunt
	3	Current L2	Shunt
	5	Current L3	Shunt
	2	Switching voltage L1	RC divider
	4	Switching voltage L2	RC divider
	6	Switching voltage L3	RC divider
	7	Test voltage	Voltage transformer

Measuring instruments:  
 Measuring points 1 - 6: Transient recorder  
 Measuring point 7: Digital voltmeter (class 0.5)



**Test results**

Date of test: 18.08.2010  
 Test circuit type: Direct  
 Test requirement: Test of making and breaking capacities AC-22B  
 Operating sequence: 5 x CO - t (t - dead time),  
 L2 closed and L3 open,  
 L1 is subjected to the make-break operation cycle  
 Connection of test object: - Power supply at busbar terminals  
 - Load circuit at cable terminals  
 Condition of test object before test: New  
 Ambient temperature: 19 °C



**Test parameters:**

Test No.		210 3745	210 3746	210 3747	210 3748	210 3749	
Operating sequence		1. CO-t	2. CO-t	3. CO-t	4. CO-t	5. CO	
Dead time	s	30	30	30	30	-	
Applied voltage	V	534	534	534	534	534	
Prospective peak short-circuit current	kA	L1	1.73	1.73	1.73	1.73	1.73
		L2	1.83	1.83	1.83	1.83	1.83
		L3	1.90	1.90	1.90	1.90	1.90
Prospective symmetrical short-circuit current	kA	L1	1.21	1.21	1.21	1.21	1.21
		L2	1.20	1.20	1.20	1.20	1.20
		L3	1.20	1.20	1.20	1.20	1.20
	Average	1.20	1.20	1.20	1.20	1.20	
Power factor cos φ		0.61	0.61	0.61	0.61	0.61	
Breaking current	kA	L1	1.05	1.05	1.05	1.05	1.05
		L2	-	-	-	-	-
		L3	-	-	-	-	-
Recovery voltage	V	L1	525	525	525	525	525
		L2	-	-	-	-	-
		L3	-	-	-	-	-
	Average phase-to-phase	-	-	-	-	-	
Joule integral	10 <sup>3</sup> kA <sup>2</sup> s	L1	206	198	205	206	206
		L2	-	-	-	-	-
		L3	-	-	-	-	-
Duration of current flow	ms	189	185	195	196	195	
Arcing time	ms	L1	12.9	12.1	22.4	19.2	17.2
		L2	-	-	-	-	-
		L3	-	-	-	-	-
Notes		1)	1)	1)	1)	1)	
Evaluation		OK	OK	OK	OK	OK	



**Notes:**

OK - The test object was able to make and break properly.  
 1) Technical data of fuses used:  
 Manufacturer/Type: SIBA/20 004 13  
 Size/char.: NH2-gG  
 Rated voltage/current: 500V/400A



**Condition of test object after test:**

Immediately after the test of making and breaking capacities, the switching device was capable of properly opening and closing during a no-load operation.

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОПЯ

**Test results**

Date of test: 18.08.2010  
 Test circuit type: Direct  
 Test requirement: Test of making and breaking capacities AC-22B  
 Operating sequence: 5 x CO - t (t - dead time),  
 L1 and L2 closed,  
 L3 is subjected to the make-break operation cycle  
 Connection of test object: - Power supply at busbar terminals  
 - Load circuit at cable terminals  
 Condition of test object before test: Prestressed by tests Nos. 210 3745 to 210 3749  
 Ambient temperature: 19 °C

**Test parameters:**

Test No.		210 3750	210 3751	210 3752	210 3753	210 3754
Operating sequence		1. CO-t	2. CO-t	3. CO-t	4. CO-t	5. CO
Dead time	s	30	30	30	30	-
Applied voltage	V	534	534	534	534	534
Prospective peak short-circuit current	kA	L1	1.73	1.73	1.73	1.73
		L2	1.83	1.83	1.83	1.83
		L3	1.90	1.90	1.90	1.90
Prospective symmetrical short-circuit current	kA	L1	1.21	1.21	1.21	1.21
		L2	1.20	1.20	1.20	1.20
		L3	1.20	1.20	1.20	1.20
	Average	1.20	1.20	1.20	1.20	1.20
Power factor cos φ		0.61	0.61	0.61	0.61	0.61
Breaking current	kA	L1	-	-	-	-
		L2	-	-	-	-
		L3	1.20	1.20	1.20	1.20
Recovery voltage	V	L1	-	-	-	-
		L2	-	-	-	-
		L3	464	464	464	465
	Average phase-to-phase	-	-	-	-	-
Joule integral	10 <sup>3</sup> kA <sup>2</sup> s	L1	423	431	431	425
		L2	414	418	419	419
		L3	245	248	248	240
Duration of current flow	ms	175	171	173	169	173
Arcing time	ms	L1	-	-	-	-
		L2	-	-	-	-
		L3	15.5	13.0	12.5	12.9
Notes		1)	1)	1)	1)	1)
Evaluation		OK	OK	OK	OK	OK

**Notes:**

OK - The test object was able to make and break properly.

1) Technical data of fuses used:

Manufacturer/Type: SIBA/20 004 13

Size/char.: NH2-gG

Rated voltage/current: 500V/400A

**Condition of test object after test:**

Immediately after the test of making and breaking capacities, the switching device was capable of properly opening and closing during a no-load operation.

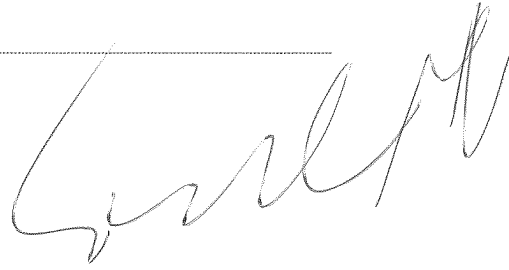
НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОП

**4.4 Dielectric verification**

**Test laboratory**

Low-voltage test laboratory, test room 9



**Normative document**

IEC 60947-3: 2008-08

**Required test parameters**

Test voltage: 1000 V  
 Test frequency: 50 Hz

**Test arrangement**

According to IEC 60947-3: 2008-08

**Test results**

Date of test: 18.08.2010

After the test of making and breaking capacities, an AC voltage withstand test across open contacts and between closed contacts and enclosure was carried out at 1050 V AC.

The test voltage was applied:

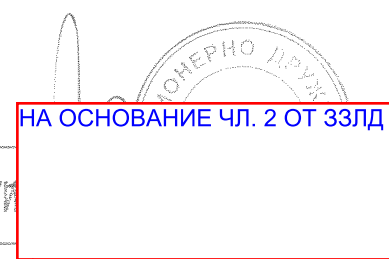
- between all closed contacts and the enclosure
- between one pair of closed contacts and the enclosure and the other connected contact gaps
- across all opened contacts and connected gaps and the enclosure
- across all connected terminals of one side and the connected terminals of the other side



During each test period of 5 s, no disruptive discharges occurred.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД



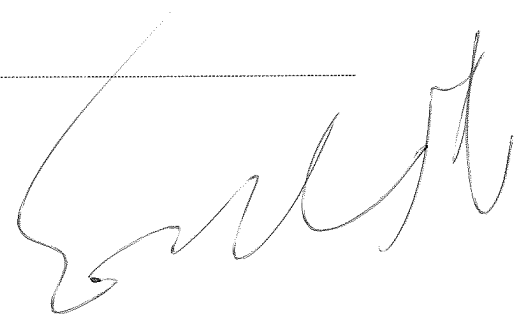
ВЯРНО С ОРИГА

#### 4.5 Leakage current

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##### Test laboratory

Low-voltage test laboratory, test room 9



##### Normative document

IEC 60947-3: 2008-08

##### Required test parameters

Test voltage: 550 V (1.1 x 500 V)

Test frequency: 50 Hz

##### Test arrangement

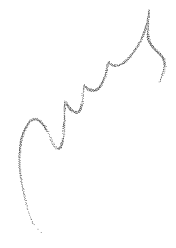
According to IEC 60947-3: 2008-08

##### Test results

Date of test: 18.08.2010

After the dielectric verification, the leakage current was measured across open contacts and between closed contacts and the enclosure at 110 % rated operational voltage.

The leakage current of max. 5  $\mu$ A measured, was smaller than the permissible value of 2 mA.



ВЯРНО С ОРИГ

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД



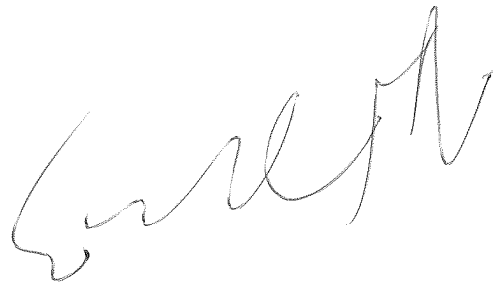
#### 4.6 Temperature-rise verification

##### Test laboratory

Low-voltage test laboratory, test room 7

##### Normative document

IEC 60947-3: 2008-08



##### Required test parameters

Test current: 400 A, three-phase

Test frequency: 50 Hz

##### Test arrangement

According to IEC 60947-3: 2008-08

The test object was mounted, as specified by the manufacturer, in vertical position of use and in free air to a 1000-mm copper bar system with a cross-section of 2 x 30 mm x 5 mm per phase. The load terminals were connected by a 3-m insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase. The neutral point was on the outgoing side.

The torque of the screws at the terminals was 32 Nm.

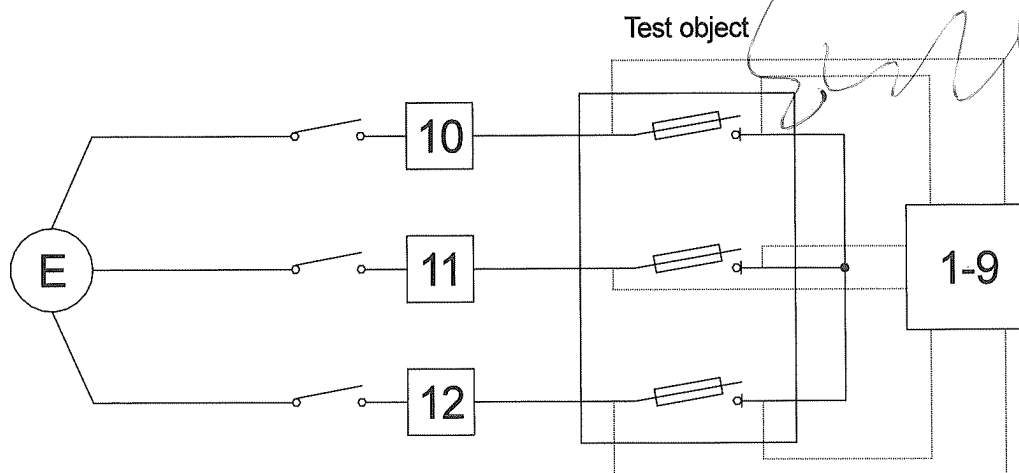




НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛА

Test and measuring circuits



- E Power supply
- 1 - 9 Points of temperature measurement
- 10 - 12 Points of current measurement

Figure 3: Circuit for the temperature-rise verification

Technical data of measuring circuits

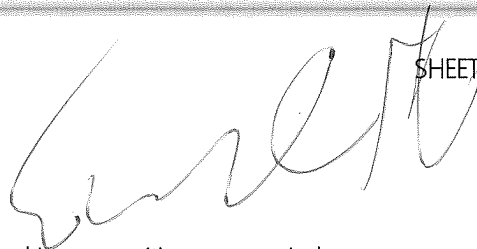
Measuring point	Measured quantity	Measuring sensor
1 - 9	Temperature	Cu/constantan thermocouples
10	Test current L1	Current transformer with burden
11	Test current L2	Current transformer with burden
12	Test current L3	Current transformer with burden
Measuring instruments: Measuring points 1 - 9: MV-logger Therm 8032-8M Measuring points 10 - 12: Digital Display SPE		

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ВЯРНО С ОРИГИНАЛ

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД



**Test results**

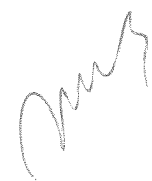
The temperature-rise verification done after the test of making and breaking capacities was carried out using LV HRC fuse-links of size 2.

Technical data of fuses used

Manufacturer: SIBA  
 Type: 20 004 13  
 Rated current: 400 A/gG  
 Rated voltage: 500 V  
 Date of test: 16.09.2010  
 Test current: 404 A  
 Test frequency: 50 Hz

Condition of test object: Prestressed by tests Nos. 210 3745 to 210 3754

Meas. point/ Phase		Designation	Classification	Temperature-rise limit permitted [K]	Final temperature measured [°C]	Final temperature rise [K]
1	L1	Busbar terminals	Terminal	80	58.6	37.6
2	L2				56.7	35.7
3	L3				55.4	34.4
4	L1	Cable terminals	Terminal	80	62.4	41.4
5	L2				63.3	42.3
6	L3				64.8	43.8
7	-	Enclosure	Insulating material	60	51.1	30.1
8	-	Actuator	Insulating material	35	27.9	6.9
9	-	Ambient air	-	-	21.0	-



The final temperature rise measured did not exceed the permissible temperature rise limits.



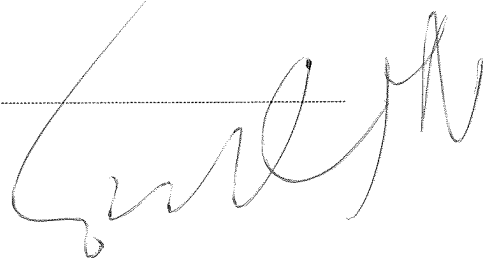
ВЕРНО С ОРИГИНАЛОМ

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

#### 4.7 Strength of actuator mechanism

##### Test laboratory

Low-voltage test laboratory, test room 7



##### Normative document

IEC 60947-3: 2008-08

##### Required test parameters

Minimum operating force: 150 N

Maximum operating force: 400 N

Test performed: One-hand operation (Figure 1e)

##### Test arrangement

According to IEC 60947-3: 2008-08

##### Test results

Date of test: 16.09.2010

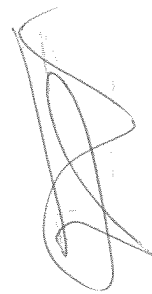
Before the strength of the actuator was verified, the force  $F$  necessary for opening the test object was measured.

This force  $F$  was 205 N.

To carry out the test, fixed and moving contacts were kept closed by bore and split-pin. The actuator was subjected to a test force of 400 N to IEC 60947-3, Table 8 (one-hand operation). The force was applied without shock to the actuator in a direction to open the contacts for a period of 10 s.

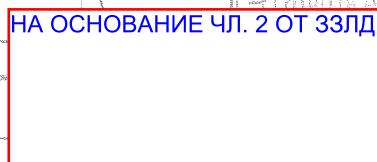
After the test of strength of actuator mechanism no damage was found on the switchgear. The actuator mechanism did not give "OFF" position when the contacts were closed.

The position indication complies with the requirements defined in IEC 60947-3, Sub-clause 8.2.5.3.

ВЯРНО С ОПИГ

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД






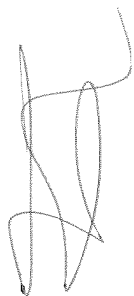
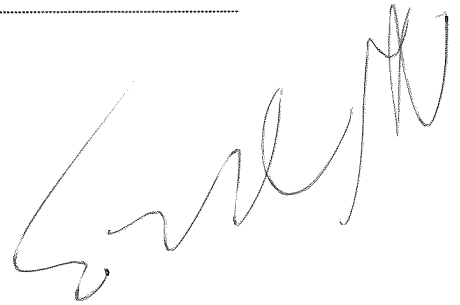
#### 4.8 Evaluation of test sequence I

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The LV HRC fuse-switch-disconnector in rail design has PASSED

- Test sequence I      General performance characteristics, consisting of
- Temperature-rise
  - Dielectric properties
  - Making and breaking capacities
  - Dielectric verification
  - Leakage current
  - Temperature-rise verification
  - Strength of actuator mechanism

at its rated parameters.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ 33ЛД

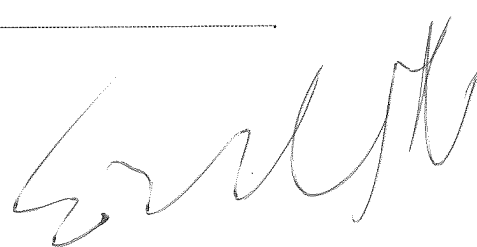
ВЯРНО С ОРИГИНА

**5. Test sequence II: Operational performance capability**

**5.1 Operational performance without current**

**Test laboratory**

Low-voltage test laboratory, test room 5



**Normative document**

IEC 60947-3: 2008-08

**Required test parameters**

Number of operating cycles:	800	(Utilization category B)
Operations per hour:	60	

**Test arrangement**

According to IEC 60947-3: 2008-08

**Test results**

Date of test: 17./18.08.2010

The poles L1 and L3 of the test object have undergone the operational performance test without current with the required number of cycles of 800 operations at a rate of 120 operations per hour without mechanical damage or failures.




НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГ

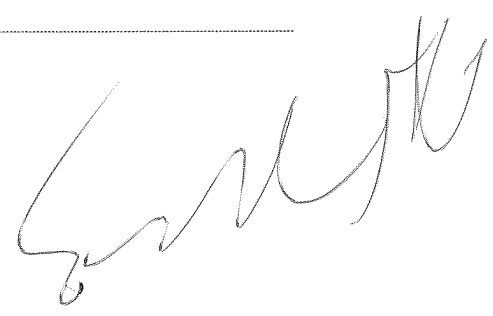
## 5.2 Operational performance with current

### Test laboratory

Low-voltage test laboratory, test room 1

### Normative document

IEC 60947-3: 2008-08



### Required test parameters

	AC-22B
Test voltage:	500 V
Test current:	400 A
Power factor:	0.8
Test frequency:	50 Hz
Number of operating cycles:	200
Operations per hour:	60

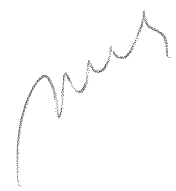
### Test arrangement

According to IEC 60947-3: 2008-08

The time interval between the tests of operational performance capability without current and with current was 14 hours.

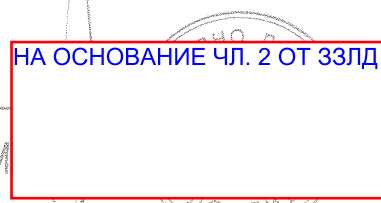
The test object was mounted, as specified by the manufacturer, in vertical position of use and in free air to a 500-mm copper bar system with a cross-section of 1 x 30 mm x 10 mm per phase. This copper bar system was connected to the test current source by a 1.5-m insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase. On its outgoing side, the test object was connected to the load circuit by a 1.5-m insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase. The distance to the metallic grid was 50 mm (left/right/top).

The torque of the screws at the terminals was 32 Nm.

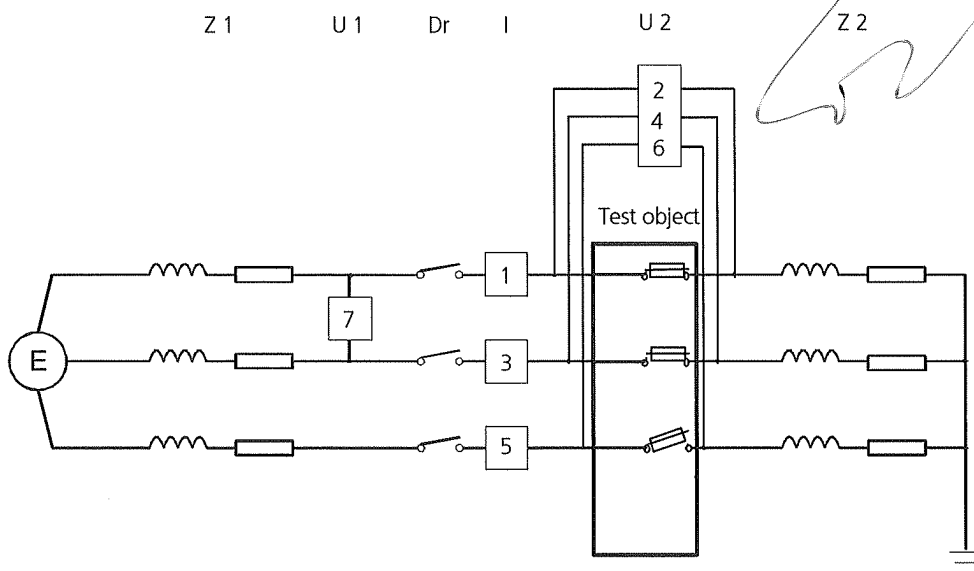



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИ



Test and measuring circuits



- |        |                        |       |                               |
|--------|------------------------|-------|-------------------------------|
| E      | Power supply           | U1    | Test voltage measurement      |
| Dr     | Making switch          | U2    | Switching voltage measurement |
| Z1, Z2 | Test circuit impedance | I     | Current measurement           |
|        |                        | 1 - 7 | Measuring points              |

Figure 4: Circuit for the operational performance test AC-22B

Technical data of measuring circuits

Test No.	Measuring point	Measured quantity	Measuring sensor
210 3762 to 210 3774,	1	Current L1	Voltage transformer
	3	Current L2	Voltage transformer
	5	Current L3	Voltage transformer
410 7786 to 410 7790	2	Switching voltage L1	RC divider
	4	Switching voltage L2	RC divider
	6	Switching voltage L3	RC divider
	7	Test voltage	Voltage transformer

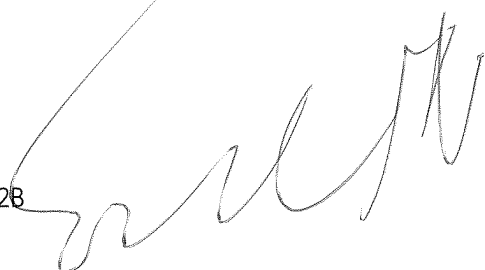
Measuring instruments:  
 Measuring points 1 - 6: Transient recorder  
 Measuring point: 7: Digital voltmeter (class 0.5)

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГ

**Test results**

Date of test: 17.08.2010  
 Test circuit type: Direct  
 Test requirement: Operational performance AC-22B  
 Operating sequence: 200 x CO-t (t - dead time)  
 L1 and L2 closed,  
 L3 is subjected to the make-break operation cycle  
 Connection of test object: - Power supply at the upper terminals  
 - Load circuit at the lower terminals  
 Condition of test object before test: Prestressed by the test according to Sub-clause 5.1  
 Ambient temperature: 21 °C



**Test parameters:**

Test No.	210 3762	210 3764	210 3766	210 3769	210 3774		
Operating sequence	Setting	1. CO-t	40. CO-t	100. CO-t	200. CO		
Dead time	s	-	60	60	60		
Applied voltage	V	510	510	510	510		
Prospective peak short-circuit current	A	L1	586	586	586	586	
		L2	590	590	590	590	
		L3	595	595	595	595	
Prospective symmetrical short-circuit current	A	L1	412	412	412	412	
		L2	407	407	407	407	
		L3	406	406	406	406	
	Average	408	408	408	408	408	
Power factor cos φ		0.79	0.79	0.79	0.79		
Breaking current	A	L1	-	-	-	-	
		L2	-	-	-	-	
		L3	-	406	406	406	403
Recovery voltage	V	L1	-	-	-	-	
		L2	-	-	-	-	
		L3	-	442	444	444	441
	Average phase-to-phase		-	-	-	-	
Joule integral	10 <sup>3</sup> A <sup>2</sup> s	L1	-	52.0	51.9	52.0	
		L2	-	50.8	50.9	50.9	50.0
		L3	-	33.0	33.5	33.5	33.2
Duration of current flow	ms	-	199	207	208	208	
Arcing time	ms	L1	-	-	-	-	
		L2	-	-	-	-	
		L3	-	9.15	14.9	18.7	17.5
Notes		-	1)	1)	1)	1)	
Evaluation		-	OK	OK	OK	OK	

**Notes:**

OK - The test object was able to make and break properly.  
 1) Technical data of fuses used:  
 Manufacturer/Type: SIBA/20 004 13  
 Size/char.: NH2-gG  
 Rated voltage/current: 500V/400A

**Condition of test object after test:**

After the test of operational performance, the switching device was capable of making and closing during a no-load operation.

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С С



**Test results (continued)**

Date of test: 18.08.2010  
 Test circuit type: Direct  
 Test requirement: Operational performance AC-22B  
 Operating sequence: 200 x CO-t (t - dead time)  
 L2 closed and L3 open,  
 L1 is subjected to the make-break operation cycle  
 Connection of test object: - Power supply at the upper terminals  
 - Load circuit at the lower terminals  
 Condition of test object before test: Prestressed by the test according to Sub-clause 5.1  
 Ambient temperature: 20 °C



**Test parameters:**

Test No.	410 7786	410 7787	410 7788	410 7789	410 7790
Operating sequence	<b>Setting</b>	<b>1. CO-t</b>	<b>20. CO-t</b>	<b>40. CO-t</b>	<b>200. CO</b>
Dead time	s	-	60	60	60
Applied voltage	V	510	510	510	510
Prospective peak short-circuit current	A	L1	567	567	567
		L2	563	563	563
		L3	582	582	582
Prospective symmetrical short-circuit current	A	L1	411	411	411
		L2	400	400	400
		L3	403	403	403
	Average	404	404	404	
Power factor cos φ		0.77	0.77	0.77	0.77
Breaking current	A	L1	-	345	356
		L2	-	-	-
		L3	-	-	-
Recovery voltage	V	L1	-	500	500
		L2	-	-	-
		L3	-	-	-
	Average phase-to-phase	-	-	-	
Joule integral	10 <sup>3</sup> A <sup>2</sup> s	L1	-	23.0	21.8
		L2	-	-	-
		L3	-	-	-
Duration of current flow	ms	-	197	187	
Arcing time	ms	L1	-	34.8	21.9
		L2	-	-	-
		L3	-	-	-
Notes		-	1)	1)	1)
Evaluation		-	OK	OK	OK

**Notes:**

OK - The test object was able to make and break properly.  
 1) Technical data of fuses used:  
 Manufacturer/Type: SIBA/20 004 13  
 Size/char: NH2-gG  
 Rated voltage/current: 500V/400A




**Condition of test object after test:**

After the test of operational performance, the switching device was capable of prop and closing during a no-load operation.

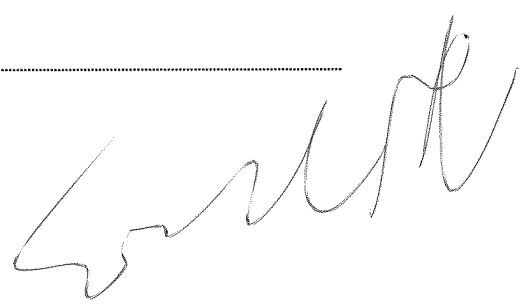
НА ОСНОВАНИЕ ЧЛ. 2 ОТ 33ЛД



**5.3 Dielectric verification**

**Test laboratory**

Low-voltage test laboratory, test room 7



**Normative document**

IEC 60947-3: 2008-08

**Required test parameters**

Test voltage: 1000 V  
 Test frequency: 50 Hz

**Test arrangement**

According to IEC 60947-3: 2008-08

**Test results**

Date of test: 14.09.2010

After the operational performance test, a power-frequency voltage withstand test was carried out at 1050 V AC.

The test voltage was applied:

- between all closed contacts and the enclosure
- between one pair of closed contacts and the enclosure and the other connected contact gaps
- across all opened contacts and connected gaps and the enclosure
- across all connected terminals of one side and the connected terminals of the other side

During each test period of 5 s, no disruptive discharges occurred.




НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОПИС

#### 5.4 Leakage current

##### Test laboratory

Low-voltage test laboratory, test room 7

##### Normative document

IEC 60947-3: 2008-08

##### Required test parameters

Test voltage: 550 V (1.1 x 500 V)

Test frequency: 50 Hz

##### Test arrangement

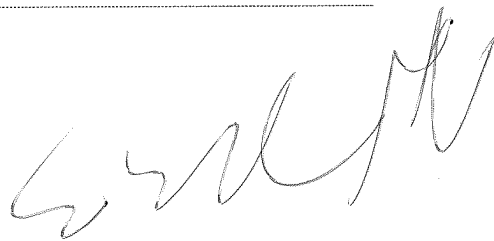
According to IEC 60947-3: 2008-08

##### Test results

Date of test: 14.09.2010

After the dielectric verification, the leakage current was measured across open contacts and between closed contacts and the enclosure at 110 % rated operational voltage.

The leakage current of max. 6  $\mu$ A measured, was smaller than the permissible value of 2 mA.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИ



## 5.5 Temperature-rise verification

### Test laboratory

Low-voltage test laboratory, test room 7

### Normative document

IEC 60947-3: 2008-08

### Required test parameters

Test current: 400 A, three-phase

Test frequency: 50 Hz

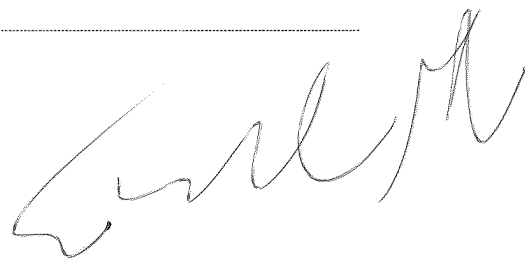
### Test arrangement

According to IEC 60947-3: 2008-08

See Sub-clause 4.6, Sheet 17

### Test and measuring circuits

See Sub-clause 4.6, Sheet 18



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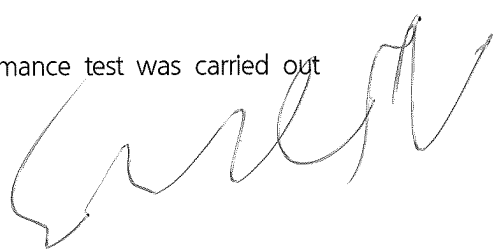
ВЯРНО С ОРИГИНАЛОМ

**Test results**

The temperature-rise verification done after the operational performance test was carried out using LV HRC fuse-links of size 2.

Technical data of fuses used

Manufacturer: SIBA  
 Type: 20 004 13  
 Rated current: 400 A/gG  
 Rated voltage: 500 V

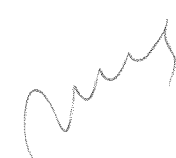


Date of test: 14.09.2010  
 Test current: 405 A  
 Test frequency: 50 Hz

Condition of test object: Prestressed by test acc. to Sub-clauses 5.1 to 5.4

Meas. point/ Phase	Designation	Classification	Temperature-rise limit permitted	Final temperature measured	Final temperature rise	
			[K]	[°C]	[K]	
1	L1	Busbar terminals	Terminal	80	66.3	35.3
2	L2				67.3	36.3
3	L3				65.7	34.7
4	L1	Cable terminals	Terminal	80	67.8	36.8
5	L2				70.7	39.7
6	L3				77.2	46.2
7	-	Enclosure	Insulating material	60	65.2	34.2
8	-	Actuator	Insulating material	35	37.2	6.2
9	-	Ambient air	-	-	31.0	-

The final temperature rise measured did not exceed the permissible temperature rise limits.


НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

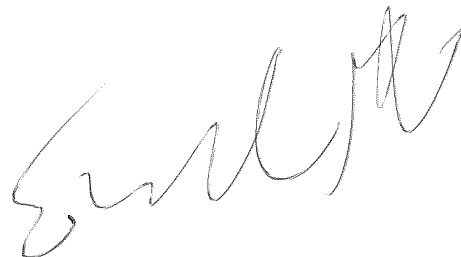
ВЯРНО С ОРИГ

### 5.6 Evaluation of test sequence II

The LV HRC fuse-switch-disconnector in rail design has PASSED

- Test sequence II Operational performance capability, consisting of
- Operational performance
  - Dielectric verification
  - Leakage current
  - Temperature-rise verification

at its rated parameters.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГ

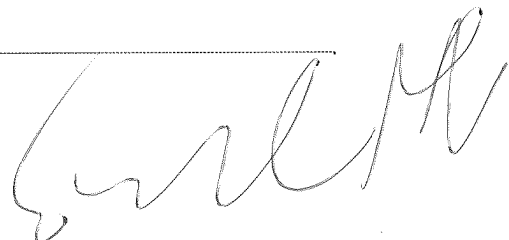


**6. Test sequence IV: Conditional short-circuit current**

**6.1 Fuse-protected short-circuit withstand/making**

**Test laboratory**

Low-voltage test laboratory, test room 1



**Normative document**

IEC 60947-3: 2008-08

**Required test parameters**

Test voltage:	525 V (1.05 x 500 V)
Test current:	50 kA
Power factor:	0.25
Test frequency:	50 Hz
Fuses used:	500 V/400 A

**Test arrangement**

According to IEC 60947-3: 2008-08

The test object was mounted, as specified by the manufacturer, in vertical position of use and in free air to a 500-mm copper bar system with a cross-section of 1 x 30 mm x 10 mm per phase. This copper bar system was connected to the test current source by a 2-m insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase. On its outgoing terminals, the test object was connected to the short-circuit by insulated single-core cable (copper conductor) with a cross-section of 240 mm<sup>2</sup> per phase.

The torque of the screws at the terminals was 32 Nm.




НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛ

Test and measuring circuits

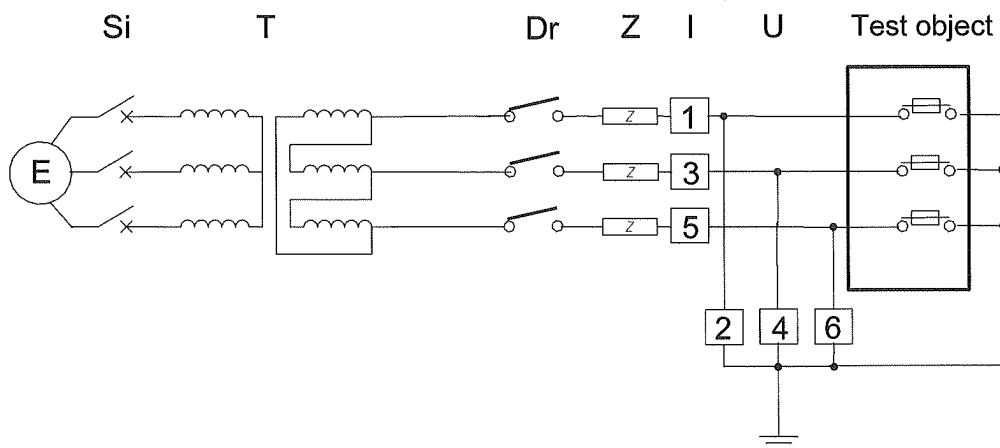


Figure 5: Circuit for the test of fuse-protected short-circuit withstand

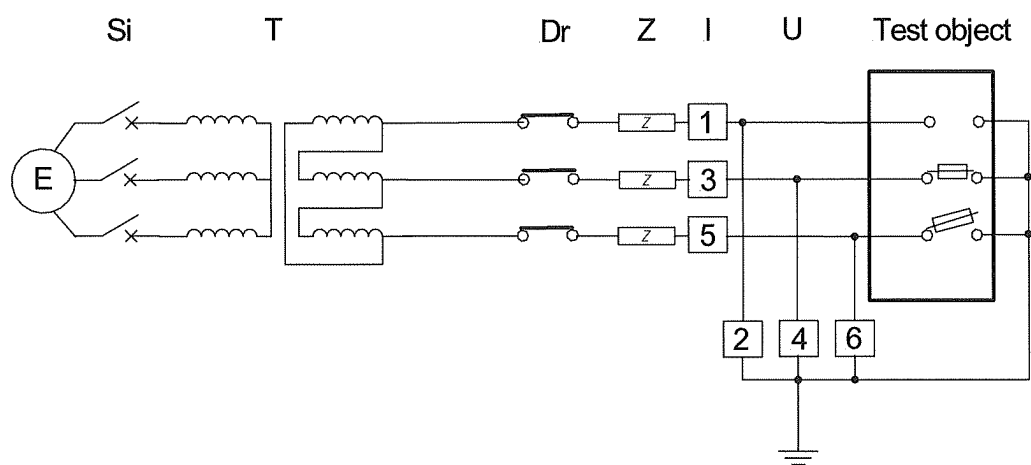


Figure 6: Circuit for the test of fuse-protected short-circuit making

E	Power supply	U	Voltage measurement
Dr	Making switch	I	Current measurement
Z	Test circuit impedance	1 - 6	Measuring points
T	Transformer		

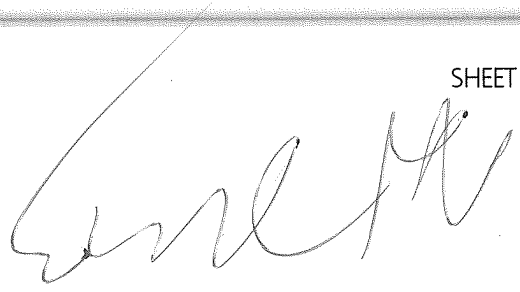
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НА ОСНОВАНИЕ ЧЛ. 2 ОТ 33ЛД

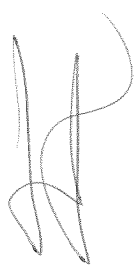
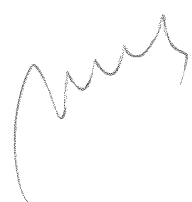
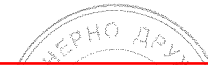
ВЯРНО С ОРИГАЛ

**Test and measuring circuits (continued)**



Technical data of measuring circuits

Test No.	Measuring point	Measured quantity	Measuring sensor
210 3777 and 210 3778	1	Current L1	Rogowski
	3	Current L2	Rogowski
	5	Current L3	Rogowski
	2	Voltage L1	RC divider
	4	Voltage L2	RC divider
	6	Voltage L3	RC divider
Measuring instruments: Measuring points 1 to 6: Transient recorder			

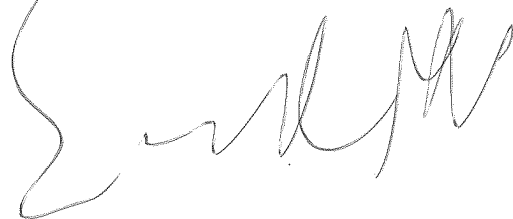




НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛОМ

**Test results**

Date of test: 18.08.2010  
 Test circuit type: Direct  
 Test requirement: Conditional short-circuit  
 Connection of test object: - Power supply at busbar terminals  
 - Short-circuit at cable terminals  
 Condition of test object before test: New  
 Ambient temperature: 23 °C


**Test parameters:**

Test No.		210 3777	210 3778
Operating sequence		O	C
Applied voltage	V	525	525
Prospective peak short-circuit current	kA		
	L1	-	-
	L2	-	-
	L3	117	117
Prospective symmetrical short-circuit current	kA		
	L1	51.4	51.4
	L2	50.5	50.5
	L3	50.9	50.9
	Average	50.9	50.9
Power factor cos φ		0.16	0.16
Cut-off current	kA		
	L1	36.5	0
	L2	23.5	28.8
	L3	20.0	29.0
Recovery voltage	kV		
	L1	0.216	0.385
	L2	0.171	0.287
	L3	0.333	0.253
	Average phase-to-phase	0.416	0.534
Joule integral	10 <sup>6</sup> A <sup>2</sup> s		
	L1	1.79	-
	L2	1.22	1.24
	L3	0.821	1.25
Break time	ms	10.1	3.7
Notes		1), 2)	1), 3)
Evaluation		OK	OK

**Notes:**

OK - The test object was able to make and break properly.

## 1) Technical parameters of fuse links:

Technical data of fuses used:

Manufacturer/Type: SIBA/20 004 13

Size/char.: NH2-gG

Rated voltage/current: 500V/400A

Breaking capacity: 120 kA

## 2) The test object is capable of properly carrying its rated conditional short-circuit current.

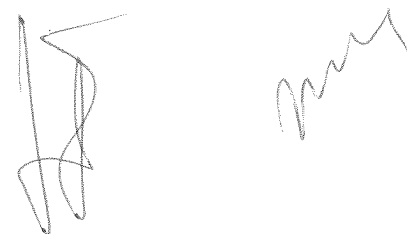
The fuse is capable of properly breaking the rated conditional short-circuit current.

## 3) The test object (L3) is capable of properly making and breaking its rated conditional short-circuit current.

The fuse is capable of properly breaking the rated conditional short-circuit current.

**Condition of test object after test:**

The test object did not show any visible damage. Immediately after the test it was demonstrated that the switching device did properly open and close during a no-load operation.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРМ

**6.2 Dielectric verification**

**Test laboratory**

Low-voltage test laboratory, test room 7

**Normative document**

IEC 60947-3: 2008-08

**Required test parameters**

Test voltage: 1000 V  
Test frequency: 50 Hz

**Test arrangement**

According to IEC 60947-3: 2008-08

**Test results**

Date of test: 14.09.2010

After the tests of fuse-protected short-circuit withstand and fuse-protected short-circuit making, a power-frequency voltage withstand test across the open contacts and between the closed contacts and the enclosure was carried out at 1050 V AC.

The test voltage was applied:

- between all closed contacts and the enclosure
- between one pair of closed contacts and the enclosure and the other connected contact gaps
- across all opened contacts and connected gaps and the enclosure
- across all connected terminals of one side and the connected terminals of the other side

During each test period of 5 s, no disruptive discharges occurred.

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

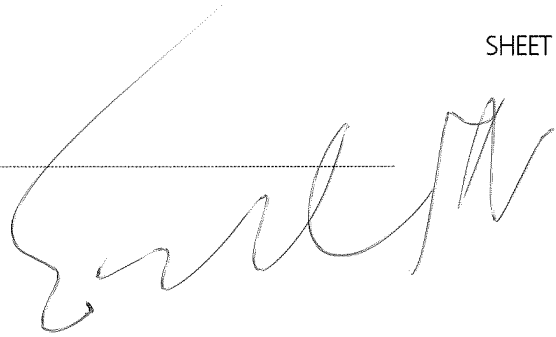
ВЯРНО С ОПРИГ



### 6.3 Leakage current

#### Test laboratory

Low-voltage test laboratory, test room 7



#### Normative document

IEC 60947-3: 2008-08

#### Required test parameters

Test voltage: 550 V (1.1 x 550 V)

Test frequency: 50 Hz

#### Test arrangement

According to IEC 60947-3: 2008-08

#### Test results

Date of test: 14.09.2010

After the dielectric verification, the leakage current was measured across open contacts and between closed contacts and the enclosure at 110 % rated operational voltage.

The leakage current of max. 11  $\mu$ A measured, was smaller than the permissible value of 2 mA.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД



#### 6.4 Temperature-rise verification

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##### Test laboratory

Low-voltage test laboratory, test room 7

##### Normative document

IEC 60947-3: 2008-08

##### Required test parameters

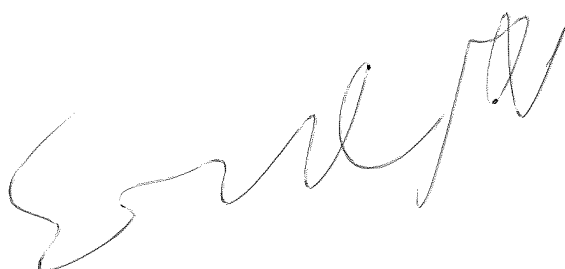
Test current: 400 A, three-phase  
Test frequency: 50 Hz

##### Test arrangement

According to IEC 60947-3: 2008-08  
See Sub-clause 4.6, Sheet 17

##### Test and measuring circuits

See Sub-clause 4.6, Sheet 18



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

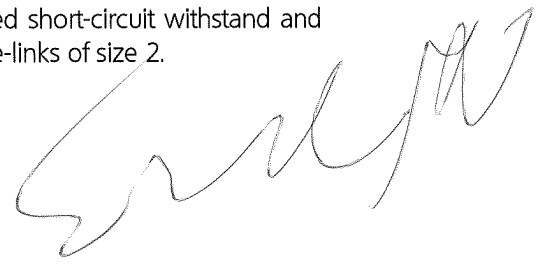
ВЯРНО С ОРИГИ

**Test results**

The temperature-rise verification done after the tests of fuse-protected short-circuit withstand and fuse-protected short-circuit making was carried out using LV HRC fuse-links of size 2.

Technical data of fuses used

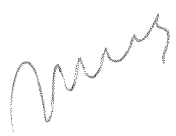
Manufacturer: SIBA  
 Type: 20 004 13  
 Rated current: 400 A/gG  
 Rated voltage: 500 V  
 Date of test: 14.092010  
 Test current: 405 A  
 Test frequency: 50 Hz



Condition of test object: Prestressed by tests Nos. 210 3777 and 210 3778

Meas. point/ Phase		Designation	Classification	Temperature-rise limit permitted [K]	Final temperature measured [°C]	Final temperature rise [K]
1	L1	Busbar terminals	Terminal	80	68.0	38.4
2	L2				66.1	36.5
3	L3				62.6	33.0
4	L1	Cable terminals	Terminal	80	72.7	43.1
5	L2				68.8	39.2
6	L3				75.1	45.5
7	-	Enclosure	Insulating material	60	60.5	30.9
8	-	Actuator	Insulating material	35	34.5	4.9
9	-	Ambient air	-	-	29.6	-

The final temperature rise measured did not exceed the permissible temperature rise limits.


НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛА

**6.5 Evaluation of test sequence IV**

The LV HRC fuse-switch-disconnector in rail design has PASSED

Test sequence IV Conditional short-circuit current, consisting of

- Fuse-protected short-circuit withstand
- Fuse-protected short-circuit making
- Dielectric verification
- Leakage current
- Temperature-rise verification

at its rated parameters.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛА

## 7. Test sequence V: Overload performance

### 7.1 Overload test

#### Test laboratory

Low-voltage test laboratory, test room 7

#### Normative document

IEC 60947-3: 2008-08

#### Required test parameters

Test current: 640 A, three-phase (1.6 x 400 A)

Test frequency: 50 Hz

Test duration: 1 h max.

#### Test arrangement

According to IEC 60947-3: 2008-08

See Sub-clause 4.6, Sheet 17

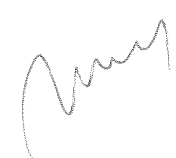
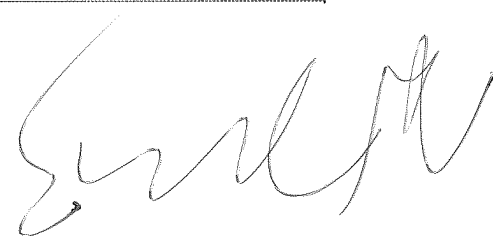
#### Technical data of fuses used

Manufacturer: SIBA

Type: 20 004 13

Rated current: 400 A, gG

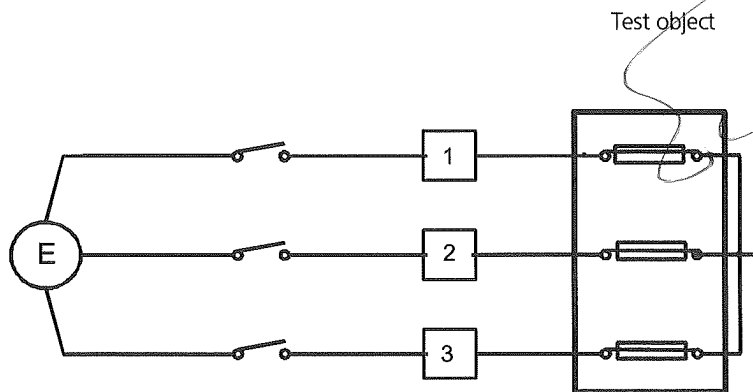
Rated voltage: 500 V



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИ

Test and measuring circuits



- E Power supply
- 1 - 3 Points of current measurement

Figure 7: Circuit for the overload test

Technical data of measuring circuits

Measuring point	Measured quantity	Measuring sensor
1	Test current L1	Current transformer with burden
2	Test current L2	Current transformer with burden
3	Test current L3	Current transformer with burden
Measuring instruments: Measuring points 1 to 3: Digital Display SPE		

Test results

Date of test: 15.09.2010

The test current was 643 A. It flew for 49 min until the fuse in phase L1 blew. Three minutes after the response of the fuse, the apparatus was opened and closed again. The no-load operations were not impaired.

Force F necessary for opening: 265 N

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛА

## 7.2 Dielectric verification

### Test laboratory


Low-voltage test laboratory, test room 7

### Normative document

IEC 60947-3: 2008-08

### Required test parameters

Test voltage: 1000 V  
 Test frequency: 50 Hz



### Test arrangement

According to IEC 60947-3: 2008-08

### Test results

Date of test: 15.09.2010

After the overload test, a power-frequency voltage withstand test across open contacts and between closed contacts and enclosure was carried out at 1040 V AC.

The test voltage was applied:

- between all closed contacts and the enclosure
- between one pair of closed contacts and the enclosure and the other connected contact gaps
- across all opened contacts and connected gaps and the enclosure
- across all connected terminals of one side and the connected terminals of the other side

During each test period of 5 s, no disruptive discharges occurred.




ВЯРНО С ОРИГИНАЛОМ

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД



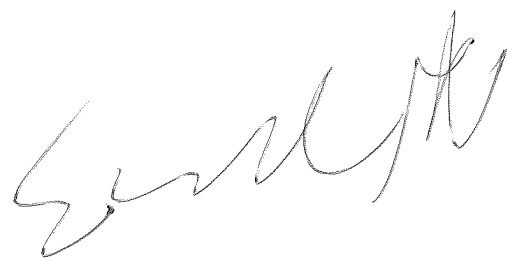
### 7.3 Leakage current

#### Test laboratory

Low-voltage test laboratory, test room

#### Normative document

IEC 60947-3: 2008-08



#### Required test parameters

Test voltage: 550 V (1.1 x 550 V)

Test frequency: 50 Hz

#### Test arrangement

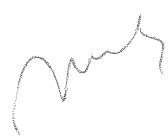
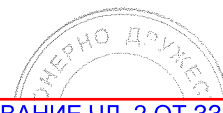
According to IEC 60947-3: 2008-08

#### Test results

Date of test: 15.09.2010

After the dielectric verification, the leakage current was measured across open contacts and between closed contacts and the enclosure at 110 % rated operational voltage.

The leakage current of max. 5  $\mu$ A measured, was smaller than the permissible value of 2 mA ( $\leq$  0.1 mA).

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛА





#### 7.4 Temperature-rise verification

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##### Test laboratory

Low-voltage test laboratory, test room 7

##### Normative document

IEC 60947-3: 2008-08

##### Required test parameters

Test current: 400 A, three-phase

Test frequency: 50 Hz

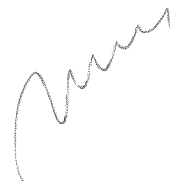
##### Test arrangement

According to IEC 60947-3: 2008-08

See Sub-clause 4.6, Sheet 17

##### Test and measuring circuits

See Sub-clause 4.6, Sheet 18



ВЯРНО С ОРИГИНА

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

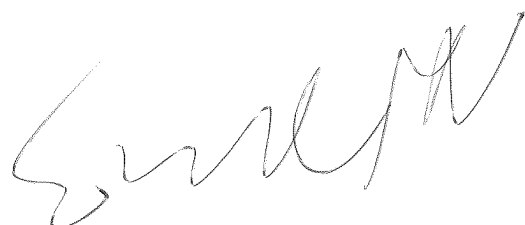


**Test results**

The temperature-rise verification done after the overload test was carried out using LV HRC fuse-links of size 2.

Technical data of fuses used

Manufacturer: SIBA  
 Type: 20 004 13  
 Rated current: 400 A/gG  
 Rated voltage: 500 V

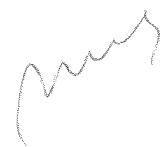


Date of test: 15.09.2010  
 Test current: 405 A  
 Test frequency: 50 Hz

Condition of test object: Prestressed by overload test

Meas. point/ Phase	Designation	Classification	Temperature-rise limit permitted	Final temperature measured	Final temperature rise	
			[K]	[°C]	[K]	
1	L1	Busbar terminals	80	63.0	42.3	
2	L2			57.8	37.1	
3	L3			56.0	35.3	
4	L1	Cable terminals	80	60.7	40.0	
5	L2			62.7	42.0	
6	L3			64.2	43.5	
7	-	Enclosure	Insulating material	60	49.7	29.0
8	-	Actuator	Insulating material	35	27.3	6.6
9	-	Ambient air	-	-	20.7	-

The final temperature rise measured did not exceed the permissible temperature rise limits.


НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОПИ

### 7.5 Evaluation of test sequence V


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The LV HRC fuse-switch-disconnector in rail design has PASSED

Test sequence V Overload performance capability, consisting of

- Overload test
- Dielectric verification
- Leakage current
- Temperature-rise verification

at its rated parameters.



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИНАЛА

8. Photos



Photo 1: Test object L1 after verification of making and breaking capacities

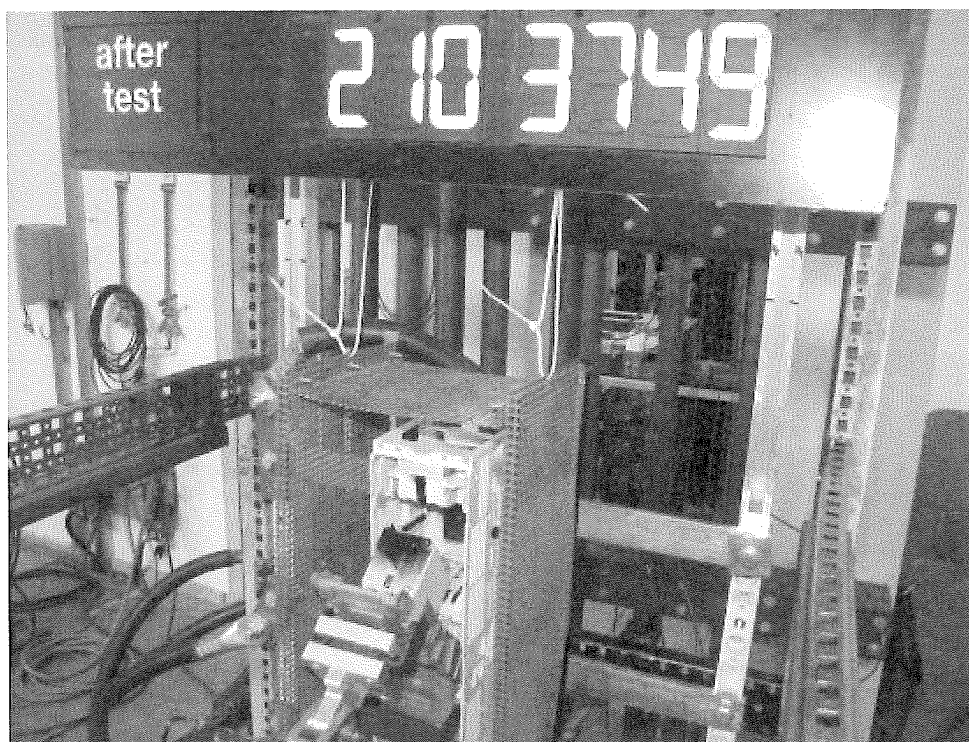


Photo 2: Test object L1 after verification of making and breaking capacities

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИ

ПЛОВДИВ

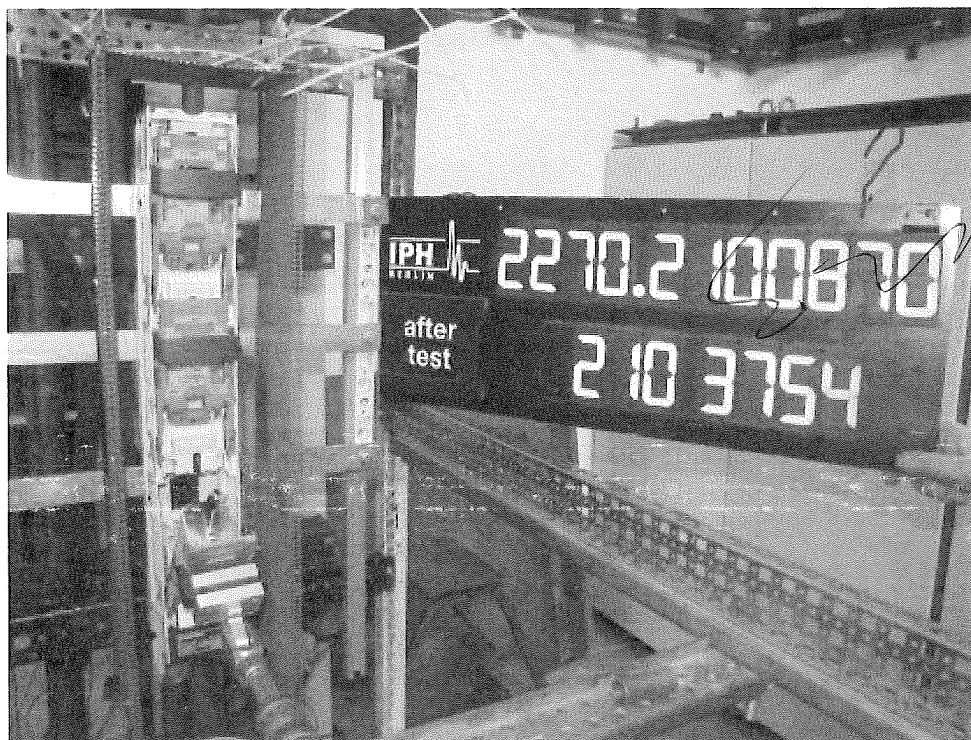


Photo 3: Test object L3 after verification of making and breaking capacities

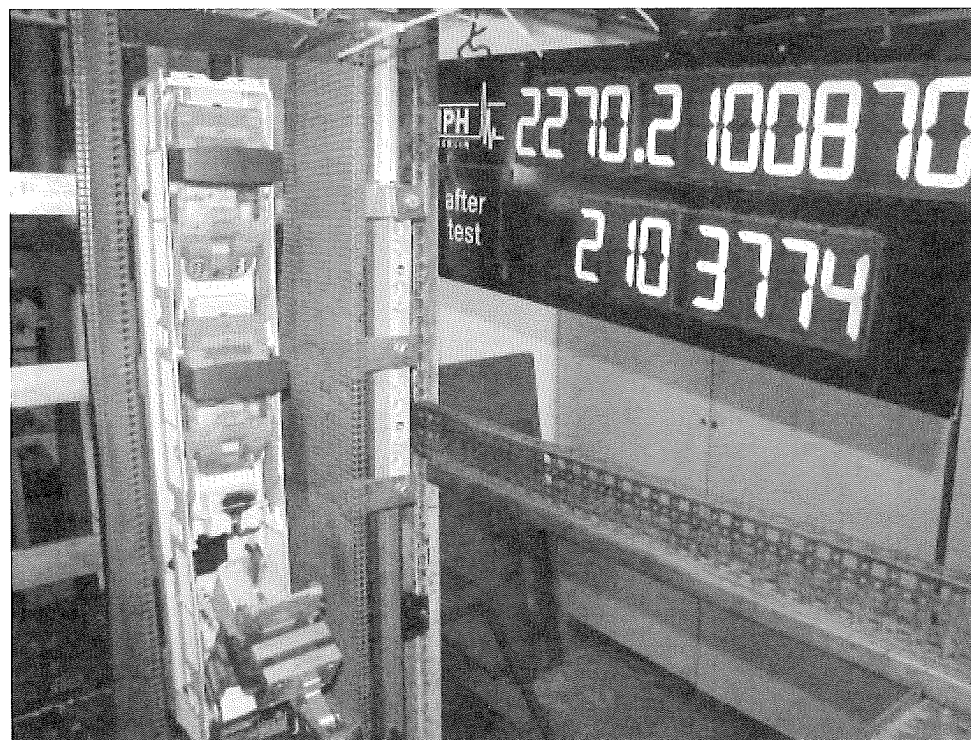


Photo 4: Test object L3 after operational performance test

НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРГИ

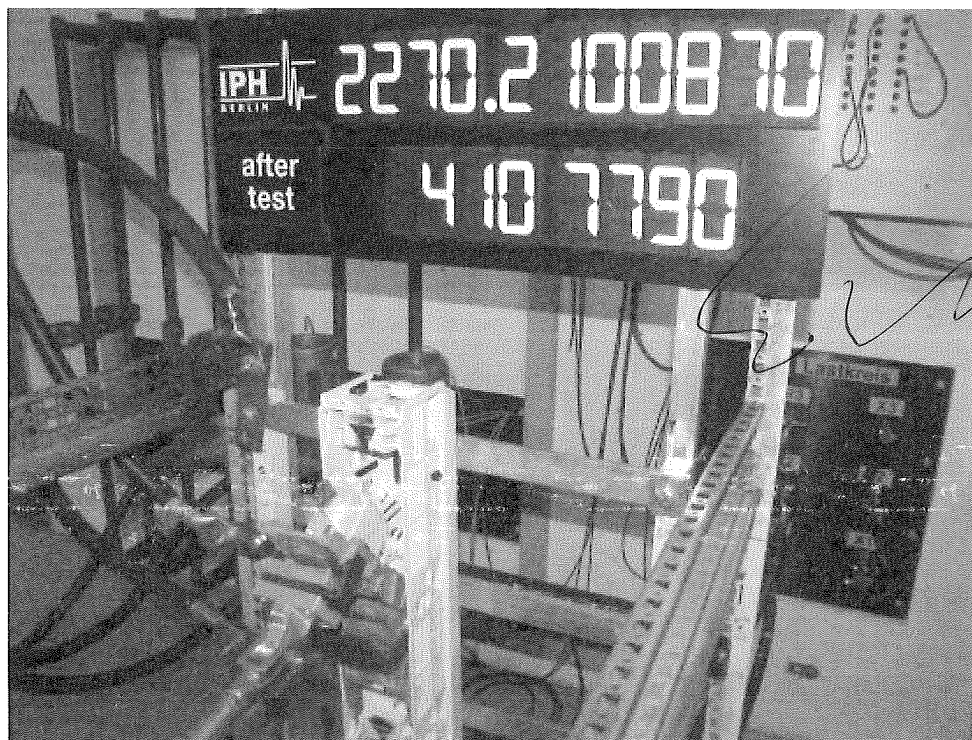


Photo 5: Test object L1 after operational performance test

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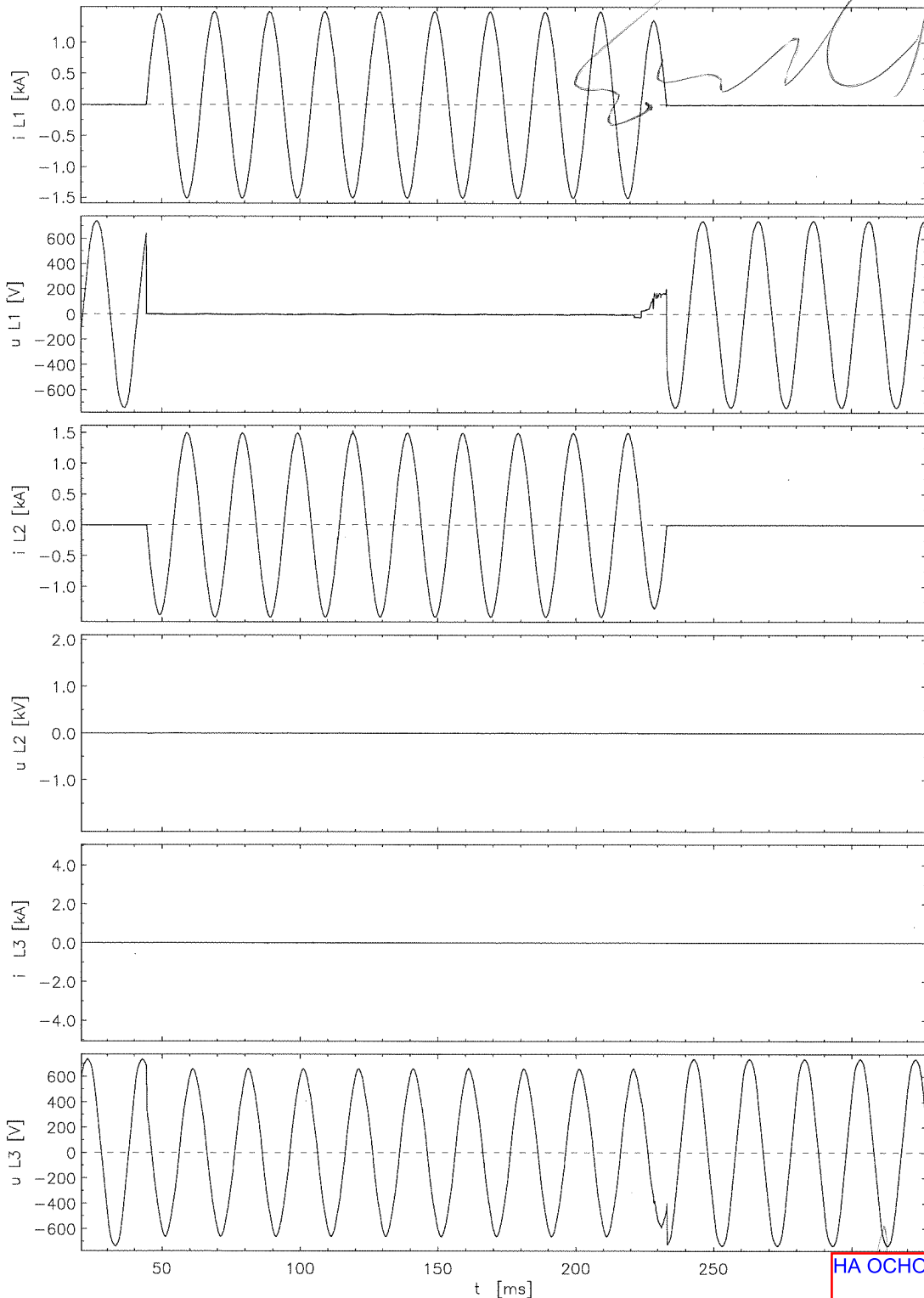


НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГА

9. Oscillograms

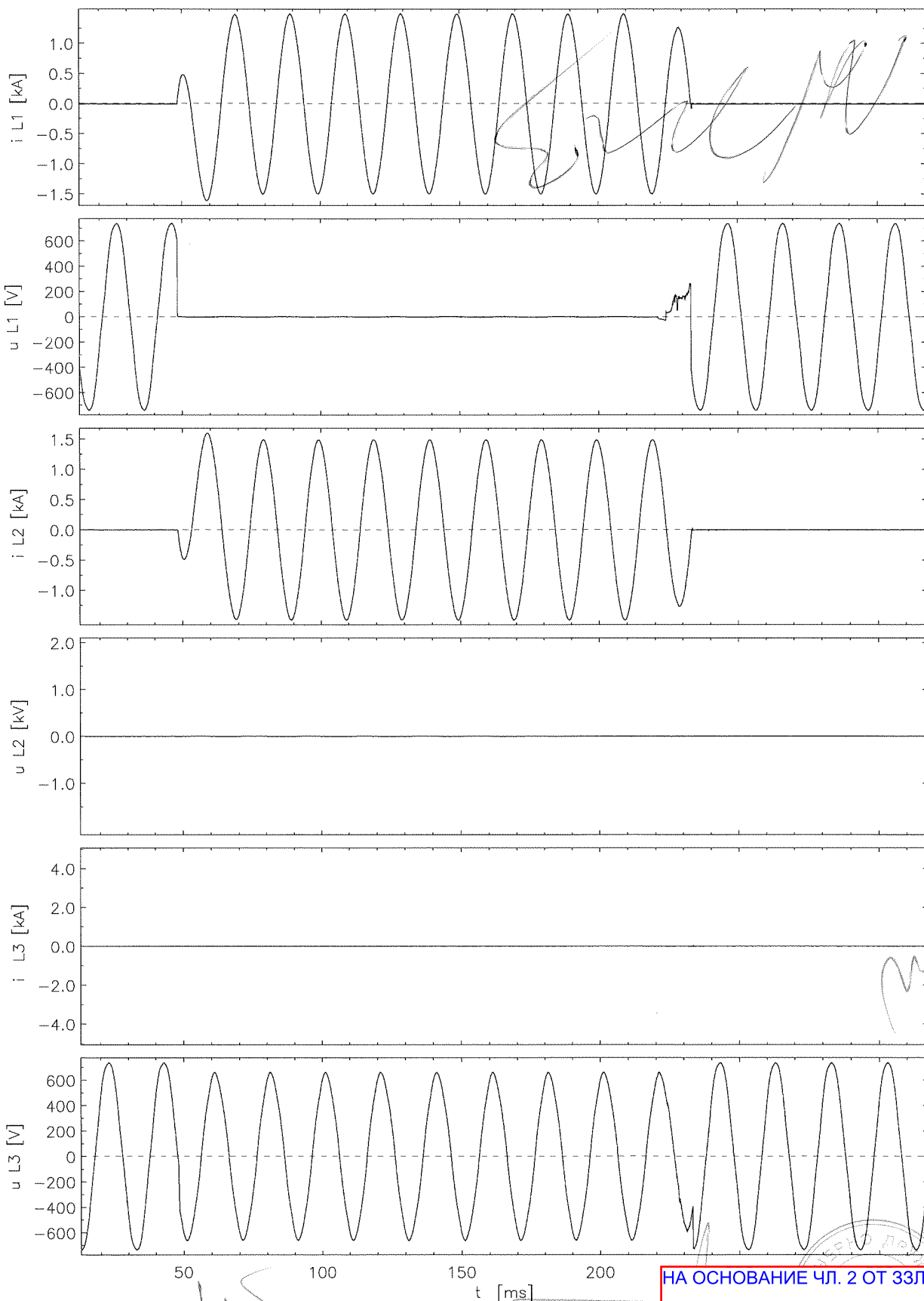
Test-No. 2103745



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГ

Test-No. 2103746

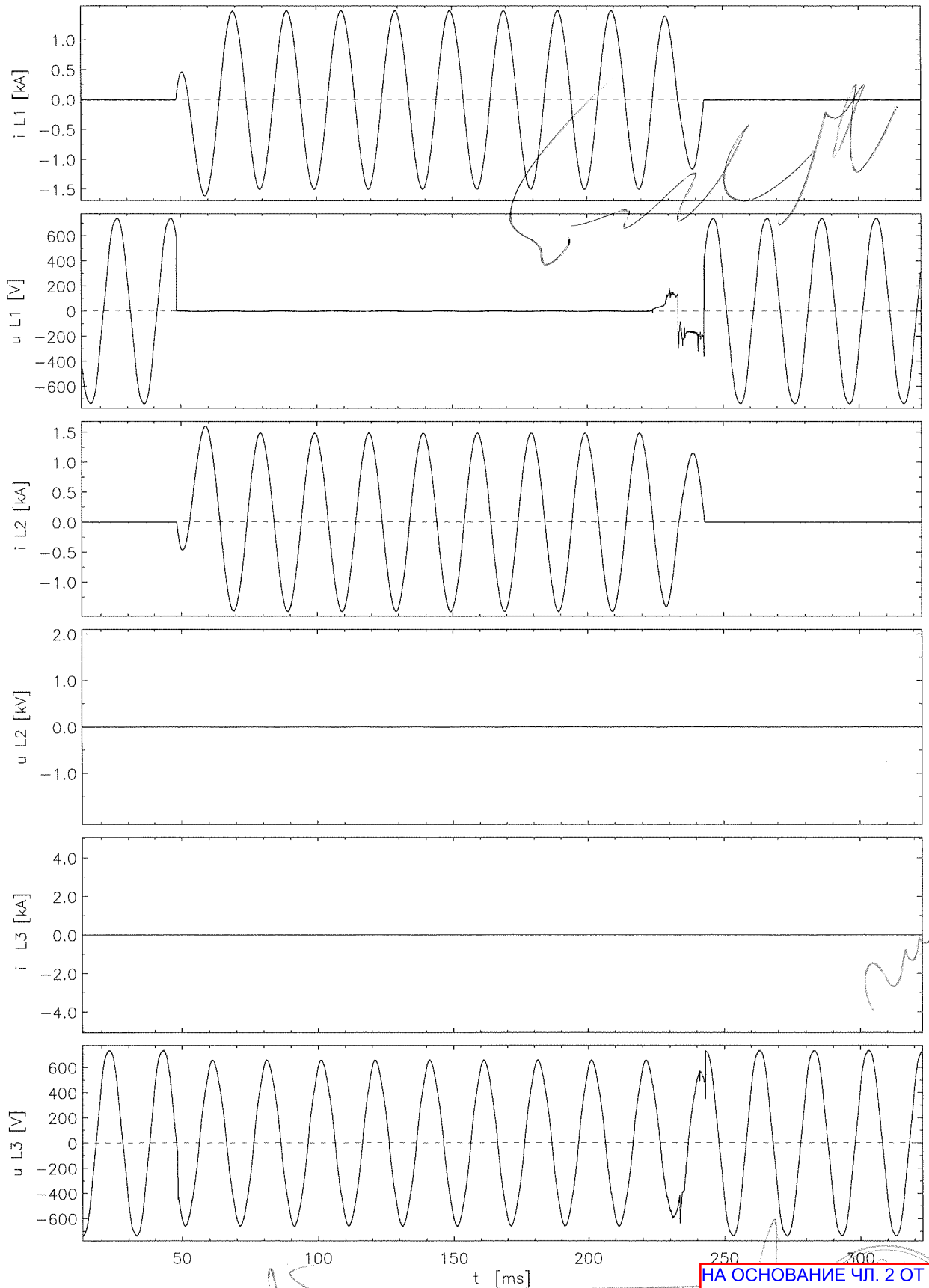


НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРНИТ



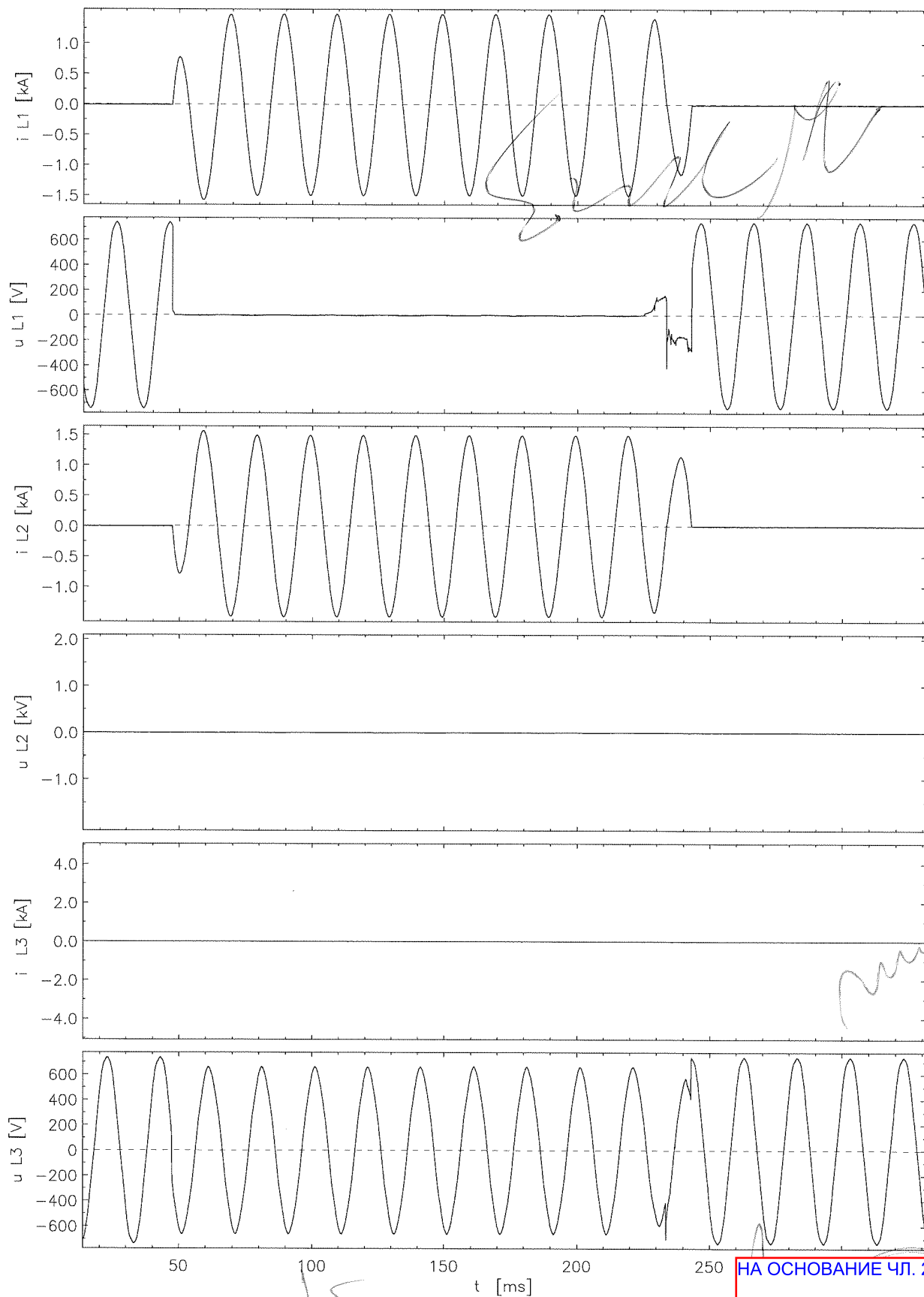
Test-No. 2103747



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОР

Test-No. 2103748



НА ОСНОВАНИЕ ЧЛ. 2 ОТ ЗЗЛД

ВЯРНО С ОРИГИ

ПЛОВДИВ