ПРЕДЛОЖЕНИЕ
ЗА ИЗПЪЛНЕНИЕ НА ПОРЪЧКАТА
ЗА ОБОСОБЕНА ПОЗИЦИЯ 4

ДО: „ЧЕЗ разпределение БЪЛГАРИЯ" АД,

ОТ: «Електролукс Табаков и синове» ООД –гр. Пловдив
Адрес: гр. Пловдив ул. «Седянка», №9
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Представлявано от Георги Николов Табаков – Управител
Лице за контакти: Георги Николов Табаков, тел.: 032/969-280 факс: 032/969-281;e-mail:info@electrolux-tabakov.com; ntelectrolux@abv.bg

УВАЖАЕМИ ГОСПОЖИ И ГОСПОДА,
След като се запознахме с изискванията на възложителя за изпълнение на обществена поръчка с реф. № PPD 17 – 052 и предмет: „Модернизация (ретрофит) на електрически уредби 110/20 (10) kV и въвеждането им в режим на телемеханика, аз долуподписаният Георги Николов Табаков, в качеството си на представител на «Електролукс Табаков и синове» ООД, декларирам, че:

В случай че бъдем определени за изпълнител на обществената поръчка, декларираме, че:
1. Ще изпълняваме договора съгласно техническите изисквания на възложителя, представени в т. 4 "Обем от дейности и основни изисквания при изпълнението на ретрофита (модернизацията) на енергийните обекти по предмета на поръчката" от раздел I. на документацията за участие, включени като Приложение № 2 към договора за изпълнение на обществената поръчка.
2. Всички материали, апаратура, оборудване, съоръжения и резервни части, които ще доставим и ще влагаме при изпълнение на предмета на поръчката ще са нови, неупотребявани, придружени от декларации и/или сертификати/декларации за съответствие, съгласно изискванията на българското законодателство.
3. Задължаваме се при всяка доставка на материал и/или апаратура и/или оборудване и/или съоръжение и/или резервни части, същите да бъдат придружени от изискуемите документи съгласно договора.
4. Представяме изисканата информация в Техническо предложение за оборудване – Приложение 2 към настоящото Предложение за изпълнение на поръчката, като:
4.1. Представям попълненно „Гарантирано предложение" в таблиците с технически данни. Предлаганото от нас оборудване отговаря на минималните технически изисквания на Възложителя, които не съдържат графа „Гарантирано предложение" в таблиците на техническите спецификации на стоката от раздел II. „Технически спецификации и изисквания на възложителя за изпълнение на поръчката" от документацията за участие.
4.2. Представям всички изисквани данни и документи от таблиците с Изисквания към документацията и изпитанията. 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 каталозите и протоколи от изпитания /в случай, че се изискват/ за материалите, които могат да се представят и само на английски език.
5. Запознат съм, че представените от нас технически документи са доказателство за декларираните технически данни и параметри на предлаганото оборудване.
6. Заявяваме, че предлаганите от нас материали, апаратура, оборудване, съоръжения и резервни части са с технически характеристики покриващи посочените от възложителя в раздел II. „Технически спецификации и изисквания на възложителя за изпълнение на поръчката" от документацията за участие.
7. Ще изпълняваме договора съгласно техническите изисквания на възложителя, представени в раздел II. «Технически спецификации и изисквания на възложителя за изпълнение на поръчката» от документацията за участие, които са включени като Приложение № 3 към договора за изпълнение на обществената поръчка.
8. Потвърждаваме, че доставяните от нас материали, апаратура, оборудване и съоръжения ще отговарят на посочените от възложителя стандарти или на еквивалентни. В случай, че даден материал, апаратура, оборудване и съоръжение отговаря на стандарт, еквивалентен на посочения от Възложителя в раздел II. „Технически спецификации и изисквания на възложителя

за изпълнение на поръчката" от документацията за участие, се задължаваме да го отразим в отделен документ и да представим доказателства за еквивалентността на двата стандарта заедно с настоящото предложение за изпълнение на поръчката.
9. С настоящото гарантираме, че ще изпълним сроковете за изпълнение на поръчката, опеделени в Приложение 1 към настоящото Техническо предложение.
10.Гарантираме, че предложеното оборудване за Комуникация на цифрови защити /ЦЗ/ и контролер с RTU отговаря на посочените в Приложение 3 минимални технически изисквания на Възложителя.
11.Декларирам, че представител на участника, когото представлявам е извършил оглед на обекта, на който ще бъде извършен ретрофит и прилагам декларация за извършен оглед към настоящото предложение – Приложение № 4.
12.Предлагам гаранционни срокове:
12.1. за материалите, апаратурата, оборудването и съоръженията, гаранционнте срокове са съгласно гаранционнте срокове определени от съответния производител, но не по-малко от 36 месеца от датата на приемо-предавателния протокол за приемане на оборудването;
12.2. за строителните работи гаранционните срокове съответстват на минималните гаранционни срокове, посочени в Наредба № 2 от 31 юли 2003 г. за въвеждане в експлоатация на строежите в Република България и минималните гаранционни срокове за изпълнени строителни и монтажни работи, съоръжения и строителни обекти.
13.Задължаваме се в рамките на гаранционните срокове всички разходи по отстраняване на дефекти или замяна на дефектни материали, апаратура, оборудване, съоръжения и резервни части с нови, да са за наша сметка.
14.Ще се съобразим с изискването на Възложителя и след сключване на договор ще изработим и представим линеен план-график за реализиране на модернизацията (ретрофита), в който за строителните или монтажни работи, планирани за извършване за след 29.12.2017 година, заскладяването на доставеното оборудване ще се извършва в складова база на Възложителя, на адрес: гр. София, ул. „Димитър Списаревски" № 10 и ще бъде съобразено с изискванията на Приложение - „Условия за доставка и съхранение на материали, апаратура, оборудване и съоръжения, необходими за изпълнение на ретрофит" от раздел II «Технически спецификации и изисквания на възложителя за изпълнение на поръчката» към документацията съответно представляващо приложение към договора, както и с условията, уговорени в договора. В случай, че доставките могат да бъдат извършени направо до обекта на изпълнение на поръчката и веднага да бъдат вложени в изпълнението на необходимите строителни и монтажни работи, в зависимост от графика, програмата и работния проект, е възможно същите да бъдат заявени за доставка чрез възлагателен протокол от Възложителя, направо до обекта на изпълнение на поръчката.

Неразделна част от настоящото предложение са следните приложения:
Приложение № 1 - Срокове за изпълнение на ретрофита
Приложение № 2 - Техническо предложение за оборудване
Приложение № 3 – Изисквания към комуникация на цифрови устройства с RTU
Приложение № 4 – декларация за извършен оглед
Приложение № ... – други по преценка на участника;

Дата:24.07.2017 г.

ПОДПИС и ПЕЧАТ
/Георги Табаков-Управител/

ПРИЛОЖЕНИЕ № 1

СРОКОВЕ ЗА ИЗПЪЛНЕНИЕ НА РЕТРОФИТА ПО ОБОСОБЕНА ПОЗИЦИЯ № 4:

Проектирането, доставката на цялостното оборудване и изпълнението на всички необходими дейности за цялостната реализация на модернизацията (ретрофита) (като демонтаж на съществуващо оборудване, строителни работи /включително доставка на необходимите строителни материали/ по подготовка на площадките в енергийния обект за извършване на монтажа на новото оборудване, монтажни работи по отношение на доставеното ново енергийно оборудване, единични функционални проби на монтираните машини и съоръжения и въвеждането им в работен режим на телемеханика, както и провеждане на обучение на персонал на възложителя за работа с новото оборудване) и настоящото техническо задание следва да се изпълнят в срок до 18 (осемнадесет) месеца, считано от датата на подписване на договора за изпълнение на поръчката.

1. ***Срок за изготвяне на програмата с линейния план-график за цялостно изпълнение на модернизацията (ретрофита) и представянето й на Възложителя:***

Срокът за изготвяне на програмата с линейния план-график и представянето й на Възложителя за одобрение е до 14 (четиринадесет) дни, считано от датата на подписване на договора. Срокът за одобрение на предложената програма с линеен план-график от Възложителя е до 3 (три) дни, считано от датата на представяне на изработената програмата с линейния план-график на Възложителя.

2. Изготвяне на работен проект:

Срокът за проектирането на модернизацията (ретрофит) на ЗРУ 10 kV в пълен обем е до 20 (двадесет) дни след датата на подписване на Договора с конкретния Изпълнител.

3. Съгласуване на работния проект с „ЧЕЗ Разпределение България“ АД:

Срокът за съгласуване на работния проект е до 10 (десет) дни след датата на предаването му на Възложителя.

4. Доставка на цялостно оборудване, съгласно утвърдения работен проект:

Срокът за доставка на цялостното оборудване за изпълнение на предмета на поръчката съобразно предвижданията на съгласувания работен проект, както и на всички необходими резервни части, включително и за изработката и доставката на необходимите за модернизацията (ретрофита) врати и детайли в заводски условия, е до 90 (деветдесет) дни от датата на одобрена от Възложителя заявка до съответен доставчик, по количествено – стойностни сметки към договора.

В допълнение, доставките на цялостното оборудване, апарати и помощни съоръжения, планирани в утвърдения линеен план-график за изпълнение на предмета на поръчката, в частта им предвидена за 2017 година (до 29.12.2017 г.), следва да се изпълняват планово направо до работната площадка (съответният енергиен обект, който се модернизира). За всички останали дейности за изпълнение на модернизацията (ретрофита) по предмета на поръчката, планирани за извършване през 2018 година (след 29.12.2017 г.), цялостното оборудване, апарати и помощни съоръжения, както и резервните части, включително изработените врати и детайли в заводски условия, следва да бъдат доставени до складова база на Възложителя, на адрес: гр. София, ул. „Димитър Списаревски“ № 10.

Доставеното оборудване в складовата база на Възложителя ще бъде предоставено за отговорно пазене на Възложителя, при спазване на съвкупност от условия, дейности и мероприятия за заскладяване/изземане от склад, описани в Приложение – „Условия за доставка и съхранение на материали, апаратура, оборудване и съоръжения, необходими за изпълнение на ретрофит“. Графикът за доставка на цялостното оборудване в складовата база на Възложителя е неразделна част от линейния план-график за изпълнение на модернизацията (ретрофита) на съответния енергиен обект. Цялостното оборудване, апарати и помощни съоръжения се предоставят за заскладяване в здрава заводска опаковка. През времето на престой същите няма да се разопаковат, използват или друго. Входящ съответно изходящ контрол по отношение на оборудването за изпълнение на поръчката, следва да се извърши от представители на Възложителя и Изпълнителя при заскладяване и при изземане на доставените материали и оборудване, на място в складовата база на Възложителя, както и при доставката на съответното оборудване на работната площадка, преди то да бъде монтирано.

5. Срок за изпълнение на модернизацията (ретрофита):

Срокът за изпълнението на модернизацията (ретрофита) за цялата уредба 10 kV, включително и въвеждане на вериги за телемеханика, е до 150 дни от датата на първия подписан възлагателен протокол за изпълнение на модернизацията (ретрофита) на присъединение 10 kV.

6. Обучение на специалисти на Възложителя:

- Срокът за изготвяне от страна на избрания Изпълнител на програма за обучение на 6-ма служители на Възложителя и предаването ѝ за одобрение на Възложителя е до 10 (десет) дни, считано от датата на съгласуване на работния проект от Възложителя и предаването му на Изпълнителя;
- Срокът за одобрение на програмата за обучение от страна на Възложителя е до 10 (десет) дни, след датата на предаването ѝ на Възложителя.
- Срокът за провеждане на обучението и сертифицирането на 6-ма служители на Възложителя, за работа и поддръжка на доставеното и монтирано оборудване, включително цифрови защити и др. е до 10 (десет) дни, след датата на одобрение на програмата за обучение от страна на Възложителя.

7. Изработване и предоставяне на екзекутивна документация:

Срокът за изработване и предоставяне от Изпълнителя на Възложителя на екзекутивни чертежи (документация) с нанесени всички изменения в работния проект, настъпили в процеса на изпълнение на модернизацията (ретрофита), е до 15 (петнадесет) работни дни, считано от датата на последния подписан възлагателен протокол за изпълнение на модернизацията (ретрофита) на присъединение 10 kV, с който приключва целия обем дейности в обекта, но не по-късно от датата на провеждане на 72 часовите проби под напрежение и товар.

8. Провеждане на 72-часови проби под напрежение и товар:

Срокът за провеждане на 72-часови проби под напрежение и товар и въвеждане на новоизградената ЗРУ 10 kV и свързаните с нормалната ѝ експлоатация апарати и съоръжения в работен режим е до 10 (десет) работни дни, считано от датата на протокола на приемателната комисия за приемане на цялостното изпълнение на модернизацията (ретрофит) на ЗРУ 10 kV в пълен обем за целия обект.

Дата:24.07.2017 г.

ПОДПИС и ПЕЧАТ:
/Георги Табаков-Управител/

ПРИЛОЖЕНИЕ № 2
Техническо предложение за оборудване

ТАБЛИЦА 1 КЪМ ОБОСОБЕНА ПОЗИЦИЯ № 4
СТАНДАРТ НА МАТЕРИАЛА ЗА ТРИПОЛЮСНИ ВАКУУМНИ ПРЕКЪСВАЧИ, 12 KV/31,5 KA ЗА МОНТИРАНЕ НА ЗАКРИТО, ФИКСИРАН

Изисквания към документацията и изпитванията:

№	Документ при участие	Приложение № (или текст)
1.	Техническо описание на прекъсвача, в т.ч. гарантирани параметри и съоръжаване	Приложение 1.1 документ: Приложение 1.1 - Техническо описание.pdf помощен документ:CA_VD4-50kA(EN)V_1VCP000001_DigiPrint.pdf помощен документ: MA_VD4-36kV-50KA(EN)Y_647654-1403 .pdf
2.	Протоколи от типови изпитвания на английски или български език, проведени от независима акредитирана изпитателна лаборатория– заверени копия (и допълнителни изпитвания, ако са проведени), с приложен списък на отделните изпитвания на български език.	Приложение 1.2 Документи пакет1: 100081_C.pdf; 0003Ra.pdf; HZ144F08.pdf; HZ146L02.pdf; MZZS1A03.pdf; pehla0231Ra.pdf; pehla0316Ra.pdf; Превод на 100081_C List_of_type_tests_BG.pdf Документи пакет2: 0016Ra[1].pdf; 0020Ra[1].pdf; 100087_C.pdf; CesiMPA4_010735[1].pdf; HZ146L02.pdf; HZ147E10[1].pdf; pehla0303Ra.pdf; pehla0317_2Ra[1].pdf; Превод на 100087_C List_of_type_tests_BG.pdf
3.	Сертификат/акредитация на независимата изпитателна лаборатория, провела типовите изпитвания – заверено копие	Приложение 1.3 Документ: Приложение 1.3 - Акредитация.pdf

Технически данни за триполюсен вакуумен прекъсвач 12 kV, 1250 A, 31,5 kA, за монтиране на закрито, фиксиран, които се попълват от Участника в графа „Гарантирано предложение":

Наименование на материала		Триполюсен вакуумен прекъсвач, 12 kV/1250 A/31,5 kA, за монтиране на закрито, фиксиран	
Съкратено наименование на материала		Трип. Вак. Прек., 12 kV/1250 A/31,5 kA, 3M, Ф	
№	Технически параметър	Изискване	Гарантирано предложение
1.	Тип/референтен номер съгласно каталога на производителя	Да се посочи	VD4 фиксиран 12 kV, 1250 A, 31,5 kA, p 210 mm; тип VD4 12.12.32 p210; Производствен номер: 1VCF337111R1352
2.	Производител	Да се посочи	АББ Италия, гр. Далмине – Бергамо, Завод АББ Унита оперативa САЧЕ
3.	Обявен нормален ток, Ir	≥ 1250 A	1250 A

Технически данни за триполюсен вакуумен прекъсвач 12 kV, 2500 A, 31,5 kA, за монтиране на закрито, фиксиран, които се попълват от Участника в графа „Гарантирано предложение":

Наименование на материала		Триполюсен вакуумен прекъсвач, 12 kV/2500 A/31,5 kA, за монтиране на закрито, фиксиран	
Съкратено наименование на материала		Трип. Вак. Прек., 12 kV/2500 A/31,5 kA, ЗМ, Ф	
№	Технически параметър	Изискване	Гарантирано предложение
1.	Тип/референтен номер съгласно каталога на производителя	Да се посочи	VD4 фиксиран 12 kV, 2500 A, 31,5 kA, p 210 mm; Тип VD4 12.25.32 p210; Производствен номер: 1VCF337111R0652
2.	Производител	Да се посочи	АББ Италия, гр. Далмине – Бергамо, Завод АББ Унита оператива САЧЕ
3.	Обявен нормален ток, Ir	≥ 2500 A	2500 A

ТАБЛИЦА 2 КЪМ ОБОСОБЕНА ПОЗИЦИЯ № 4
СТАНДАРТ НА МАТЕРИАЛА ЗА ЦИФРОВИ ЗАЩИТИ ЗА ВЪЗДУШНИ И КАБЕЛНИ ЕЛЕКТРОПРОВОДНИ ЛИНИИ СР.Н.

Технически данни за непосочна цифрова защита за въздушни и кабелни електропроводни линии Ср.Н., които се попълват от Участника в графа „Гарантирано предложение“:

Название на материала		Непосочна цифрова защита за въздушни и кабелни електропроводни линии СрН	
Съкратено название на материала		Непосочна ЦЗ ВКЕЛ СрН	
№	Технически параметър	Изискване	Гарантирано предложение
1.	Тип	Да се посочи	REF615
2.	Производител	Да се посочи	ABB Oy, Финландия

Дата:24.07.2017 г.

ПОДПИС и ПЕЧАТ:
/Георги Табаков-Управител/

ПРИЛОЖЕНИЕ №3

ТАБЛИЦА 3 КЪМ ОБОСОБЕНА ПОЗИЦИЯ № 4
КОМУНИКАЦИЯ НА ЦИФРОВИ УСТРОЙСТВА С RTU

Предложеното оборудване отговаря на посочените по-долу минималните технически изисквания на Възложителя:

№	Параметър/характеристика	Минимални технически изисквания
1.	Всяка защита и контролер да притежава стандартен интерфейс за комуникация по Ethernet, RS-485 или оптичен интерфейс, стандартен интерфейс за комуникация с персонален компютър и съответно програмно осигуряване.	Да
2. -	Комуникацията между RTU и ЦЗ, чрез оптичен интерфейс се осъществява с HFBR-4516Z connector .	Да
3. -	Комуникацията между RTU и ЦЗ, чрез четирипроводна или двупроводна мрежа RS-485 се осъществява с RJ-45.	Да
4. -	Комуникацията между ЦЗ и персонален компютър се осъществява с USB порт.	Да
5. -	Комуникационния интерфейс за връзка с RTU да се счита като неразделна част от ЦЗ. Комуникационния интерфейс да има светодиодна индикация за режима на работа.	Да
6.	ЦЗ трябва да включва система за самоконтрол и самодиагностика, на комуникациите с вътрешни и външни потребители.	Да
7.	Наличие на сменяема парола за достъп до данните за настройките на комуникационните функции.	Да
8.	Наличие на стандартен интерфейс и протокол съгласно MODBUS TCP/IP и IEC 61850 по жична връзка с локална мрежа за предаване на информацията .	Да
9.	Потребителска настройка на комуникацията по комуникационен протокол:	-
10. -	При осъществяване на комуникацията по комуникационен протокол съгласно БДС EN 61850-5	Потребителска настройка на IP адрес на ЦУ (ЦЗ и контролер)
11. -	При осъществяване на комуникацията по комуникационен протокол съгласно MODBUS TCP/IP	Потребителска настройка на MODBUS server адрес на ЦУ (ЦЗ и контролер)
12.	Предаване на данни :	Адресите на всички цифрови входове, цифрови изходи, аналогови входове и изчислени аналогови величини по съответният комуникационен протокол

Дата:24.07.2017 г.

ПОДПИС и ПЕЧАТ:
/Георги Табаков-Управител/

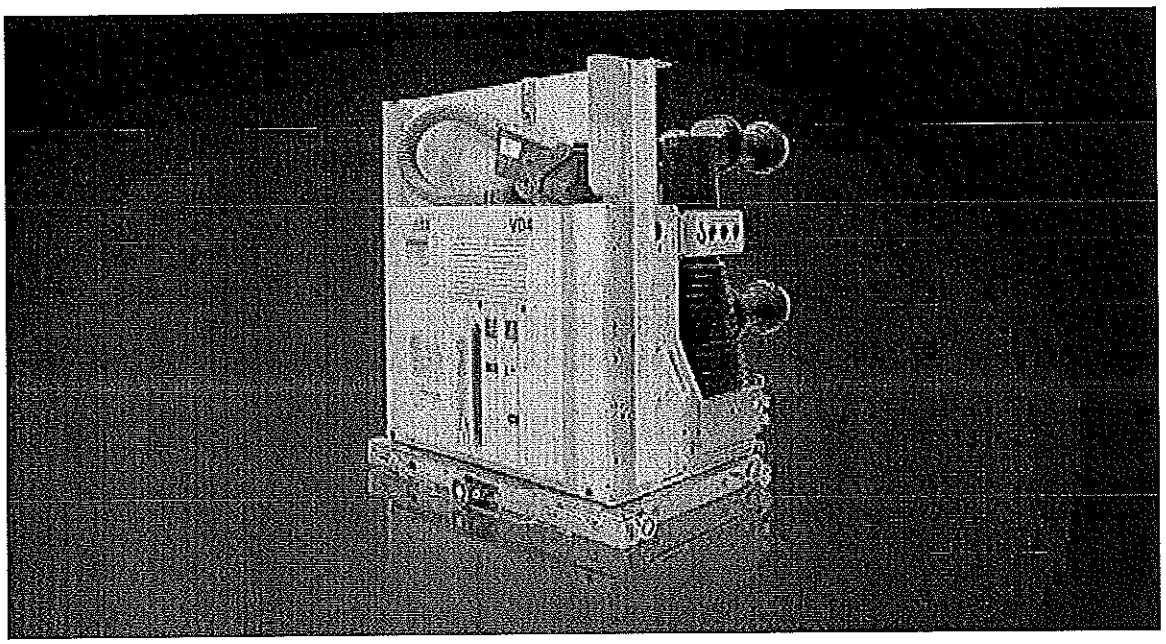
Приложение 1.1 - Техническо описание

ВЯРНО С ОРИГИНАЛА

VD4

Вакуумни прекъсвачи за средно напрежение

12 ...36kV – 630 ... 4000 A – 16 ... 50 kA



ABB

ВЯРНО С ОРИГИНАЛА

Технически параметри:

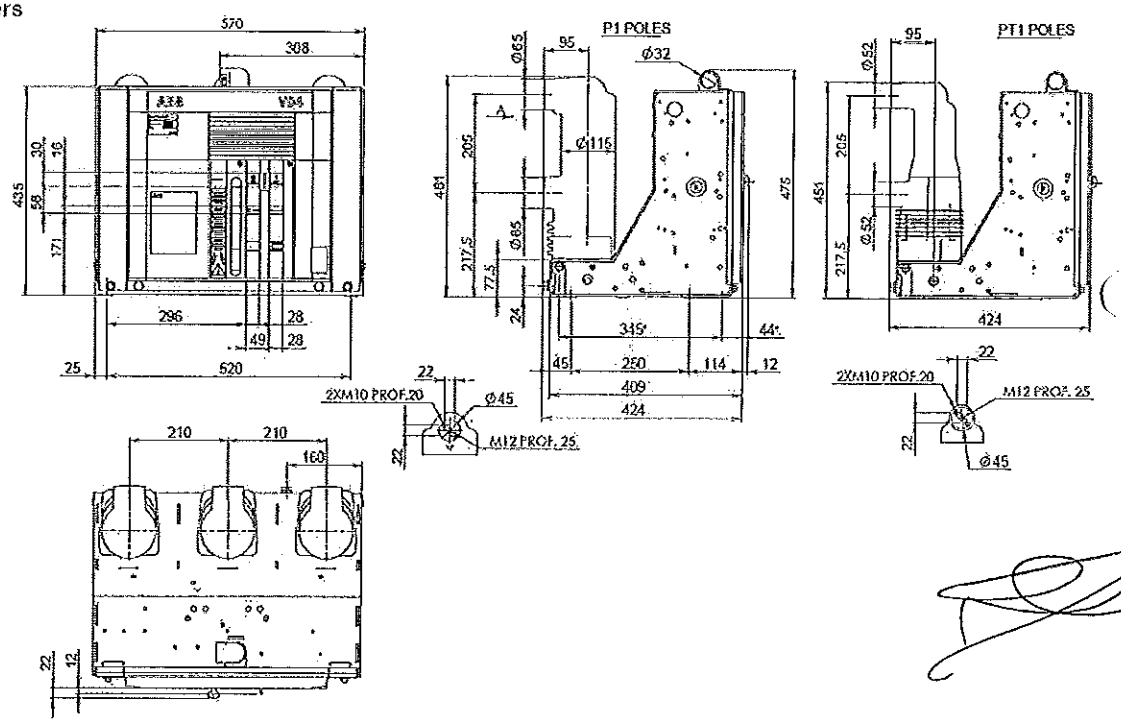
1. Вакуумен прекъсвач 12kV, 1250A, 31,5kA

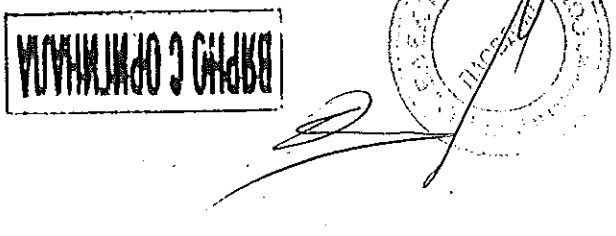
СЕРИЕН НОМЕР:	1VCF337111R1352
ТИП НА ПРЕКЪСВАЧА:	VD4
НОМИНАЛНО НАПРЕЖЕНИЕ:	12 KV
НОМИНАЛЕН ТОК:	1250 A
НОМИНАЛЕН ИЗКЛЮЧВАТЕЛНА СПОСОБНОСТ:	31.5 KA
РАЗСТОЯНИЕ МЕЖДУ ЦЕНТРОВЕТЕ НА ПОЛЮСИТЕ:	210 MM
ТИП НА ПОЛЮСА:	PT ЧЕРЕН
ТАБЕЛКА:	1VCF339700R0881

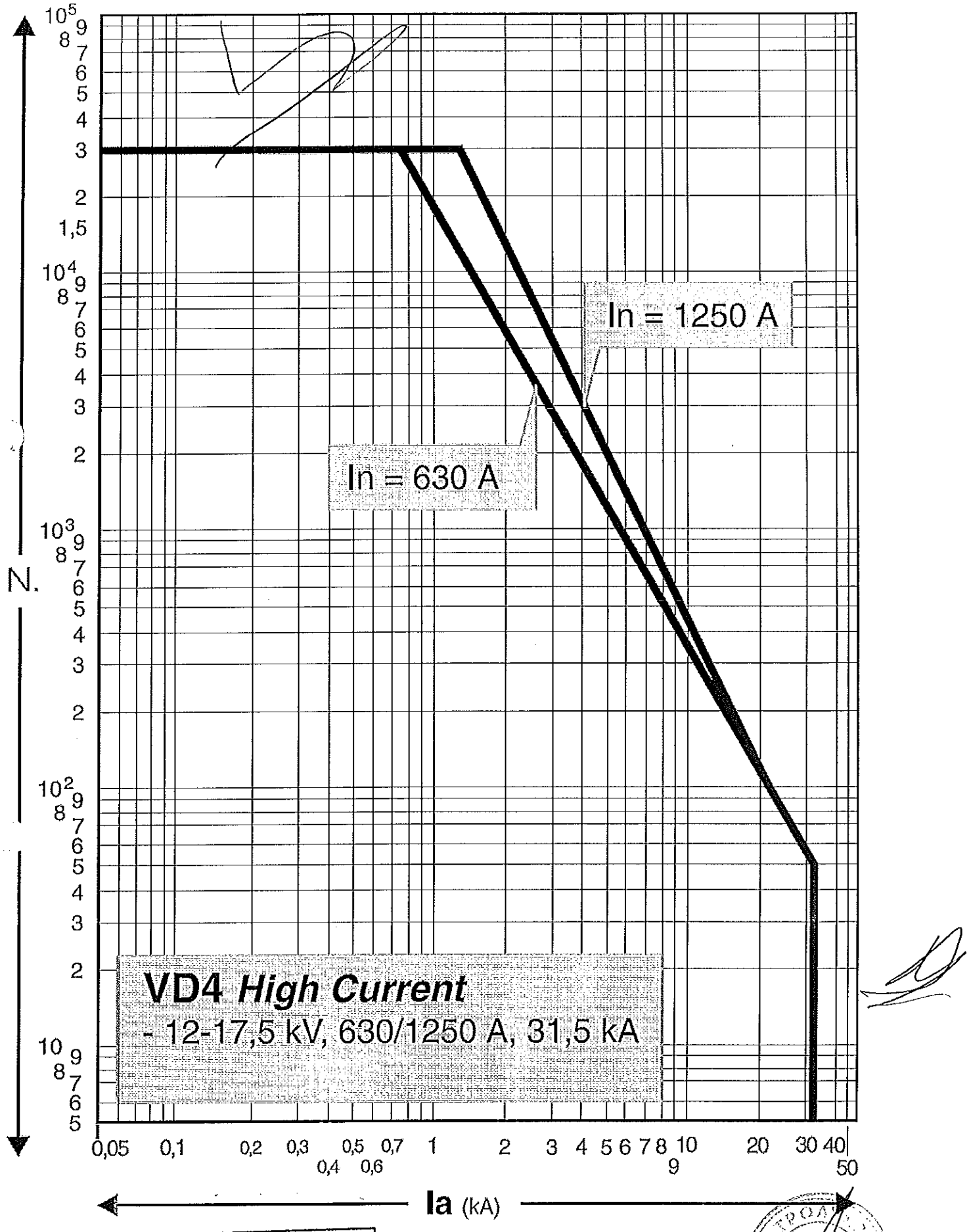
ИЗПИТВАТЕЛЕН СЕРТИФИКАТ: 1VCF339723R0882 ИЗПИТВАТЕЛЕН СЕРТИФИКАТ ЗА VD4 НА АНГЛИЙСКИ ЕЗИК
ОПАКОВКА: 1VCF339700R5885 ЗА НАЗЕМЕН ТРАНСПОРТ
МОТОРНО ЗАДВИЖВАНЕ (-MS): 1VCF339701R8918 МОТОРНО ЗАДВИЖВАНЕ С НОМИНАЛНО ЗАХРАНВАЩО НАПРЕЖЕНИЕ 220V DC
ИЗКЛЮЧВАТЕЛНА БОБИНА -MO1: 1VCF339701R2918 ЗА НОМИНАЛНО ОПЕРТАИВНО НАПРЕЖЕНИЕ 220V DC
ВКЛЮЧВАТЕЛНА БОБИНА (-MC): 1VCF339800R6922 ЗА ОПЕРАТИВНО НАПРЕЖЕНИЕ (-MBC) ЗА НОМИНАЛНО ОПЕРАТИВНО НАПРЕЖЕНИЕ 220...250 V DC/AC
ПОМОЩНИ КОНТАКТИ: 1VCF339701R0170 16БР. ПОМОЩНИ КОНТАКТИ KNFIG.31-32 FOR FIXED
БЛОКИРАЩ ЕЛЕКТРОМАГНИТ НА ЗАДВИЖВАЩИЯ МЕЖАНИЗЪМ (-RL1): 1VCF329700R0922
ЕЛЕКТРОМАГНИТ (-RLE1) ЗА НОМИНАЛНО ОПЕРАТИВНО НАПРЕЖЕНИЕ 220...250V DC/AC

Fixed circuit-breakers

VD4		
TN	7406	
Ur	12	kV
	17,5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31,5	kA

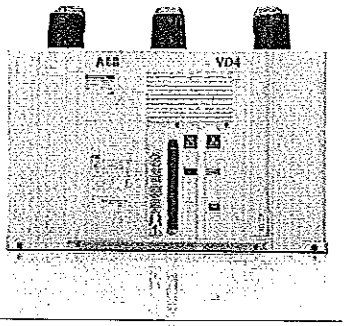






ВЕРНО С ОРИГИНАЛА

Fixed VD4 circuit-breaker (12 kV) (4)



Circuit-breaker		VD4 12									
Standards	IEC 62271-100	•									
Rated voltage	Ur [kV]	12 (2)									
Rated insulation voltage	Us [kV]	12									
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28									
Impulse withstand voltage	Up [kV]	75									
Rated frequency	fr [Hz]	50-60									
Rated normal current (40 °C)	Ir [A]	630	630	630	1250	1250	1250	1250	1250	1250	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	—	—	—	—
		20	20	20	20	20	20	—	—	—	—
		25	25	25	25	25	25	—	—	—	—
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	—	—
		—	—	—	—	—	—	40	40	—	—
		—	—	—	—	—	—	—	—	50	50
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	—	—	—	—
		20	20	20	20	20	20	—	—	—	—
		25	25	25	25	25	25	—	—	—	—
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	—	—
		—	—	—	—	—	—	40	40	—	—
		—	—	—	—	—	—	—	—	50	50
Making capacity	Ip [kA]	40	40	40	40	40	40	—	—	—	—
		50	50	50	50	50	50	—	—	—	—
		63	63	63	63	63	63	—	—	—	—
		80	80	80	80	80	80	—	—	—	—
		—	—	—	—	—	—	100	100	—	—
		—	—	—	—	—	—	—	—	125	125
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60									
Arcing time	[ms]	10 ... 15									
Total breaking time	[ms]	43 ... 75									
Closing time	[ms]	30 ... 60									
Maximum overall dimensions	H [mm]	461	461	461	461	461	461	589	589	610	610
	W [mm]	450	570	700	450	570	700	570	700	600	750
	D [mm]	424	424	424	424	424	424	424	424	459	459
	Pole distance P [mm]	150	210	275	150	210	275	210	275	210	275
Weight	[kg]	73	75	79	73	75	79	84	84	146	158
Standardised table of dimensions	TN	7405(1)	7406(1)	—	7405(1)	7406(1)	—	—	—	—	—
	1VCD	—	—	000051(1)	—	—	000051(1)	003282(1)	003285(1)	003440	003441
Operating temperature	[°C]	- 5 ... + 40									
Tropicalization	IEC: 60068-2-30, 60721-2-1	•									
Electromagnetic compatibility	IEC: 62271-1	•									

(1) Poles in polyamide
(2) Available in 10 kV voltage version in accordance with GOST standards
(3) Up to 4000 A with forced ventilation
(4) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading by a lever built into the front of operating mechanism)

ВЯРНО С ОРИГИНАЛА

•															
12 (²)															
12															
28															
75															
50-60															
1600	1600	1600	1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	2500	3150 (²)	3150 (²)
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	20	20	—	—	—	—	20	20	—	—	20	20	—	20	—
25	25	25	—	—	—	—	25	25	—	—	25	25	—	25	—
31.5	31.5	31.5	—	—	—	—	31.5	31.5	—	—	31.5	31.5	—	31.5	—
—	—	—	40	40	—	—	40	40	—	—	40	40	—	40	—
—	—	—	—	—	50	50	—	—	50	50	—	—	50	—	50
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	20	20	—	—	—	—	20	20	—	—	20	20	—	20	—
25	25	25	—	—	—	—	25	25	—	—	25	25	—	25	—
31.5	31.5	31.5	—	—	—	—	31.5	31.5	—	—	31.5	31.5	—	31.5	—
—	—	—	40	40	—	—	40	40	—	—	40	40	—	40	—
—	—	—	—	—	50	50	—	—	50	50	—	—	50	—	50
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	50	50	—	—	—	—	50	50	—	—	50	50	—	50	—
63	63	63	—	—	—	—	63	63	—	—	63	63	—	63	—
80	80	80	—	—	—	—	80	80	—	—	80	80	—	80	—
—	—	—	100	100	—	—	100	100	—	—	100	100	—	100	—
—	—	—	—	—	125	125	—	—	125	125	—	—	125	—	125
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
33 ... 60															
10 ... 15															
43 ... 75															
... 60															
599	599	599	589	589	610	610	599	599	610	610	599	599	610	635	636
450	570	700	570	700	600	750	570	700	600	750	570	700	750	700	750
424	424	424	424	424	459	459	424	424	459	459	424	424	459	424	459
150	210	275	210	275	210	275	210	275	210	275	210	275	275	275	275
93	98	105	84	84	146	158	98	105	146	158	98	105	163	140	177
—	7407 (¹)	7408 (¹)	—	—	—	—	7407 (¹)	7408 (¹)	—	—	7407 (¹)	7408 (¹)	—	—	—
000050	—	—	003282(¹)	003285(¹)	003440	003441	—	—	003440	003441	—	—	003441	000149 (¹)	003443
- 5 ... + 40															
•															
•															

ВЯРНО С ОРИГИНАЛА

VD4 fixed circuit-breaker without bottom and top terminals (12 kV)

Ur	Isc	Rated uninterrupted current (40°C) [A]											
		H=461			H=589		H=599			H=610		H=636	
		D=424			D=424		D=424			D=459		D=459	
		u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	
kV	kA	l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237	Circuit-breaker type
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
	16	630											VD4 12.06.16 p150
	20	630											VD4 12.06.20 p150
	25	630											VD4 12.06.25 p150
	31.5	630											VD4 12.06.32 p150
	16	1250											VD4 12.12.16 p150
	20	1250											VD4 12.12.20 p150
	25	1250											VD4 12.12.25 p150
	31.5	1250											VD4 12.12.32 p150
	20						1600						VD4 12.16.20 p150
	25						1600						VD4 12.16.25 p150
	31.5						1600						VD4 12.16.32 p150
	16		630										VD4 12.06.16 p210
	20		630										VD4 12.06.20 p210
	25		630										VD4 12.06.25 p210
	31.5		630										VD4 12.06.32 p210
	16		1250										VD4 12.12.16 p210
	20		1250										VD4 12.12.20 p210
	25		1250										VD4 12.12.25 p210
	31.5		1250										VD4 12.12.32 p210
	40				1250								VD4 12.12.40 p210
	50									1250			VD4 12.12.50 p210
	20							1600					VD4 12.16.20 p210
	25							1600					VD4 12.16.25 p210
	31.5							1600					VD4 12.16.32 p210
	40				1600								VD4 12.16.40 p210
	50									1600			VD4 12.16.50 p210
	20							2000					VD4 12.20.20 p210
	25							2000					VD4 12.20.25 p210
	31.5							2000					VD4 12.20.32 p210
	40							2000					VD4 12.20.40 p210
	50									2000			VD4 12.20.50 p210
	20							2500					VD4 12.25.20 p210
	25							2500					VD4 12.25.25 p210
	31.5							2500					VD4 12.25.32 p210
	16			630									VD4 12.06.16 p275
	20			630									VD4 12.06.20 p275
	25			630									VD4 12.06.25 p275
	31.5			630									VD4 12.06.32 p275
	16			1250									VD4 12.12.16 p275
	20			1250									VD4 12.12.20 p275
	25			1250									VD4 12.12.25 p275
	31.5			1250									VD4 12.12.32 p275
	40					1250							VD4 12.12.40 p275
	50										1250		VD4 12.12.50 p275
12													

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

ВЯРНО С ОРИГИНАЛА

2. Вакуумен прекъсвач 12kV, 2500A, 31,5kA

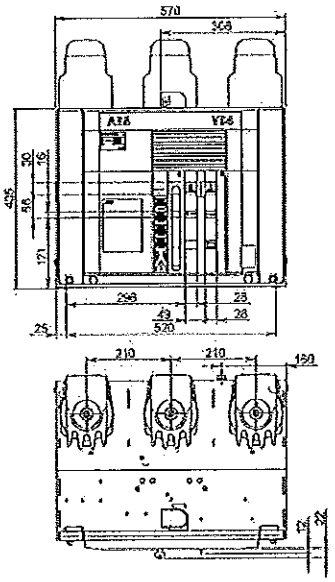
СЕРИЕН НОМЕР:	1VCF337111R1352
ТИП НА ПРЕКЪСВАЧА:	VD4
НОМИНАЛНО НАПРЕЖЕНИЕ:	12 KV
НОМИНАЛЕН ТОК:	2500 A
НОМИНАЛЕН ИЗКЛЮЧВАТЕЛНА СПОСОБНОСТ:	31.5 KA
РАЗСТОЯНИЕ МЕЖДУ ЦЕНТРОВЕТЕ НА ПОЛЮСИТЕ:	210 MM
ТИП НА ПОЛЮСА:	PT ЧЕРЕН
ТАБЕЛКА:	1VCF339700R0882
ИЗПИТВАТЕЛЕН СЕРТИФИКАТ:	1VCF339723R0882 ИЗПИТВАТЕЛЕН СЕРТИФИКАТ ЗА VD4 НА АНГЛИЙСКИ ЕЗИК
ОПАКОВКА:	1VCF339700R5885 ЗА НАЗЕМЕН ТРАНСПОРТ
МОТОРНО ЗАДВИЖВАНЕ (-MS):	1VCF339701R8918 МОТОРНО ЗАДВИЖВАНЕ С НОМИНАЛНО ЗАХРАНВАЩО НАПРЕЖЕНИЕ 220V DC
ИЗКЛЮЧВАТЕЛНА БОБИНА -MO1:	1VCF339701R2918 ЗА НОМИНАЛНО ОПЕРТАИВНО НАПРЕЖЕНИЕ 220V DC
ВКЛЮЧВАТЕЛНА БОБИНА (-MC):	1VCF339800R6922 ЗА НОМИНАЛНО ОПЕРАТИВНО НАПРЕЖЕНИЕ (-MBC) 220...250 V DC/AC
ПОМОЩНИ КОНТАКТИ:	1VCF339701R0170 16БР. ПОМОЩНИ КОНТАКТИ KNFIG.31-32 FOR FIXED
БЛОКИРАЩ ЕЛЕКТРОМАГНИТ НА ЗАДВИЖВАЩИЯ МЕЖАНИЗЪМ (-RL1):	1VCF329700R0922 ЕЛЕКТРОМАГНИТ (-RLE1) ЗА НОМИНАЛНО ОПЕРАТИВНО НАПРЕЖЕНИЕ 220...250V DC/AC

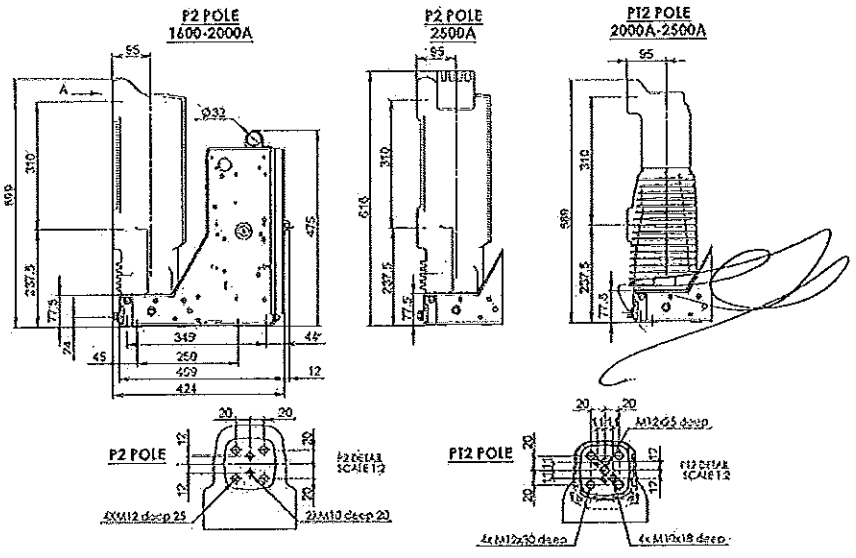
Fixed circuit-breakers

VD4		
TN	7407	
Ur	12-17,5	kV
Ir	1600	A
Isc	20	kA
	25	kA
	31,5	kA

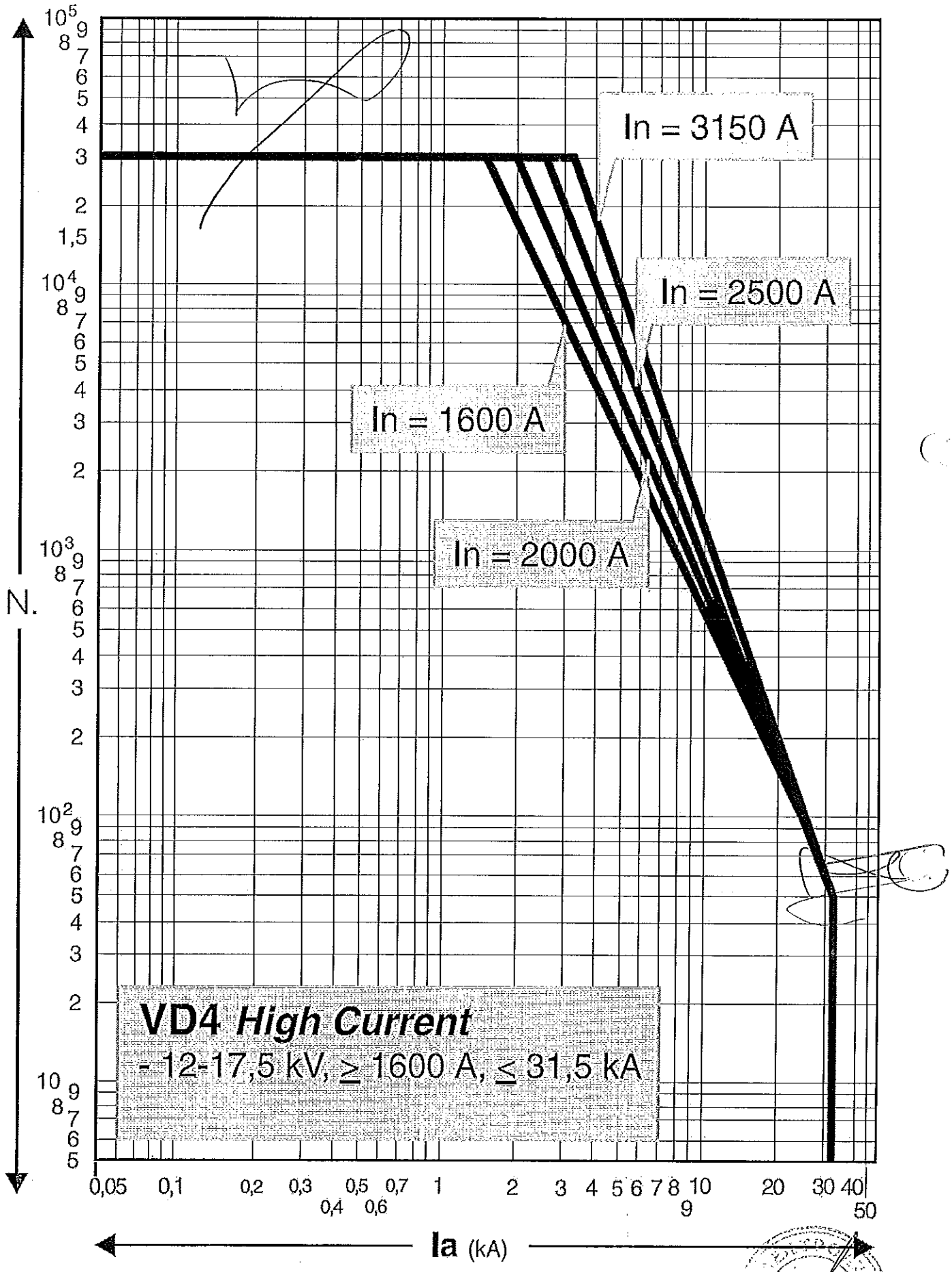
VD4		
TN	7407	
Ur	12-17,5	kV
Ir	2000	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

VD4		
TN	7407	
Ur	12	kV
Ir	2500	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA





ВЯРНО С ОРИГИНАЛА


In = 3150 A
In = 2500 A
In = 1600 A
In = 2000 A
VD4 High Current
- 12-17,5 kV, ≥ 1600 A, ≤ 31,5 kA
N.
Ia (kA)
0,05
0,1
0,2
0,3
0,4
0,5
0,6
0,7
1
2
3
4
5
6
7
8
9
10
20
30
40
50

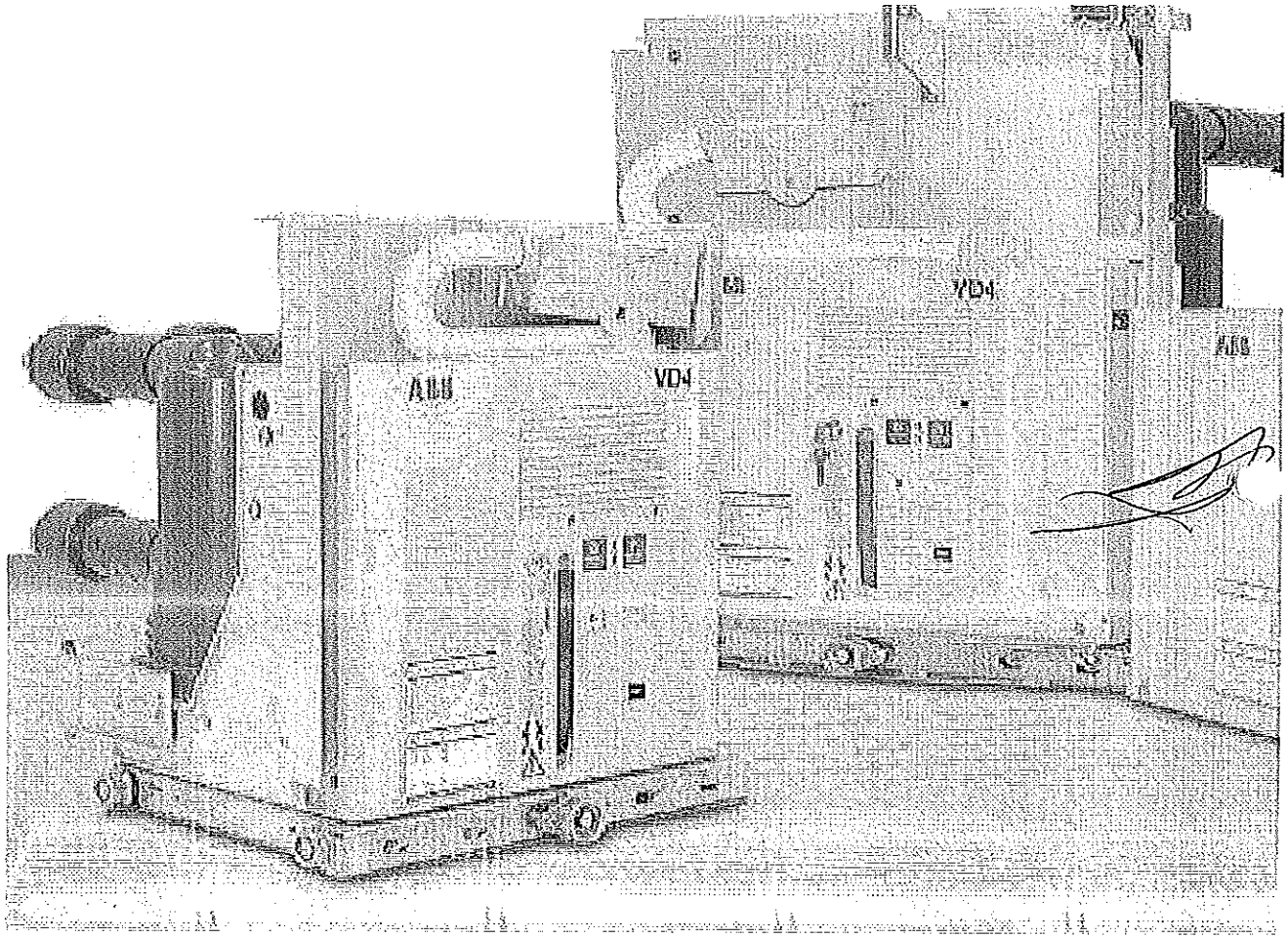
Общи положения

Новият VD4 е синтез от най-добрите традиции в проектирането и конструирането на вакуумни камери с полюси от смола и в прецизността на проектирането, инженеринга и производството на прекъсвачи.
Прекъсвачите за средно напрежение VD4 използват вакуумни комутиращи устройства, вградени в полюси от смола. Вграждането на комутиращото устройство в смола прави полюсите на прекъсвачите особено здрави и защитава устройството от сътресения, натрупване на прах и влага.
Комутационните устройства на прекъсвачите включват в себе си контактите и комутационната камера.

Прекъсване на ток във вакуум

Вакуумните прекъсвачи не изискват специална изолационна среда за да прекъснат аварийния ток. Всъщност, комутиращите устройства не съдържат вещество, което може да се йонизира.

Във всеки случай при разделяне на контактите се генерира дъга от метални пари, която е съставена изключително от разтопеният и изпарен материал на контактите.
Металните пари се поддържат само от придадената отвън енергия, докато токът не се прекъсне при преминаването през нулата. В момента, в който рязко се намали плътността на тока и след моменталното кондензиране на металните пари, диелектричната якост бързо се възстановява.
По този начин вакуумните прекъсвачи възстановяват изолационната якост и способността си да издържат преходния ток и окончателно гасят дъгата.
Тъй като във вакуумна среда диелектричната якост може да се достигне дори при малки разстояния, прекъсването на контура е гарантирано дори когато



ВЯРНО С ОРИГИНАЛА

отделянето на контактите става няколко милисекунди преди преминаването на тока през нулата.
Специално проектираните контакти и материали, както и ограничената продължителност и ниското напрежение на дъгата гарантират минимално износване на контактите и техния дълъг живот. Освен това вакуумът предотвратява оксидацията и замърсяването.

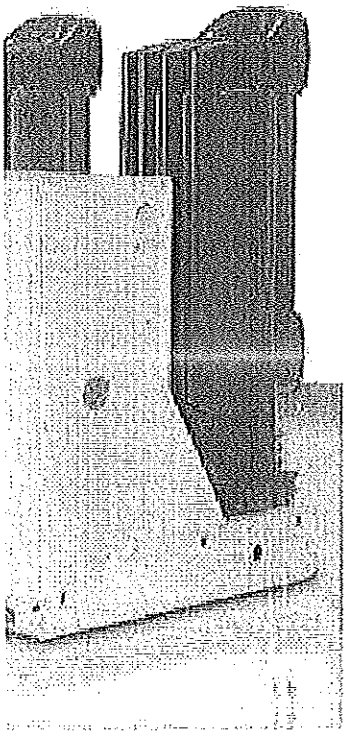
Тип EL задвижващ механизъм

Малката скорост на контактите заедно с намаленото разстояние, което те трябва да преминат и малката маса, ограничават енергията, необходима за задвижването, което гарантира изключително малкото износване на системата. Поради тази причина прекъсвачите VD4 не се нуждаят от особена поддръжка. Прекъсвачите VD4 използват механична енергия за задвижване, с енергия съхраняваща се в освобождаващ механизъм.

Тези характеристики позволяват действията по отварянето и затварянето се извършват независимо от оператор.
Задвижващият механизъм на прекъсвача VD4 е на елементарен принцип и лесен за управление и позволява да бъде оборудван с широка гама от аксесоари с лесно и бързо инсталиране.
Простотата на изпълнението води до изключителна надеждност на апарата.

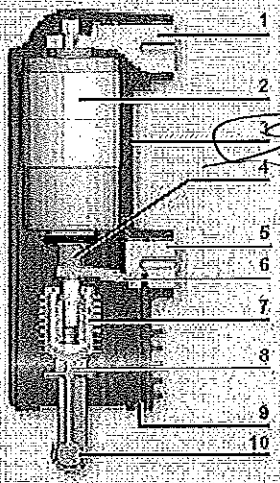
Конструкция

Задвижващият механизъм и полюсите са закрепени на метална рамка, която поддържа и самото комутиращо устройство в неподменяемите версии. Компактната конструкция осигурява здравина и механична издръжливост.
Отделно от първичните контакти и връзката с накрайник за схемата на вторичните вериги, подменяемите версии притежават и количка за поставяне и изваждане на прекъсвача в комутационното устройство или за включване към контура на веригата при затворена вратичка.



- Вакуумен принцип на комутиране
- Контактите не оксидират във вакуум
- ВДК е вградена в полюси от епоксидна смола
- ВДК е защитена от сътресения, прах и влага
- Работа при различни климатични условия
- Ограничена консумация при комутиране
- Задвижващият механизъм е снабден с неизтощаемо устройство за съхраняване на енергия, по изискванията на стандарта
- Улеснена приспособимост посредством пълна гама аксесоари
- Неподменяеми версии и версии на количка
- Компактни размери
- Трайно запечатани полюси
- Здравина и надеждност
- Ограничена поддръжка
- Поставяне и изваждане на прекъсвача при отворена вратичка
- Благодарение на специалните блокировки в работния механизъм и количката, неправилните и рискувани действия са предотвратени
- Екологично безопасни

Вакуумна дъгогасителна камера, вградена в епоксиден полюс

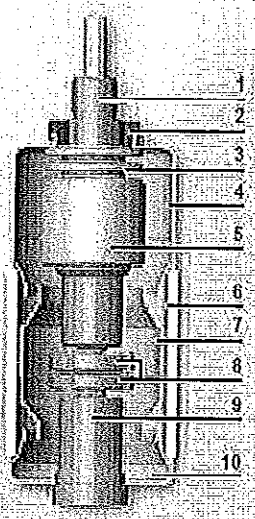


1 Горен извод
2 Вакуумна дъгогасяща камера
3 Кутия от епоксидна смола
4 Щифка на подвижния контакт
5 Долен извод
6 Гъвкава връзка
7 Контакт на задействащите пружини
8 Изтеглящ прът
9 Закрепване
10 Връзка към задвижващият механизъм

ВЯРНО С ОРИГИНАЛА

Принцип на гасене на дъгата при прекъсвачите на ABB

Вакуумен прекъсвач



1 Шийка/извод
2 Защита срещу изкривяване
3 Резервоари
4 Капак на прекъсвача
5 Щит
6 Керамичен изолатор
7 Щит
8 Контакти
9 Извод
10 Капак на прекъсвача

Във вакуумните прекъсвачи, отделянето на контактите поражда вакуумна дъга, която се поддържа до следващото преминаване на тока през нулата или докато не бъде продухана чрез магнитно поле.

Вакуумна дъга- дифузен или концентриран тип
След отделянето на контактите, върху цялата повърхност на катода се образуват отделни точки на разтопяване, които отделят метални пари, поддържащи дъгата. Дифузната вакуумна дъга се характеризира с разширяване над контактната повърхност и с равномерно разпределение на топлинното натоварване върхуконтактните повърхности.
При номинален ток на вакуумния прекъсвач, електрическата дъга е винаги от дифузен тип. Ерозията на контактите е пренебрежимо малка, а броя на комутациите, които могат да се извършат е висок.
При нарастване на стойността на комутирания ток (над номиналния ток), в електрическата дъга се наблюдава тенденция към концентриране на дъгата, което се дължи на ефекта на Хол. Запалена при анода, дъгата се концентрира и колкото повече нараства тока, толкова по- концентрирана става тя. Около областта на горене има повишаване на температурата с последващо термично натоварване на контактите.
За да се предотврати прегряването и ерозията на контактите, се поддържа въртене на дъгата. При въртене на дъгата се получава ефект, както при движещ се проводник, по който тече ток.

Спирална геометрия на контактите на вакуумните прекъсвачи ABB
Специалната геометрия на спиралните контакти генерира радиално магнитно поле, в областта около канала на дъгата, концентрирано около окръжностите на контактите.
Електромагнитната сила се самогенерира и действа тангенциално, предизвиква бързо въртене дъгата около оста на контактите.
Това означава, че дъгата е принудена да се върти и да огражда все по- голяма повърхност, отколкото неподвижната концентрирана дъга.
Освен минимизирането на термичното натоварване на контактите, това прави ерозията на контактите пренебрежимо малка и, преди всичко, прави възможно прекъсване на големи к. с.
Вакуумните прекъсвачи на ABB комутират тока на късо съединение при преминаването му през нулата и не позволяват повторно запалване.
Бързото намаляване на токовото натоварване и бързото кондензиране на металните пари при преминаването на тока през нулата, означава че възстановяването на максималната диелектрична якост между контактите на прекъсвача може да бъде възстановена до няколко микросекунд

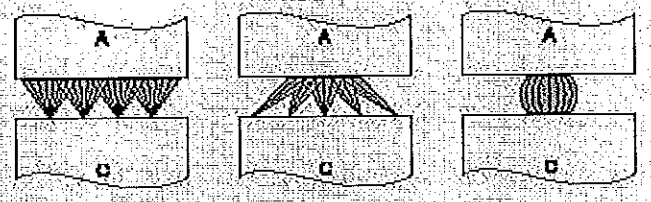
Съществуващи версии
Прекъсвачите VD4 имат неподменяема версия и версия на количка, с преден задвижващ механизъм. Версиите на количка се отнасят до комутиращи устройства тип UniGear ZS1 и UniSafe.

Област на приложение
Прекъсвачите VD4 се използват в разпределителните електрически мрежи за управление и защита на кабелни и въздушни линии, двигатели, трансформатори, генератори и кондензаторни батерии.

Стандарти и признания
Прекъсвачите VD4 съответстват на Стандартите IEC 62271-100, CEI 17-1, част 1375 и тези на основните индустриални държави. Прекъсвачите VD4 са преминали тестовете, посочени по-долу и гарантират безопасност и надеждност при работа на апарата при всяка инсталация.

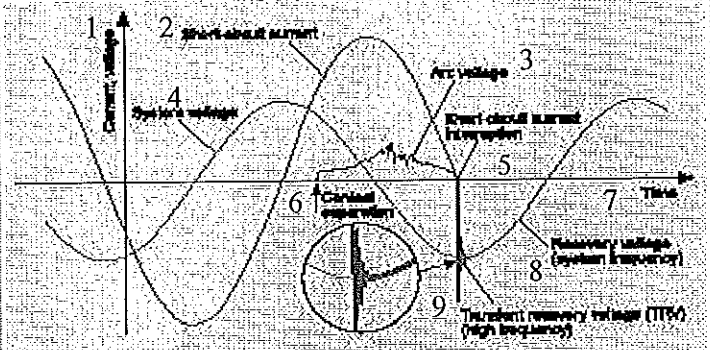
Типове изпитания: прегряване, якост на изолацията при индустриална честота, якост на изолацията при мълниеносна дейност, устойчивост на кратковременен и върхов ток, срок на работа на механичните части, устойчивост при ток на късо съединение и максимален ток и комутиране без товар

ВЯРНО С ОРИГИНАЛА



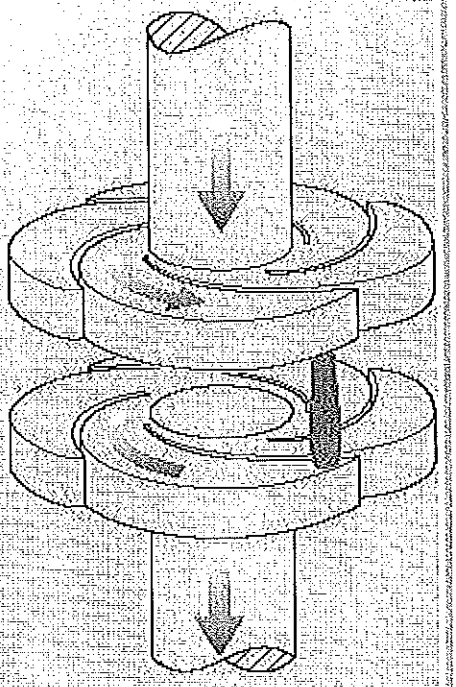
Дифузна дъга | Свиване към анода | Свиване към анода и към катода

Схематична диаграма на преминаването на дифузната дъга в концентрирана в вакуумните прекъсвачи.



Развитие на тока и напрежението при еднофазно прекъсване:

1. Ток, напрежение;
2. Ток на късо съединение (т.к.с.);
3. Напрежение на дъгата;
4. Напрежение на системата;
5. Прекъсване на т.к.с.;
6. Отделяне на контакта
7. Време;
8. Възстановяващо се напрежение (честота на системата);
9. Преходно възстановяващо се напрежение (RTV) с висока честота



Разположение на контактите един спрямо друг, за формиране на радиално магнитно поле и въртене на дъгата.

• **Индивидуални изпитания:** Изолацията на първичната верига с напрежение на индустриална честота, изолацията на вторичните вериги и задвижващия механизъм, измерване на съпротивлението на първичната верига, механично и електрическо задвижване.

Безопасност при работа

Благодарение на предвиждането на всички необходими механични и електрически блокировки (поръчват се допълнително), е възможно към прекъсвачите VD4 да се конструират напълно безопасни разпределителни табла. Блокиращите устройства са разработени за предотвратяване на неправилни заработвания и за съблюдаване на условията, гарантиращи максимална безопасност за оператора.

Блокирането с ключа на таблото или устройство за заключване разрешава действията за "отваряне / затваряне" и "въвеждане / изваждане".

Устройството за изваждане със затворена вратичка позволява прекъсвачът да бъде поставян и изваждан от количката само със затворена вратичка.

Блокировката против изваждане предпазва прекъсвача със затворена вратичка от изваждане и поставяне при различни номинални токове.

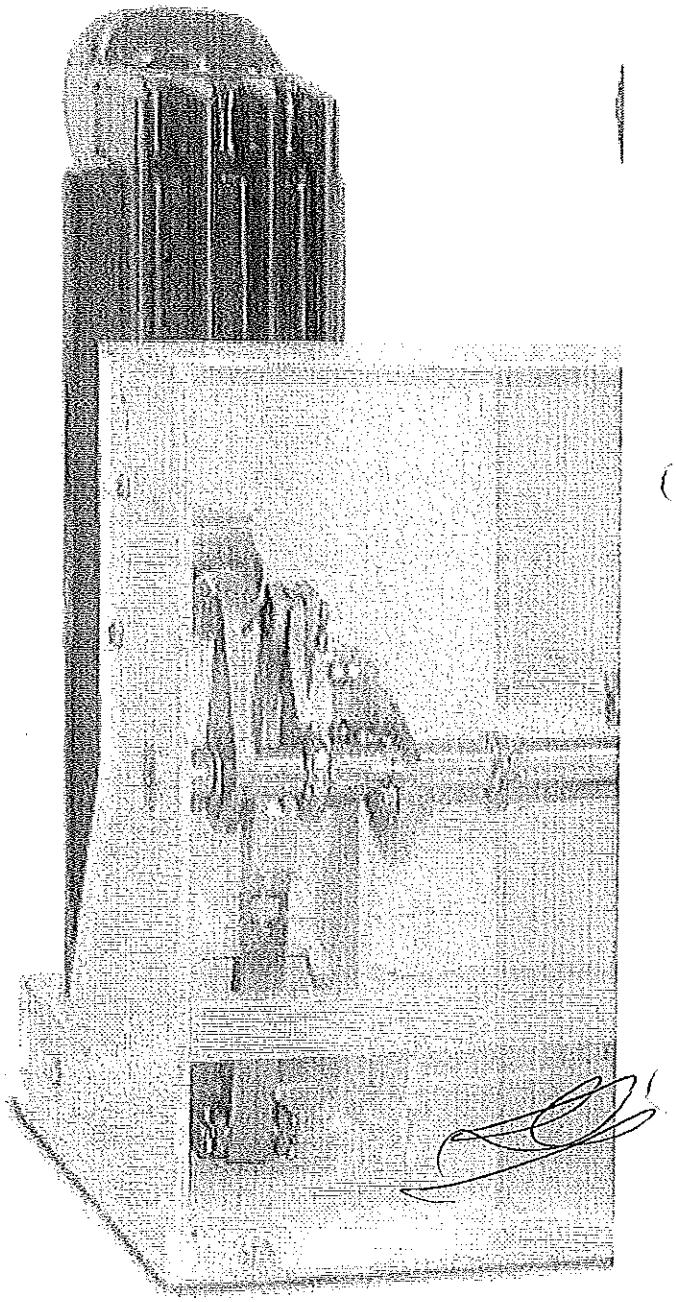
ВЯРНО С ОРИГИНАЛА

Аксесоари

Прекъсвачите VD4 притежават пълна гама от аксесоари, за да удовлетворят инсталационните изисквания.
Задвижващият механизъм има стандартизирана гама от аксесоари и резервни части, като изборът и тяхното поръчване е напълно улеснено.
Задвижващите механизми са удобни за инсталиране от лицевата част на прекъсвача.
Електрическият контакт се извършва с връзка от вида щепсел-гнездо. Използването, поддръжката и обслужването на апарата са прости и изискват ограничени ресурси.

Задвижващ механизъм

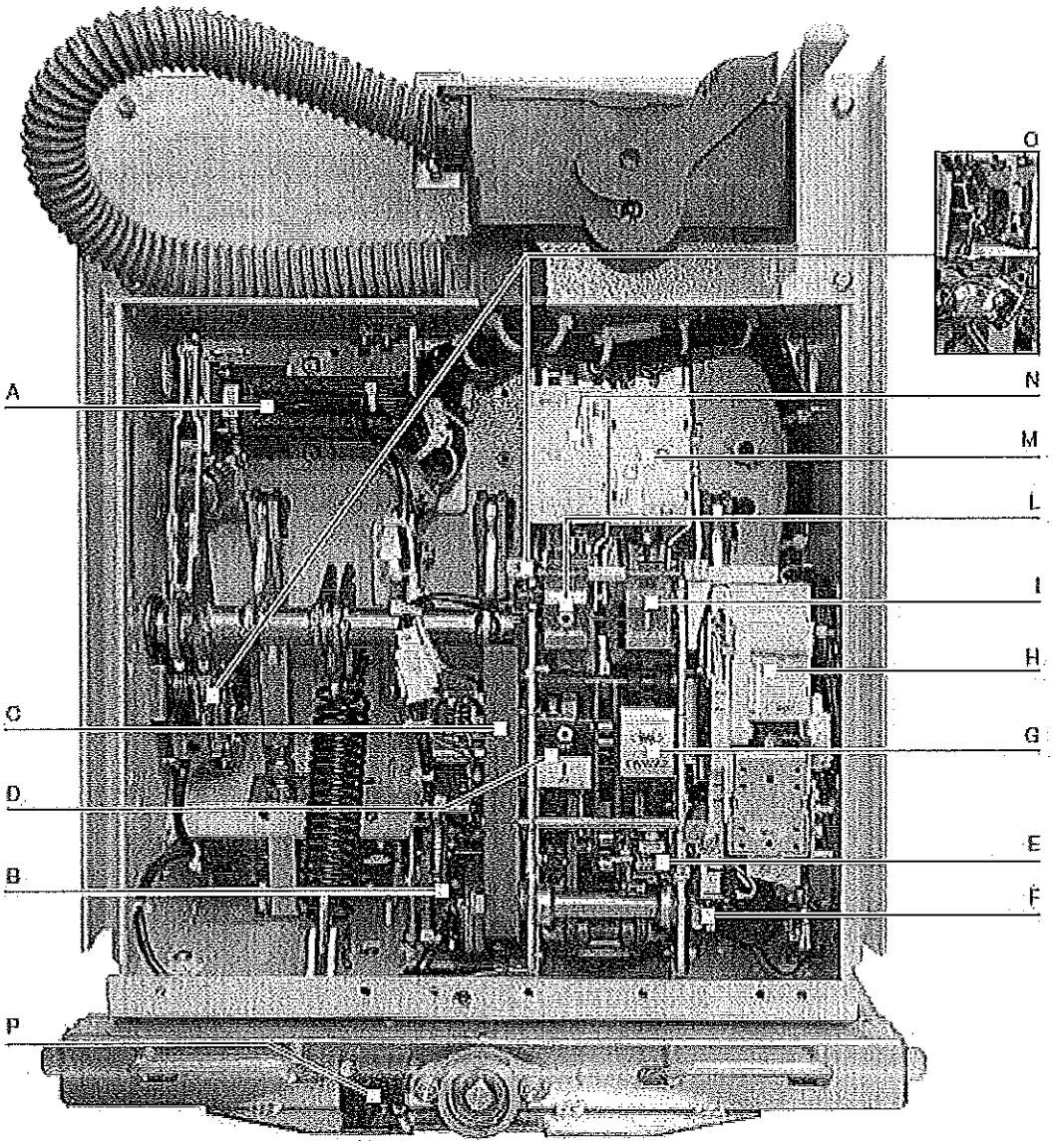
Задвижващият механизъм заработва благодарение на съхранена в него енергия, и е съоръжен с устройство против многократно включване, монтирано стандартно и има подходящи блокировки за предотвратяване на неправилни заработвания.
Всяко едно действие се разрешава само в случай, че всички условия, осигуряващи правилното му протичане са налице.
Аксесоарите са същите, както за прекъсвачите тип VD4s.
За да се улесни монтажът и подмяната на аксесоари, върху монтажните легла са добавени подходящи закрепващи езичета.



- Висока надеждност на задвижващият механизъм, благодарение на малкия брой елементи в състава му и поточното им производство в големи количества
- Изключително ограничена и проста поддръжка
- Аксесоарите са общи за цялата гама и са еднакви за апарати за променлив и постоянен ток
- Електрическите аксесоари се заменят лесно и бързо, благодарение на предварително подготвените кабелни връзки, със собствени щепсел- гнездо контакти
- Стандартизирано механично устройство, непозволяващо утечка
- Вграден пост за зареждане на затварящите пружини
- Ключ за блокиране при отворен прекъсвач
- Защитното капаче на пуш- бутоните за отваряне и затваряне се задействат само посредством специален инструмент
- Заключващо устройство на превключващите пуш- бутони

ВЯРНО С ОРИГИНАЛА

1



Задвижващ механизъм на прекъсвача
A Помощни контакти Вкл./Изкл.
B Мотор за зареждане на включвателна пружина
C Вграден лост за зареждане на пружината
D Механично сигнално усройство за прекъсвача изключен/включен
E Механичен брояч
F Контакти за сигнализация на заредена/разредена пружина
G Сигнално устройство за включвателна пружина заредена/разредена
H Устройство за освобождаване
I Бутон за включване
L Бутон за изключване
M Блокиращ електромагнит за задвижващия механизъм
N Допълнителна изключвателна бобина – опция
O Прелитащ контакт
P Блокировка при отворена врата

ВЯРНО С ОРИГИНАЛА

1

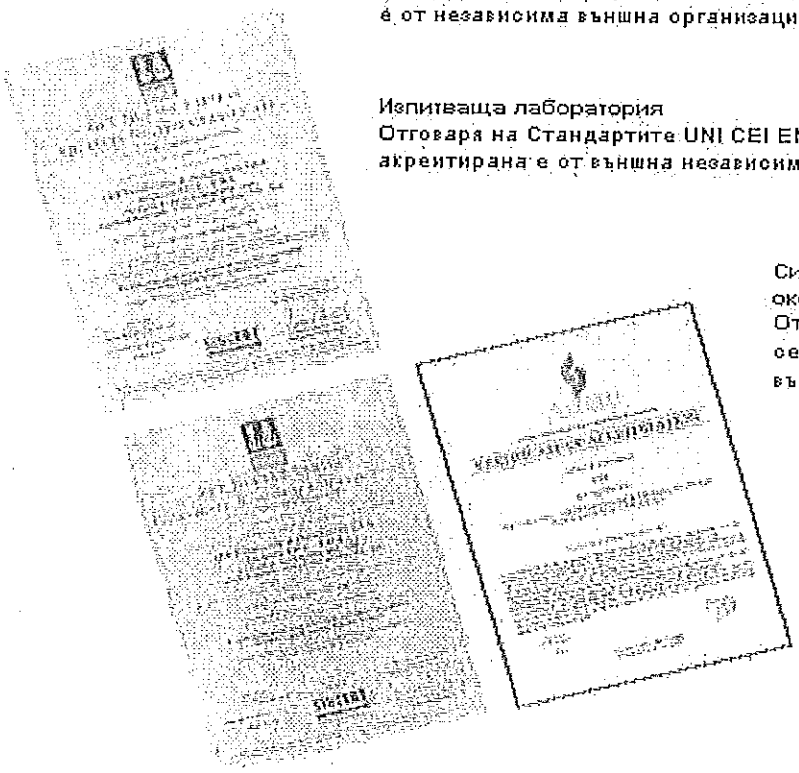
ОПИСАНИЕ

Техническа документация

За да добиете задълбочено познаване на техническите аспекти на прекъсвачите VD4 и областта им на приложение, моля осведомете се за следните публикации:

- КРУ тип UniSafe	код 649228
- КРУ тип UniGear ZS1	код 649424
- Релейна защита с блок за управл. REFxxx	код 649423
- Релеен блок PR512	код 649092

Система за оценяване на качеството
Отговаря на Стандартите ISO 9001, сертифициран е от независима външна организация.



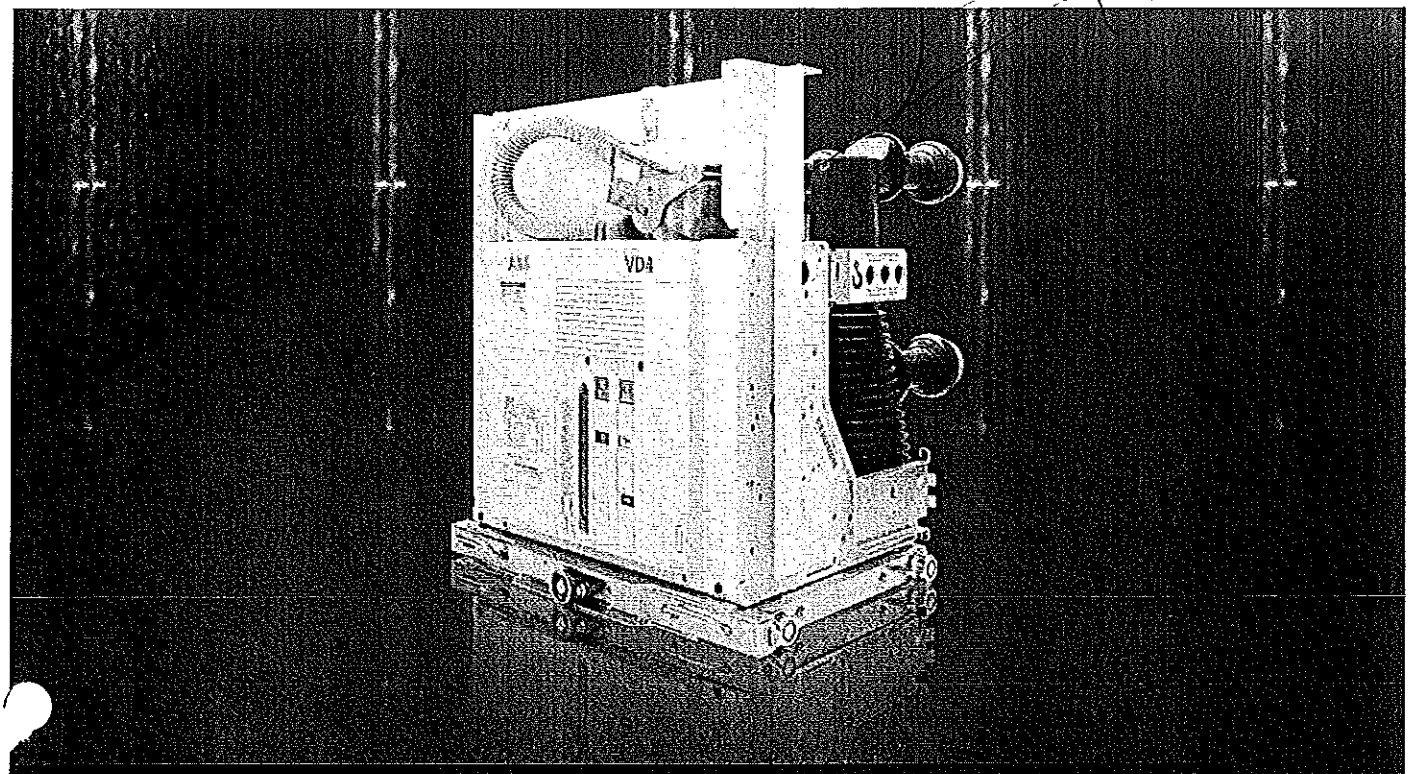
Изпитваща лаборатория
Отговаря на Стандартите UNI CEI EN ISO/IEC 17025, акредитирана е от външна независима организация

Система за опазване на околната среда
Отговаря на Сандартите ISO 14001, сертифицирана е от независима външна организация.

ВЯРНО С ОРИГИНАЛА

Приложение 1.1 помощен документ_CA_VD4-50kA(EN)V_1VCP000001_DigiPrint

ВЯРНО С ОРИГИНАЛА



Medium voltage products

ВЯРНО С ОРИГИНАЛА

Power and productivity for a better world™

ABB

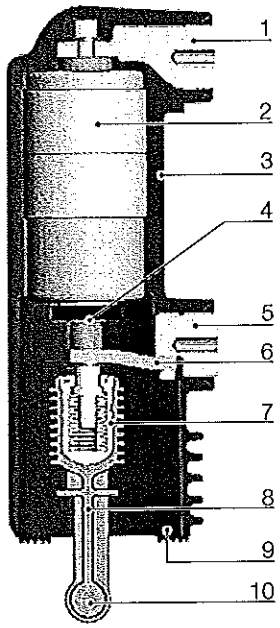
Index

ВЯРНО С ОРИГИНАЛА

1. Description

The new VD4 are a synthesis of renowned technology in designing and constructing vacuum interrupters embedded in poles, and excellency in design, engineering and production of circuit-breakers.
The VD4 medium voltage circuit-breakers use vacuum interrupters embedded in the poles. This construction technique makes the circuit-breaker poles particularly sturdy and protects the interrupter from impacts, dust deposits and humidity. The vacuum interrupter houses the contacts and makes up the interrupting chamber.

Current interruption in vacuum
The vacuum circuit-breaker does not require an interrupting and insulating medium. In fact, the interrupters do not contain ionisable material.
In any case, on separation of the contacts an electric arc is generated made up exclusively of melted and vaporised contact material.
The electric arc remains supported by the external energy until the current is cancelled in the vicinity of natural zero. At that instant, the rapid reduction in the load density carried and the rapid condensation of the metallic vapour, leads to extremely rapid recovery of the dielectric characteristics.
The vacuum interrupter therefore recovers the insulating capacity and the capacity to withstand the transient recovery voltage, definitively extinguishing the arc.
Since high dielectric strength can be reached in the vacuum,



1 Upper terminal
2 Vacuum interrupter
3 Housing/pole
4 Stem of moving contact
5 Lower terminal
6 Flexible connection
7 Tie-rod spring fork
8 Tie-rod
9 Pole fixing
10 Connection to operating mechanism

Vacuum interrupter embedded in the pole

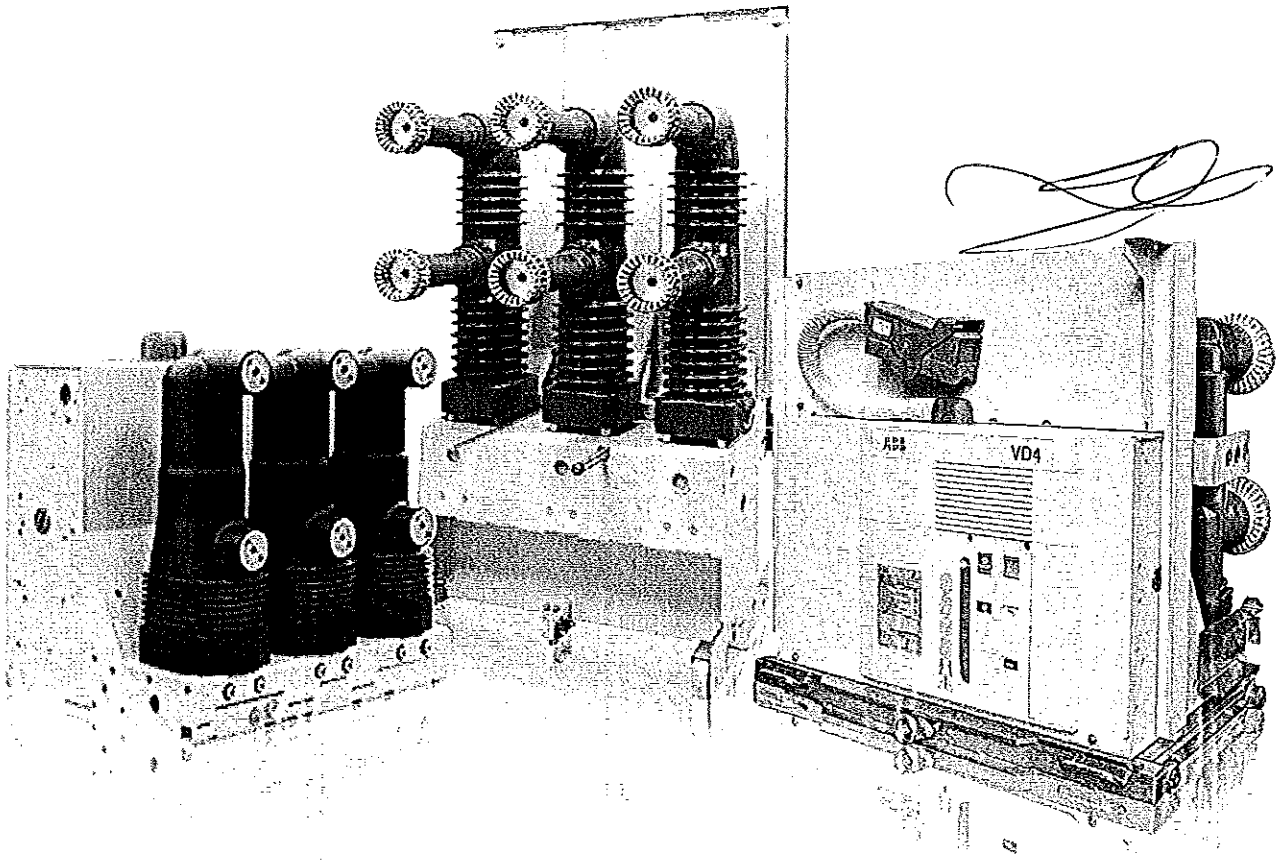
- **Vacuum interruption technique**
- **Vacuum contacts protected against oxidation and contamination**
- **Vacuum interrupter embedded in the pole**
- **Interrupter protected against shocks, dust and humidity**
- **Operation under different climatic conditions**
- **Limited switching energy**
- **Stored energy operating mechanism with anti-pumping device supplied as standard**
- **Simple customisation with a complete range of accessories**
- **Fixed and withdrawable version**
- **Compact dimensions**
- **Sealed-for-life poles**
- **Sturdiness and reliability**
- **Limited maintenance**
- **Circuit-breaker racking in and racking out with door closed**
- **Incorrect and hazardous operations are prevented thanks to special locks in the operating mechanism and in the truck**
- **High environmental compatibility**

even with minimum distances, interruption of the circuit is also guaranteed when separation of the contacts takes place a few milliseconds before passage of the current through natural zero.
The special geometry of the contacts and the material used, as well as the limited duration and low voltage of the arc, guarantee minimum contact wear and long life. Furthermore, the vacuum prevents their oxidation and contamination.

Operating mechanism
The low speed of the contacts, together with the reduced run and low mass, limit the energy required for the operation and therefore guarantee extremely limited wear of the system.
The circuit-breaker therefore only requires limited maintenance.
The VD4 circuit-breakers use a mechanical operating mechanism, with stored energy and free trip.

These characteristics allow opening and closing operations independent of the operator. The operating mechanism is of simple conception and use and can be customised with a wide range of accessories which are easy and rapid to install. This simplicity converts into greater reliability of the apparatus.

The structure
The operating mechanism and the poles are fixed to a metal frame which is also the support for the fixed version of the circuit-breaker. The compact structure ensures sturdiness and mechanical reliability.
Apart from the isolating contacts and the cord with plug for connection of the auxiliary circuits, the withdrawable version is completed with the truck for racking it into and out of the switchgear or enclosure with the door closed.



ВЯРНО С ОРИГИНАЛА

1. Description

Quenching principle of ABB interrupters

In a vacuum interrupter, the electric arc starts at the moment of contact separation and is maintained until zero current and can be influenced by magnetic fields.

Vacuum arc – diffuse or contracted

Following contact separation, single melting points form over the entire surface of the cathode, producing metal vapours which support the arc.

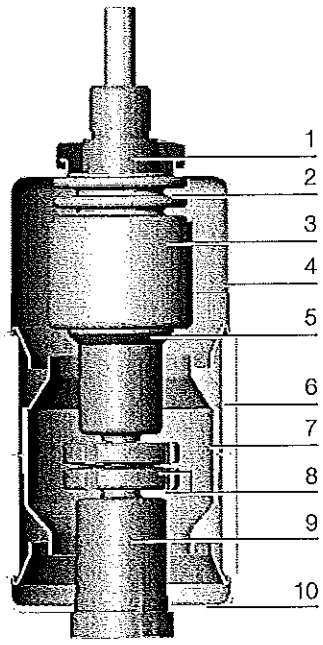
The diffuse vacuum arc is characterised by expansion over the contact surface and by an even distribution of thermal tress on the contact surfaces.

At the rated current of the vacuum interrupter, the electric arc is always of the diffuse type. Contact erosion is very limited and the number of current interruptions very high.

As the interrupted current value increases (above the rated value), the electric arc tends to be transformed from the diffuse into the contracted type, due to the Hall effect.

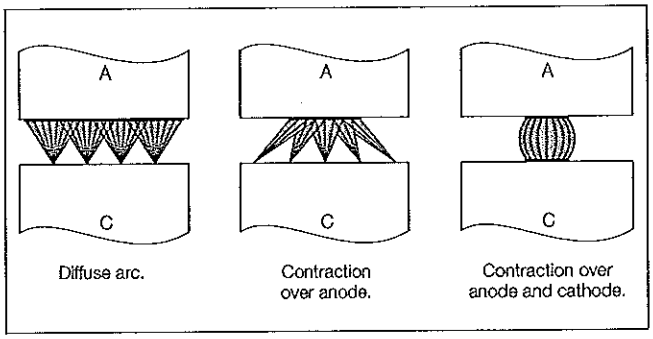
Starting at the anode, the arc contracts and as the current rises further it tends to become sharply defined. Near the area involved there is an increase in temperature with consequent thermal stress on the contact.

To prevent overheating and erosion of the contacts, the arc is kept rotating. With arc rotation it becomes similar to a moving conductor which the current passes through.



1 Stem/terminal
2 Twist protection
3 Bellows
4 Interrupter housing
5 Shield
6 Ceramic insulator
7 Shield
8 Contacts
9 Terminal
10 Interrupter housing

Vacuum interrupter

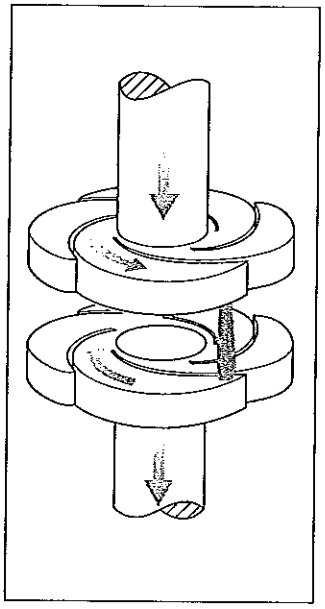


Schematic diagram of the transition from a diffuse arc to a contracted arc in a vacuum interrupter.

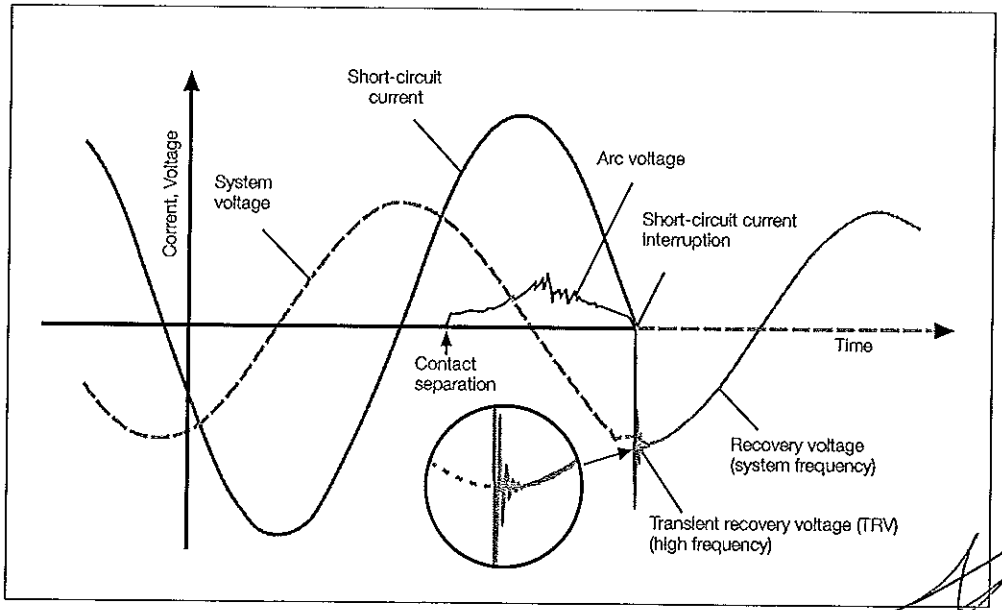
ВЯРНО С ОРИГИНАЛА

The spiral geometry of ABB vacuum interrupter contacts
The special geometry of the spiral contacts generates a radial magnetic field in all areas of the arc column, concentrated over the contact circumferences.
An electromagnetic force is self-generated and this acts tangentially, causing rapid arc rotation around the contact axis.
This means the arc is forced to rotate and to involve a wider surface than that of a fixed contracted arc.

Apart from minimising thermal stress on the contacts, all this makes contact erosion negligible and, above all, allows the interruption process to be controlled even with very high short-circuits.
ABB vacuum interrupters interrupt at the natural passage of the current through zero, thereby preventing the arc from restriking after that event.
Rapid reduction in the current charge and rapid condensation of the metal vapours simultaneously with the zero current, allows maximum dielectric strength to be restored between the interrupter contacts within microseconds.



Radial magnetic field contact arrangement with a rotating vacuum arc.



Development of current and voltage trends during a single phase vacuum interruption process.

ВЕРНО С ОРИГИНАЛА

1. Description

Versions available

The VD4 circuit-breakers are available in the fixed and withdrawable version with front operating mechanism.
The withdrawable version is available for UniGear ZS1, ZS2, ZS8.4 and UniSec switchgear and for PowerCube and Powerbloc enclosures.

Fields of application

The VD4 circuit-breakers are used in power distribution for control and protection of cables, overhead lines, transformer and distribution substations, motors, transformers, generators and capacitor banks.

Standards

The VD4 circuit-breakers comply with the IEC 62271-100 Standards and with those of the major industrialised countries.
The VD4 circuit-breakers have undergone the tests indicated below and guarantee the safety and reliability of the apparatus in service in any installation.

- **Type tests:** heating, withstand insulation at power frequency, withstand insulation at lightning impulse, short-time and peak withstand current, mechanical life, short-circuit current making and breaking capacity.
- **Individual tests:** insulation of the main circuits with voltage at power frequency, auxiliary circuit and operating mechanism insulation, measurement of the main circuit resistance, mechanical and electrical operation.

Service safety

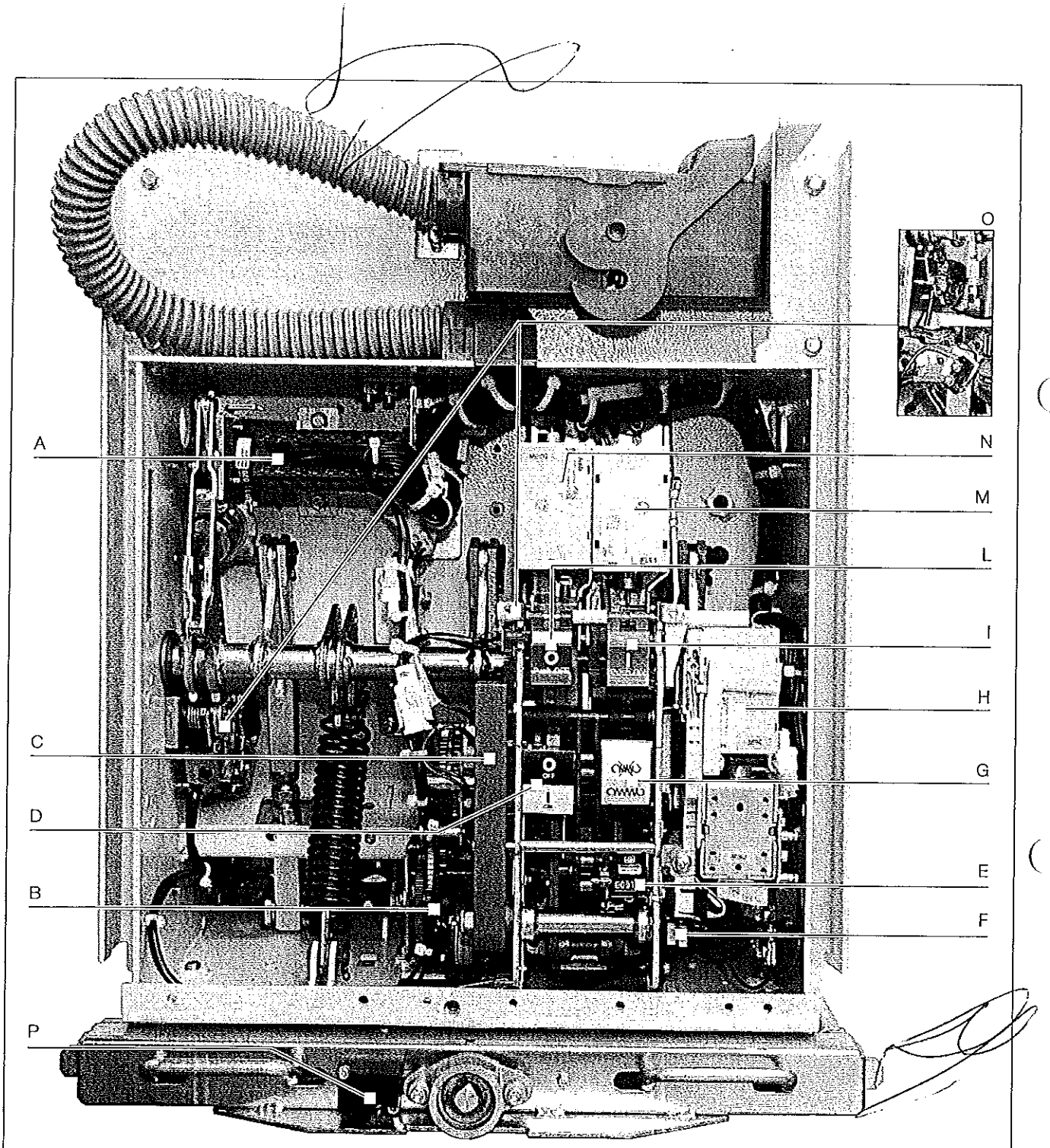
Thanks to the complete range of mechanical and electrical locks (available on request), it is possible to construct safe distribution switchgear with the VD4 circuit-breakers.
The locking devices have been studied to prevent incorrect operations and to inspect the installations whilst guaranteeing maximum operator safety.
Key locks or padlock devices enable opening and closing operations and/or racking in and racking out.
The racking-out device with the door closed allows the circuit-breaker to be racked into or out of the switchgear only with the door closed.
Anti-racking-in locks prevent circuit-breakers with different rated currents from being racked in, and the racking-in and racking out operation with the circuit-breaker closed.

- **Highly reliable operating mechanisms thanks to a low number of components which are manufactured using production systems for large quantities**
- **Extremely limited and simple maintenance**
- **Accessories common to the entire range**
- **Electrical accessories that can be easily and quickly installed or replaced thanks to wiring pre-engineered with plug-socket connectors**
- **Mechanical anti-pumping device is supplied as standard**
- **Built-in closing spring charging lever**
- **Key lock with circuit-breaker open**
- **Protective covering over the opening and closing pushbuttons to be operated using a special tool**
- **Padlock device on the operating pushbuttons**

Accessories

The VD4 circuit-breakers have a complete range of accessories to satisfy all installation requirements.
The operating mechanism has a standardised range of accessories and spare parts which are easy to identify and order.
The accessories are installed conveniently from the front of the circuit-breaker. Electrical connection is carried out with plug-socket connectors.
Use, maintenance and service of the apparatus are simple and require limited use of resources.

ВЕРНО С ОРИГИНАЛА



Circuit-breaker operating mechanism

A Open/closed auxiliary contacts
B Geared motor for closing spring charging
C Built-in closing spring charging lever
D Mechanical signalling device for circuit-breaker open/closed
E Mechanical operation counter
F Contacts for signalling spring charged/discharged
G Signalling device for closing springs charged/discharged
H Service releases
I Closing pushbutton
L Opening pushbutton
M Operating mechanism locking electromagnet
N Additional shunt opening release
O Transient contact
P Lock that prevents racking-in when door is open

ВЗЯТО С ОРИГИНАЛА

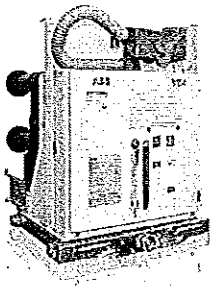
1. Description

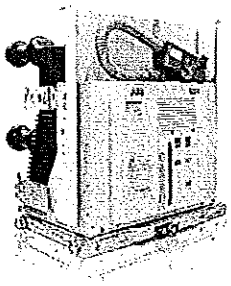
General characteristics of the complete VD4 series (*)

The VD4 series of vacuum circuit-breakers conform to the specifications of the following standards:

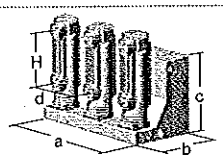
- IEC 62271-1
- IEC 62271-100

(*) For information about the 12 kV • 1250 ... 4000 A • 50/63 kA and 36/40.5 kV • 630 ... 2500 A • 16 ... 40 kA circuit-breakers, please see technical catalogue GCBA520PO102.





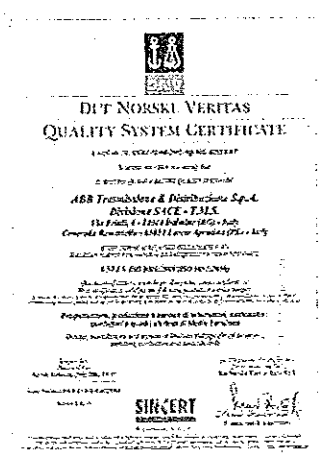
Rated voltage [1]	kV	12			
ated frequency	Hz	50 - 60			
Rated normal current	A	630 . . . 4000 [2]			
Short-time withstand current and breaking capacity	kA	16 ... 31.5	40	50	63
Making capacity	kA	40 ... 80	100	125 [3]	158
Short-time withstand current	s	3	3	3	3
Fixed / withdrawable version		•/•	•/•	•/•	• / –
Maximum overall dimensions (fixed version)	d (mm)	150 - 275	210 - 275	210 - 275	275
	H (mm)	205 - 310	310	310	310
	a (mm)	450 - 700	570 - 700	600 - 750	750
	b (mm)	424	424	459	459
	c (mm)	461 - 599	599 [5]	608 [7]	677
Weight	kg	73 - 105	94 - 180	147 - 260	260
Embedded poles		•	•	•	-
Assembled poles		-	-	-	•

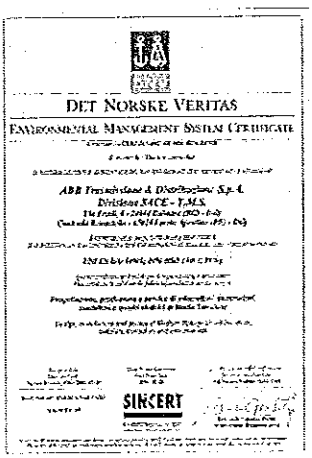


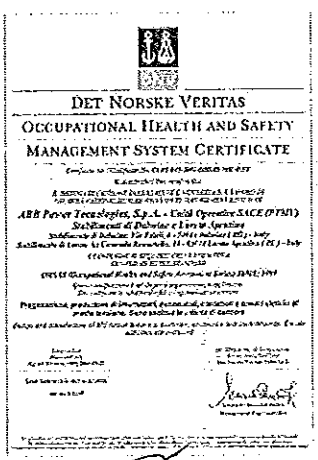
Technical documentation

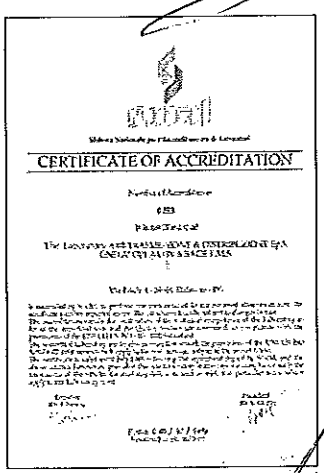
To go into technical and application aspects of the VD4 circuit-breakers in depth, please ask us for the following publications:

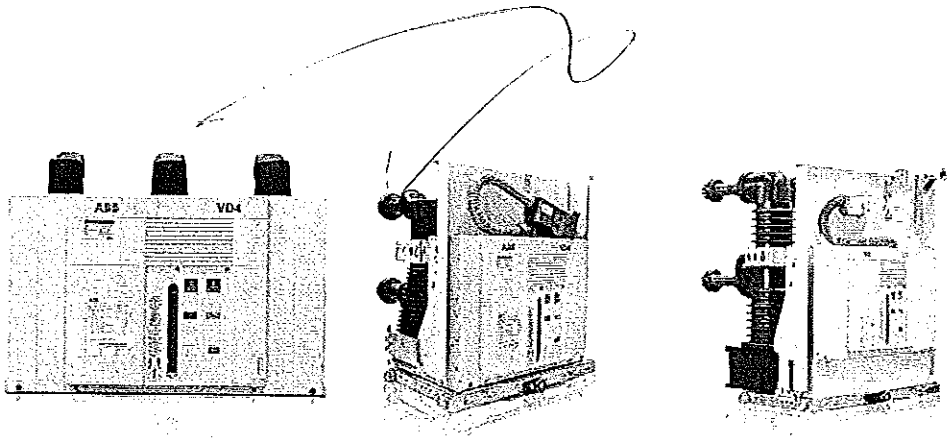
– PowerCube modules	code 1VCP000091
– Powerbloc modules	code BA441/03E
– UniGear ZS1 switchgear	code 1VCP000138
– ZS8.4 switchgear	code L2288
– REF542*plus* unit	code 1VTA100001
– UniSec	cod. 1VFM200003


DET NORSKE VERITAS
QUALITY SYSTEM CERTIFICATE


DET NORSKE VERITAS
ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE


DET NORSKE VERITAS
OCCUPATIONAL HEALTH AND SAFETY
MANAGEMENT SYSTEM CERTIFICATE


CERTIFICATE OF ACCREDITATION



	17.5		24	36	40,5
	50 - 60		50 - 60	50-60	50-60
	630 . . . 4000 [2]		630 . . . 3150 [2]	630 ... 3150	630 ... 3150
	16 ... 31.5	40 ... 50	16 ... 31.5	16 ... 31.5	16 ... 40
	40 ... 80	100 ... 125	40 ... 80	40 ... 80	40 ... 100
	3	3	3	3	4
	•/•	•/•	•/•	•/•	•/•
	150 - 275	210 - 275	210 - 275	275	280 - 360 [4]
	205 - 310	310	310	328 / 280 [5]	328
	450 - 700	570 - 700	570 - 700	786 / 853 [5]	895 [6] - 1000
	424	424	424	492 / 789 [5]	555 - 686 [5]
	461 - 599 [5]	599 [5] [7]	631 - 661	876 / 973 [5]	1575
	73 - 105	94 - 180	100 - 110	170 / 210	290 - 350
	•	•	•	•	•
	-	-	-	•	•

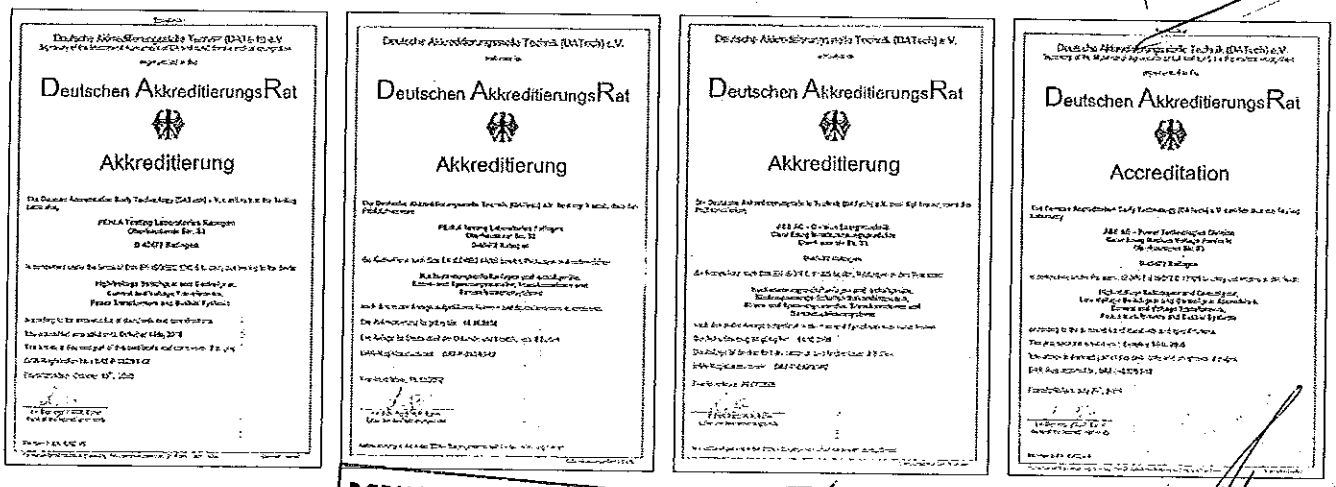
[1] Test voltage according to IEC 62271-1 Standards table 1a, VDE 0670, - part 1000, list 2
[2] With forced ventilation
[3] Higher values on request
[4] 360 mm for fixed version, 280 mm for withdrawable version
[5] Circuit-breaker with eat sink 616 mm (2500 A)
[6] Withdrawable version
[7] Circuit-breaker with eat sink 634 mm (3150 A)

Quality System
Complies with ISO 9001 Standards, certified by an independent organisation.

Test Laboratory
Complies with UNI CEI EN ISO/IEC 17025 Standards, accredited by an independent organisation.

Environmental Management System
Complies with ISO 14001 Standards, certified by an independent organisation.

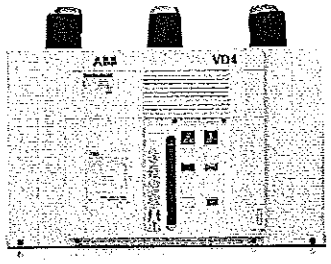
Health and Safety Management System
Complies with OHSAS 18001 Standards, certified by an independent organisation.



ВЕРНО С ОРИГИНАЛА

2. Selection and ordering
Fixed circuit-breakers

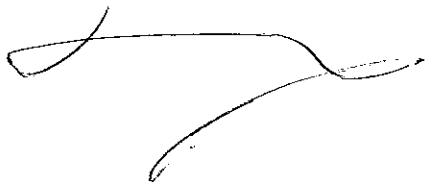
Fixed VD4 circuit-breaker (12 kV) (4)



Circuit-breaker		VD4 12									
Standards	IEC 62271-100	•									
Rated voltage	Ur [kV]	12 (2)									
Rated insulation voltage	Us [kV]	12									
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28									
Impulse withstand voltage	Up [kV]	75									
Rated frequency	fr [Hz]	50-60									
Rated normal current (40 °C)	Ir [A]	630	630	630	1250	1250	1250	1250	1250	1250	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	—	—	—	—
		20	20	20	20	20	20	—	—	—	—
		25	25	25	25	25	25	—	—	—	—
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	—	—
		—	—	—	—	—	—	40	40	—	—
		—	—	—	—	—	—	—	—	50	50
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	—	—	—	—
		20	20	20	20	20	20	—	—	—	—
		25	25	25	25	25	25	—	—	—	—
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	—	—
		—	—	—	—	—	—	40	40	—	—
		—	—	—	—	—	—	—	—	50	50
aking capacity	Ip [kA]	40	40	40	40	40	40	—	—	—	—
		50	50	50	50	50	50	—	—	—	—
		63	63	63	63	63	63	—	—	—	—
		80	80	80	80	80	80	—	—	—	—
		—	—	—	—	—	—	100	100	—	—
		—	—	—	—	—	—	—	—	125	125
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60									
Arcing time	[ms]	10 ... 15									
Total breaking time	[ms]	43 ... 75									
Closing time	[ms]	30 ... 60									
Maximum overall dimensions	H [mm]	461	461	461	461	461	461	589	589	610	610
	W [mm]	450	570	700	450	570	700	570	700	600	750
	D [mm]	424	424	424	424	424	424	424	424	459	459
	Pole distance P [mm]	150	210	275	150	210	275	210	275	210	275
Weight	[kg]	73	75	79	73	75	79	84	84	146	158
Standardised table of dimensions	TN	7405(1)	7406(1)	—	7405(1)	7406(1)	—	—	—	—	—
	1VCD	—	—	000051(1)	—	—	000051(1)	003282(1)	003285(1)	003440	003441
Operating temperature	[°C]	- 5 ... + 40									
Tropicalization	IEC: 60068-2-30, 60721-2-1	•									
Electromagnetic compatibility	IEC: 62271-1	•									

(1) Poles in polyamide
(2) Available in 10 kV voltage version in accordance with GOST standards
(3) Up to 4000 A with forced ventilation
(4) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading by a lever built into the front of operating mechanism)

ВЯРНО С ОРИГИНАЛА

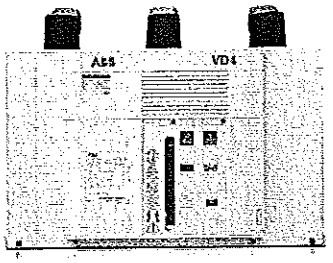


•															
12 (2)															
12															
28															
75															
50-60															
1600	1600	1600	1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	2500	3150 (3)	3150 (3)
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	20	20	—	—	—	—	20	20	—	—	20	20	—	20	—
25	25	25	—	—	—	—	25	25	—	—	25	25	—	25	—
31.5	31.5	31.5	—	—	—	—	31.5	31.5	—	—	31.5	31.5	—	31.5	—
—	—	—	40	40	—	—	40	40	—	—	40	40	—	40	—
—	—	—	—	—	50	50	—	—	50	50	—	—	50	—	50
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	20	20	—	—	—	—	20	20	—	—	20	20	—	20	—
25	25	25	—	—	—	—	25	25	—	—	25	25	—	25	—
31.5	31.5	31.5	—	—	—	—	31.5	31.5	—	—	31.5	31.5	—	31.5	—
—	—	—	40	40	—	—	40	40	—	—	40	40	—	40	—
—	—	—	—	—	50	50	—	—	50	50	—	—	50	—	50
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	50	50	—	—	—	—	50	50	—	—	50	50	—	50	—
63	63	63	—	—	—	—	63	63	—	—	63	63	—	63	—
80	80	80	—	—	—	—	80	80	—	—	80	80	—	80	—
—	—	—	100	100	—	—	100	100	—	—	100	100	—	100	—
—	—	—	—	—	125	125	—	—	125	125	—	—	125	—	125
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
33 ... 60															
10 ... 15															
43 ... 75															
30 ... 60															
599	599	599	589	589	610	610	599	599	610	610	599	599	610	635	636
450	570	700	570	700	600	750	570	700	600	750	570	700	750	700	750
424	424	424	424	424	459	459	424	424	459	459	424	424	459	424	459
150	210	275	210	275	210	275	210	275	210	275	210	275	275	275	275
93	98	105	84	84	146	158	98	105	146	158	98	105	163	140	177
—	7407 (1)	7408 (1)	—	—	—	—	7407 (1)	7408 (1)	—	—	7407 (1)	7408 (1)	—	—	—
000050	—	—	003282(1)	003285(1)	003440	003441	—	—	003440	003441	—	—	003441	000149 (1)	003443
- 5 ... + 40															
•															
•															

ВЗЯТО С ОРИГИНАЛА

2. Selection and ordering
Fixed circuit-breakers

Fixed VD4 circuit-breaker (17.5 kV) (3)



Circuit-breaker		VD4 17									
Standards	IEC 62271-100	•									
Rated voltage	Ur [kV]	17.5									
Rated insulation voltage	Us [kV]	17.5									
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38									
Impulse withstand voltage	Up [kV]	95									
Rated frequency	fr [Hz]	50-60									
Rated normal current (40 °C)	Ir [A]	630	630	630	1250	1250	1250	1250	1250	1250	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	—	—	—	—
		20	20	20	20	20	20	—	—	—	—
		25	25	25	25	25	25	—	—	—	—
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	—	—
		—	—	—	—	—	—	40	40	—	—
		—	—	—	—	—	—	—	—	50	50
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	—	—	—	—
		20	20	20	20	20	20	—	—	—	—
		25	25	25	25	25	25	—	—	—	—
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	—	—
		—	—	—	—	—	—	40	40	—	—
		—	—	—	—	—	—	—	—	50	50
Making capacity	Ip [kA]	40	40	40	40	40	40	—	—	—	—
		50	50	50	50	50	50	—	—	—	—
		63	63	63	63	63	63	—	—	—	—
		80	80	80	80	80	80	—	—	—	—
		—	—	—	—	—	—	100	100	—	—
		—	—	—	—	—	—	—	—	125	125
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60									
Arcing time	[ms]	10 ... 15									
Total breaking time	[ms]	43 ... 75									
Closing time	[ms]	30 ... 60									
Maximum overall dimensions	H [mm]	461	461	461	461	461	461	589	589	610	610
	W [mm]	450	570	700	450	570	700	570	700	600	750
	D [mm]	424	424	424	424	424	424	424	424	459	459
	Pole distance P [mm]	150	210	275	150	210	275	210	275	210	275
Weight	[kg]	73	75	79	73	75	79	84	84	146	158
Standardised table of dimensions	TN	7405(1)	7406(1)	—	7405(1)	7406(1)	—	—	—	—	—
	1VCD	—	—	000051(1)	—	—	000051(1)	003282(1)	003285(1)	003440	003441
Operating temperature	[°C]	- 5 ... + 40									
Tropicalization	IEC: 60068-2-30, 60721-2-1	•									
Electromagnetic compatibility	IEC: 62271-1	•									

(1) Poles in polyamide
(2) Up to 4000 A with forced ventilation
(3) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading by a lever built into the front of operating mechanism)

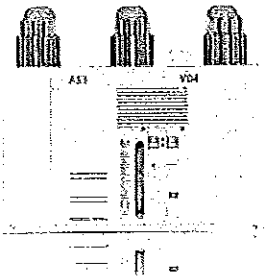
ВЗЯТО С ОРИГИНАЛА

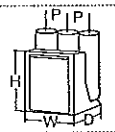
•														
17.5														
17.5														
38														
95														
50-60														
1600	1600	1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	3150 (²)	3150 (²)	
—	—	—	—	—	—	—	—	—	—	—	—	—	—	
20	20	—	—	—	—	20	20	—	—	20	—	20	—	
25	25	—	—	—	—	25	25	—	—	25	—	25	—	
31.5	31.5	—	—	—	—	31.5	31.5	—	—	31.5	—	31.5	—	
—	—	40	40	—	—	40	40	—	—	40	—	40	—	
—	—	—	—	50	50	—	—	50	50	—	50	—	50	
—	—	—	—	—	—	—	—	—	—	—	—	—	—	
20	20	—	—	—	—	20	20	—	—	20	—	20	—	
25	25	—	—	—	—	25	25	—	—	25	—	25	—	
31.5	31.5	—	—	—	—	31.5	31.5	—	—	31.5	—	31.5	—	
—	—	40	40	—	—	40	40	—	—	40	—	40	—	
—	—	—	—	50	50	—	—	50	50	—	50	—	50	
—	—	—	—	—	—	—	—	—	—	—	—	—	—	
50	50	—	—	—	—	50	50	—	—	50	—	50	—	
63	63	—	—	—	—	63	63	—	—	63	—	63	—	
80	80	—	—	—	—	80	80	—	—	80	—	80	—	
—	—	100	100	—	—	100	100	—	—	100	—	100	—	
—	—	—	—	125	125	—	—	125	125	—	125	—	125	
•	•	•	•	•	•	•	•	•	•	•	•	•	•	
33 ... 60														
10 ... 15														
43 ... 75														
30 ... 60														
599	599	589	589	610	610	599	599	610	610	599	610	635	636	
570	700	570	700	600	750	570	700	600	750	700	750	700	750	
424	424	424	424	459	459	424	424	459	459	424	459	424	459	
210	275	210	275	210	275	210	275	210	275	275	275	275	275	
98	105	84	84	146	158	98	105	146	158	105	163	140	177	
7407 (¹)	7408 (¹)	—	—	—	—	7407 (¹)	7408 (¹)	—	—	7408 (¹)	—	—	—	
—	—	003282 (¹)	003285 (¹)	003440	003441	—	—	003440	003441	—	003441	000149 (¹)	003443	
- 5 ... + 40														
•														
•														

ВЗЯТО С ОРИГИНАЛА

2. Selection and ordering
Fixed circuit-breakers

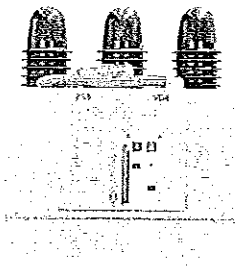
Fixed VD4 circuit-breaker (24 kV) (2)

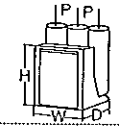


Circuit-breaker		VD4 24						
Standards	IEC 62271-100	•						
Rated voltage	Ur [kV]	24						
Rated insulation voltage	Us [kV]	24						
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50						
Impulse withstand voltage	Up [kV]	125						
Rated frequency	fr [Hz]	50-60						
Rated normal current (40 °C)	Ir [A]	630	630	1250	1250	1600	2000	2500
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	–
		20	20	20	20	20	20	–
		25	25	25	25	25	25	25
		–	–	31.5	–	31.5	31.5	31.5
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	–
		20	20	20	20	20	20	–
		25	25	25	25	25	25	25
		–	–	31.5	–	31.5	31.5	31.5
Making capacity	Ip [kA]	40	40	40	40	40	40	–
		50	50	50	50	50	50	–
		63	63	63	63	63	63	63
		–	–	80	–	80	80	80
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60						
Arcing time	[ms]	10 ... 15						
Total breaking time	[ms]	43 ... 75						
Closing time	[ms]	30 ... 60						
Maximum overall dimensions 	H [mm]	631	631	631	631	642	642	642
	W [mm]	570	700	570	700	700	700	700
	D [mm]	424	424	424	424	424	424	424
	Pole distance P [mm]	210	275	210	275	275	275	275
Weight	[kg]	100	104	100/106 (1)	104	110	110	110
Standardised table of dimensions	TN	7409	7410	7409	7410	7411	7411	7411
	1VCD	–	–	000172 (1)	–	–	–	–
Operating temperature	[°C]	- 5 ... + 40						
Tropicalization	IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility	IEC: 62271-1	•						

(1) 31.5 kA version
(2) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading by a lever built into the front of operating mechanism)

Fixed VD4 circuit-breaker (36 kV)



Circuit-breaker		VD4 36			
Standards	IEC 62271-100	•			
Rated voltage	Ur [kV]	36			
Rated insulation voltage	Us [kV]	36			
Withstand voltage at 50 Hz	Ud (1 min) [kV]	70			
Impulse withstand voltage	Up [kV]	170			
Rated frequency	fr [Hz]	50			
Rated normal current (40 °C)	Ir [A]	1250	1600	2000	2500 (1)
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31.5
Rated short-time withstand current (3s)	Ik [kA]	20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31. 5
Making capacity	Ip [kA]	50	50	50	50
		63	63	63	63
		80	80	80	80
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•
Opening time	[ms]	35 ... 60			
Arcing time	[ms]	10 ... 15			
Total breaking time	[ms]	45 ... 75			
Closing time	[ms]	30 ... 60			
Maximum overall dimensions 	H [mm]	564	564	564	564
	W [mm]	778	778	778	778
	D [mm]	468	468	468	468
	Pole distance P [mm]	275	275	275	275
Weight	[kg]	150	150	170	170
Standardised table of dimensions	TN	1VYN300901-LT	1VYN300901-LT	1VYN300901-LT	1VYN300901-LT
Operating temperature	[°C]	- 5 ... + 40			
Tropicalization	IEC: 60068-2-30, 60721-2-1	•			
Electromagnetic compatibility	IEC: 62271-1	•			

(1) 2500 A with forced ventilation

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Fixed circuit-breakers

Types of fixed version circuit-breakers available

Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4 fixed circuit-breaker without bottom and top terminals (12 kV)

Ur	Isc	Rated uninterrupted current (40°C) [A]											Circuit-breaker type
		H=461			H=589		H=599			H=610		H=636	
		D=424			D=424		D=424			D=459		D=459	
		u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	
kV	kA	l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
12	16	630											VD4 12.06.16 p150
	20	630											VD4 12.06.20 p150
	25	630											VD4 12.06.25 p150
	31.5	630											VD4 12.06.32 p150
	16	1250											VD4 12.12.16 p150
	20	1250											VD4 12.12.20 p150
	25	1250											VD4 12.12.25 p150
	31.5	1250											VD4 12.12.32 p150
	20						1600						VD4 12.16.20 p150
	25						1600						VD4 12.16.25 p150
	31.5						1600						VD4 12.16.32 p150
	16		630										VD4 12.06.16 p210
	20		630										VD4 12.06.20 p210
	25		630										VD4 12.06.25 p210
	31.5		630										VD4 12.06.32 p210
	16		1250										VD4 12.12.16 p210
	20		1250										VD4 12.12.20 p210
	25		1250										VD4 12.12.25 p210
	31.5		1250										VD4 12.12.32 p210
	40				1250								VD4 12.12.40 p210
	50									1250			VD4 12.12.50 p210
	20							1600					VD4 12.16.20 p210
	25							1600					VD4 12.16.25 p210
	31.5							1600					VD4 12.16.32 p210
	40				1600								VD4 12.16.40 p210
	50									1600			VD4 12.16.50 p210
	20							2000					VD4 12.20.20 p210
	25							2000					VD4 12.20.25 p210
	31.5							2000					VD4 12.20.32 p210
	40							2000					VD4 12.20.40 p210
	50									2000			VD4 12.20.50 p210
	20							2500					VD4 12.25.20 p210
	25							2500					VD4 12.25.25 p210
	31.5							2500					VD4 12.25.32 p210
	40							2500					VD4 12.25.40 p210

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

ВЗЯТО С ОРИГИНАЛА

VD4 fixed circuit-breaker without bottom and top terminals (12 kV)

Ur	Isc	Rated uninterrupted current (40°C) [A]											
		H=461			H=589		H=599			H=610		H=636	
		D=424			D=424		D=424			D=459		D=459	
kV	kA	u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	Circuit-breaker type
		l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
	16			630									VD4 12.06.16 p275
	20			630									VD4 12.06.20 p275
	25			630									VD4 12.06.25 p275
	31.5			630									VD4 12.06.32 p275
	16			1250									VD4 12.12.16 p275
	20			1250									VD4 12.12.20 p275
	25			1250									VD4 12.12.25 p275
	31.5			1250									VD4 12.12.32 p275
	40					1250							VD4 12.12.40 p275
	50										1250		VD4 12.12.50 p275
	20								1600				VD4 12.16.20 p275
	25								1600				VD4 12.16.25 p275
	31.5								1600				VD4 12.16.32 p275
	40					1600							VD4 12.16.40 p275
12	50										1600		VD4 12.16.50 p275
	20								2000				VD4 12.20.20 p275
	25								2000				VD4 12.20.25 p275
	31.5								2000				VD4 12.20.32 p275
	40								2000				VD4 12.20.40 p275
	50										2000		VD4 12.20.50 p275
	20								2500				VD4 12.25.20 p275
	25								2500				VD4 12.25.25 p275
	31.5								2500				VD4 12.25.32 p275
	40								2500				VD4 12.25.40 p275
	50										2500		VD4 12.25.50 p275
	20											3150 (1)	VD4 12.32.20 p275
	25											3150 (1)	VD4 12.32.25 p275
	31.5											3150 (1)	VD4 12.32.32 p275
	40											3150 (1)	VD4 12.32.40 p275
	50											3150 (1)	VD4 12.32.50 p275

H = Height of the circuit-breaker.
W = Width of the circuit-breaker
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker
P = Pole horizontal centre distance.
(1) Up to 4000 A with forced ventilation

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Fixed circuit-breakers

VD4 fixed circuit-breaker without bottom and top terminals (17.5 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]											Circuit-breaker type
		H=461			H=589		H=599			H=610		H=635	
		D=424			D=424		D=424			D=459		D=459	
		u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	
kV	kA	l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237.5	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
17.5	16	630											VD4 17.06.16 p150
	20	630											VD4 17.06.20 p150
	25	630											VD4 17.06.25 p150
	31.5	630											VD4 17.06.32 p150
	16	1250											VD4 17.12.16 p150
	20	1250											VD4 17.12.20 p150
	25	1250											VD4 17.12.25 p150
	31.5	1250											VD4 17.12.32 p150
	16		630										VD4 17.06.16 p210
	20		630										VD4 17.06.20 p210
	25		630										VD4 17.06.25 p210
	31.5		630										VD4 17.06.32 p210
	16		1250										VD4 17.12.16 p210
	20		1250										VD4 17.12.20 p210
	25		1250										VD4 17.12.25 p210
	31.5		1250										VD4 17.12.32 p210
	40				1250								VD4 17.12.40 p210
	50									1250			VD4 17.12.50 p210
	20							1600					VD4 17.16.20 p210
	25							1600					VD4 17.16.25 p210
	31.5							1600					VD4 17.16.32 p210
	40				1600								VD4 17.16.40 p210
	50									1600			VD4 17.16.50 p210
	20							2000					VD4 17.20.20 p210
	25							2000					VD4 17.20.25 p210
	31.5							2000					VD4 17.20.32 p210
	40							2000					VD4 17.20.40 p210
	50									2000			VD4 17.20.50 p210

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

ВЕРНО С ОРИГИНАЛА

VD4 fixed circuit-breaker without bottom and top terminals (17.5 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]											
		H=461			H=589		H=599			H=610		H=635	
		D=424			D=424		D=424			D=459		D=459	
kV	kA	u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	Circuit-breaker type
		l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237.5	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
17.5	16			630									VD4 17.06.16 p275
	20			630									VD4 17.06.20 p275
	25			630									VD4 17.06.25 p275
	31.5			630									VD4 17.06.32 p275
	16			1250									VD4 17.12.16 p275
	20			1250									VD4 17.12.20 p275
	25			1250									VD4 17.12.25 p275
	31.5			1250									VD4 17.12.32 p275
	40					1250							VD4 17.12.40 p275
	50										1250		VD4 17.12.50 p275
	20								1600				VD4 17.16.20 p275
	25								1600				VD4 17.16.25 p275
	31.5								1600				VD4 17.16.32 p275
	40					1600							VD4 17.16.40 p275
	50										1600		VD4 17.16.50 p275
	20								2000				VD4 17.20.20 p275
	25								2000				VD4 17.20.25 p275
	31.5								2000				VD4 17.20.32 p275
	40								2000				VD4 17.20.40 p275
	50										2000		VD4 17.20.50 p275
	20								2500				VD4 17.25.20 p275
	25								2500				VD4 17.25.25 p275
	31.5								2500				VD4 17.25.32 p275
	40								2500				VD4 17.25.40 p275
	50										2500		VD4 17.25.50 p275
	20											3150	VD4 17.32.20 p275
	25											3150	VD4 17.32.25 p275
	31.5											3150	VD4 17.32.32 p275
	40											3150	VD4 17.32.40 p275
	50											3150	VD4 17.32.50 p275

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.
(1) Up to 4000 A with forced ventilation

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Fixed circuit-breakers

VD4 fixed circuit-breaker without bottom and top terminals (24 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]			Circuit-breaker type
		H=631		H=642	
		D=424		D=424	
		u/l=310		u/l=310	
kV	kA	l/g=282.5		l/g=282.5	
		P=210	P=275	P=275	
		W=570	W=700	W=700	
24	16	630			VD4 24.06.16 p210
	20	630			VD4 24.06.20 p210
	25	630			VD4 24.06.25 p210
	16	1250			VD4 24.12.16 p210
	20	1250			VD4 24.12.20 p210
	25	1250			VD4 24.12.25 p210
	31.5	1250			VD4 24.12.32 p210
	16		630		VD4 24.06.16 p275
	20		630		VD4 24.06.20 p275
	25		630		VD4 24.06.25 p275
	16		1250		VD4 24.12.16 p275
	20		1250		VD4 24.12.20 p275
	25		1250		VD4 24.12.25 p275
	16			1600	VD4 24.16.16 p275
	20			1600	VD4 24.16.20 p275
	25			1600	VD4 24.16.25 p275
	31.5			1600	VD4 24.16.32 p275
	16			2000	VD4 24.20.16 p275
	20			2000	VD4 24.20.20 p275
	25			2000	VD4 24.20.25 p275
	31.5			2000	VD4 24.20.32 p275
	25			2500	VD4 24.25.25 p275
	31.5			2500	VD4 24.25.32 p275

, = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

ВЯРНО С ОРИГИНАЛА

VD4 fixed circuit-breaker without bottom and top terminals (36 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]				
		H = 876				Circuit-breaker type
		L = 786				
kV	kA	P = 478.5				
		u/l = 328				
		l/g = 428.5				
		l = 275				
36	20	1250 A				VD4 36.12.20 p275
	25	1250 A				VD4 36.12.25 p275
	31.5	1250 A				VD4 36.12.32 p275
	20		1600 A			VD4 36.16.20 p275
	25		1600 A			VD4 36.16.25 p275
	31.5		1600 A			VD4 36.16.32 p275
	20			2000 A		VD4 36.20.20 p275
	25			2000 A		VD4 36.20.25 p275
	31.5			2000 A		VD4 36.20.32 p275
	20				2500 A (1)	VD4 36.25.20 p275
	25				2500 A (1)	VD4 36.25.25 p275
	31.5				2500 A (1)	VD4 36.25.32 p275

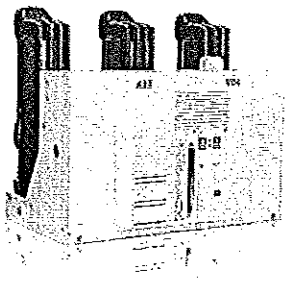
H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.
(1) = 2500 A rated current guaranteed with forced ventilation.

Standard fittings of fixed circuit-breakers

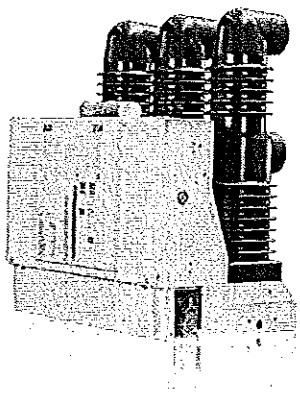
The basic versions of the fixed circuit-breakers are three-pole and fitted with:

- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton, opening pushbutton and operation counter
- set of ten auxiliary circuit-breaker break/make contacts

  Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and five make contacts (signalling circuit-breaker closed) are available.
- lever built into operating mechanism for linear loading of closing spring.



VD4 - up to 24 kV



VD4 - 36 kV

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Fixed circuit-breakers

Types of fixed version circuit-breakers available

Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4 fixed circuit-breaker without bottom and top terminals (12 kV)

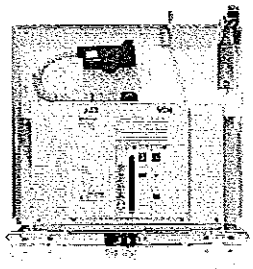
Ur	Isc	Rated uninterrupted current (40°C) [A]											
		H=461			H=589		H=599			H=610		H=636	
		D=424			D=424		D=424			D=459		D=459	
		u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	Circuit-breaker type
kV	kA	l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
	16	630											VD4 12.06.16 p150
	20	630											VD4 12.06.20 p150
	25	630											VD4 12.06.25 p150
	31.5	630											VD4 12.06.32 p150
	16	1250											VD4 12.12.16 p150
	20	1250											VD4 12.12.20 p150
	25	1250											VD4 12.12.25 p150
	31.5	1250											VD4 12.12.32 p150
	20						1600						VD4 12.16.20 p150
	25						1600						VD4 12.16.25 p150
	31.5						1600						VD4 12.16.32 p150
	16		630										VD4 12.06.16 p210
	20		630										VD4 12.06.20 p210
	25		630										VD4 12.06.25 p210
	31.5		630										VD4 12.06.32 p210
	16		1250										VD4 12.12.16 p210
	20		1250										VD4 12.12.20 p210
12	25		1250										VD4 12.12.25 p210
	31.5		1250										VD4 12.12.32 p210
	40				1250								VD4 12.12.40 p210
	50									1250			VD4 12.12.50 p210
	20							1600					VD4 12.16.20 p210
	25							1600					VD4 12.16.25 p210
	31.5							1600					VD4 12.16.32 p210
	40				1600								VD4 12.16.40 p210
	50									1600			VD4 12.16.50 p210
	20							2000					VD4 12.20.20 p210
	25							2000					VD4 12.20.25 p210
	31.5							2000					VD4 12.20.32 p210
	40							2000					VD4 12.20.40 p210
	50									2000			VD4 12.20.50 p210
	20							2500					VD4 12.25.20 p210
	25							2500					VD4 12.25.25 p210
	31.5							2500					VD4 12.25.32 p210
	40							2500					VD4 12.25.40 p210

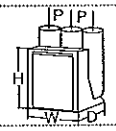
H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

ВЗАМЕН С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

Withdrawable version circuit-breakers for UniGear ZS1 switchgear (12 kV) (5)



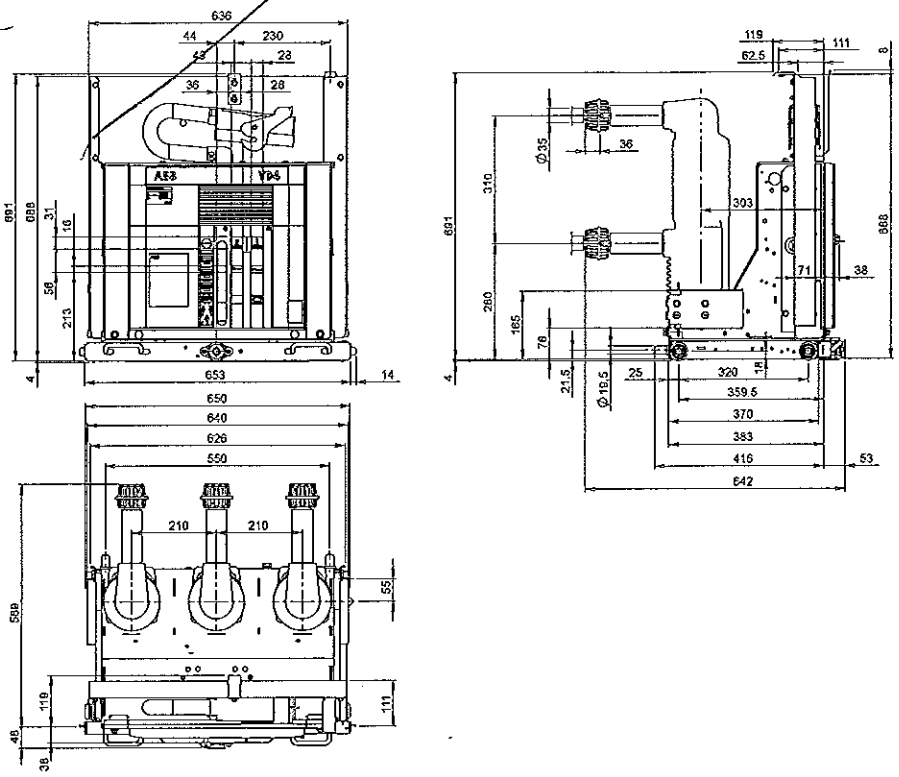
Circuit-breaker			VD4/P 12						
Standards		IEC 62271-100	•						
Rated voltage		Ur [kV]	12 (4)						
Rated insulation voltage		Us [kV]	12						
hstand voltage at 50 Hz		Ud (1 min) [kV]	28						
Impulse withstand voltage		Up [kV]	75						
Rated frequency		fr [Hz]	50-60						
Rated normal current (40 °C) (1)		Ir [A]	630	1250	1250	1250	1250	1600	1600
Rated breaking capacity (rated short-circuit breaking current symmetrical)		Isc [kA]	16	16	–	–	–	–	–
			20	20	–	–	–	20	20
			25	25	–	–	–	25	25
			31.5	31.5	–	–	–	31.5	31.5
			–	–	40	40	–	–	–
			–	–	–	–	50	–	–
Rated short-time withstand current (3s)		Ik [kA]	16	16	–	–	–	–	–
			20	20	–	–	–	20	20
			25	25	–	–	–	25	25
			31.5	31.5	–	–	–	31.5	31.5
			–	–	40	40	–	–	–
			–	–	–	–	50	–	–
Making capacity		Ip [kA]	40	40	–	–	–	–	–
			50	50	–	–	–	50	50
			63	63	–	–	–	63	63
			80	80	–	–	–	80	80
			–	–	100	100	–	–	–
			–	–	–	–	125	–	–
Operation sequence		[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•
Opening time		[ms]	33 ... 60						
Arcing time		[ms]	10 ... 15						
Total breaking time		[ms]	43 ... 75						
Closing time		[ms]	30 ... 60						
Maximum overall dimensions		H [mm]	628	628	691	691	691	691	691
		W [mm]	503	503	653	853	681	653	853
		D [mm]	662	662	641	642	643	642	642
		Pole distance P [mm]	150	150	210	275	210	210	275
Weight		[kg]	116	116	174	176	180	160	166
Standardised table of dimensions		TN	7412(3)	7412(3)	–	–	–	7415(3)	7416(3)
		1VCD	–	–	003284(3)	003286(3)	003444	–	–
Operating temperature		[°C]	- 5 ... + 40						
Tropicalization		IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility		IEC: 62271-1	•						

(1) Rated current guaranteed with circuit-breaker installed in UniGear ZS1 switchgear and with 40 °C ambient temperature.
(2) Up to 4000 A with forced ventilation.
(3) Poles in polyamide
(4) Available in 10 kV voltage version in accordance with GOST standards
(5) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading, only possible with the door open, by means of a lever built into the front of the operating mechanism).

ВЯРНО С ОРИГИНАЛА

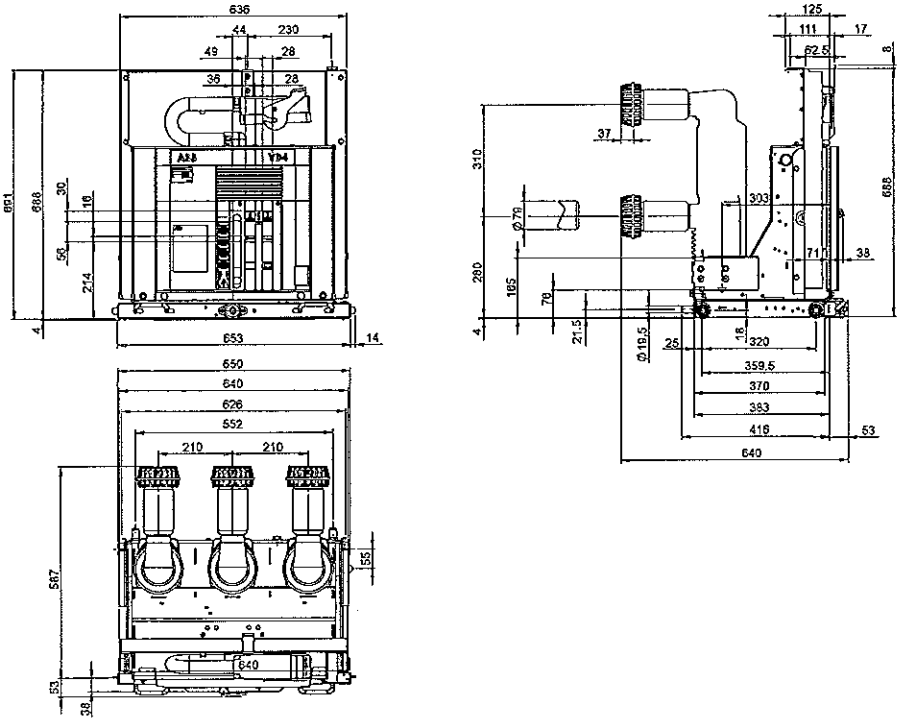
Withdrawable circuit-breakers for PowerCube PB2 modules

VD4/W		
TN	7420	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB2modules

VD4/P		
TN	1VCD003284	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA

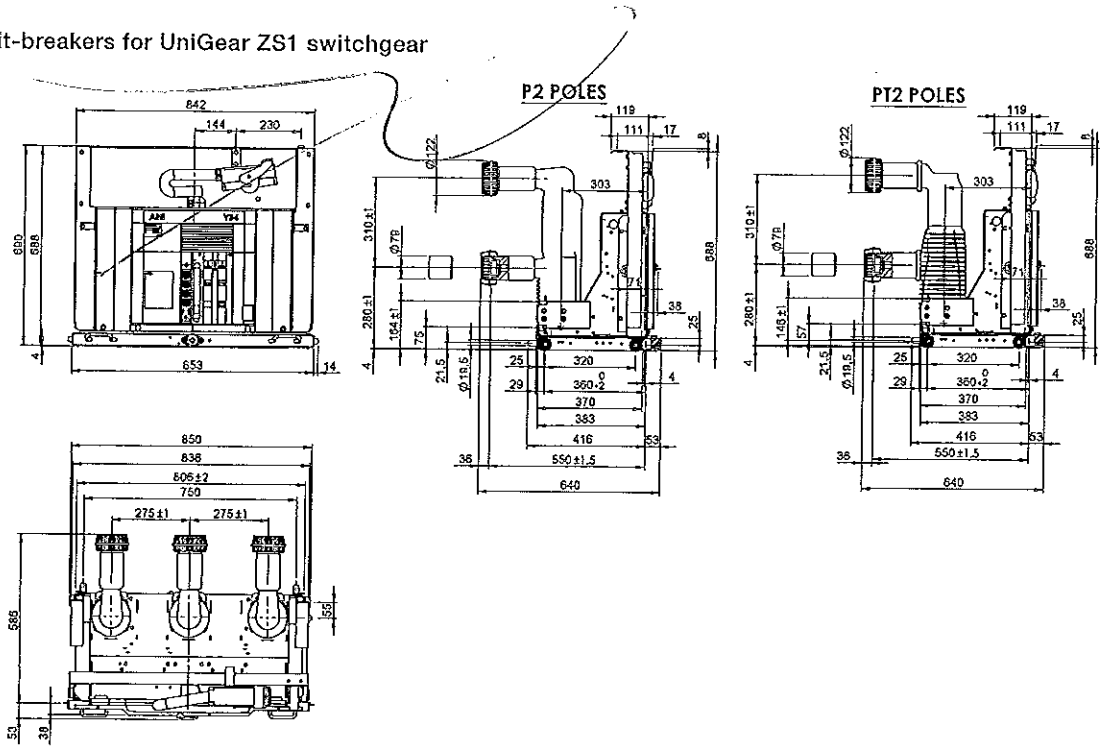


ВЗЯТО С ОРИГИНАЛА

4. Overall dimensions

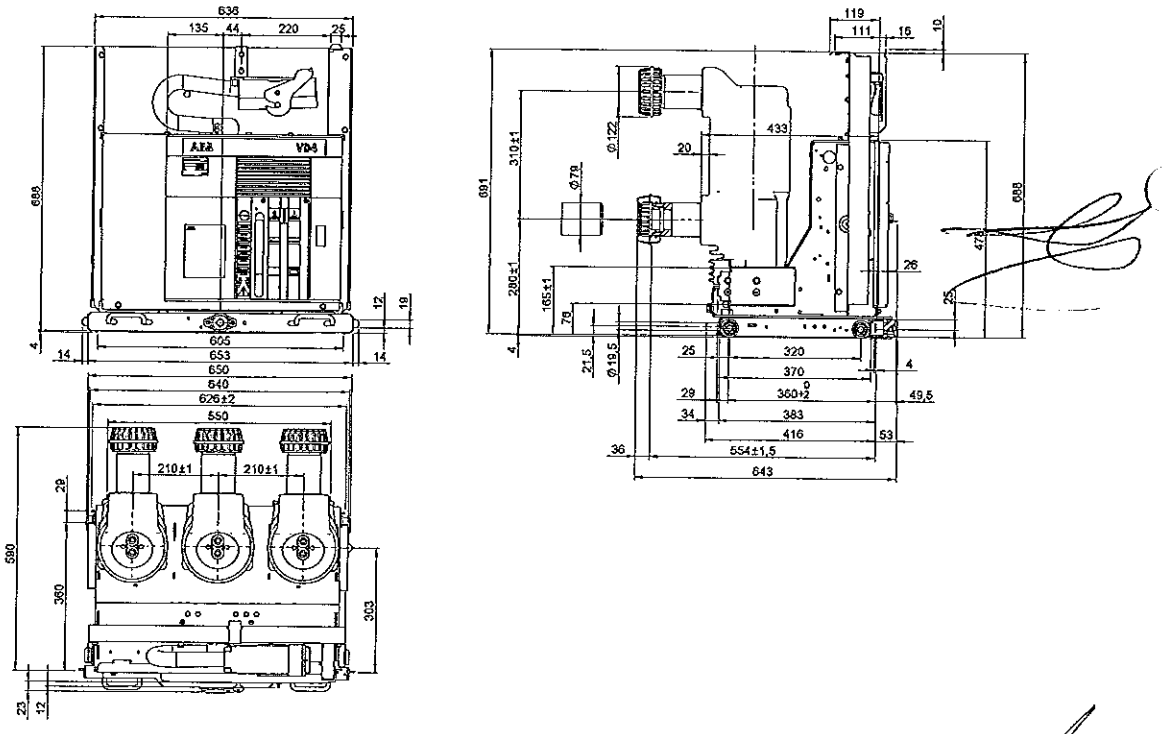
Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	1VCD003286	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB2 modules

VD4/P		
TN	1VCD 003444	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
	2000	A
Isc	50	kA

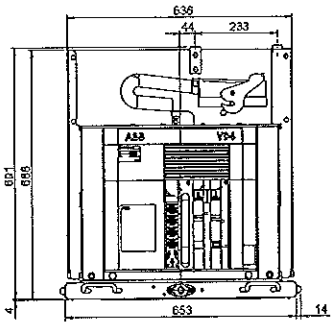


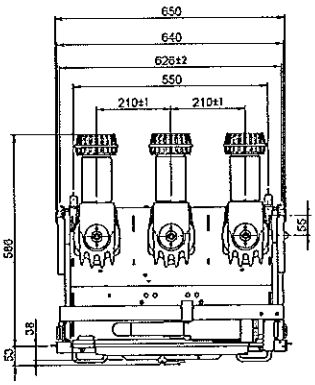
ВЗЯТО С ОРИГИНАЛА

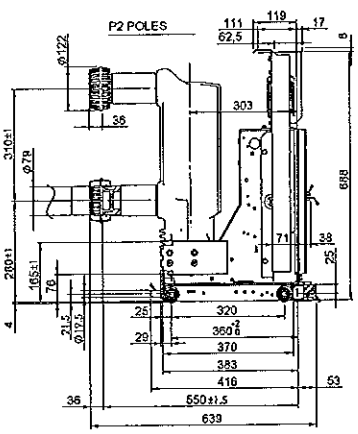
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB2 modules

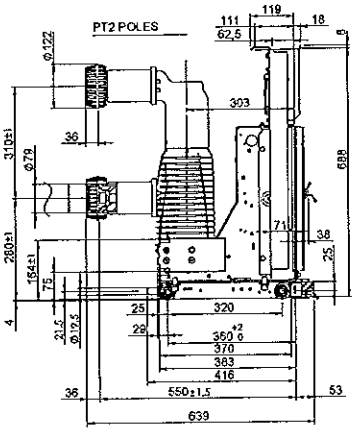
VD4/P		
TN	7415	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
Isc	20	kA
	25	kA
	31.5	kA

VD4/P		
TN	7415	
Ur	12	kV
	17.5	kV
Ir	2000	A
Isc	40	kA





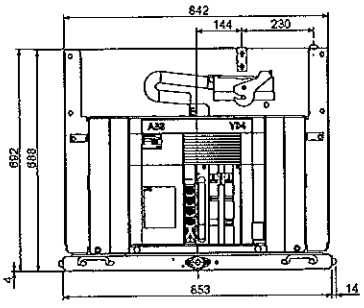


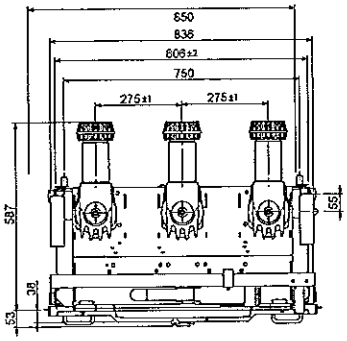


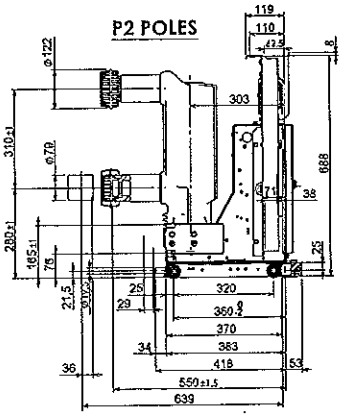
Withdrawable circuit-breakers for UniGear ZS1 switchgear

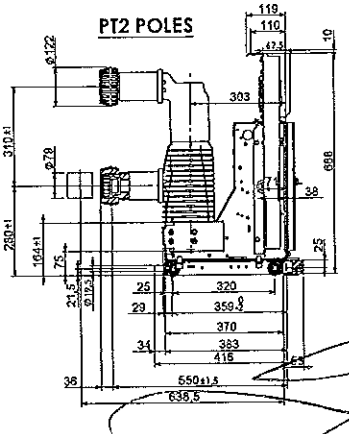
VD4/P		
TN	7416	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
Isc	20	kA
	25	kA
	31.5	kA

VD4/P		
TN	7416	
Ur	12	kV
	17.5	kV
Ir	2000	A
Isc	40	kA







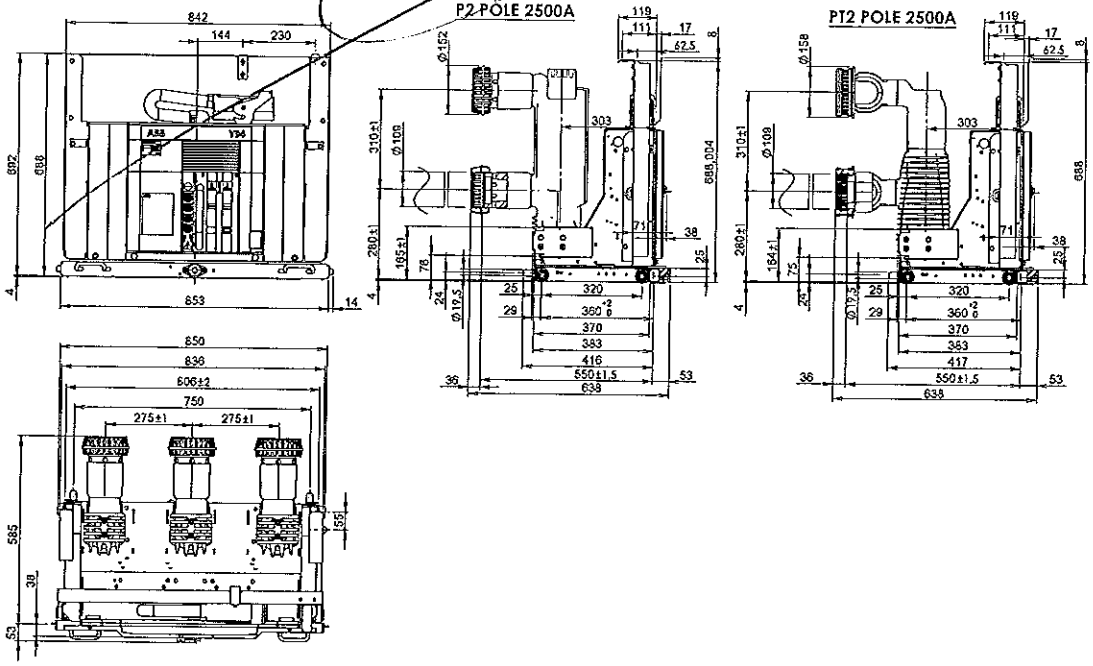


КОПИЯ С ОРИГИНАЛА

4. Overall dimensions

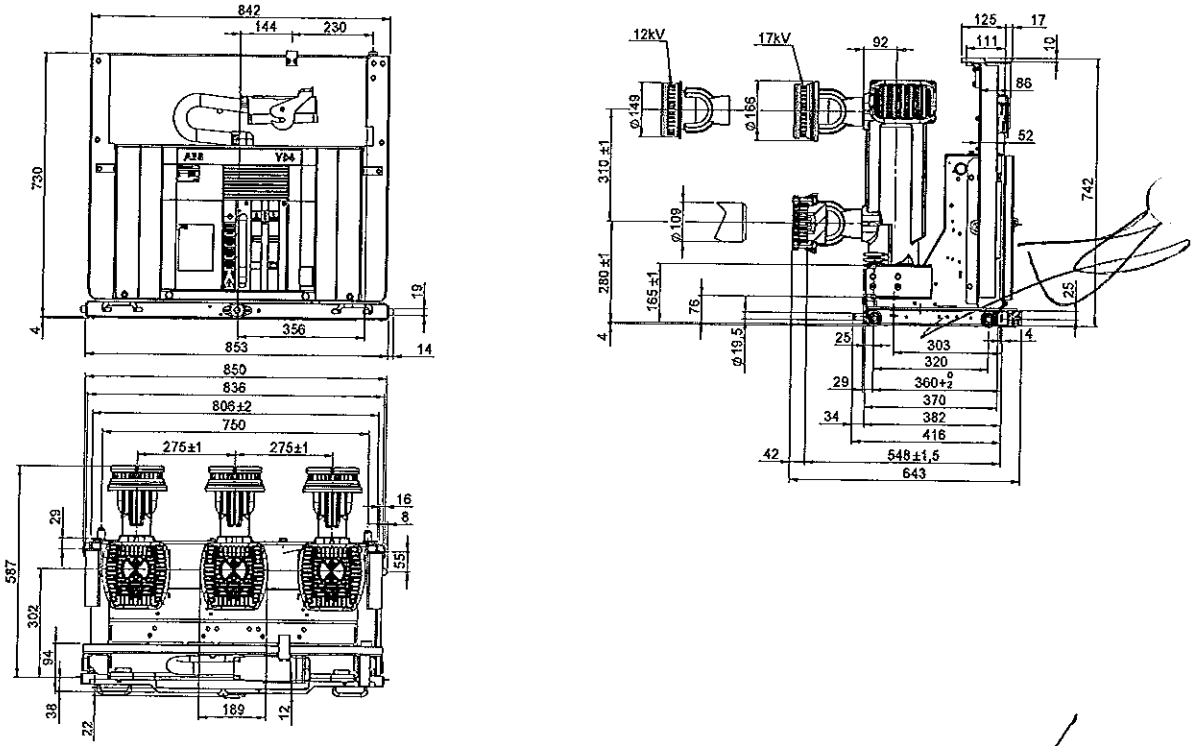
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB3 modules

VD4/P		
TN	7417	
Ur	12	kV
	17.5	kV
Ir	2500	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA



Withdrawable circuit-breakers for PowerCube PB3 modules

VD4/W		
TN	1VCD000152	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

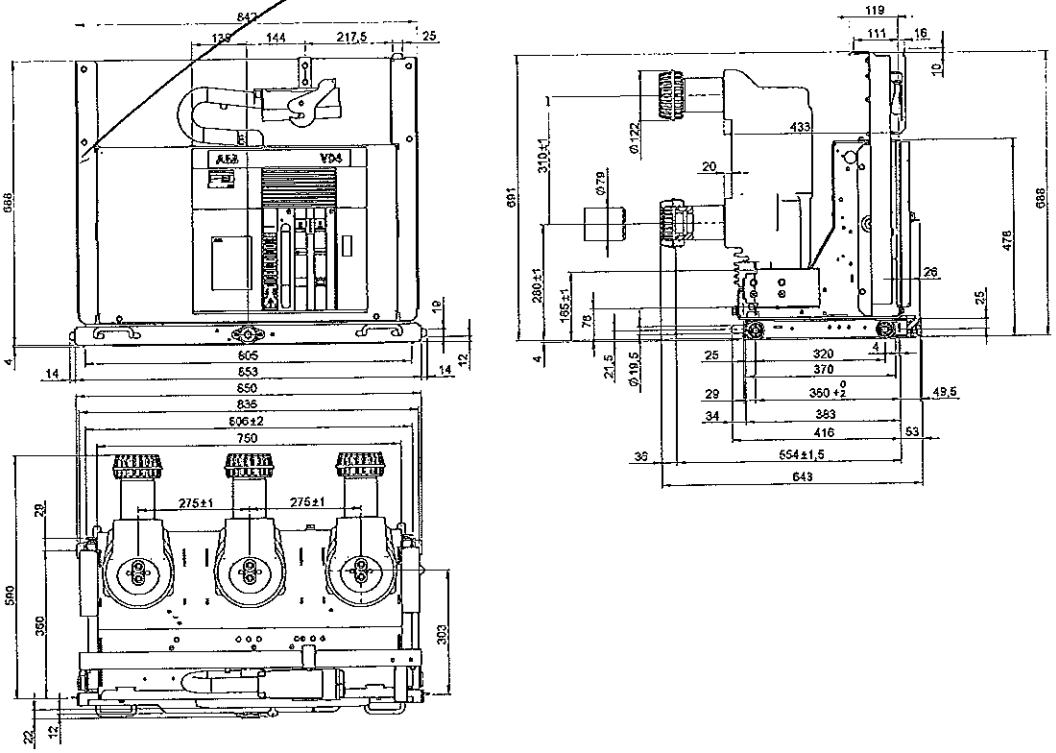


(*) 4000 A with forced ventilation.

ВЯРНО С ОРИГИНАЛА

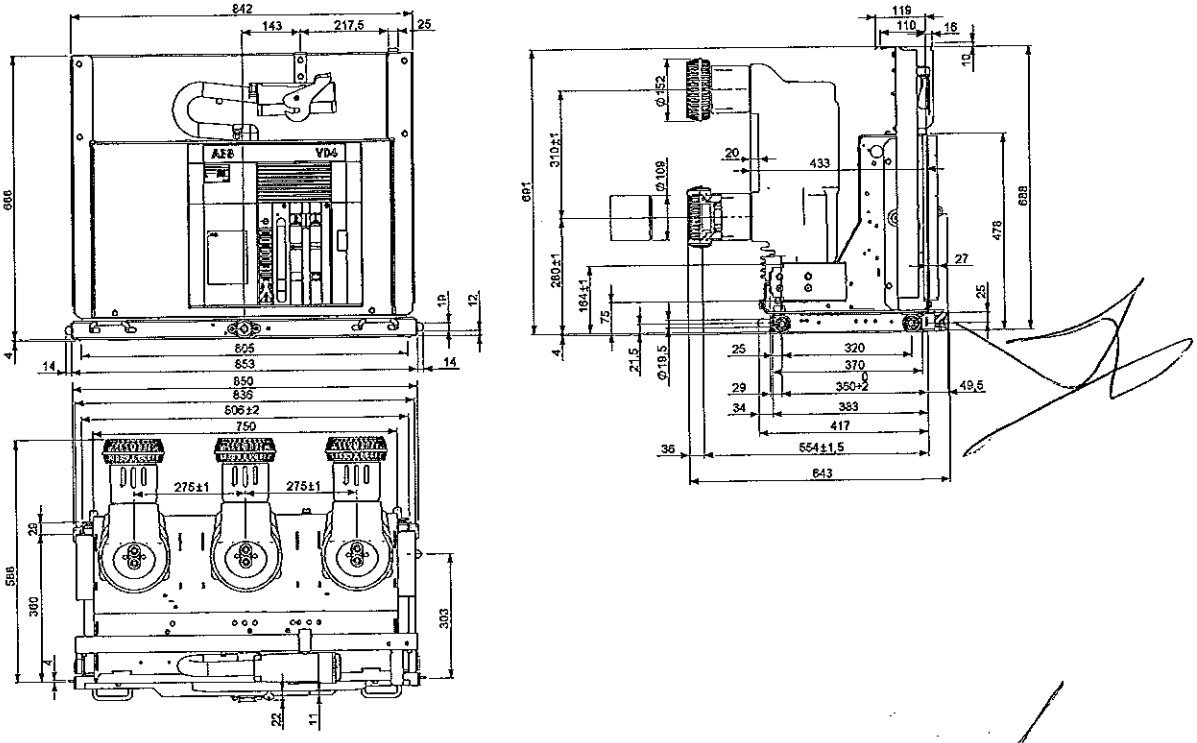
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB3 modules

VD4/P		
TN	1VCD003445	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
Isc	50	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	1VCD003446	
Ur	12	kV
	17.5	kV
Ir	2500	A
Isc	50	kA

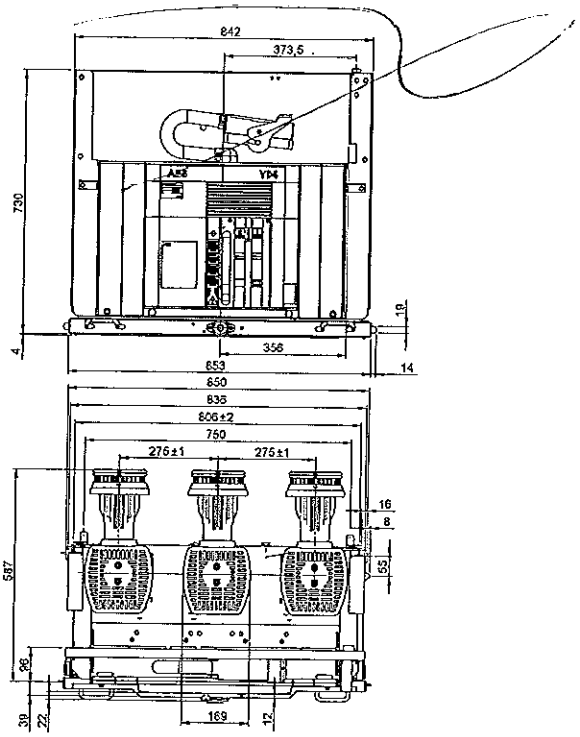


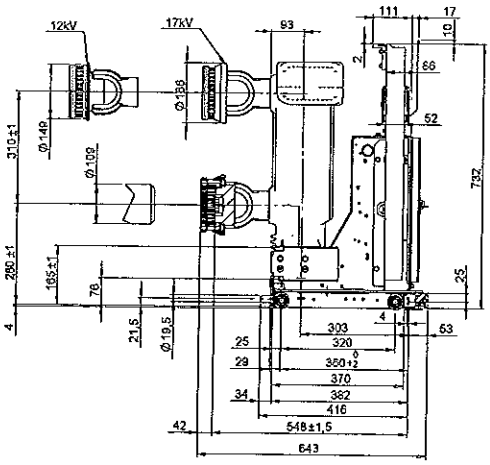
ВАРИЈ С ОРИГИНАЛА

4. Overall dimensions

Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	1VCD000153	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	40	kA

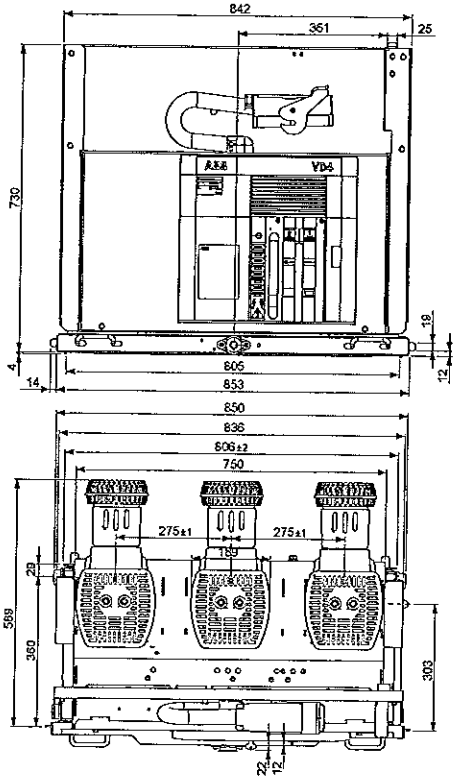


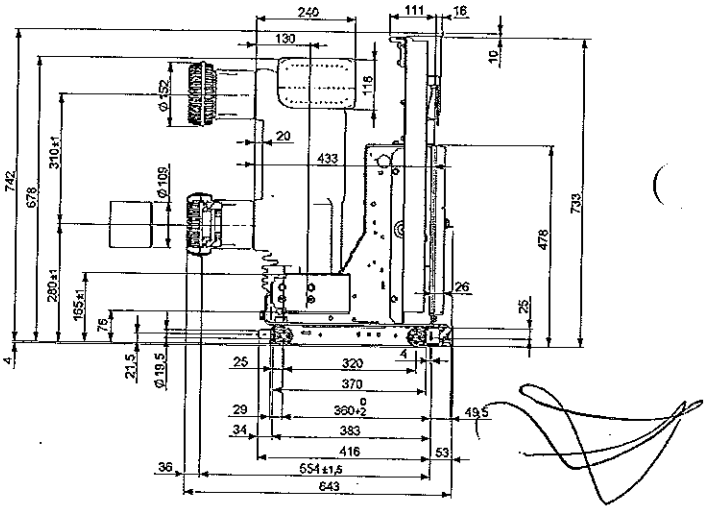


(*) 4000 A with forced ventilation.

Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	1VCD003447	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	50	kA



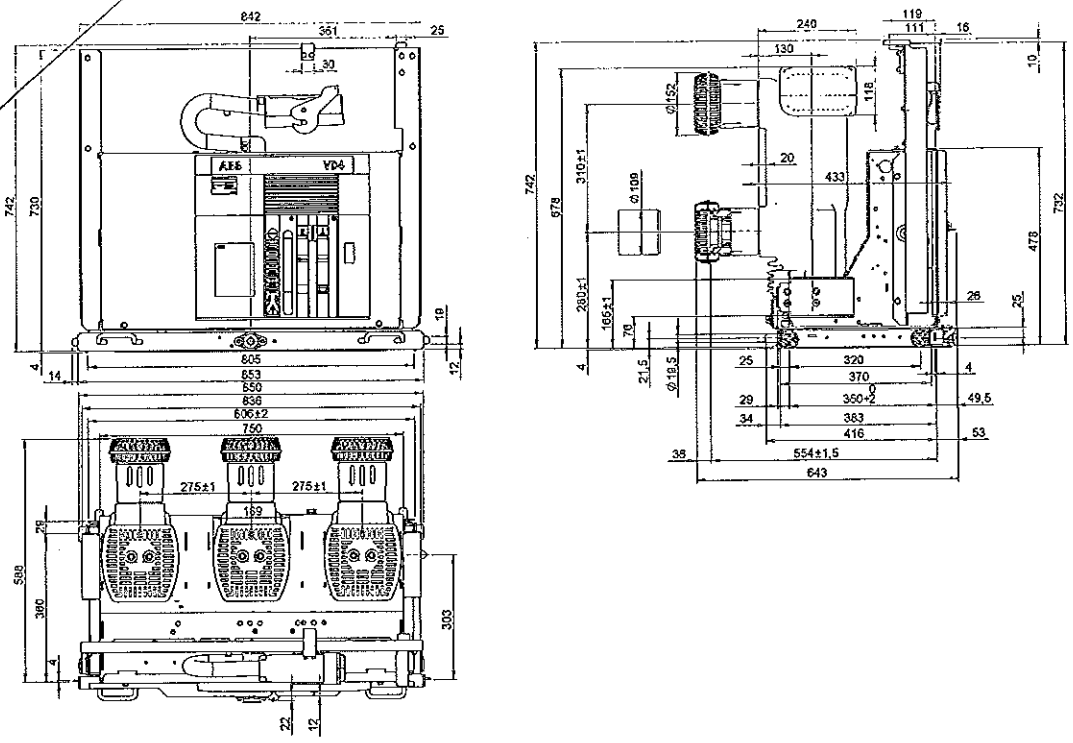


(*) 4000 A with forced ventilation.

ВЯРНО С ОРИГИНАЛА

Withdrawable circuit-breakers for PowerCube PB3 modules

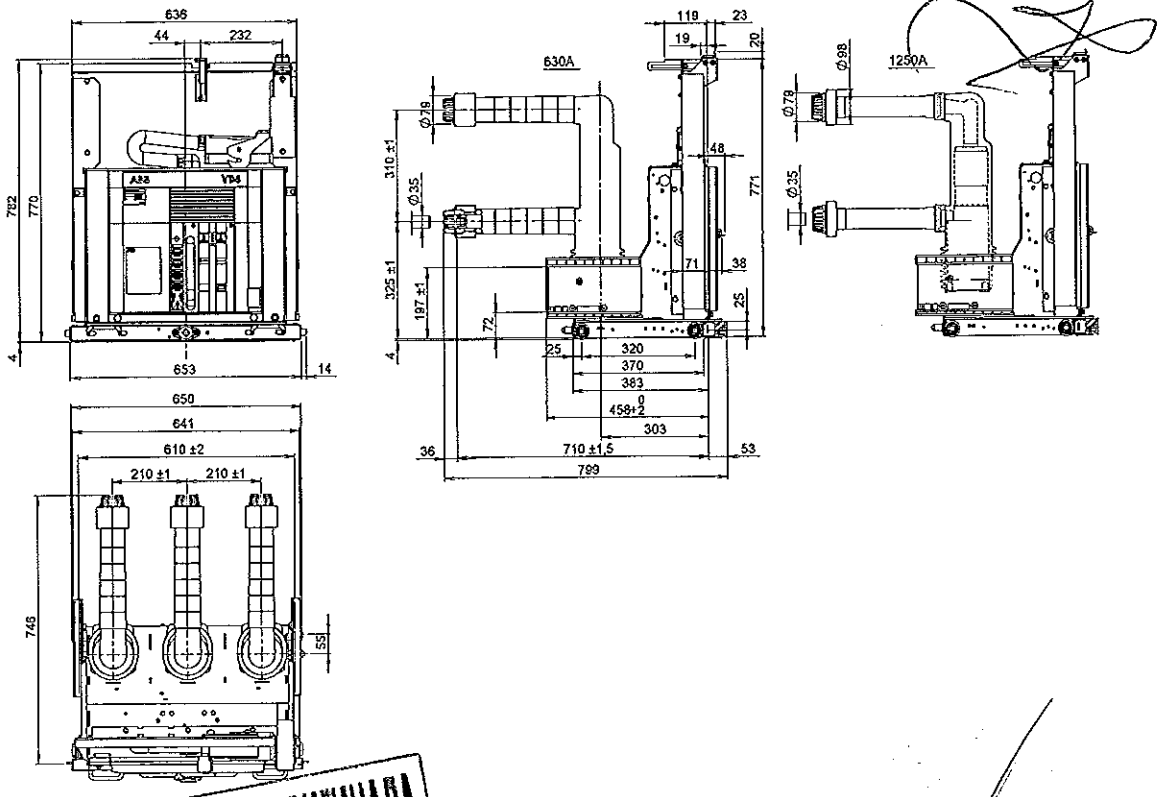
VD4/W		
TN	1VCD003596	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	50	kA



(*) 4000 A with forced ventilation.

Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB4 modules

VD4/P		
TN	7413	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA

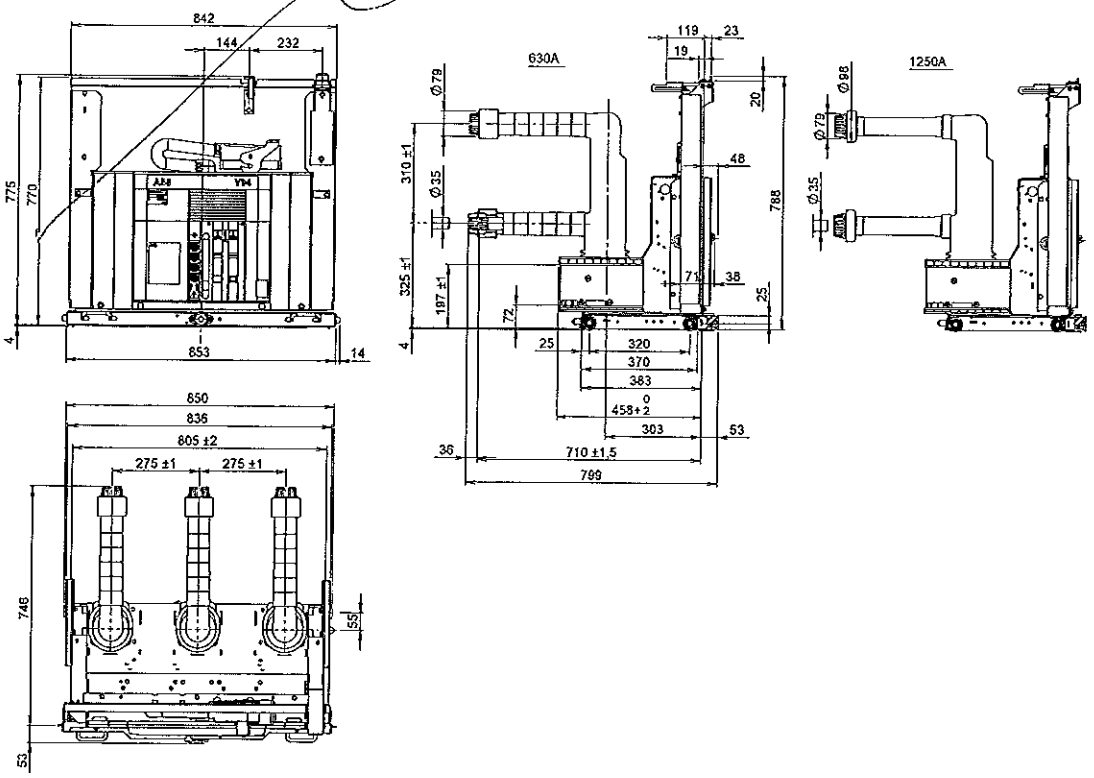


ВЯРНО С ОРИГИНАЛА

4. Overall dimensions

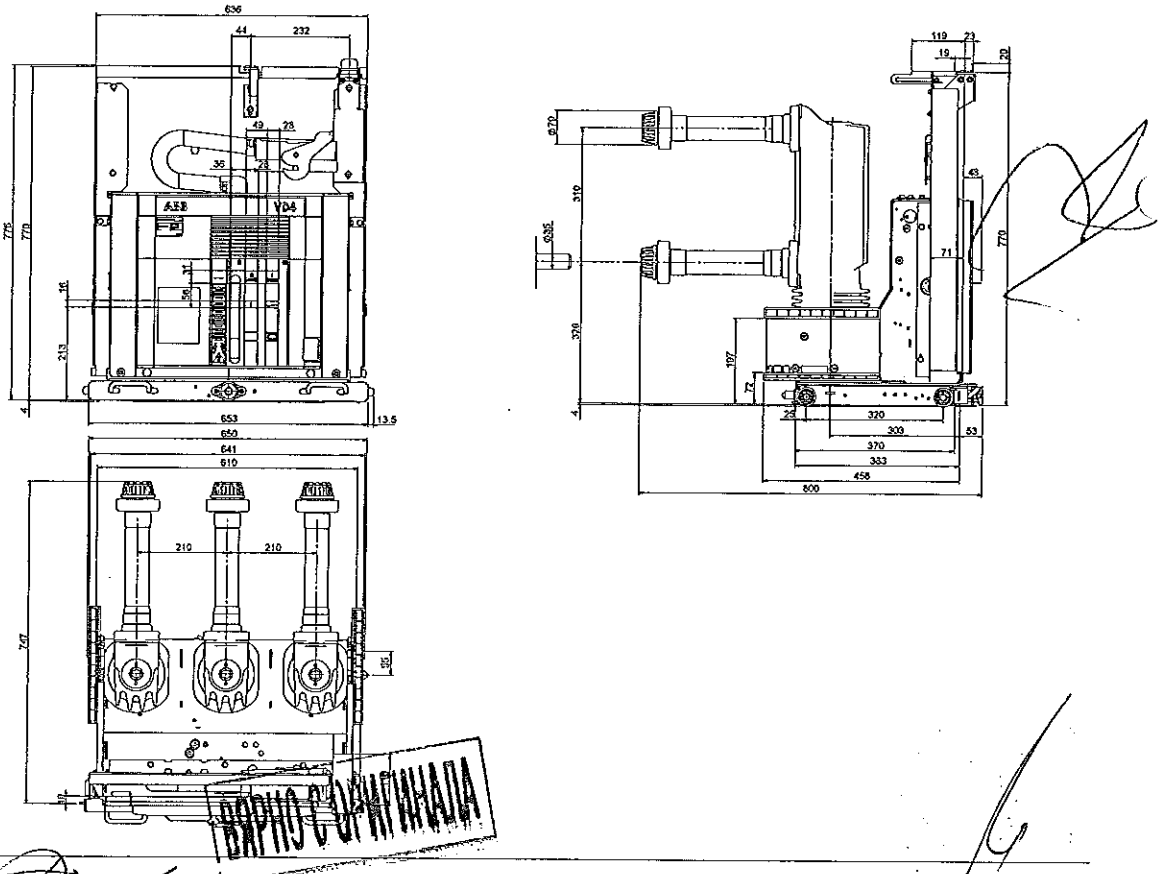
Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	7414	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



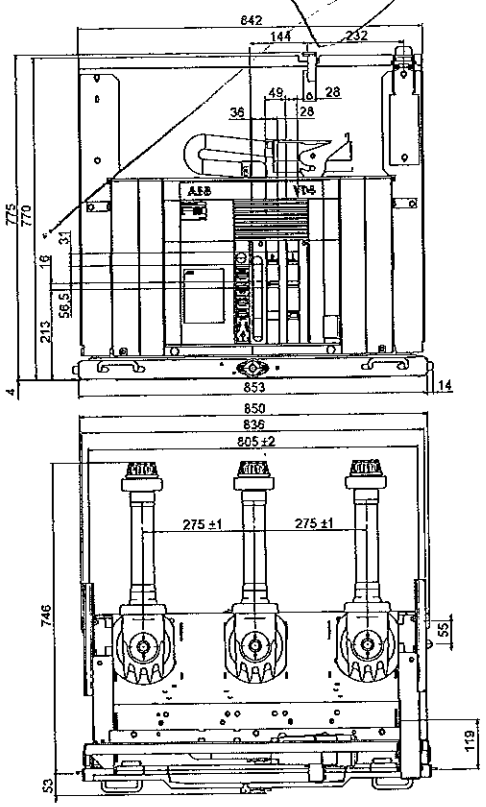
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB4 modules

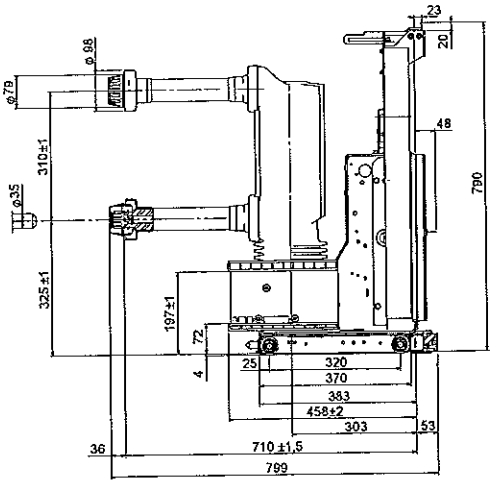
VD4/P		
TN	1VCD000173	
Ur	24	kV
Ir	1250	A
Isc	31.5	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear

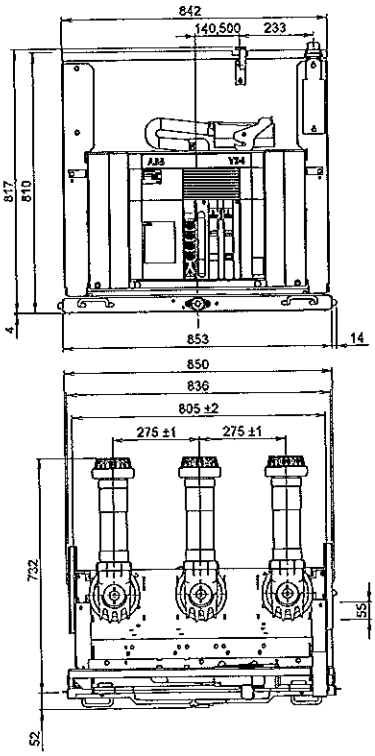
VD4/P		
TN	1VCD000174	
Ur	24	kV
Ir	1250	A
Isc	31.5	kA

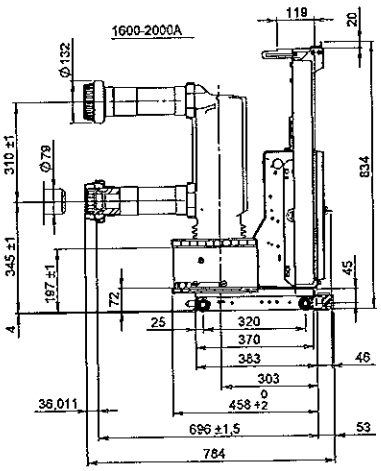


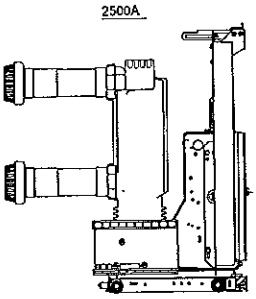


Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB5 modules

VD4/P		
TN	7418	
Ur	24	kV
Ir	1600	A
	2000	A
	2500	A (1)
Isc	16	kA
	20	kA
	25	kA
	31.5	kA







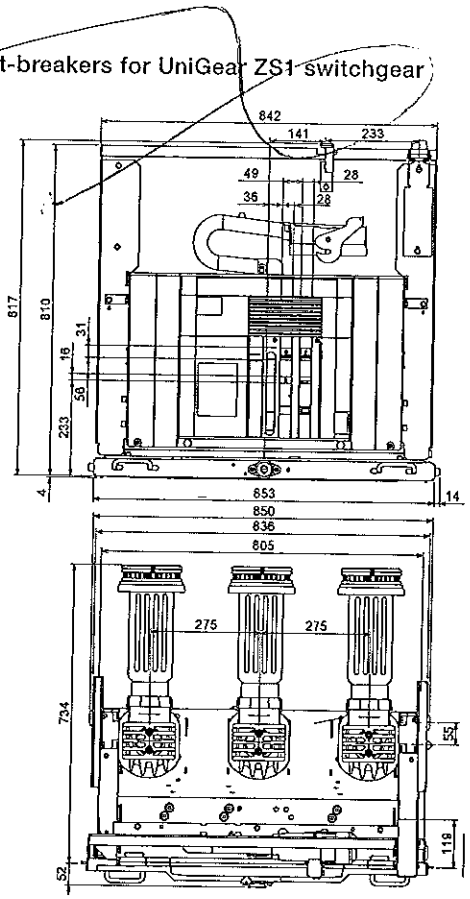
(1) The rated uninterrupted current of 2300 A is guaranteed with natural ventilation. The rated uninterrupted current of 2500 A is guaranteed with forced ventilation.

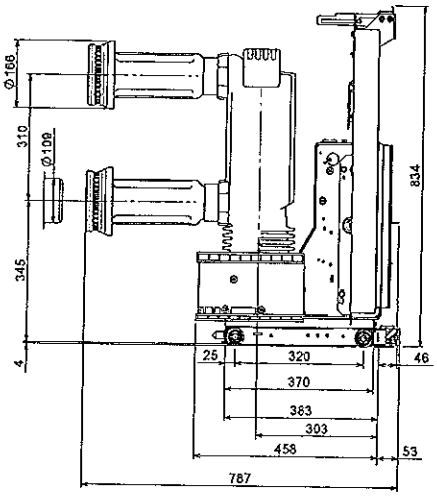
ВЯРНО С ОРИГИНАЛА

4. Overall dimensions

Withdrawable circuit-breakers for UniGear ZS1 switchgear

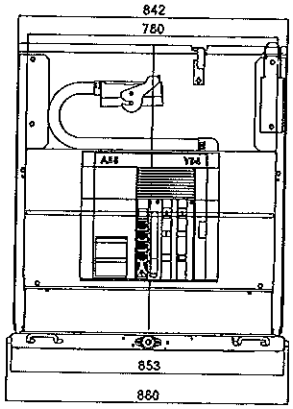
VD4/P		
TN	1VCD000177	
Ur	24	kV
	3150	A
Isc	31.5	kA

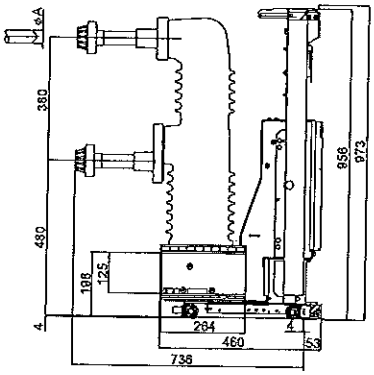


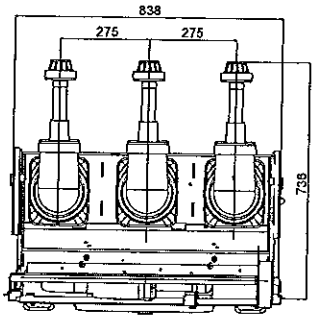


Withdrawable circuit-breakers for UniGear ZS2 switchgear

VD4/W		
TN	1VYN300901-KG	
Ur	36	kV
Ir	1250	A
	1600	A
	2000	A
	2500	A (*)
Isc	20	kA
	25	kA
	31.5	kA







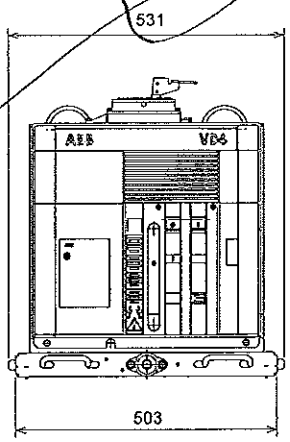
Ø A	
35 mm	1250 A
79 mm	1600-2000-2500 A

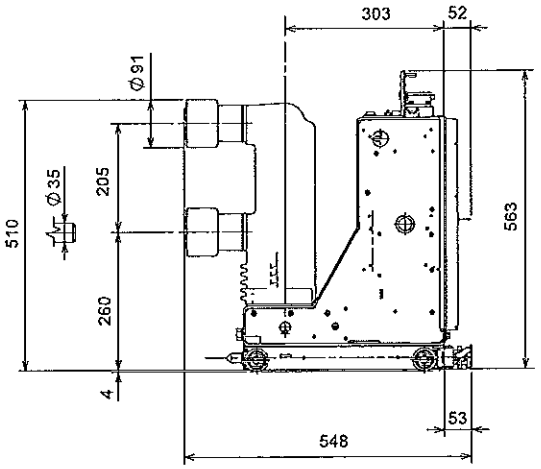
(*) The rated uninterrupted current of 2500 A is guaranteed with forced ventilation.

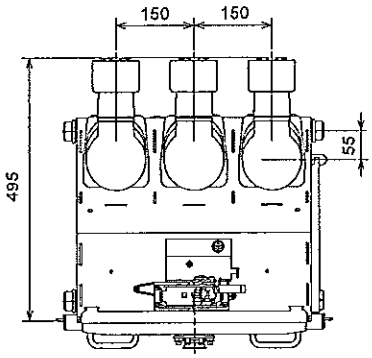
ВЯРНО С ОРИГИНАЛА

Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/Z8		
TN	1VCD000092	
Ur	12	kV
Ir	630	A
Isc	20	kA
	25	kA



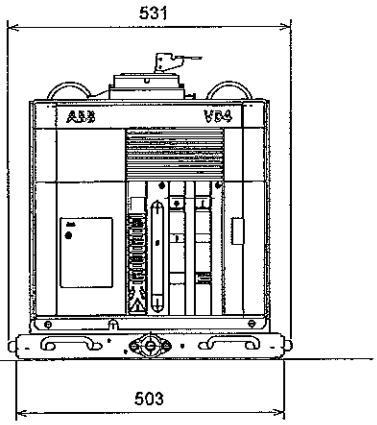


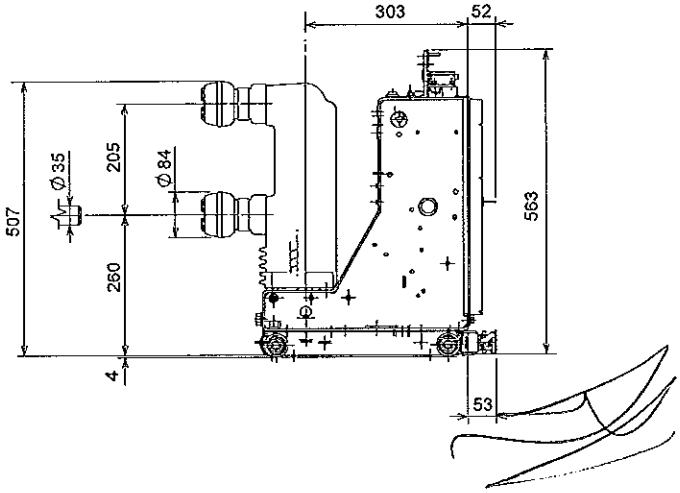


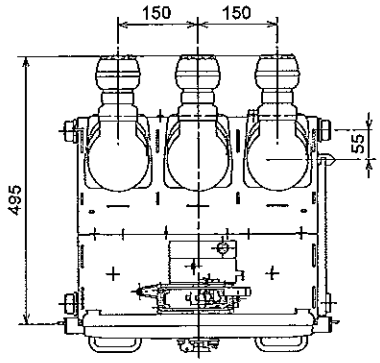
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/Z8		
TN	1VCD000137	
Ur	12	kV
Ir	1250	A
Isc	20	kA
	25	kA

TN	1VCD000137	
Ur	17.5	kV
Ir	630	A
	1250	A
Isc	20	kA
	25	kA





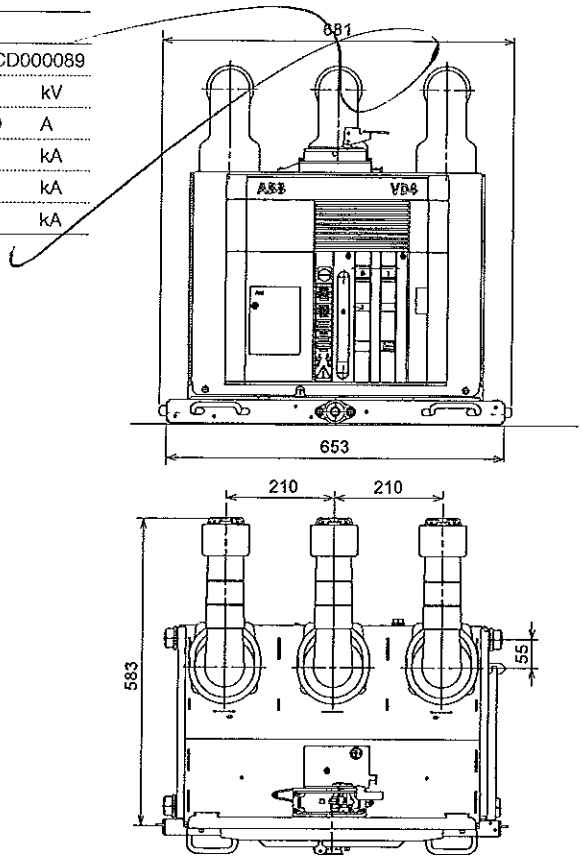


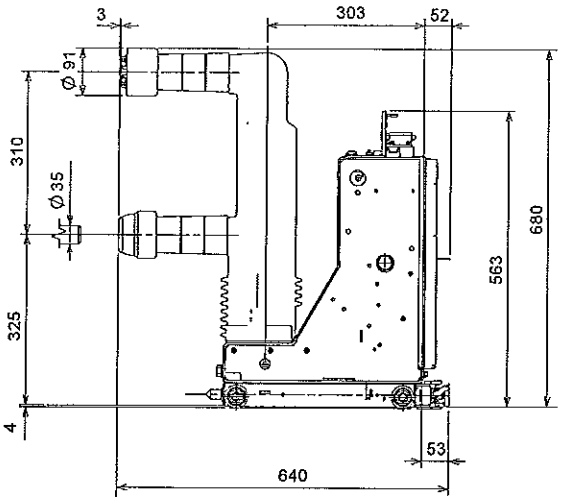
ВЯРНО С ОРИГИНАЛА

4. Overall dimensions

Withdrawable circuit-breakers for ZS8.4 switchgear

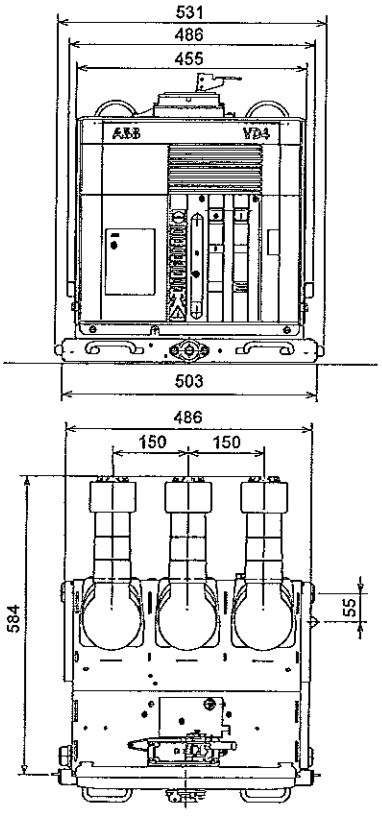
VD4/Z8		
TN	1VCD000089	
Ur	24	kV
Ir	630	A
Isc	16	kA
	20	kA
	25	kA

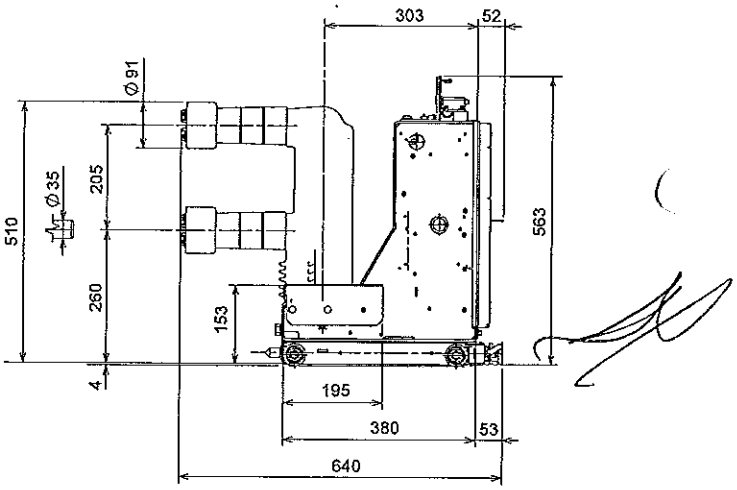




Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZT8		
TN	1VCD000093	
Ur	12	kV
Ir	630	A
Isc	20	kA
	25	kA

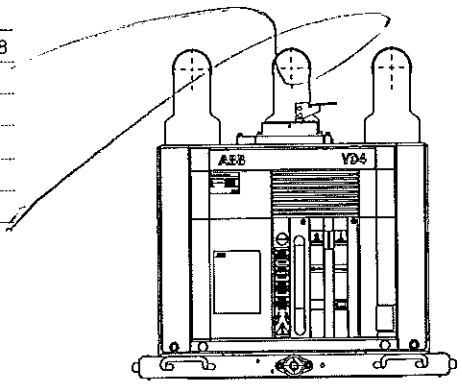


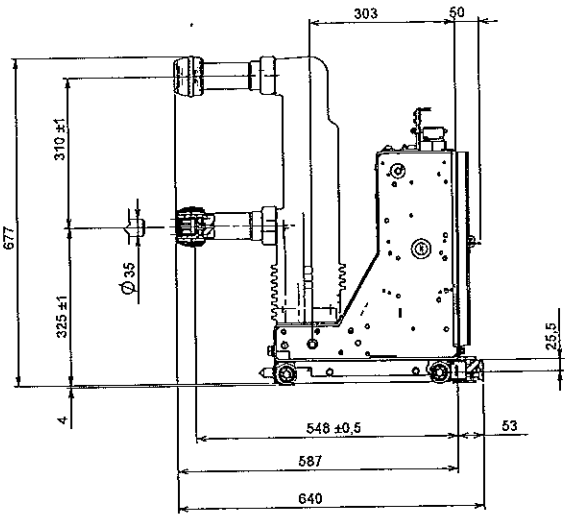


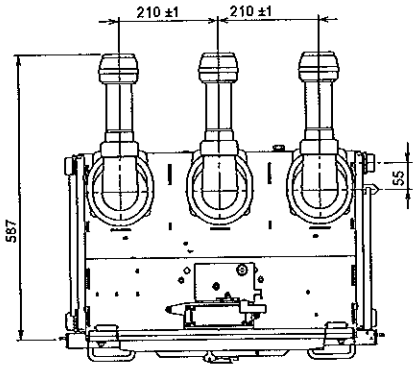
ВЯРНО С ОРИГИНАЛА

Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/Z8		
TN	1VCD000138	
Ur	24	kV
Ir	1250	A
Isc	16	kA
	20	kA
	25	kA



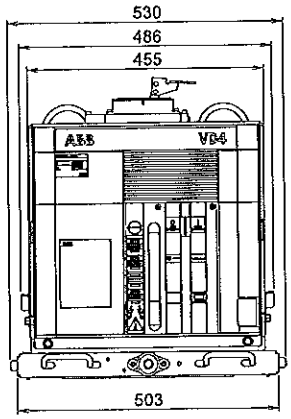


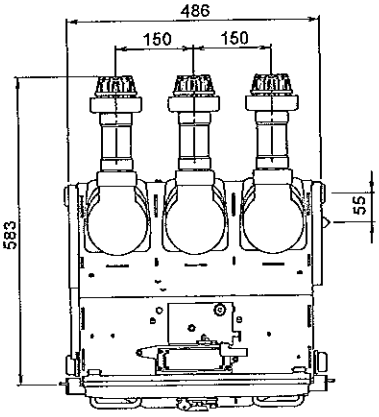


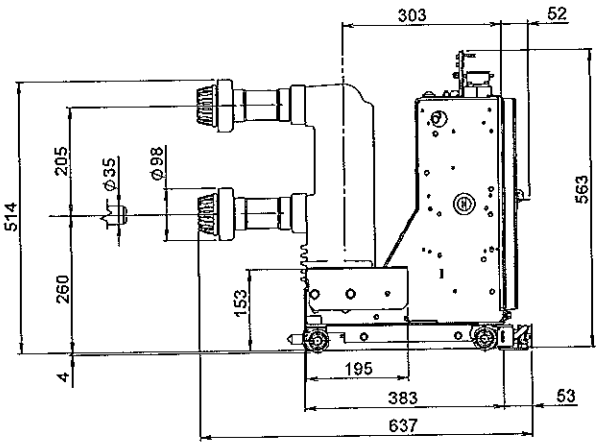
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZT8		
TN	1VCD000134	
Ur	12	kV
Ir	1250	A
Isc	20	kA
	25	kA

VD4/ZT8		
TN	1VCD000134	
Ur	17.5	kV
Ir	630	A
	1250	A
Isc	20	kA
	25	kA





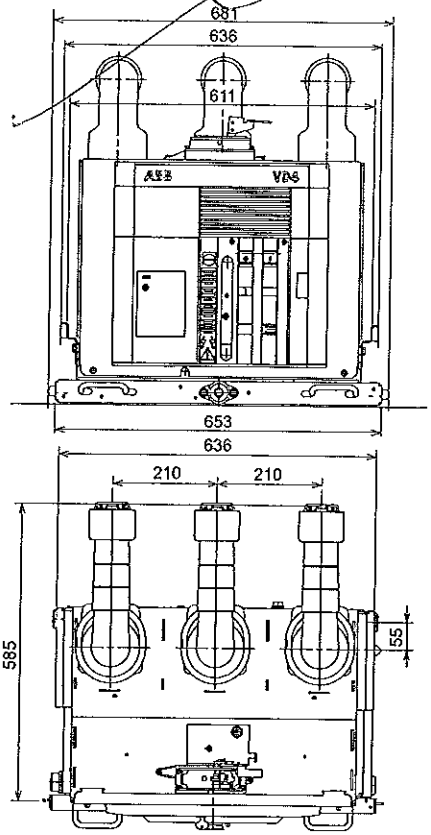


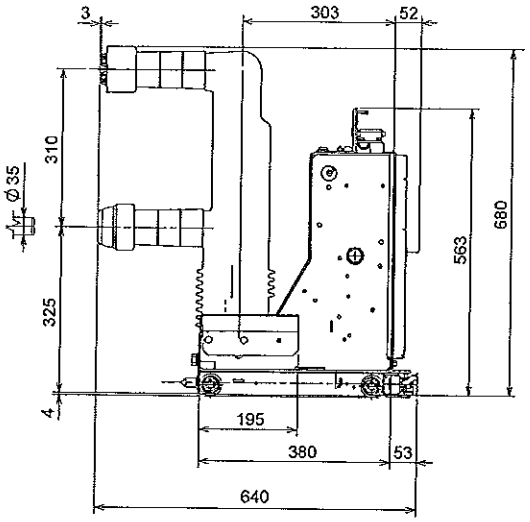
ВЯРНО С ОРИГИНАЛА

4. Overall dimensions

Withdrawable circuit-breakers for ZS8.4 switchgear

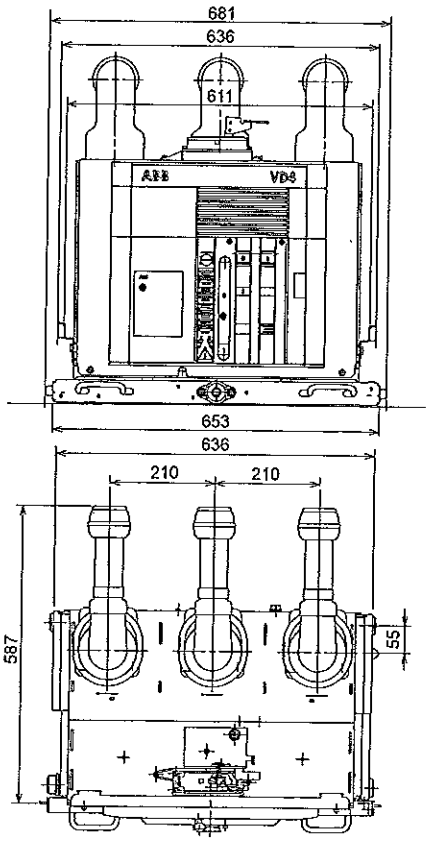
VD4/ZT8		
TN	1VCD000090	
Ur	24	kV
Ir	630	A
Isc	16	kA
	20	kA
	25	kA

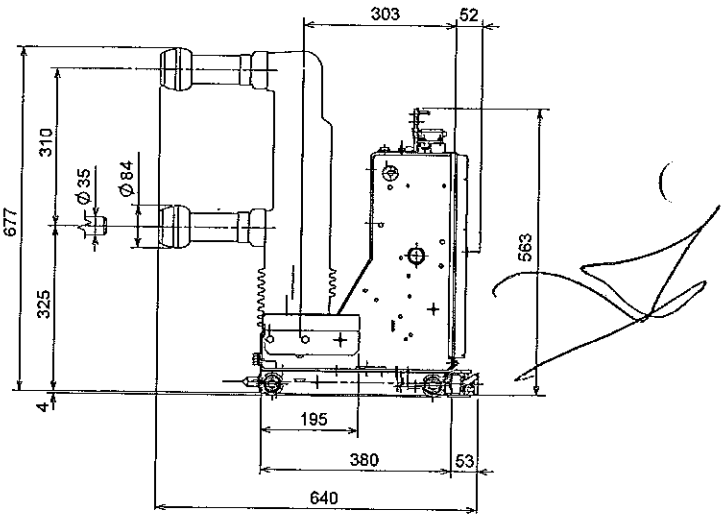




Withdrawable circuit-breakers for ZS8.4 switchgear

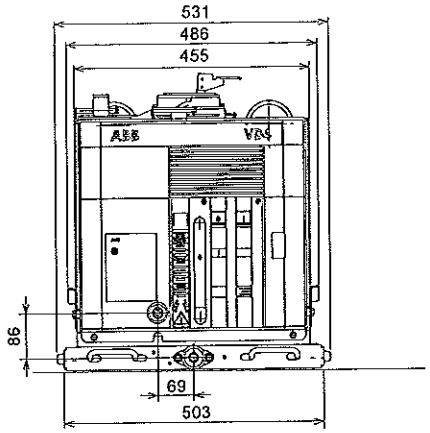
VD4/ZT8		
TN	1VCD000136	
Ur	24	kV
Ir	1250	A
Isc	16	kA
	20	kA
	25	kA

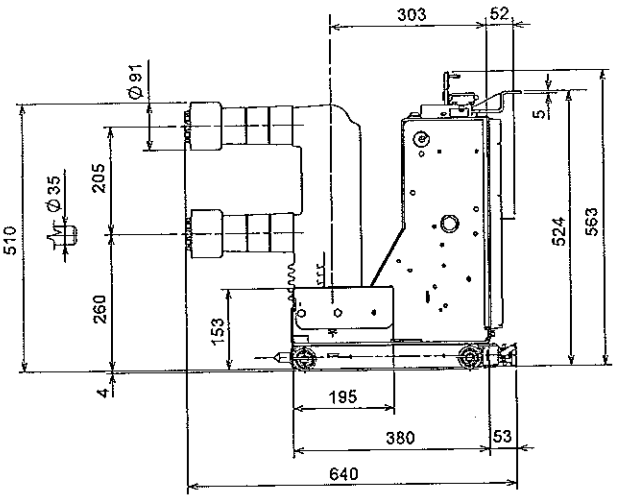


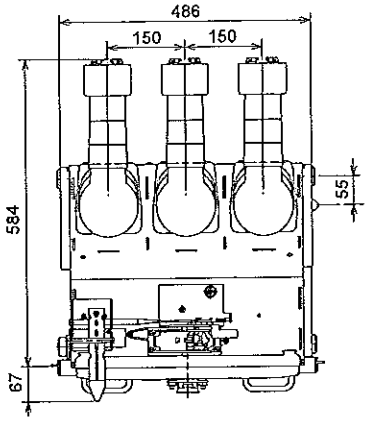


Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZS8		
TN	1VCD000091	
Ur	12	kV
Ir	630	A
Isc	20	kA
	25	kA

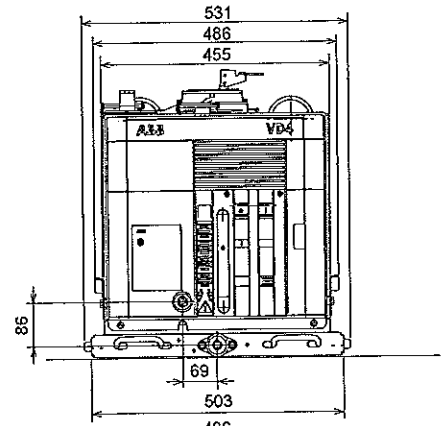


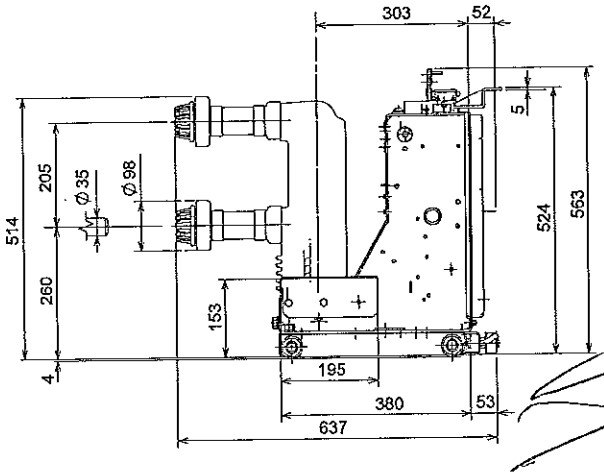


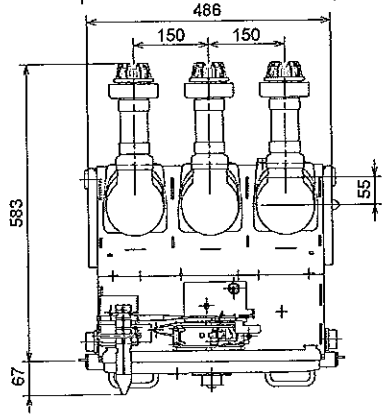


Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZS8		
TN	1VCD000133	
Ur	12	kV
Ir	1250	A
Isc	20	kA
	25	kA





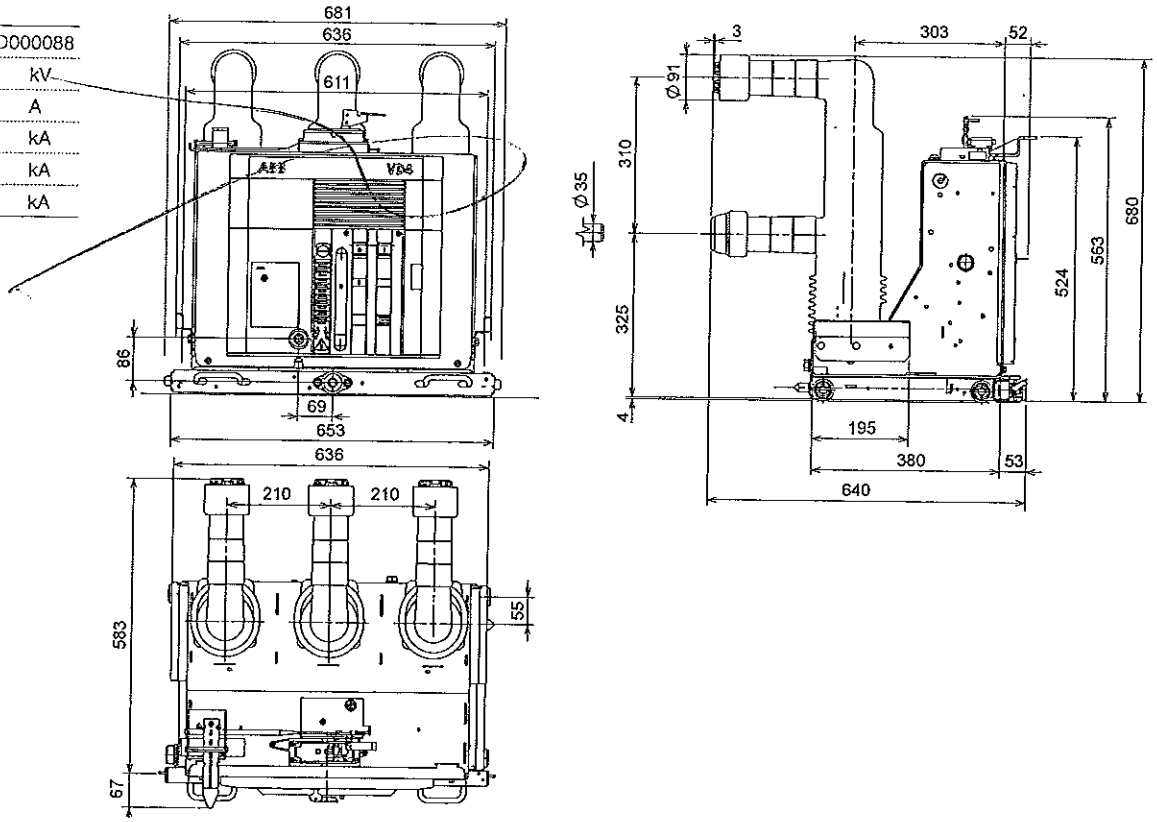


ВЯРНО С ОРИГИНАЛА

4. Overall dimensions

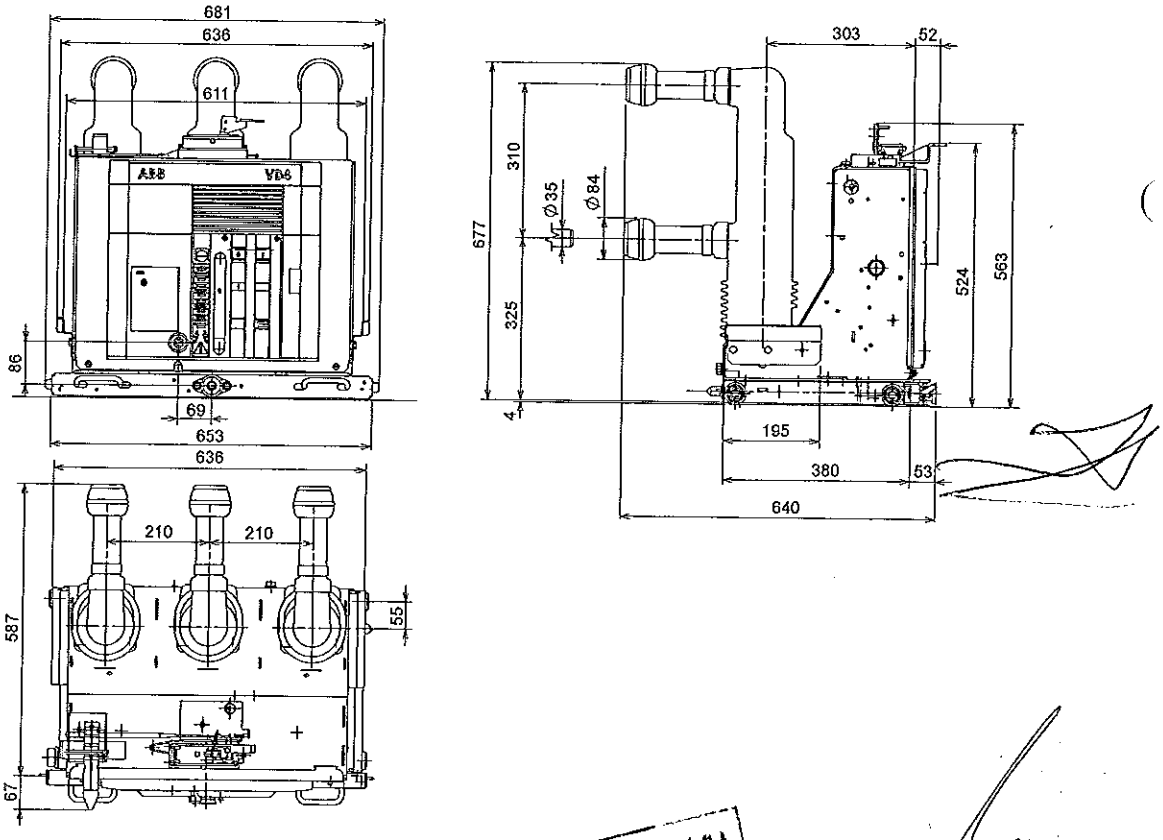
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZS8		
TN	1VCD000088	
Ur	24	kV
Ir	630	A
Isc	16	kA
	20	kA
	25	kA



Withdrawable circuit-breakers for ZS8.4 switchgear

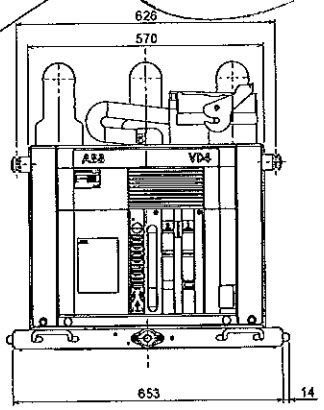
VD4/ZS8		
TN	1VCD000135	
Ur	24	kV
Ir	1250	A
Isc	16	kA
	20	kA
	25	kA

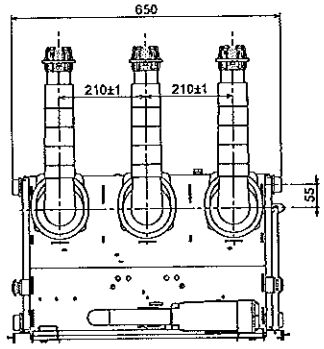


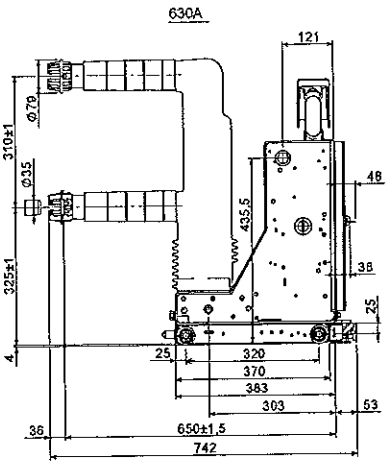
ВЯРНО С ОРИГИНАЛА

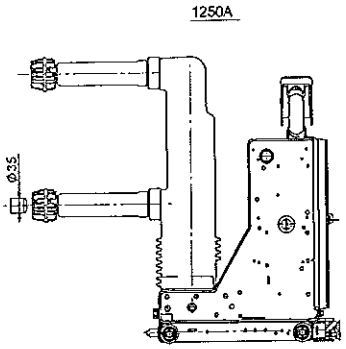
Withdrawable circuit-breakers for UniSwitch (CBW) and UniMix (P1/E) switchgear

VD4/US		
TN	1VCD000047	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



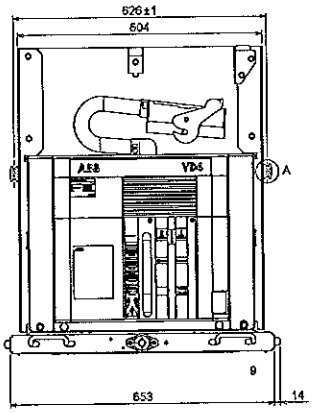


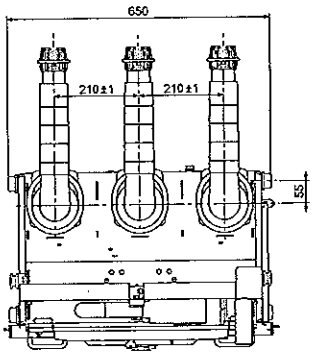


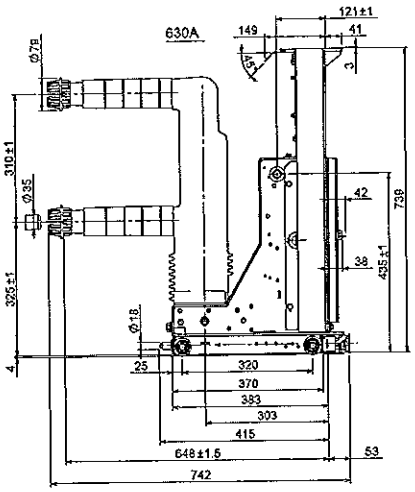


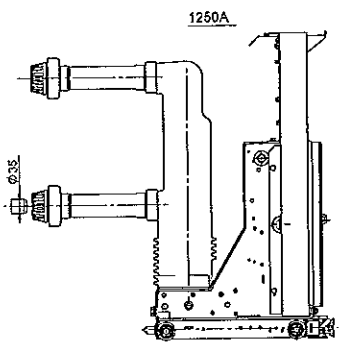
Withdrawable circuit-breakers for UniSec (WBC e WBS) switchgear

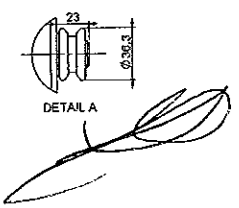
VD4/Sec		
TN	1VCD000190	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA











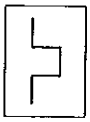
5. Electric circuit diagram

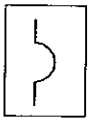
State of operation represented

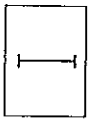
The diagrams shows the following conditions:

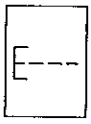
- Circuit-breaker open and connected (only withdrawable circuit-breaker)
- Circuits de-energized
- Closing springs discharged

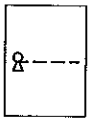
Graphical symbols for electric diagrams

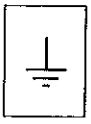

Thermal effect

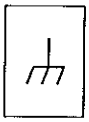

Electromagnetic effect

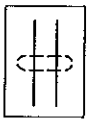

Timing

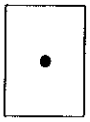

Pushbutton control

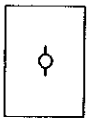

Key control

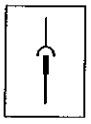

Earth (general symbol)

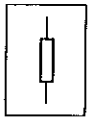

Mass, frame

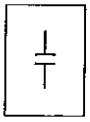

Conductors in shielded cable (two conductors shown)

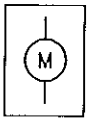

Connection of conductors


Terminal or clamp

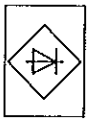

Socket and plug (female and male)


Resistor (general symbol)


Capacitor (general symbol)

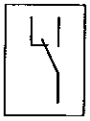


Motor (general symbol)

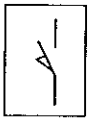

Rectifier with two half-waves (bridge)


Make contact

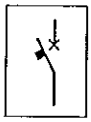

Break contact

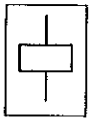

Change-over break before make contact

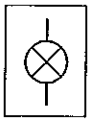

Passing make contact closing momentarily during release


Closing position contact (limit switch)


Opening position contact (limit switch)

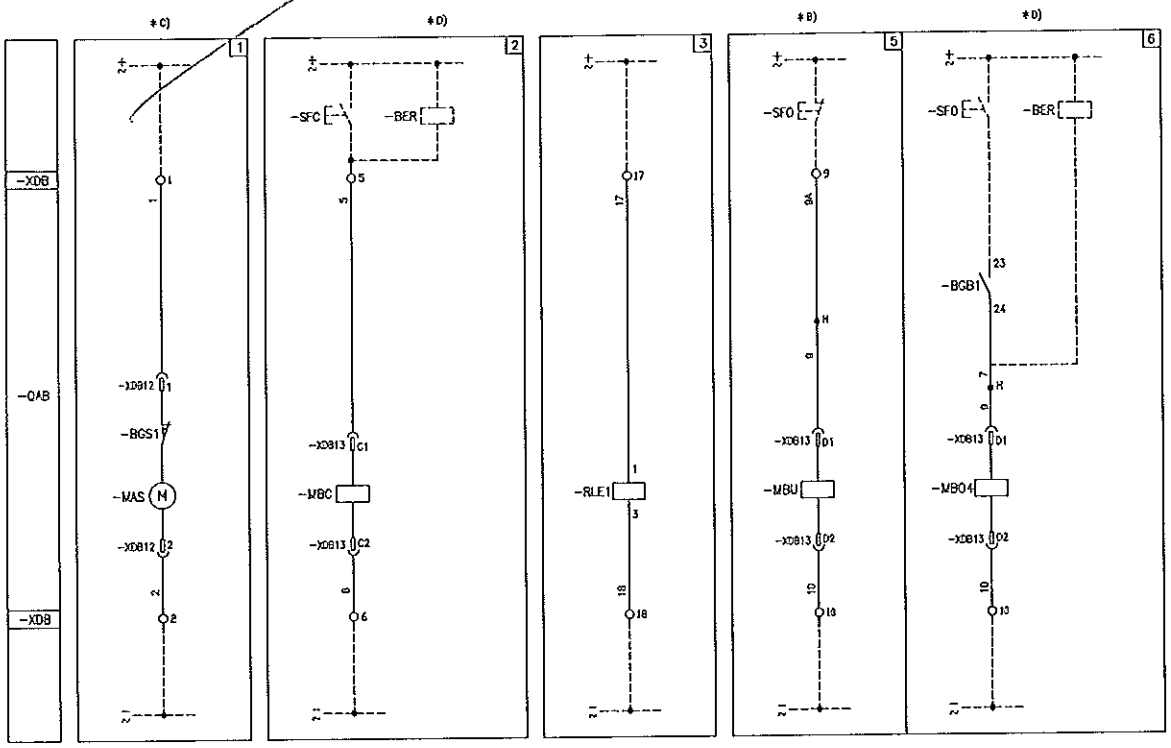

Power circuit-breaker with automatic opening

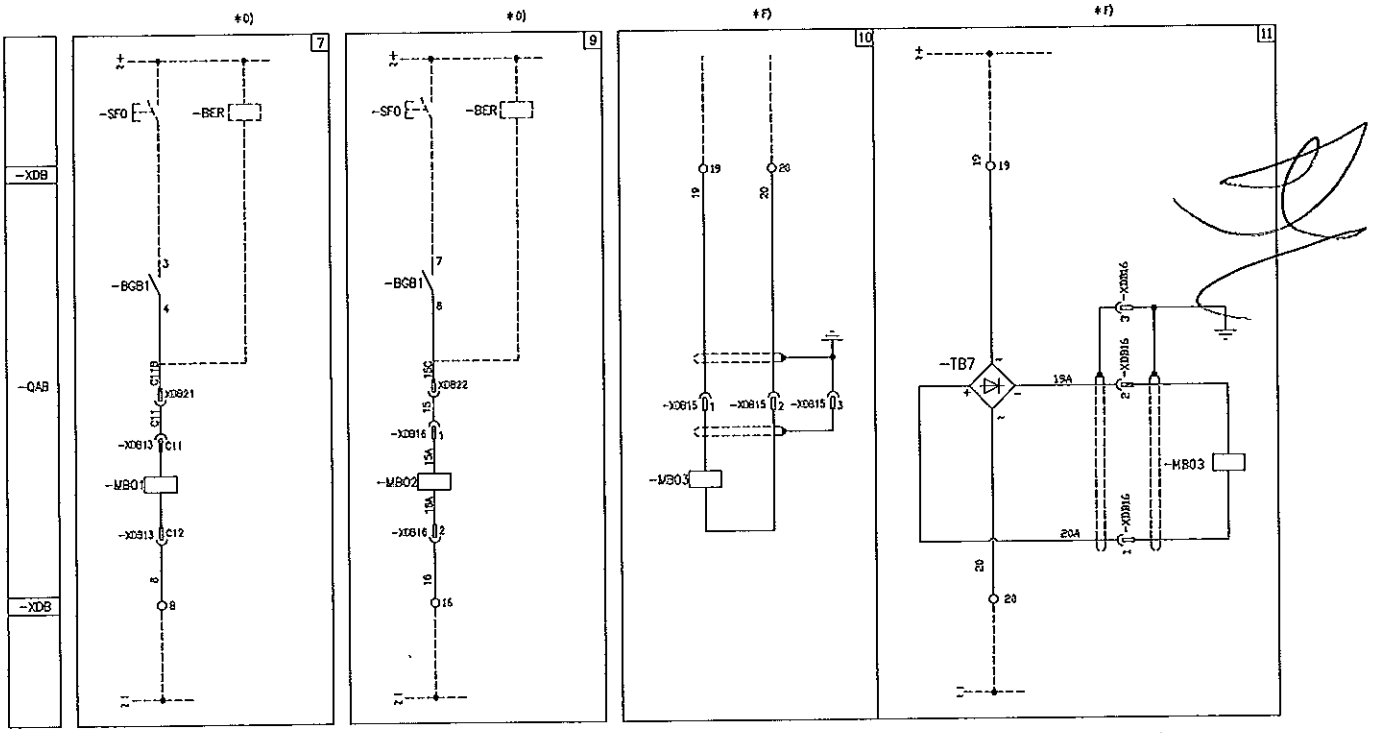

Control coil (general symbol)


Lamp (general symbol)

Electric circuit-diagram of fixed circuit-breakers 12 .. 24 kV 1VCD 400046

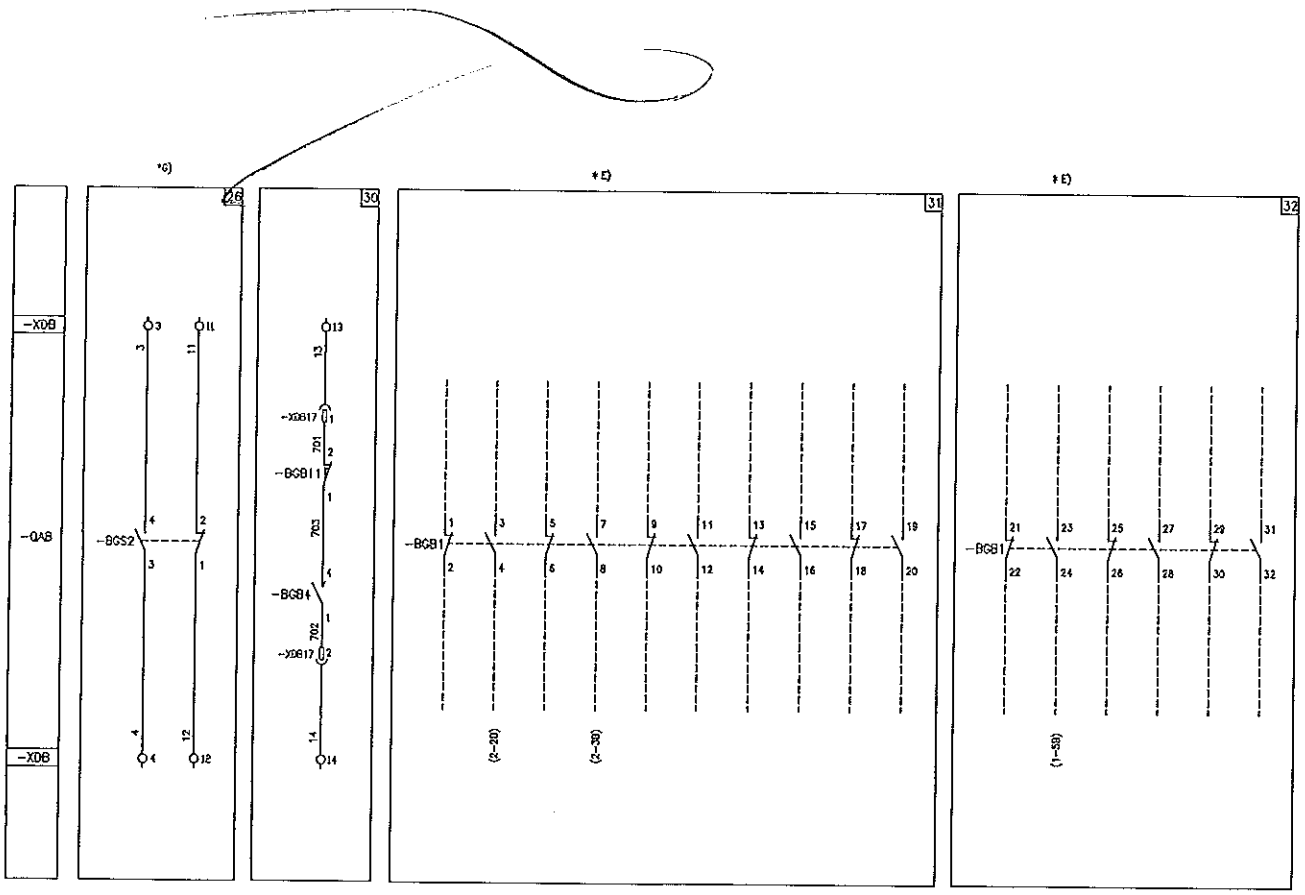
The electric circuit diagram given in this section regards the fixed circuit-breakers 12 .. 24 kV.

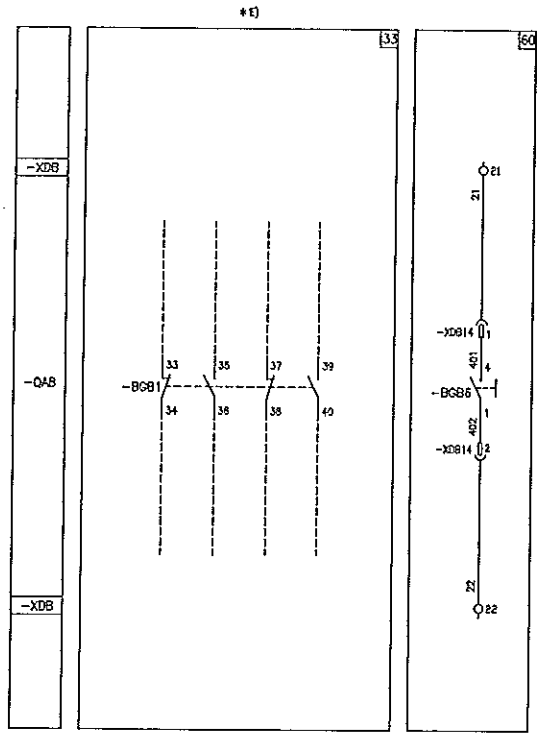




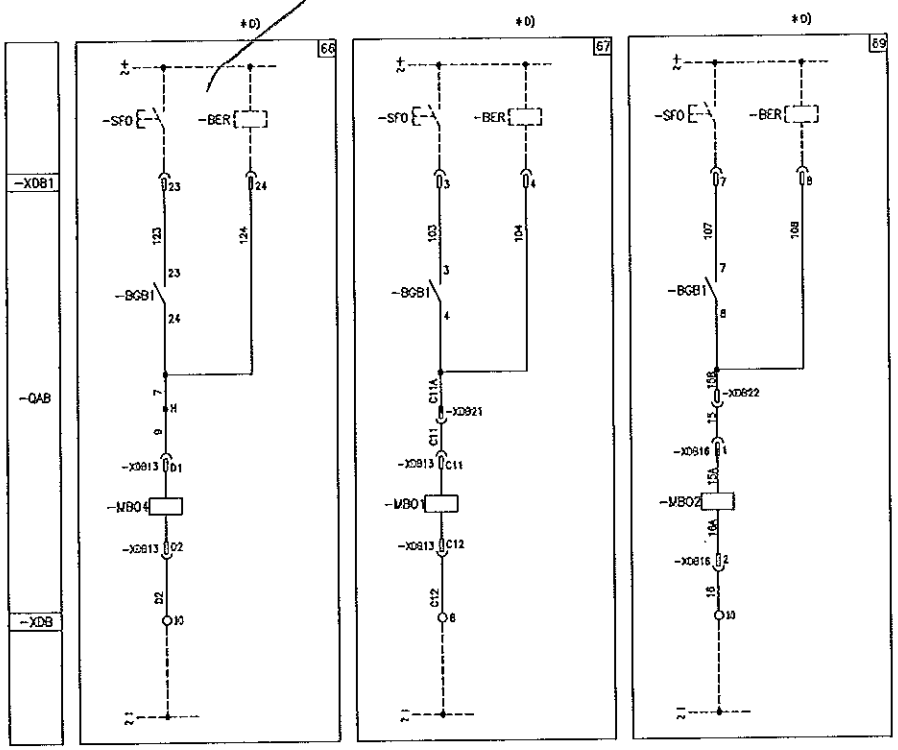
ВЕРНО С ОРИГИНАЛ

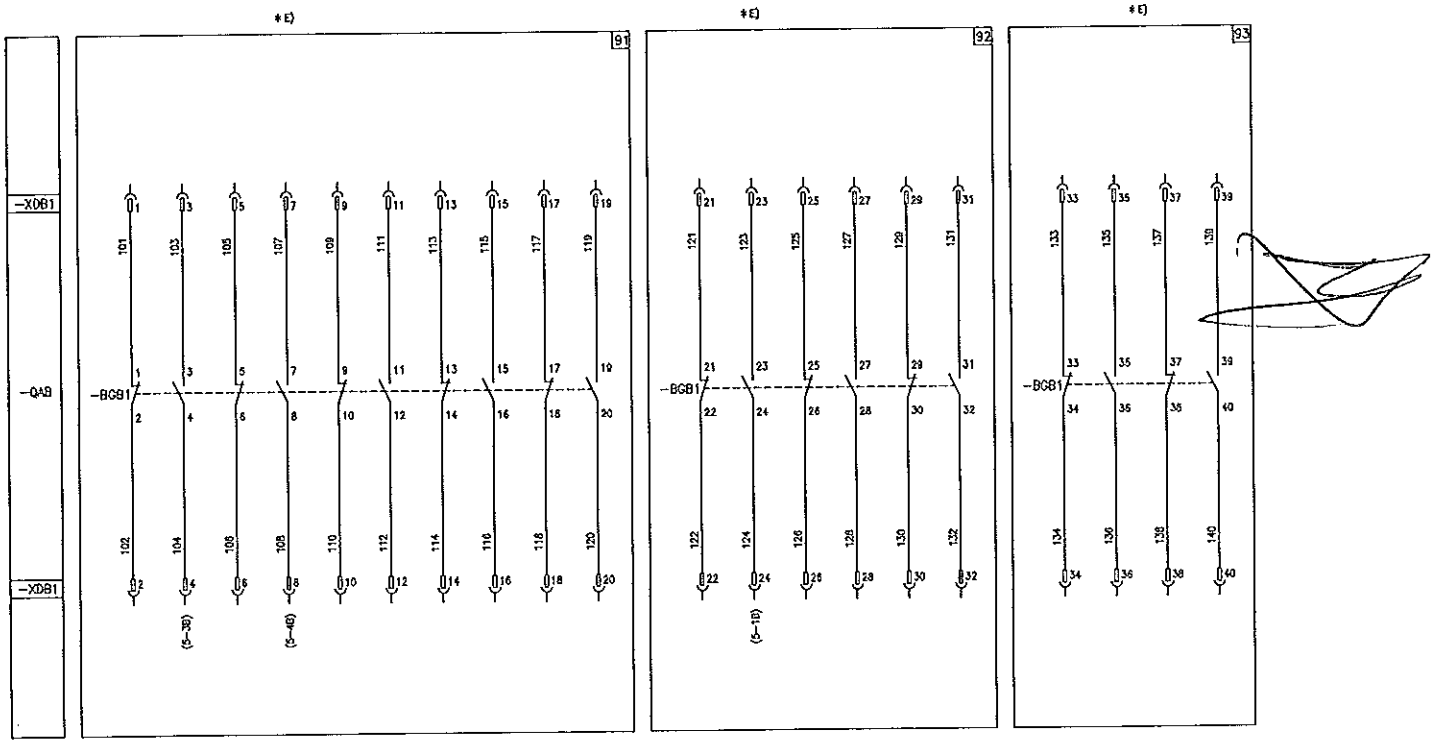
5. Electric circuit diagram





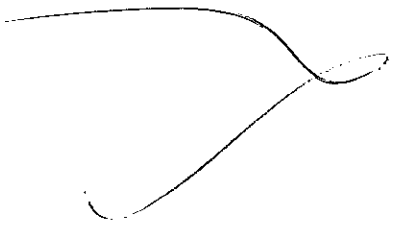
ВЯРНО С ОРИГИНАЛА





ВЯРНО С ОРИГИНАЛА

5. Electric circuit diagram



Caption

□ = Figure number of the diagram.
* = See note indicated by the letter.
-BER = SOR Test Unit device for monitoring continuity of shunt opening and closing release winding (see note D)
-BGB1 = Auxiliary contacts of circuit-breaker.
-BGB4 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.
-BGB6 = Contact for electrical signalling of undervoltage release de-energized.
-BGB11 = Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGS1 = Limit contact of spring loading motor.
-BGS2 = Contact for signalling closing springs loaded-discharged.
-MAS = Motor for loading closing springs (see note C).
-MBC = Shunt closing release (see note D).
-MBO1 = First shunt opening release (see note D).
-MBO2 = Second shunt opening release (see note D).
-MBO3 = Opening solenoid for release outside circuit-breaker (see note F).
-MBO4 = Third shunt opening release (see note D).
-MBU = Under-voltage release (see note B).
-QAB = Circuit-breaker applications.
-RLE1 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (Consumption can be limited by connecting a delayed operation enabling pushbutton in series).
-SFC = Pushbutton or contact for closing circuit-breaker.
-SFO = Pushbutton or contact for opening circuit-breaker.
-TB7 = Rectifier for release -MBO3.
-XDB = Terminal box of circuit-breaker circuits.
-XDB1 = Connector of circuit-breaker circuits.
-XDB10, ...,17 = Connectors of applications.

Description of the figures

Fig. 1 = Circuit of motor for loading closing springs (see note C).
Fig. 2 = Shunt closing release (anti-pumping is achieved mechanically), (see note D).
Fig. 3 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. Consumption can be limited by connecting a delayed operation enabling pushbutton in series.
Fig. 5 = Instantaneous undervoltage release (see note B).
Fig. 6, 66 = Circuit of third shunt opening release with possibility of continuous control of winding (see note D).
Fig. 7, 67 = Circuit of first shunt opening release with possibility of continuous control of winding (see note D).
Fig. 9, 69 = Circuit of second shunt opening release with possibility of continuous control of winding (see note D).
Fig. 10 = Opening solenoid for release outside circuit-breaker.
Fig. 11 = Opening solenoid for release outside circuit-breaker with AC supply.
Fig. 26 = Electrical signalling of closing springs loaded and discharged.
Fig. 30 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.
Fig. 31, 91 = Available auxiliary contacts of circuit-breaker (see note E).
Fig. 32, 92 = Available auxiliary contacts of circuit-breaker (see note E).
Fig. 33, 93 = Available auxiliary contacts of circuit-breaker (see note E).
Fig. 60 = Contact for electrical signalling of undervoltage release de-energized.

ВЯРНО С ОРИГИНАЛА

Incompatibility

The circuits indicated in the following figures cannot be supplied at the same time in the same circuit-breaker:

5-6-66 7-67 9-69 31-91 32-92 33-93 10-11

Notes

A) The circuit-breaker is equipped solely with the applications specified in the order confirmation. Consult this catalogue for information about how to make out an order.

B) The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit-breaker or from an independent source.
Circuit-breaker closing is only allowed when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit-breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the under-voltage release's enabling instant and energizing of the shunt closing release.
Incompatible with -MBO4.

C) Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, the springs must be loaded by hand before the auxiliary circuit is powered.

D) The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases.
-MBO4 incompatible with -MBU.
-MBO4 not available for VD4 50 kA.

E) When fig. 6 is required, contact -BGB1 (23-24) of fig.32 is not available.
When fig. 7 is required, contact -BGB1 (3-4) of fig. 31 is not available.
When fig. 9 is required, contact -BGB1 (7-8) of fig. 31 is not available.
When fig. 32 is required, it is obligatory to supply the auxiliary contacts of fig. 31.
When fig. 33 is required, it is obligatory to supply the auxiliary contacts of fig. 32.
When fig. 66 is required, contact -BGB1 (23-24) of fig. 92 is not available.
When fig. 67 is required, contact -BGB1 (3-4) of fig. 91 is not available.
When fig. 69 is required, contact -BGB1 (7-8) of fig. 91 is not available.
When fig. 92 is required, it is obligatory to supply the auxiliary contacts of fig. 91.
When fig. 93 is required, it is obligatory to supply the auxiliary contacts of fig. 92.
Figs. 33 and 93 are not available for VD4 50 kA.

F) Figs. 10 and 11 are only available for VD4 up to 31.5 kA.

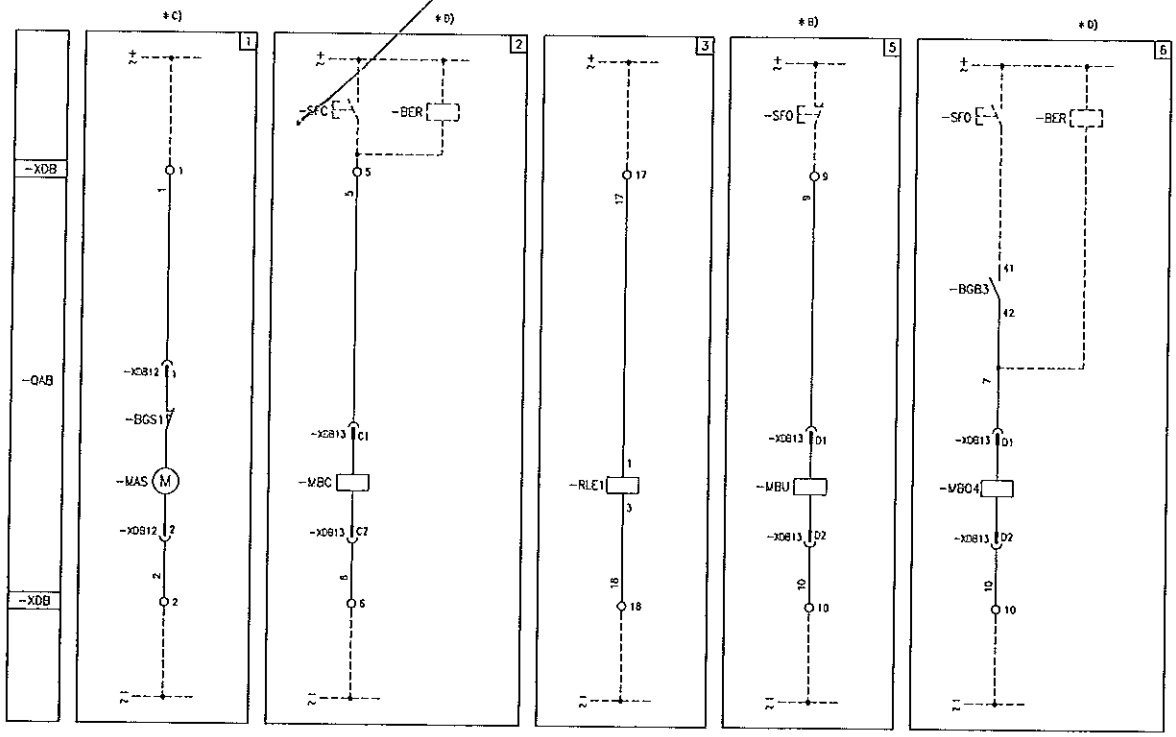
G) The energizing voltage must be the same for both signals.

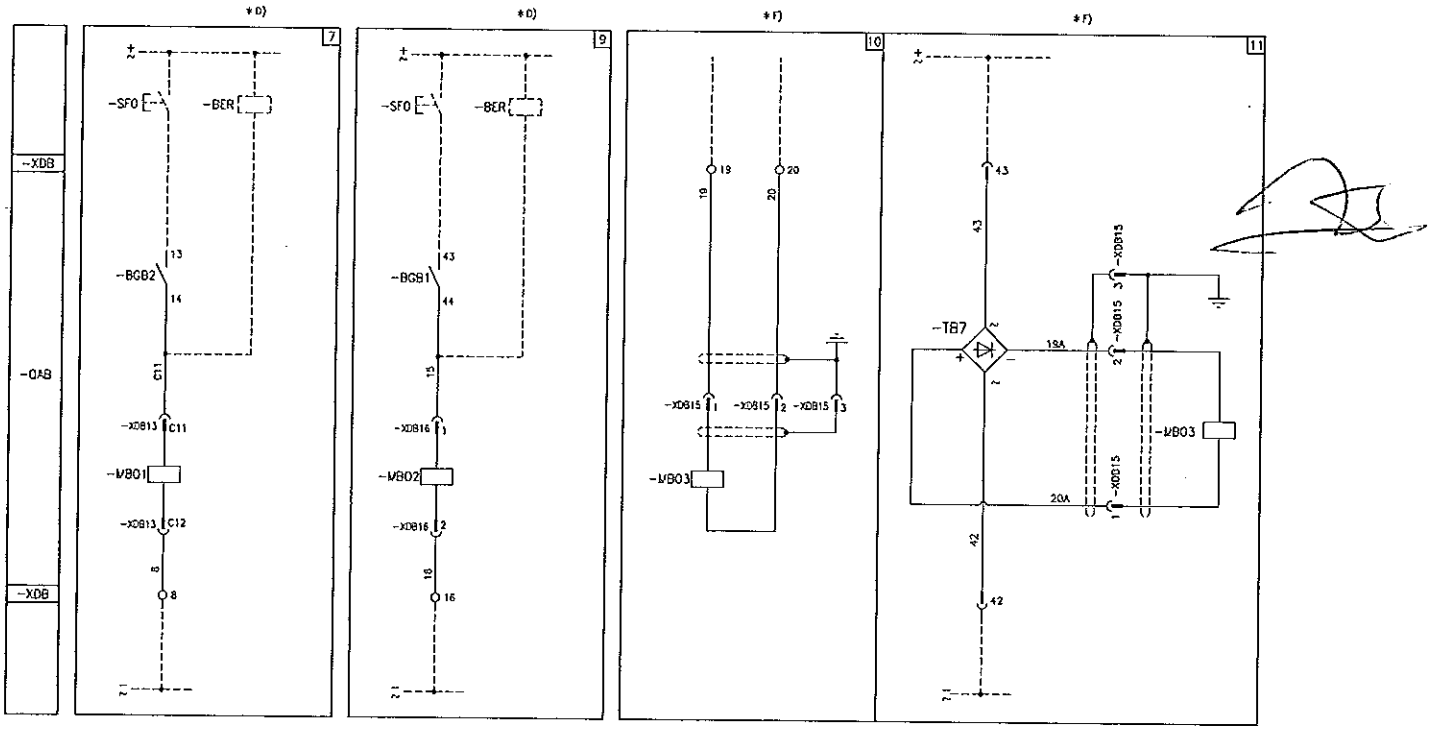
ВЯРНО С ОРИГИНАЛА

5. Electric circuit diagram

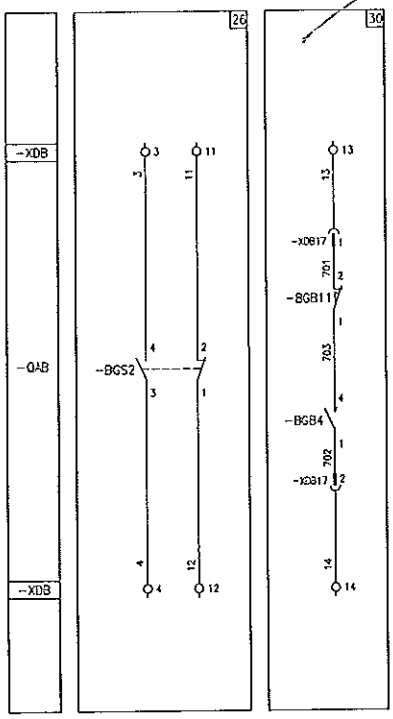
Electric circuit diagram of fixed circuit-breakers 36 kV 1VCD 400236

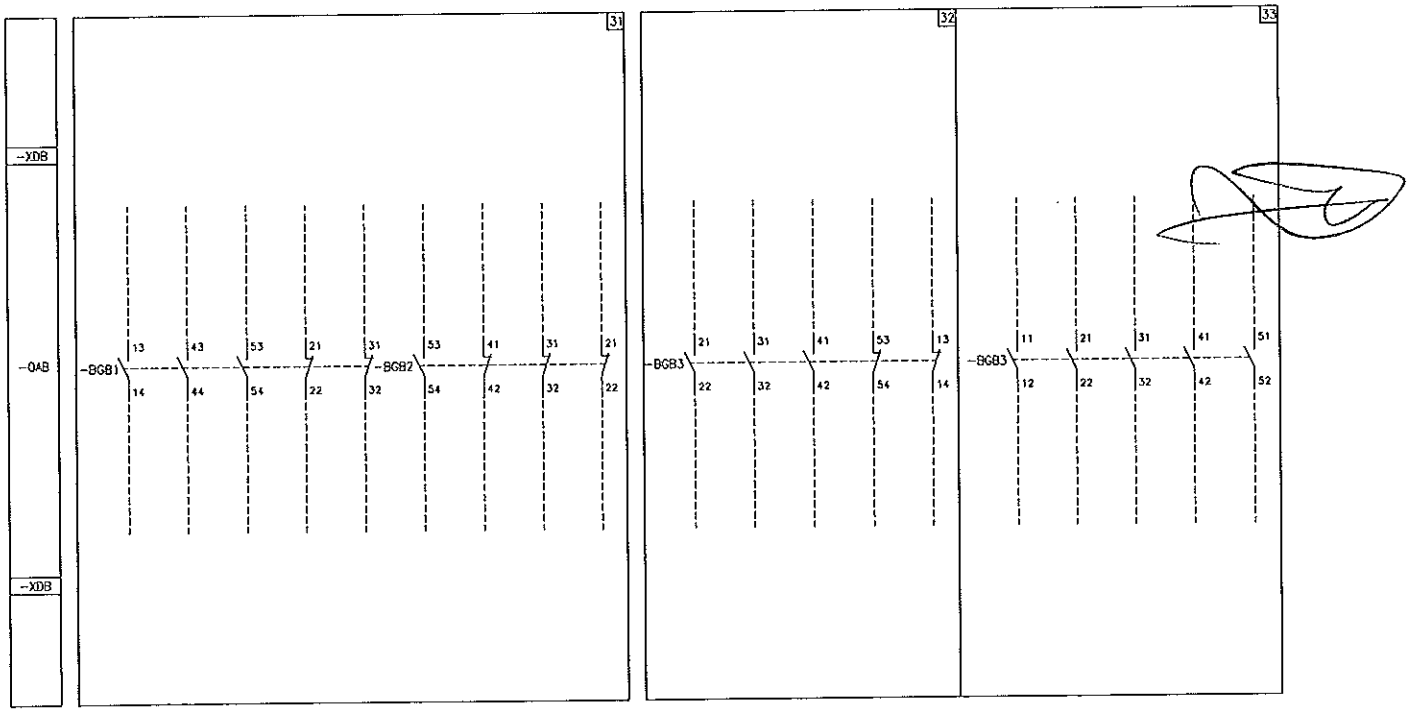
The electric circuit diagram given in this section regards the fixed circuit-breakers 36 kA.





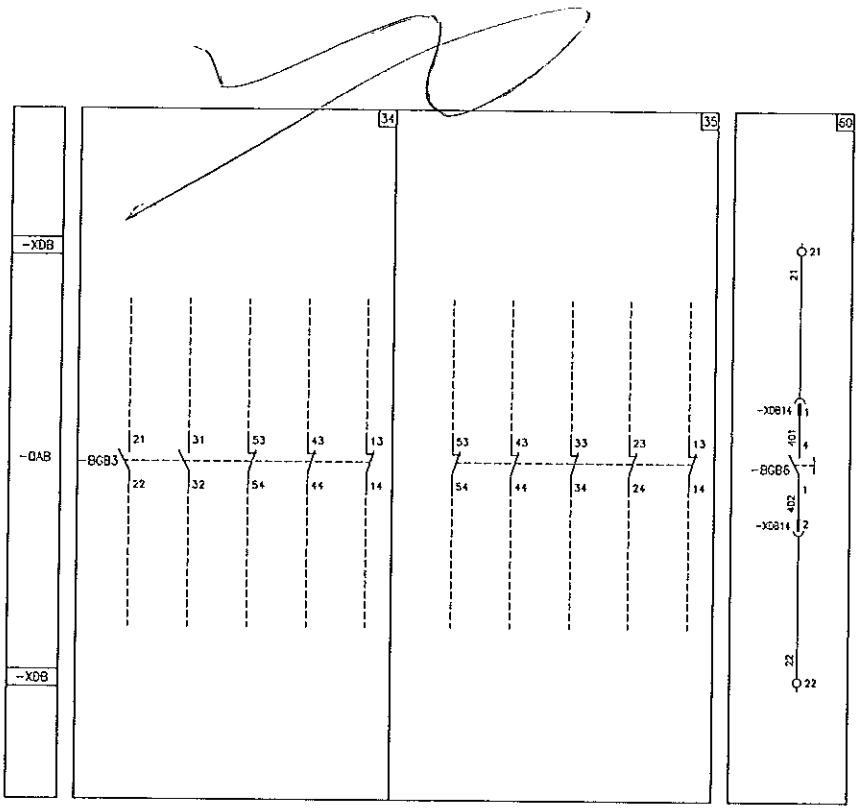
ВЯРНО С ОРИГИНАЛА

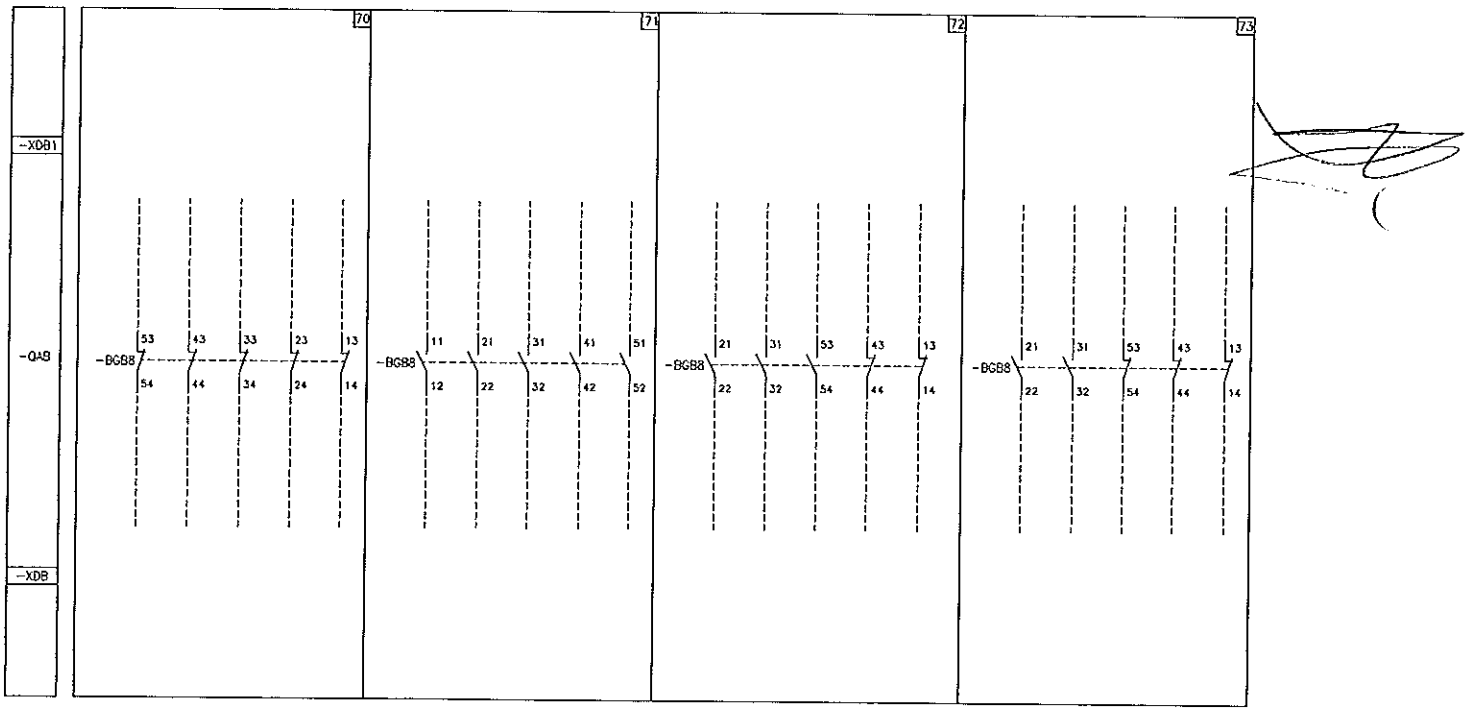




СКРИН С ОРИГИНАЛА

5. Electric circuit diagram





ВЯРНО С ОРИГИНАЛА

Caption

☐ = Figure number of the diagram.
* = See note indicated by the letter.
-BER = SOR Test Unit device for monitoring the continuity of the shunt opening and closing release winding (see note D)
-BGB1, 2, 3, 8 = Auxillary contacts of circuit-breaker.
-BGB4 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.
-BGB6 = Contact for electrical signalling of undervoltage release de-energized.
-BGB11 = Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGS1 = Limit contact of spring loading motor.
-BGS2 = Contact for signalling closing springs loaded-discharged.
-MAS = Motor for loading closing springs (see note C).
-MBC = Shunt closing release (see note D).
-MBO1 = First shunt opening release (see note D).
-MBO2 = Second shunt opening release (see note D).
-MBO3 = Opening solenoid for release outside circuit-breaker.
-MBO4 = Third shunt opening release (see note D).
-MBU = Undervoltage release (see note B).
-QAB = Circuit-breaker applications.
-RLE1 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (Consumption can be limited by connecting a delayed operation enabling pushbutton in series).
-SFC = Pushbutton or contact for closing circuit-breaker.
-SFO = Pushbutton or contact for opening circuit-breaker.
-TB7 = Rectifier for release -MBO3.
-XDB = Terminal box of circuit-breaker circuits.
-XDB10, ... ,17 = Connectors of applications

Description of the figures

Fig. 1 = Circuit of motor for loading closing springs (see note C).
Fig. 2 = Shunt closing release (anti-pumping is achieved mechanically), (see note D).
Fig. 3 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 5 = Instantaneous undervoltage release (see note B).
Fig. 6 = Circuit of third opening release with continuous control of winding (see note D).
Fig. 7 = Circuit of first opening release with continuous control of winding (see note D).
Fig. 9 = Circuit of second opening release with continuous control of winding (see note D).
Fig. 10 = Opening solenoid for release outside circuit-breaker.
Fig. 11 = Opening solenoid for release outside circuit-breaker with AC supply.
Fig. 26 = Electrical signalling of closing springs loaded and discharged.
Fig. 30 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.
Fig. 31 = Available auxiliary contacts of circuit-breaker.
Fig. 32, ..., 35 = Available auxiliary contacts of circuit-breaker.
Fig. 60 = Contact for electrical signalling of undervoltage release de-energized.
Fig. 70, ..., 73 = Available auxiliary contacts of circuit-breaker.

ВЯРНО С ОРИГИНАЛА

5. Electric circuit diagram

Incompatibility
The circuits indicated in the following figures cannot be supplied at the same time in the same circuit-breaker:

5-6 10-11 32-33-34-35 70-71 -72-73

Notes

A) Circuit-breaker is equipped solely with the applications specified in the order confirmation. Consult this catalogue for information about how to make out an order.

B) The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit-breaker or from an independent source.
Circuit-breaker closing is only allowed when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit-breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the under-voltage release's enabling instant and energizing of the shunt closing release.
Incompatible with -MBO4.

C) Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, springs must be loaded by hand before auxiliary circuit is powered.

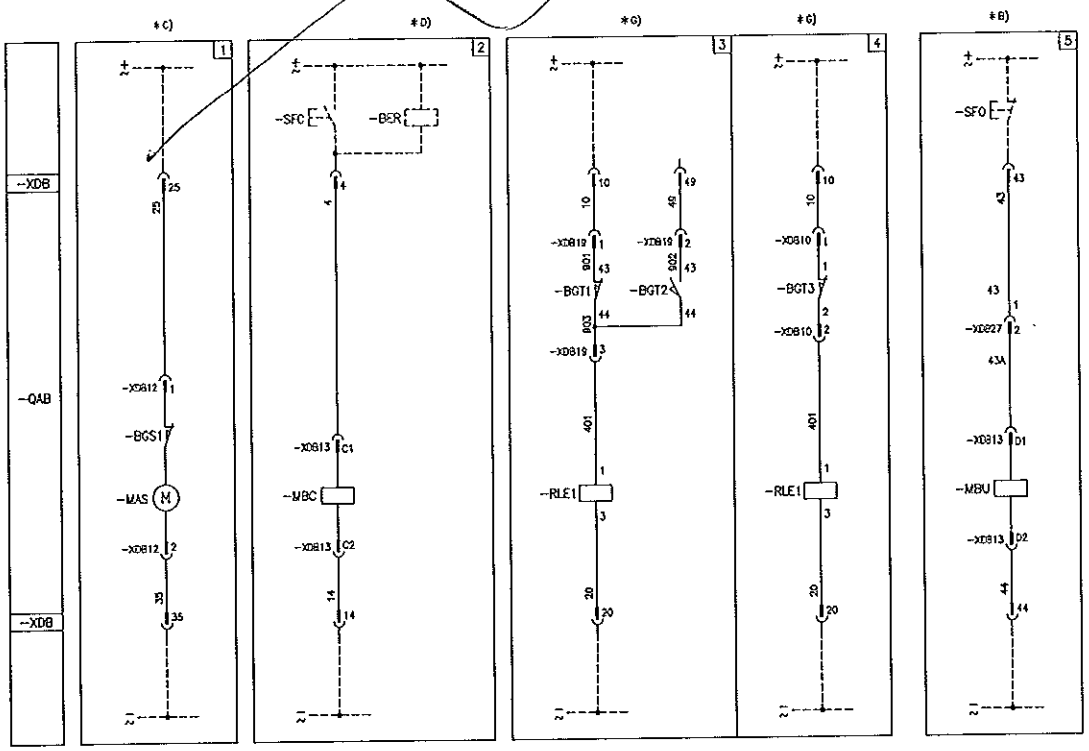
D) The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases.

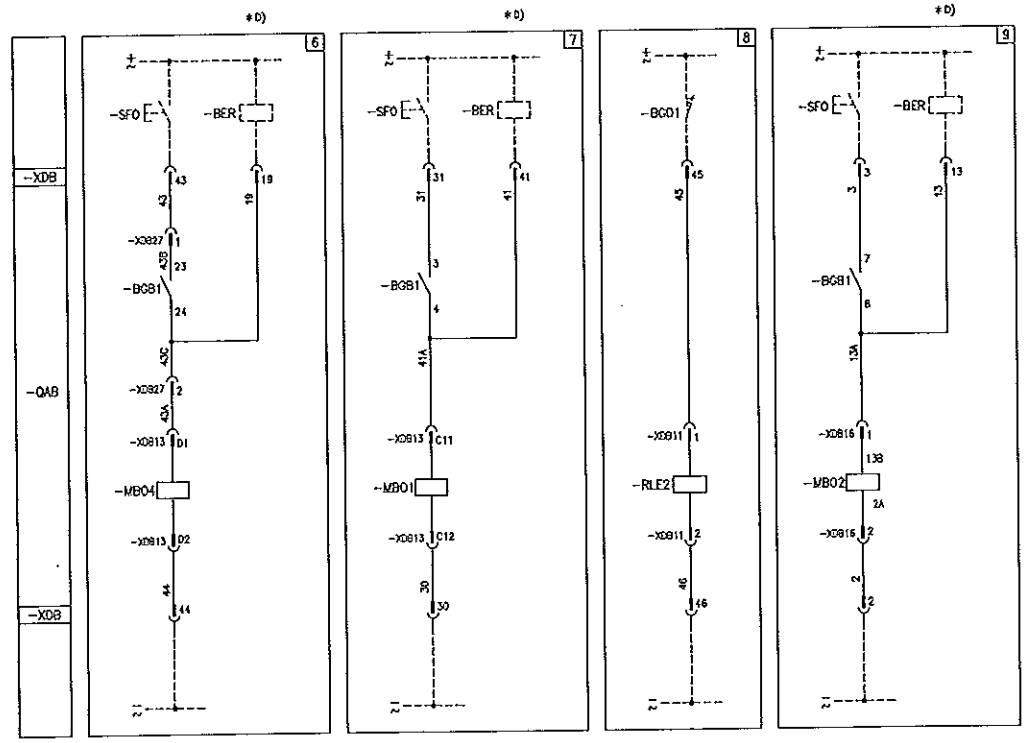
E) When fig. 6 is required, contact -BGB3 (41-42) of fig. 32-33 is not available and fig. 34-35 cannot be supplied.
When fig. 9 is required, contact -BGB1 (43-44) of fig. 31 is not available.

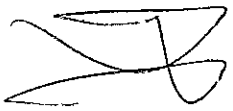
F) Only available for 31.5 kA.

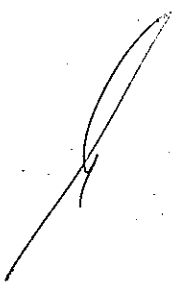
ВЯРНО С ОРИГИНАЛА

Electric circuit diagram of withdrawable circuit-breakers for UniGear switchgear and PowerCube enclosure 12 .. 24 kV 1VCD 400155







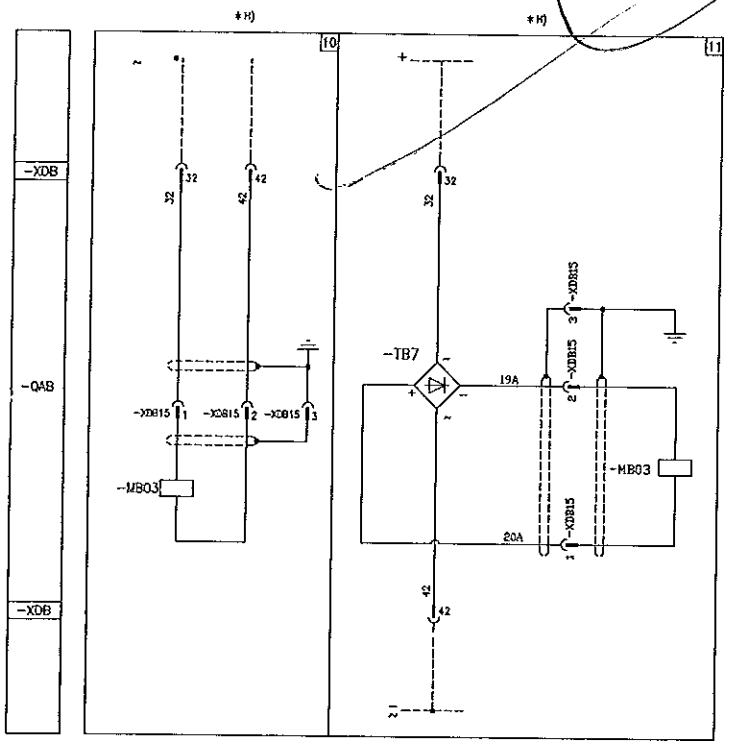


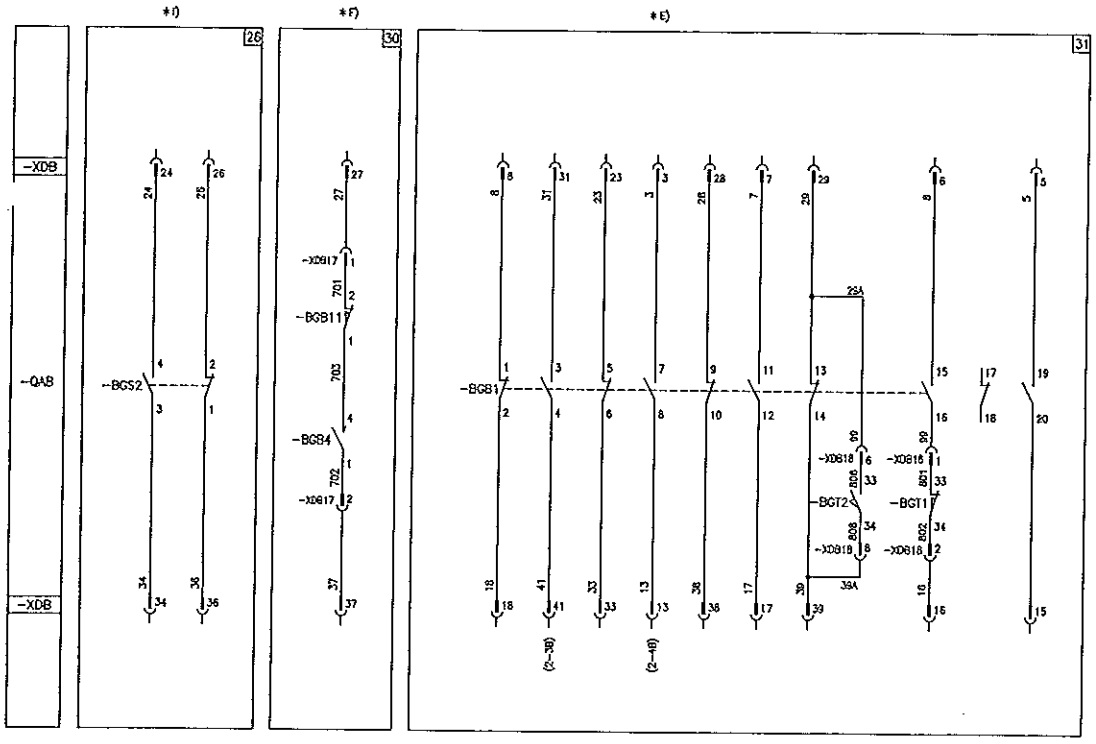
5. Electric circuit diagram

The electric circuit diagram given in this section regards the withdrawable circuit-breakers for UniGear switchgear and PowerCube 12 .. 24 kV enclosures; for withdrawable circuit-breakers with motorized truck, see diagram 1VCD400156.

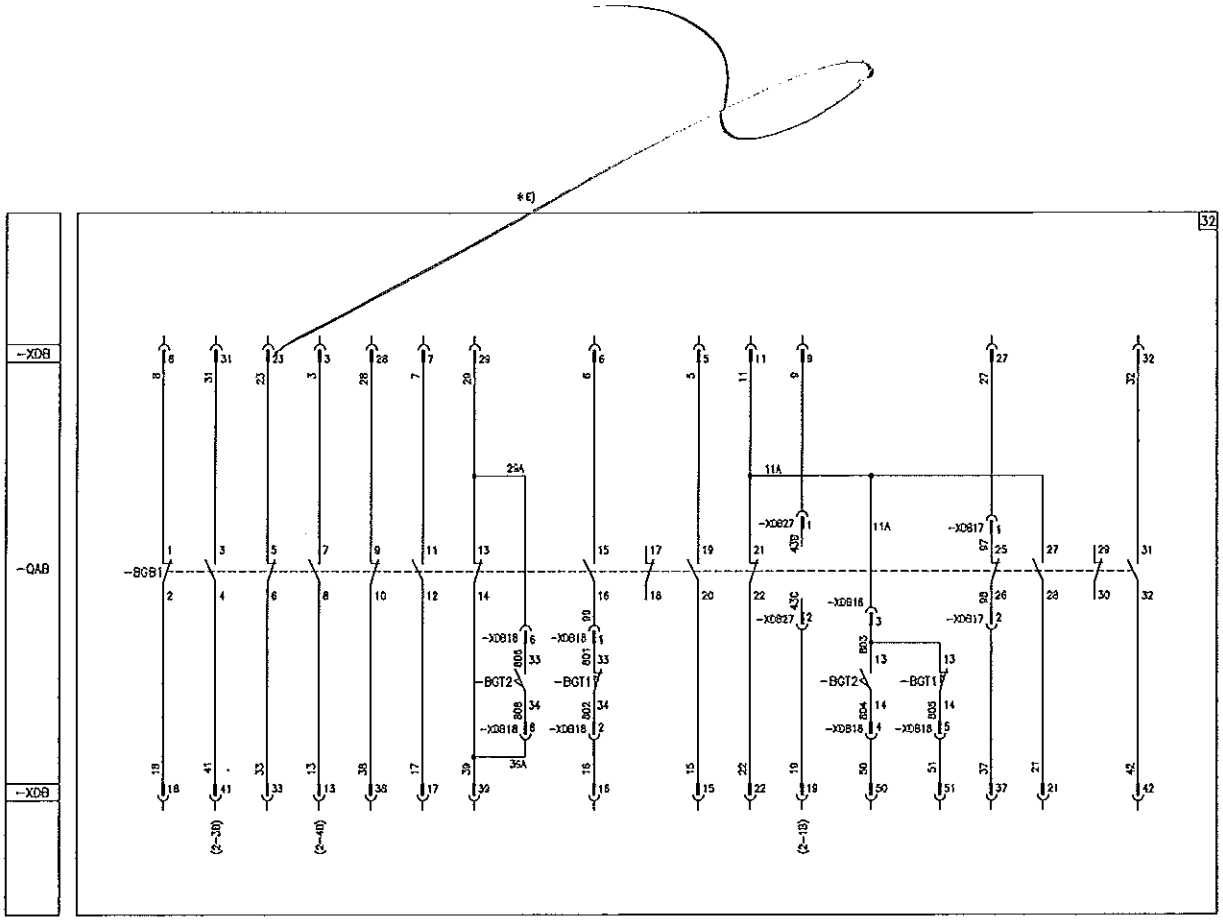
For circuit-breaker of ZS8.4 switchgears the following diagrams are available:

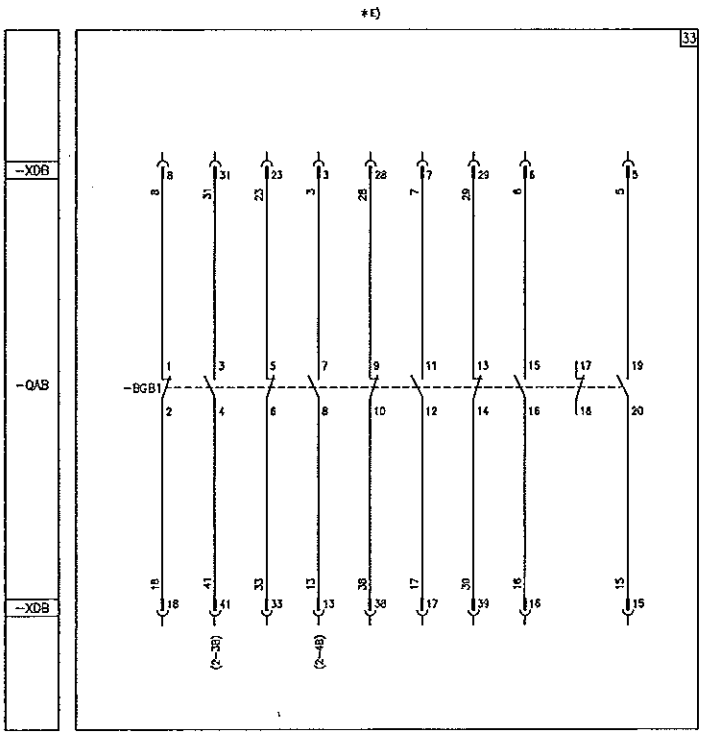
1VCD400158 Standard version
1VCD400159 Version with motorized truck.





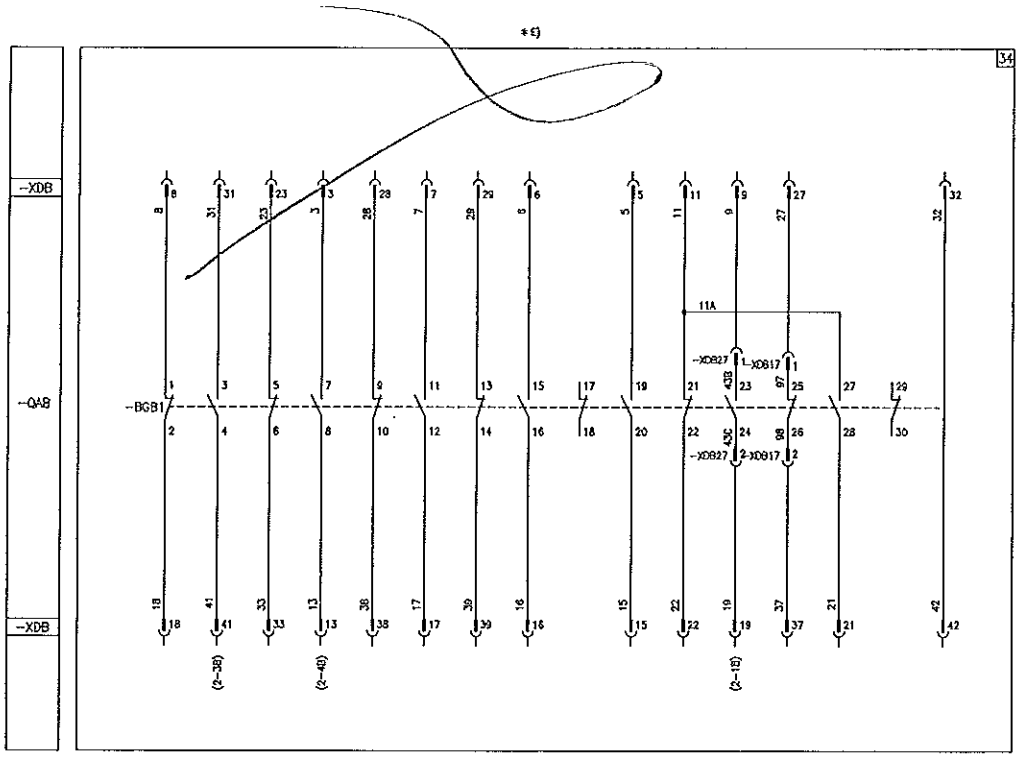
ВЯРНО С ОРИГИНАЛА

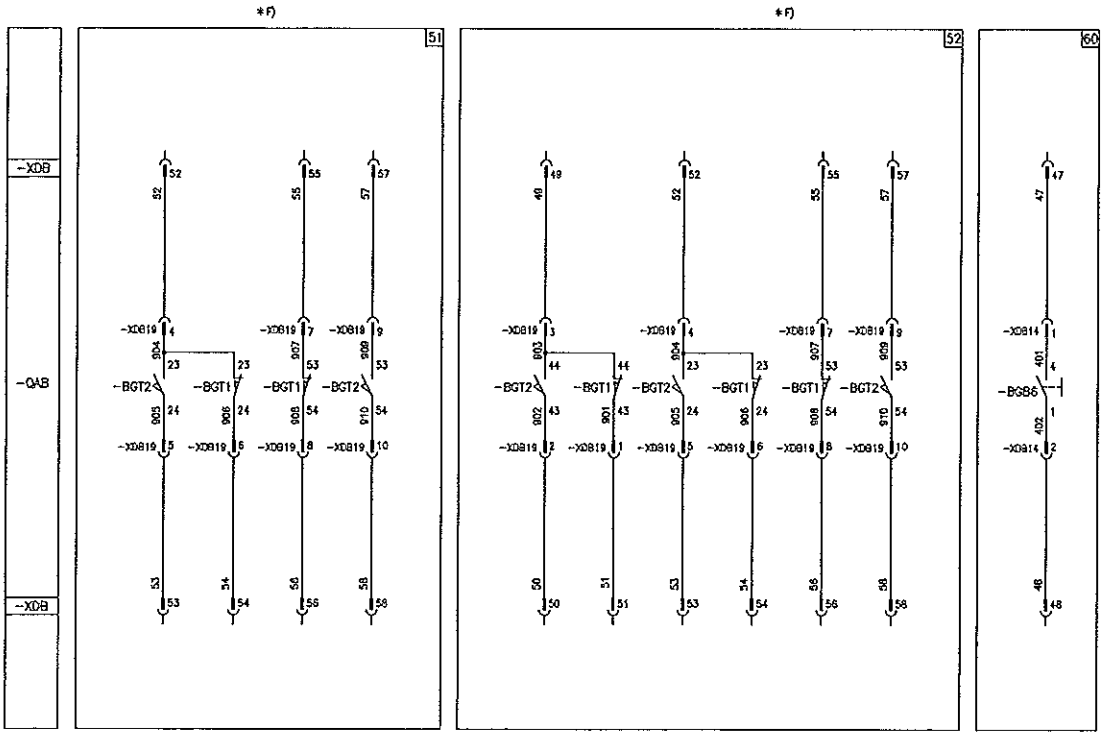




ОНО С ОРИГИНАЛА

5. Electric circuit diagram





КОПИЯ С ОРИГИНАЛА

Caption

□ = Figure number of the diagram.
* = See note indicated by the letter.
-BER = SOR Test Unit device for monitoring continuity of shunt opening and closing release winding (see note D)
-BGB1 = Auxiliary contacts of circuit-breaker.
-BGB4 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.
-BGB6 = Contact for electrical signalling of undervoltage release de-energized.
-BGB11 = Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGD1 = Enclosure door position contact.
-BGS1 = Limit contact of spring loading motor.
-BGS2 = Contact for signalling closing springs loaded-discharged.
-BGT1 = Electrical signalling contacts for circuit-breaker in racked-in position (see note F)
-BGT2 = Electrical signalling contacts for circuit-breaker in isolated position (see note F).
-BGT3 = Circuit-breaker position contact, open during isolating travel.
-MAS = Motor for loading closing springs (see note C).
-MBC = Shunt closing release (see note D).
-MBO1 = First shunt opening release (see note D).
-MBO2 = Second shunt opening release (see note D).
-MBO3 = Opening solenoid for release outside circuit-breaker.
-MBO4 = Third shunt opening release (see note D).
-MBU = Under-voltage release (see note B).
-QAB = Circuit-breaker applications.
-RLE1 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
-RLE2 = Locking magnet (on truck). Mechanically inhibits circuit-breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
-SFC = Pushbutton or contact for closing circuit-breaker.
-SFO = Pushbutton or contact for opening circuit-breaker.
-TB7 = Rectifier for release -MBO3.
-XDB = Terminal box of circuit-breaker circuits.
-XDB10, ... , 27 = Connectors of applications
-XDB28 = Connector of applications.

Description of the figures

Fig. 1 = Circuit of motor for loading closing springs (see note C).
Fig. 2 = Shunt closing release (anti-pumping is achieved mechanically). (see note D).
Fig. 3 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (If -RL1 is required, provide this figure when fig.31 or 32 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 4 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (If -RL1 is required, provide this figure when fig.33 or 34 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 5 = Instantaneous undervoltage release (see note B).
Fig. 6 = Circuit of third opening release with continuous control of winding (see note D).
Fig. 7 = Circuit of first opening release with continuous control of winding (see note D).
Fig. 8 = Locking magnet (on truck). Mechanically inhibits circuit-breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
Fig. 9 = Circuit of second opening release with continuous control of winding (see note D).
Fig. 10 = Opening solenoid for release outside circuit-breaker.
Fig. 11 = Opening solenoid for release outside circuit-breaker with AC supply.

ЯРНО С ОРИГИНАЛА

5. Electric circuit diagram

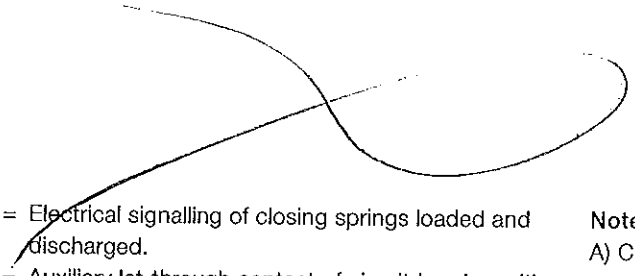


Fig. 26 = Electrical signalling of closing springs loaded and discharged.
Fig. 30 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.
Fig. 31, ... , 34 = Available auxiliary contacts of circuit-breaker (see note E).
Fig. 51 = Contacts for electrical signalling of circuit-breaker in racked-in and isolated positions located on circuit-breaker truck (obligatory when fig. 31 or 32 are required).
Fig. 52 = Contacts for electrical signalling of circuit-breaker in racked-in and isolated positions located on circuit-breaker truck (supplied on request when fig. 33 to 34 are required).
Fig. 60 = Contact for electrical signalling of undervoltage release de-energized.

Incompatibility

The circuits indicated in the following figures cannot be supplied at the same time in the same circuit-breaker:

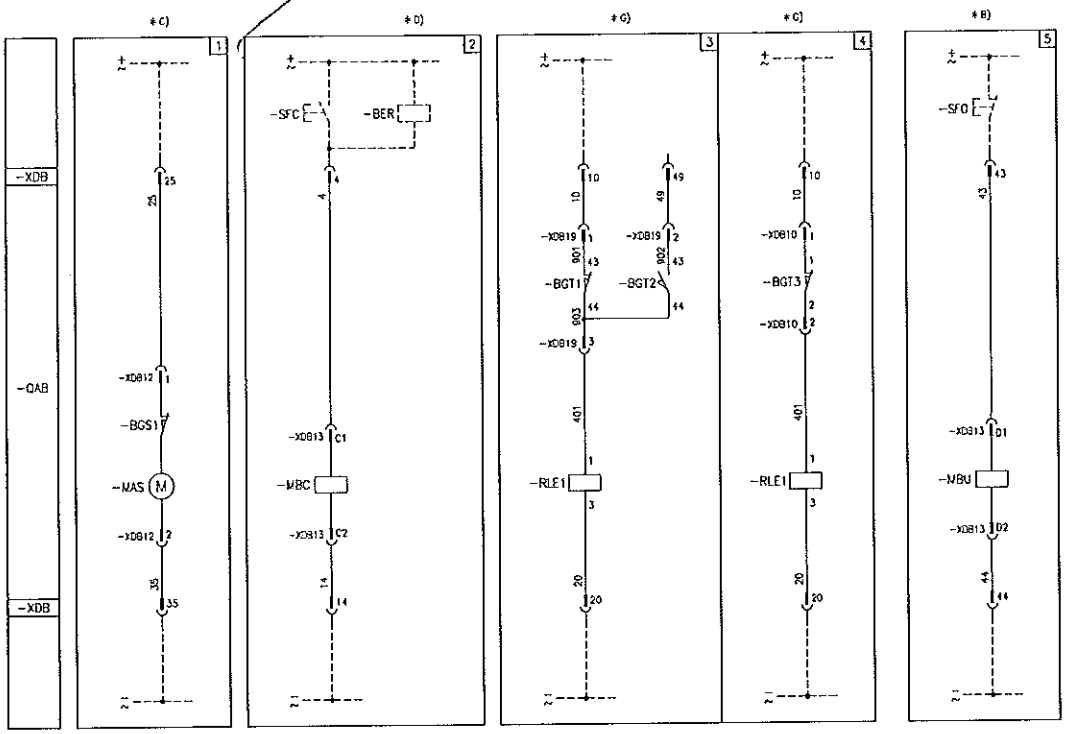
3-4	3-33-34	4-31-32	5-6	10-11
31-32-33-34	31-32-52	33-34-51	51-52	

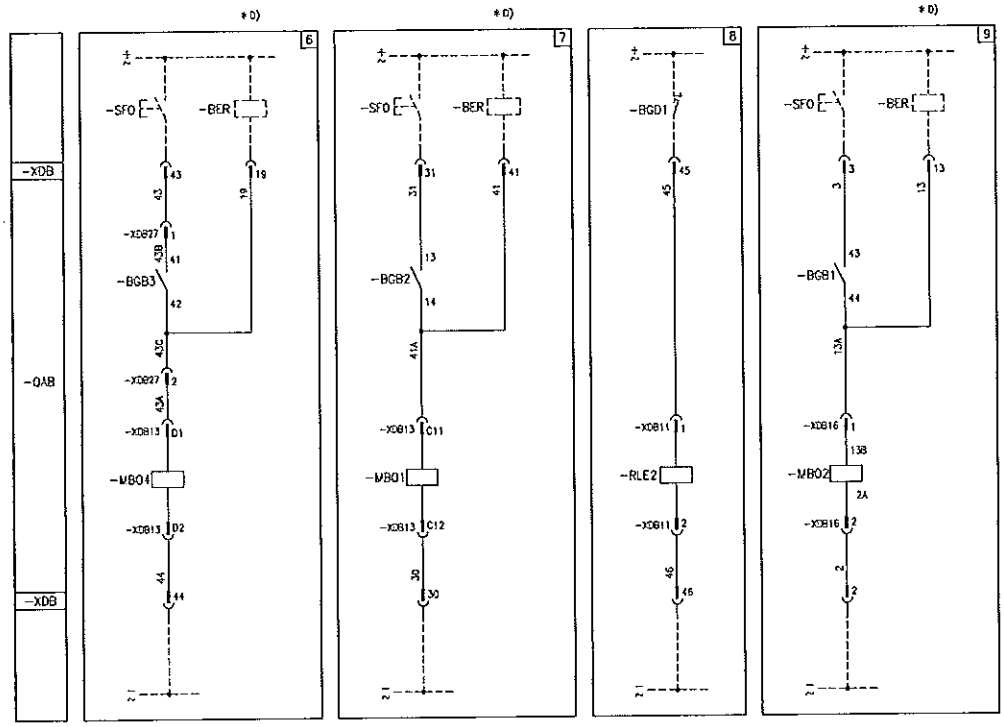
Notes

A) Circuit-breaker is equipped solely with the applications specified in the order confirmation. Consult this catalogue for information about how to make out an order.
B) The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit-breaker or from an independent source.
Circuit-breaker closing is only allowed when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit-breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the under-voltage release's enabling instant and energizing of the shunt closing release.
Incompatible with -MBO4.
C) Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, the springs must be loaded by hand before auxiliary circuit is powered.
D) The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases:
-MBO4 incompatible with -MBU.
-MBO4 not available on Vmax and VD4 50kA.
E) When fig. 6 is required, contact -BGB1 (23-24) of fig. 32-34 is not available.
When fig. 7 is required, contact -BGB1 (3-4) of fig. 31-32-33-34 is not available.
When fig. 9 is required, contact -BGB1 (7-8) of fig. 31-32-33-34 is not available.
When fig. 10 or 11 are required, contact -BGB1 (31-32) of fig. 32 and 34 is not available.
When fig. 30 is required, contact -BGB1 (25-26) of fig. 32 and 34 is not available.
F) The contacts for electrical signalling of circuit-breaker in isolated and racked-in position (-BGT1 and BGT2) shown in fig. 51-52 are installed on circuit-breaker truck (movable part).
G) Fig. 3 is supplied when fig. 31 or 32 are required.
Fig. 4 is supplied when fig. 33 or 34 are required (in this case, it is obligatory to supply –BGT3).
H) Fig. 10 is only available for VD4 up to 31.5 kA and Vmax.
Fig. 11 is only available for VD4 up to 31.5 kA.
I) The energizing voltage must be the same for both signals.

РИО С ОРИГИНАЛА

Electric circuit diagram of withdrawable circuit-breakers 36 kV 1VCD 400237



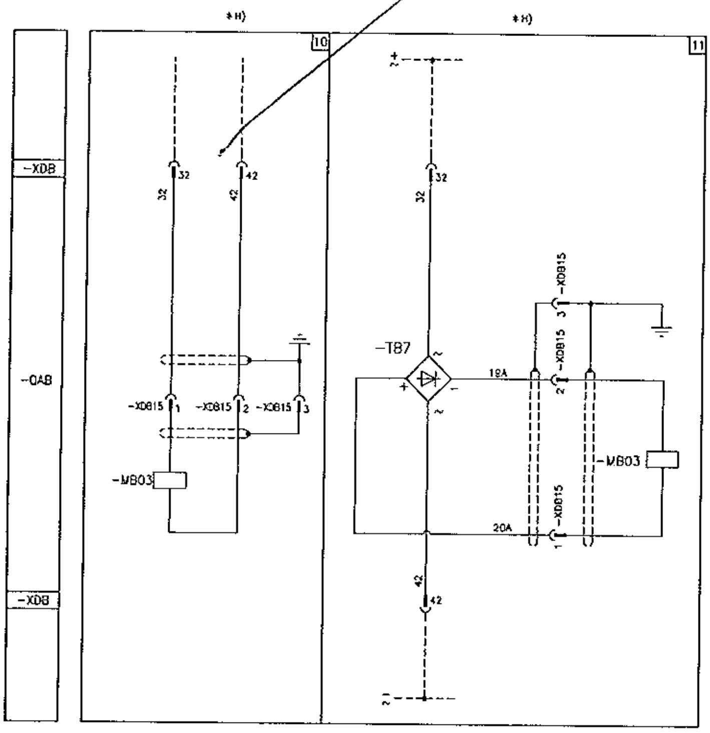


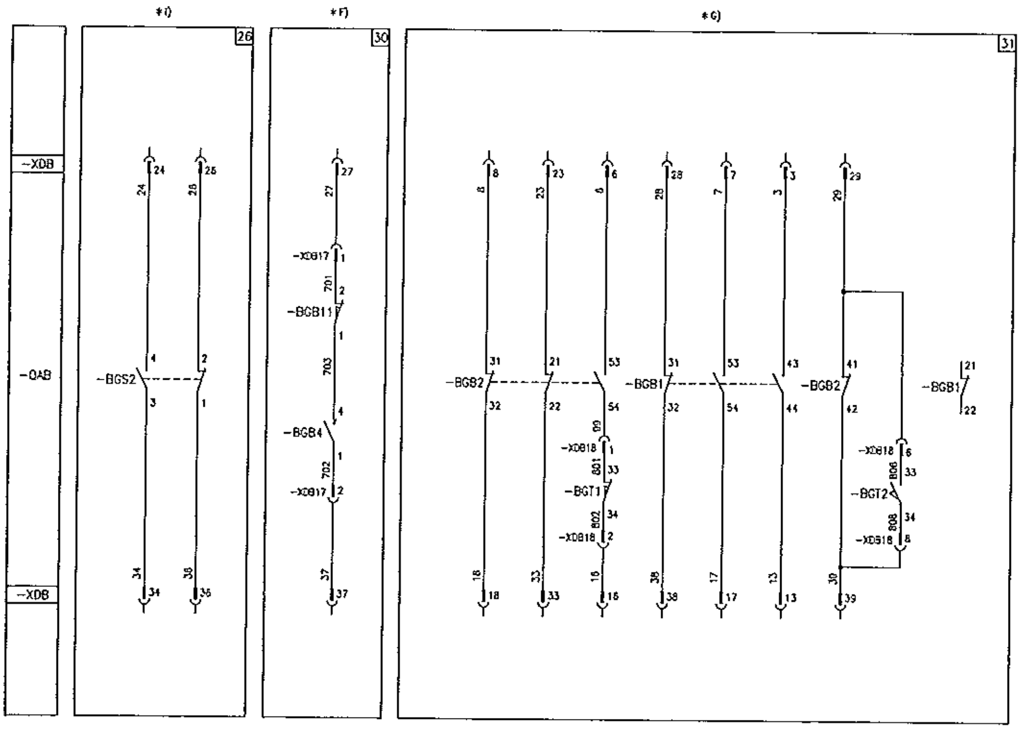
ВЯРНО С ОРИГИНАЛА

5. Electric circuit diagram

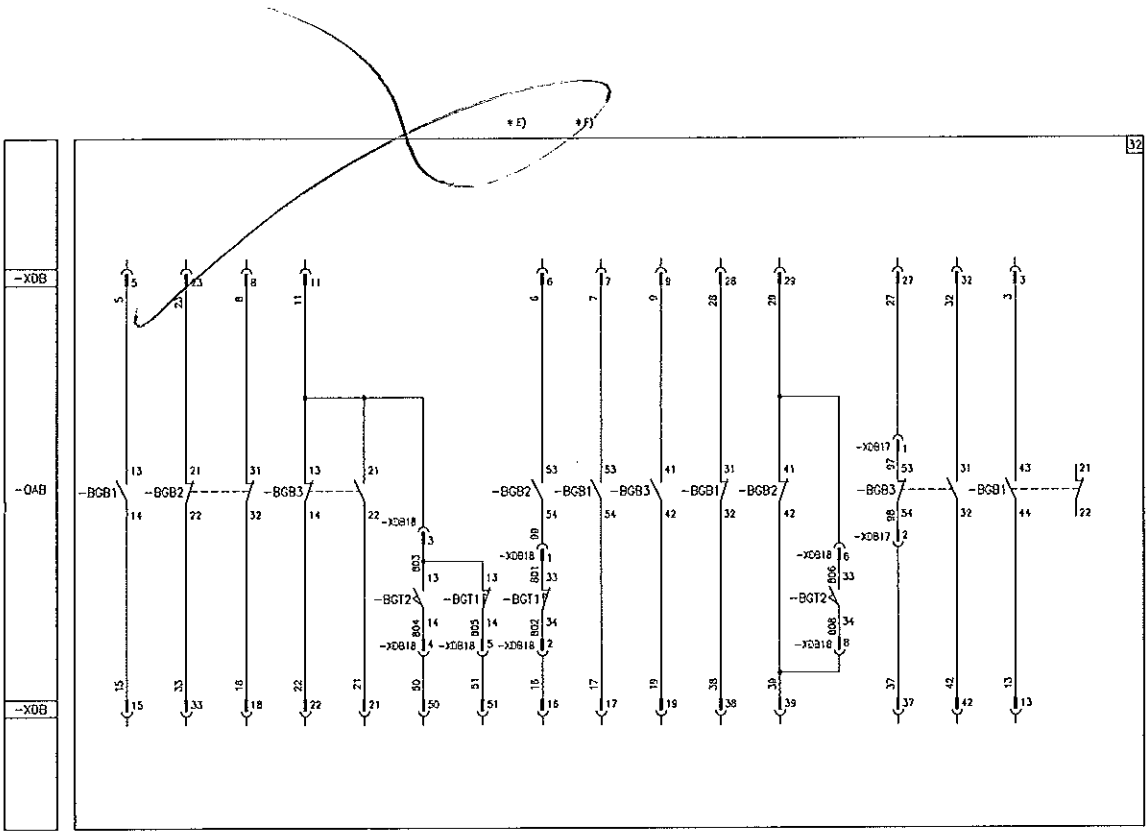
The electric circuit diagram given in this section regards the withdrawable circuit-breakers with **breaking capacity up to** 36 kV.

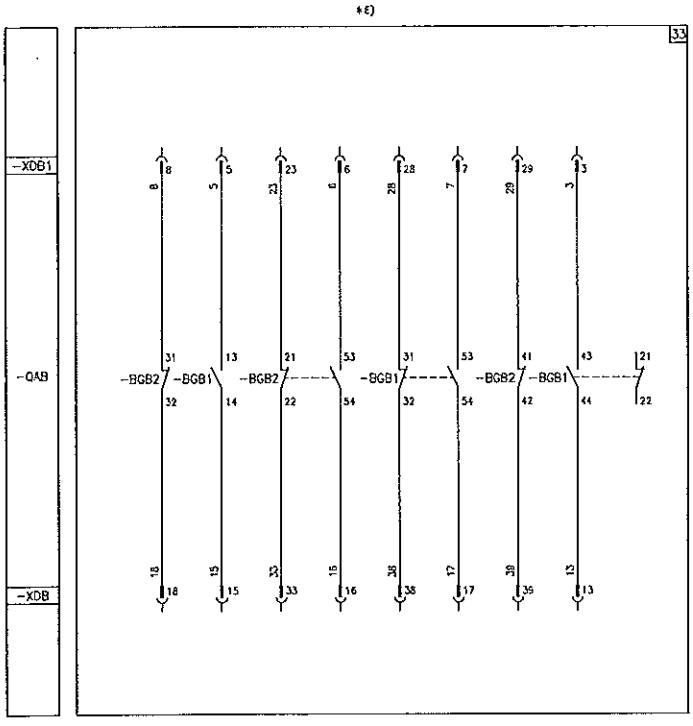
Note: the withdrawable version with motor-operated truck is not available for 36 kV.





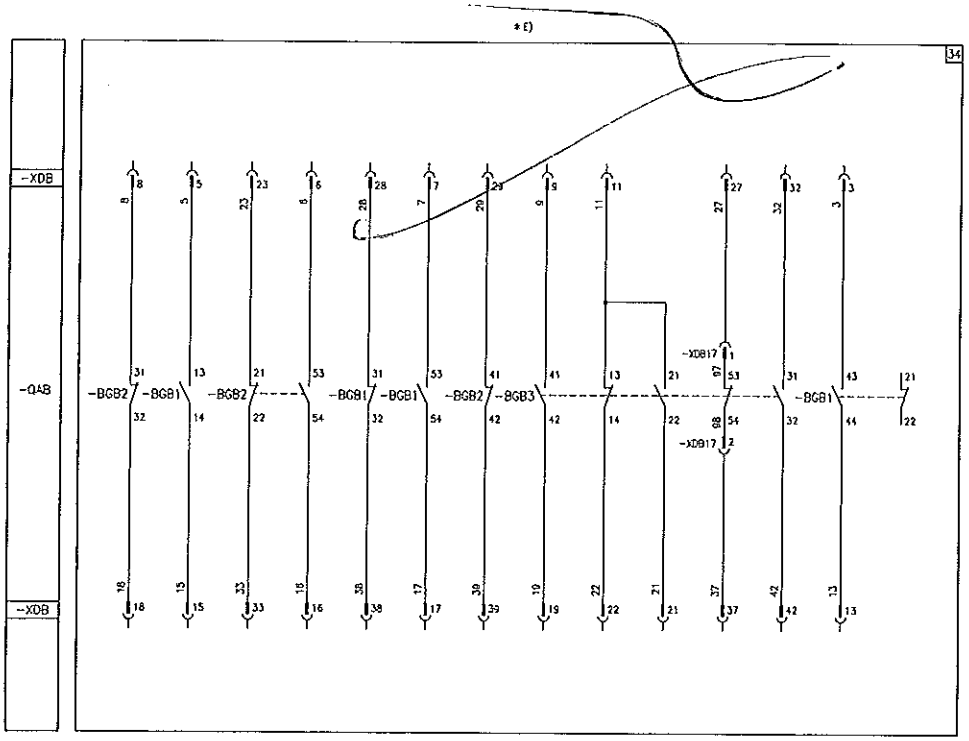
ВЯРНО С ОРИГИНАЛА

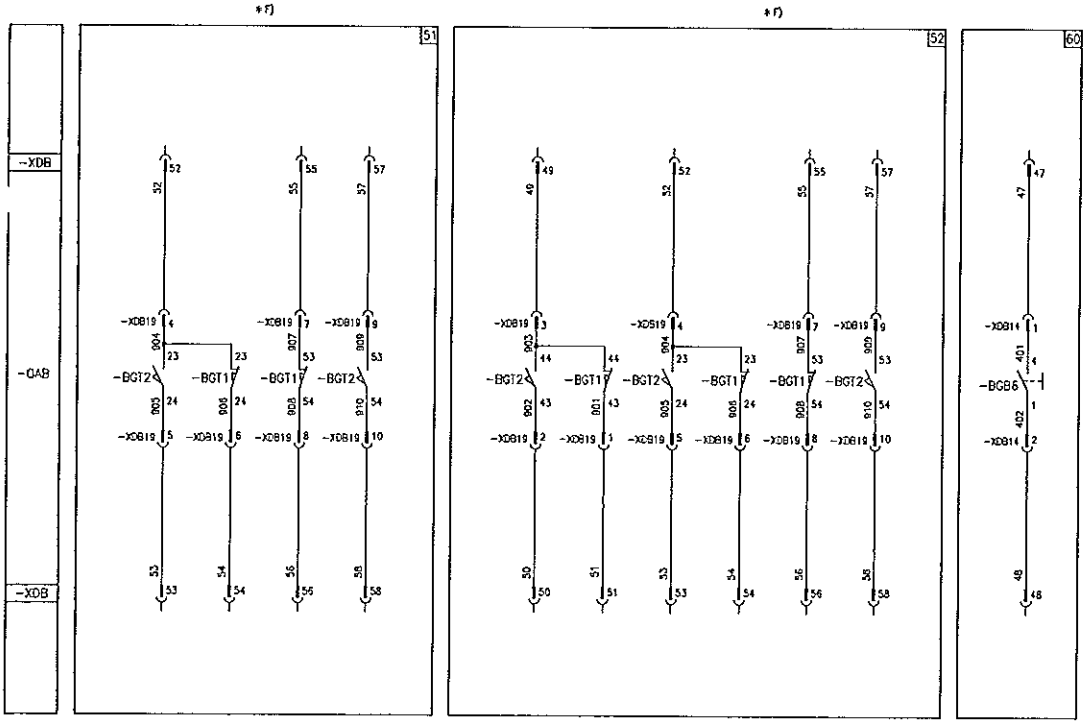




ВЯРНО С ОРИГИНАЛА

5. Electric circuit diagram





ВЯРНО С ОРИГИНАЛА

Caption

□ = Figure number of the diagram.
* = See note indicated by the letter.
-BER = SOR Test Unit device for monitoring continuity of shunt opening and closing release winding (see note D)
-BGB1, ... ,3 = Auxiliary contacts of circuit-breaker.
-BGB4 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.
-BGB6 = Contact for electrical signalling of undervoltage release de-energized.
-BGB11 = Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGD1 = Enclosure door position contact.
-BGS1 = Limit contact of spring loading motor.
-BGS2 = Contact for signalling closing springs loaded-discharged.
-BGT1 = Electrical signalling contacts for circuit-breaker in racked-in position (see note F).
-BGT2 = Contacts for electrical signalling of circuit-breaker in isolated position (see note F).
-BGT3 = Circuit-breaker position contact, open during isolating travel.
-MAS = Motor for loading closing springs (see note C).
-MBC = Shunt closing release (see note D).
-MBO1 = First shunt opening release (see note D).
-MBO2 = Second shunt opening release (see note D).
-MBO3 = Opening solenoid for release outside circuit-breaker.
-MBO4 = Third shunt opening release (see note D).
-MBU = Under-voltage release (see note B).
-QAB = Circuit-breaker applications.
-RLE1 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (Consumption can be limited by connecting a delayed operation enabling pushbutton in series).
-RLE2 = Locking magnet (on truck). Mechanically inhibits circuit-breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
-SFC = Pushbutton or contact for closing circuit-breaker.
-SFO = Pushbutton or contact for opening circuit-breaker.
-TB7 = Rectifier for release -MBO3.
-XDB = Terminal box of circuit-breaker circuits.
-XDB10, ... , 27 = Connectors of applications.
-XDB28 = Connector of applications.

Description of the figures

Fig. 1 = Circuit of motor for loading closing springs (see note C).
Fig. 2 = Shunt closing release (anti-pumping is achieved mechanically), (see note D).
Fig. 3 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (If -RL1 is required, provide this figure when fig. 31 or 32 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 4 = Locking magnet. Mechanically inhibits circuit-breaker closing if de-energized. (If -RL1 is required, provide this figure when fig.33 or 34 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 5 = Instantaneous undervoltage release (see note B).
Fig. 6 = Circuit of third opening release with continuous control of winding (see note D).
Fig. 7 = Circuit of first opening release with continuous control of winding (see note D).

ВЯРНО С ОРИГИНАЛА

5. Electric circuit diagram

Fig. 8 = Locking magnet (on truck). Mechanically inhibits circuit-breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).

Fig. 9 = Circuit of second opening release with continuous control of winding (see note D).

Fig. 10 = Opening solenoid for release outside circuit-breaker.

Fig. 11 = Opening solenoid for release outside circuit-breaker with AC supply.

Fig. 26 = Electrical signalling of closing springs loaded and discharged.

Fig. 30 = Auxiliary let-through contact of circuit-breaker with momentary closing during circuit-breaker opening.

Fig. 31, ... , 34 = Available auxiliary contacts of circuit-breaker (see note E).

Fig. 51 = Contacts for electrical signalling of circuit-breaker in racked-in and isolated positions located on circuit-breaker truck (obligatory when fig.31 or 32 are required).

Fig. 52 = Contacts for electrical signalling of circuit-breaker in racked-in and isolated positions located on circuit-breaker truck (supplied on request when fig.33 to 34 are required).

Fig. 60 = Contact for electrical signalling of undervoltage release de-energized.

Incompatibility

The circuits indicated in the following figures cannot be supplied at the same time in the same circuit-breaker:

3-4	3-33-34	4-31-32	5-6	10-11
31-32-33-34	31-32-52	33-34-51	51-52	

Notes

A) The circuit-breaker is equipped solely with the applications specified in the order confirmation. Consult this catalogue for information about how to make out an order.

B) The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit-breaker or from an independent source.
Circuit-breaker closing is only allowed when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit-breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the under-voltage release's enabling instant and energizing of the shunt closing release.
Incompatible with -MBO4.

C) Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, springs must be loaded by hand before auxiliary circuit is powered.

D) The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases.
-MBO4 incompatible with -MBU.

E) When fig. 6 is required, contact -BGB3 (41-42) of fig. 32-34 is not available.
When fig. 9 is required, contact -BGB1 (43-44) of fig. 31-32-33-34 is not available.
When fig. 10 or 11 are required, contact -BGB3 (31-32) of fig. 32 and 34 is not available.
When fig. 30 is required, contact -BGB3 (53-54) of fig. 32 and 34 is not available.

F) The contacts for electrical signalling of circuit-breaker in racked-in and isolated positions (-BGT1 and -BGT2) shown in fig. 51-52 are located on circuit-breaker truck (moving part).

G) Fig. 3 is supplied when fig. 31 or 32 are required. Fig. 4 is supplied when fig. 33 or 34 are required (in this case, it is obligatory for -BGT3 to be supplied).

H) Fig. 10 is only available for VD4 up to 31.5 kA. Fig. 11 is only available for VD4 up to 31.5 kA.

I) The energizing voltage must be the same for both signals.

ВАРНЭ С ОРИГИНАЛА

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ВЯРНО С ОРИГИНАЛА

Power and productivity for a better world™

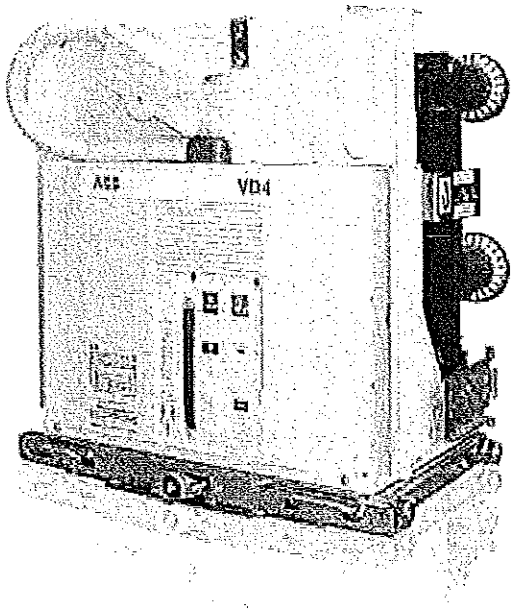
Приложение 1.1 помощен документ_MA_VD4-36kV-50KA(EN)Y_647654-1403

ВЯРНО С ОРИГИНАЛА

Medium voltage products

Installation and service instructions
12 ... 36 kV - 630 ... 3150 A - 16 ... 50 kA

Index



ВЯРНО С ОРИГИНАЛА

Power and productivity
for a better world™

For your safety!

- Make sure that the installation room (spaces, divisions and ambient) is suitable for the electrical apparatus.
- Check that all the installation, putting into service and maintenance operations are carried out by qualified personnel with suitable knowledge of the apparatus.
- Make sure that the standard and legal prescriptions are complied with during installation, putting into service and maintenance, so that installations according to the rules of good working practice and safety in the work place are constructed.
- Strictly follow the information given in this instruction manual.
- Check that the rated performance of the apparatus is not exceeded during service.
- Check that the personnel operating the apparatus have this instruction manual to hand as well as the necessary information for correct intervention.
- Pay special attention to the danger notes indicated in the manual by the following symbol:

Responsible behaviour safeguards your own and others' safety!

For any requests, please contact the ABB Assistance Service.

ВЯРНО С ОРИГИНАЛА

I. Introduction

This publication contains the information needed to install medium voltage VD4 circuit-breakers and put them into service.
For correct use of the product, please read it carefully.
Like all the apparatus we manufacture, the VD4 circuit-breakers are designed for different installation configurations. However, this apparatus allows further technical-construction modifications (at the customer's request) to adapt to special installation requirements.
Consequently, the information given below may sometimes not contain instructions concerning special configurations. Apart from this manual, it is therefore always necessary to consult the latest technical documentation (electric circuit and wiring diagrams, assembly and installation drawings, any protection coordination studies, etc.), especially regarding any variants requested in relation to the standardised configurations.
Only use original spare parts for maintenance operations.
For further information, please also see the technical catalogue of the circuit-breaker and the spare parts catalogue.

⚠ **All the installation, putting into service, running and maintenance operations must be carried out by skilled personnel with in-depth knowledge of the apparatus.**

II. Environmental protection programme

The VD4 circuit-breakers are manufactured in accordance with the ISO 14000 Standards (Guidelines for environmental management).
The production processes are carried out in compliance with the Standards for environmental protection in terms of reduction in energy consumption as well as in raw materials and production of waste materials. All this is thanks to the medium voltage apparatus manufacturing facility environmental management system.

ВЯРНО С ОРИГИНАЛА

1. Packing and transport

The circuit-breaker is shipped in special packing, in the open position and with the spring discharged.
Each piece of apparatus is protected by a plastic cover to prevent any infiltration of water during the loading and unloading stages and to keep the dust off during storage.

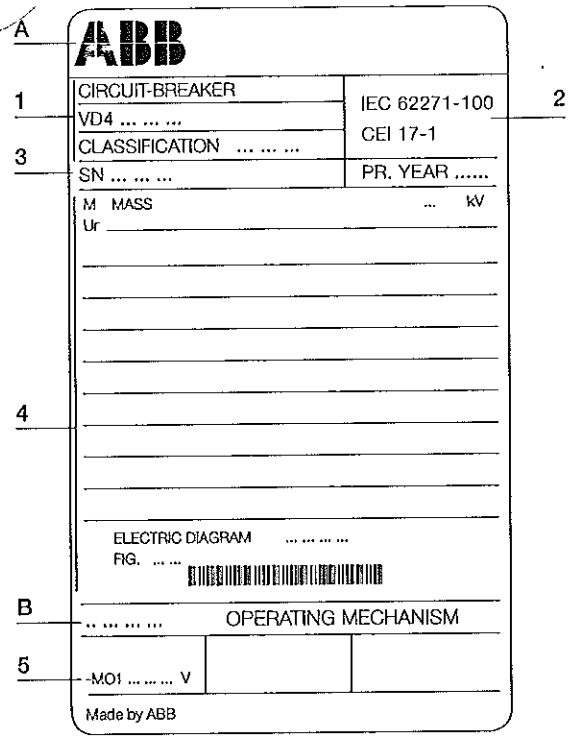
ВЫПИСЬ С ОРИГИНАЛА

2. Checking on receipt

⚠ **Before carrying out any operation, always make sure that the operating mechanism spring is discharged and that the apparatus is in the open position.**

On receipt, check the state of the apparatus, integrity of the packing and correspondence with the nameplate data (see fig. 1) with what is specified in the order confirmation and in the accompanying shipping note.
Also make sure that all the materials described in the shipping note are included in the supply.
Should any damage or irregularity be noted in the supply on unpacking, notify ABB (directly or through the agent or supplier) as soon as possible and in any case within five days of receipt.
The apparatus is only supplied with the accessories specified at the time of ordering and validated in the order confirmation sent by ABB.
The accompanying documents inserted in the shipping packing are:
- instruction manual (this document)
- test certification
- identification label
- copy of the shipping documents
- electric wiring diagram.

Other documents which are sent prior to shipment of the apparatus are:
- order confirmation
- original shipping advice note
- any drawings or documents referring to special configurations/conditions.



Caption
A Circuit-breaker rating plate
B Operating mechanism rating plate
1 Type of apparatus
2 Symbols of compliance with Standards
3 Serial number
4 Circuit-breaker characteristics
5 Characteristics of the operating mechanism auxiliaries

Fig. 1

ВЕРНО С ОРИГИНАЛА

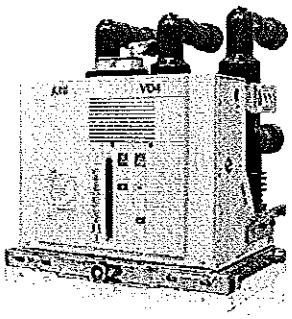
3. Storage

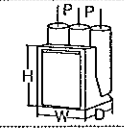
When a period of storage is foreseen, our workshops can (on request) provide suitable packing for the specified storage conditions.
On receipt the apparatus must be carefully unpacked and checked as described in Checking on receipt (chap. 2).
If immediate installation is not possible, the packing must be replaced, using the original material supplied.
Insert packets of special hygroscopic substances inside the packing, with at least one standard packet for piece of apparatus.
Should the original packing not be available and immediate installation is not possible, store in a covered, well-ventilated, dry, dust-free, non-corrosive ambient, away from any easily flammable materials and at a temperature between – 5 °C and + 45 °C.
In any case, avoid any accidental impacts or positioning which stresses the structure of the apparatus.

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

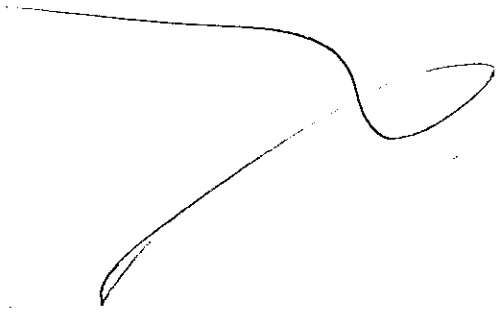
Withdrawable circuit-breakers for ZS8.4 type switchgear (12 - 17.5 - 24 kV)



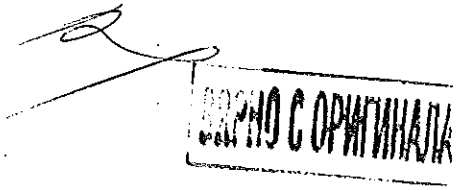
Circuit-breaker		VD4/Z8					
	Panel without partitions	•					
	Panel with partitions	–					
	Preussen Elektra - EON (2)	–					
	Width [mm]	650	650	650	650	800	800
	Depth [mm]	1000	1000	1000	1000	1200	1200
Standards	IEC 62271-100	•					
Rated voltage	Ur [kV]	12	12	17.5	17.5	24	24
Rated insulation voltage	Us [kV]	12	12	17.5	17.5	24	24
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28	28	38	38	50	50
Impulse withstand voltage	Up [kV]	75	75	95	95	125	125
Rated frequency	fr [Hz]	50-60					
Rated normal current (40 °C) (1)	Ir [A]	630	1250	630	1250	630	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	–	–	–	–	16	16
		20	20	20	20	20	20
		25	25	25	25	25	25
Rated short-time withstand current(3 s)	Ik [kA]	–	–	–	–	16	16
		20	20	20	20	20	20
		25	25	25	25	25	25
'aking capacity	Ip [kA]	–	–	–	–	40	40
		50	50	50	50	50	50
		63	63	63	63	63	63
Operation sequence	[O-0.3s-CO-15s-CO]	•					
Opening time	[ms]	33...60					
Arcing time	[ms]	10...15					
Total breaking time	[ms]	43...75					
Closing time	[ms]	30...60					
Maximum overall dimensions 	H [mm]	579	579	579	579	680	680
	W [mm]	503	503	503	503	653	653
	D [mm]	548	548	548	548	646	646
	Pole distance P [mm]	150	150	150	150	210	210
Weight	[kg]	116	116	116	116	140	140
Standardised table of dimensions	1VCD	000092	000137	000137	000137	000089	000138
Operating temperature	[°C]	– 5 ... + 40					
Tropicalisation	IEC 60068-2-30	•					
	IEC 60721-2-1	•					
Electromagnetic compatibility	IEC 62271-1	•					

(1) Rated current guaranteed with circuit-breaker installed in switchgear with 40 °C ambient temperature.
(2) Special type with device for charging the closing spring by means of a rotary handle outside the operating mechanism.

ВЕРНО С ОРИГИНАЛОМ



	VD4/ZT8						VD4/ZS8			
	–						–			
	•						–			
	–						•			
	650	650	650	650	800	800	650	650	800	800
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	•						•			
	12	12	17.5	17.5	24	24	12	12	24	24
	12	12	17.5	17.5	24	24	12	12	24	24
	28	28	38	38	50	50	28	28	50	50
	75	75	95	95	125	125	75	75	125	125
	50-60						50-60			
	630	1250	630	1250	630	1250	630	1250	630	1250
	–	–	–	–	16	16	–	–	16	16
	20	20	20	20	20	20	20	20	20	20
	25	25	25	25	25	25	25	25	25	25
	–	–	–	–	16	16	–	–	16	16
	20	20	20	20	20	20	20	20	20	20
	25	25	25	25	25	25	25	25	25	25
	–	–	–	–	40	40	–	–	40	40
	50	50	50	50	50	50	50	50	50	50
	63	63	63	63	63	63	63	63	63	63
	•						•			
	33...60						33...60			
	10...15						10...15			
	43...75						43...75			
	30...60						30...60			
	579	579	579	579	680	680	579	579	680	680
	503	503	503	503	653	653	503	503	653	653
	638	638	638	638	646	646	638	638	646	646
	150	150	150	150	210	210	150	150	210	210
	116	116	116	116	140	140	116	116	140	140
	000093	000134	000134	000134	000090	000136	000091	000133	000088	000135
	– 5 ... + 40						– 5 ... + 40			
	•						•			
	•						•			
	•						•			



2. Selection and ordering
Withdrawable circuit-breakers

VD4/ZS8 - VD4/ZT8 - VD4/Z8 withdrawable circuit-breaker for ZS8.4 switchgear

Ur	Isc	Rated uninterrupted current (40°C) [A]						Circuit-breaker type
		Panel without partition		Panel with partition		Special panel EON		
		W = 650	W = 800	W = 650	W = 800	W = 650	W = 800	
kV	kA	P = 150	P = 210	P = 150	P = 210	P = 150	P = 210	
		u/l = 205	u/l = 310	u/l = 205	u/l = 310	u/l = 205	u/l = 310	
		ø = 35	ø = 35	ø = 35	ø = 35	ø = 35	ø = 35	
12	20	630						VD4/Z8 12.06.20 p150
	25	630						VD4/Z8 12.06.25 p150
	20	1250						VD4/Z8 12.12.20 p150
	25	1250						VD4/Z8 12.12.25 p150
	20			630				VD4/ZT8 12.06.20 p150
	25			630				VD4/ZT8 12.06.25 p150
	20			1250				VD4/ZT8 12.12.20 p150
	25			1250				VD4/ZT8 12.12.25 p150
	20					630		VD4/ZS8 12.06.20 p150
	25					630		VD4/ZS8 12.06.25 p150
	20					1250		VD4/ZS8 12.12.20 p150
	25					1250		VD4/ZS8 12.12.25 p150
17.5	20	630						VD4/Z8 17.06.20 p150
	25	630						VD4/Z8 17.06.25 p150
	20	1250						VD4/Z8 17.12.20 p150
	25	1250						VD4/Z8 17.12.25 p150
	20			630				VD4/ZT8 17.06.20 p150
	25			630				VD4/ZT8 17.06.25 p150
	20			1250				VD4/ZT8 17.12.20 p150
	25			1250				VD4/ZT8 17.12.25 p150
24	16		630					VD4/Z8 24.06.16 p210
	20		630					VD4/Z8 24.06.20 p210
	25		630					VD4/Z8 24.06.25 p210
	16		1250					VD4/Z8 24.12.16 p210
	20		1250					VD4/Z8 24.12.20 p210
	25		1250					VD4/Z8 24.12.25 p210
	16				630			VD4/ZT8 24.06.16 p210
	20				630			VD4/ZT8 24.06.20 p210
	25				630			VD4/ZT8 24.06.25 p210
	16				1250			VD4/ZT8 24.12.16 p210
	20				1250			VD4/ZT8 24.12.20 p210
	25				1250			VD4/ZT8 24.12.25 p210
	16						630	VD4/ZS8 24.06.16 p210
	20						630	VD4/ZS8 24.06.20 p210
	25						630	VD4/ZS8 24.06.25 p210
	16						1250	VD4/ZS8 24.12.16 p210
	20						1250	VD4/ZS8 24.12.20 p210
	25						1250	VD4/ZS8 24.12.25 p210

W = Switchboard width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
Ø = Diameter of the isolating contact.

КОПИЯ С ОРИГИНАЛА

Standard fittings of withdrawable circuit-breakers for ZS8.4 switchgear

The basic versions of the withdrawable circuit-breakers are three-pole and fitted with:

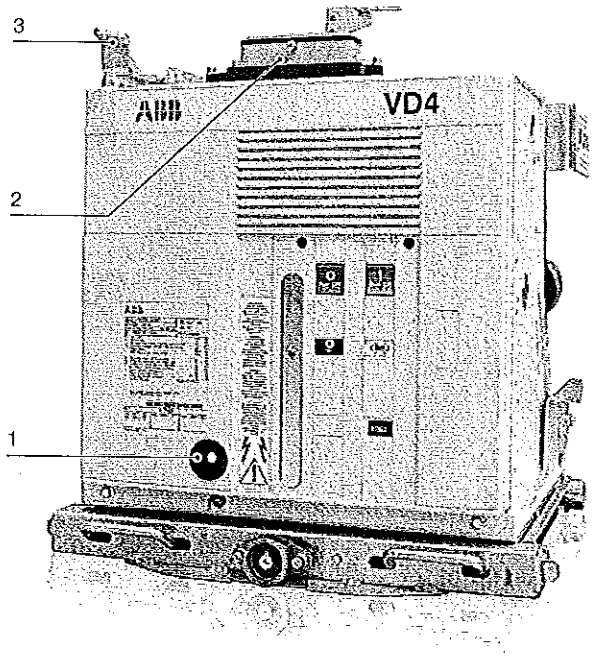
- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/ discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten circuit-breaker open/closed auxiliary contacts
  Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever built into operating mechanism for linear loading of closing spring for VD4/Z8 and VD4/ZT8, external with crank operation for VD4/ZS8
- racking in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)

VD4/ZS8

- device for closing spring charging, with the door closed, by means of a removable rotary crank handle outside the operating mechanism and the switchgear
- Harting 64-pin socket with mechanical interlock which prevents traverse of the circuit-breaker when the plug is not inserted in the socket
- interlock with the door which prevents the spring charging lever when the circuit-breaker is closed
- interlock with the door and Harting 64 pin socket which prevents door closing when the plug is not inserted in the socket.

VD4/Z8 - VD4/ZT8

- Harting 64-pin socket with mechanical interlock which prevents traverse of the circuit-breaker when the plug is not inserted in the socket.

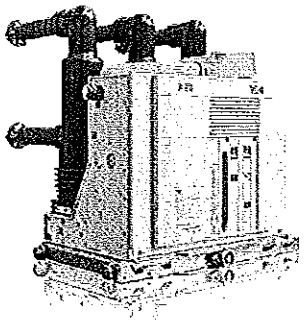


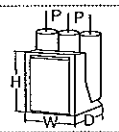
Caption
1) Device with crank handle for loading closing spring (only version VD4/ZS8)
2) Harting 64 plus socket with mechanical interlock which prevents traverse when the socket is not inserted
3) Interlock that prevents door from closing if plug is not in socket (only version VD4/ZS8)

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

Withdrawable circuit-breakers for UniSwitch switchgear (CBW type unit) and UniMix switchgear (P1/E type unit) (24 kV)



Circuit-breaker		VD4/US 24 [3]		VD4/US 24 [4]	
UniSwitch (unit CBW type)		•	•	–	–
UniMix (unit P1/E type)		–	–	•	•
Standards	IEC 62271-100	•	•	•	•
Rated voltage	Ur [kV]	24	24	24	24
Rated insulation voltage	Us [kV]	24	24	24	24
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50	50	50	50
Impulse withstand voltage	Up [kV]	125	125	125	125
Rated frequency	fr [Hz]	50-60	50-60	50-60	50-60
Rated normal current (40 °C) [1]	Ir [A]	630	1250	630	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	16 (20) [5]	16 (25) [5]	16	16
		20 (25) [5]	20 (25) [5]	20	20
		–	–	25	25
Rated short-time withstand current (3 s) [2]	Ik [kA]	16 (20) [5]	16 (25) [5]	16	16
		20 (25) [5]	20 (25) [5]	20	20
		–	–	25	25
Making capacity	Ip [kA]	40 (50) [5]	40 (50) [5]	40	40
		50 (63) [5]	50 (63) [5]	50	50
		–	–	63	63
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•
pening time	[ms]	33 ... 60	33 ... 60	33 ... 60	33 ... 60
Arcing time	[ms]	10 ... 15	10 ... 15	10 ... 15	10 ... 15
Total breaking time	[ms]	43 ... 75	43 ... 75	43 ... 75	43 ... 75
Closing time	[ms]	30 ... 60	30 ... 60	30 ... 60	30 ... 60
Maximum overall dimensions 	H [mm]	680	680	680	680
	W [mm]	653	653	653	653
	D [mm]	742	742	742	742
	Pole distance P [mm]	210	210	210	210
Weight	[kg]	125	125	125	125
Standardised table of dimensions	1VCD	000047	000047	000047	000047
Operating temperature	[°C]	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40
Tropicalization	IEC: 60068-2-30, 60721-2-1	•	•	•	•
Electromagnetic compatibility	IEC 62271	•	•	•	•

(1) Rated current guaranteed with withdrawable circuit-breaker installed in switchgear with 40 °C ambient temperature
(2) The value and duration of the rated short-time withstand current depends on the switchgear. See the specific catalogues of the UniSwitch and UniMix switchgear
(3) The top shutter activation wheels of the UniSwitch switchgear (CBW unit) are mounted and adjusted by the manufacturer of the UniSwitch switchgear
(4) The top shutter activation wheels of the UniMix switchgear (P1/E unit) are available on request
(5) The values in brackets refer to the 12 kV rated voltage.

ВЯРНО С ОРИГИНАЛА

Withdrawable c.-breaker for UniSwitch switchgear (CBW type unit) and UniMix switchgear (P1/E type unit)

Ur	Isc	Rated uninterrupted current (40 °C) [A]		
		UniSwitch CBW	UniMix P1/E	
kV	kA	P=210	P=210	Circuit-breaker type
		u/l=310	u/l=310	
		ø=35	ø=79	
24	16	630 (1)	630	VD4/US 24.06.16 p210
	20	630 (1)	630	VD4/US 24.06.20 p210
	25	–	630	VD4/US 24.06.25 p210
	16	1250 (1)	1250	VD4/US 24.12.16 p210
	20	1250 (1)	1250	VD4/US 24.12.20 p210
	25	–	1250	VD4/US 24.12.25 p210

(1) Isc 25 kA at 12 kV.
P = Horizontal centre distance between poles.
u/l = Distance between top and bottom terminal.
Ø = Diameter of the isolating contacts.

Standard fittings of withdrawable circuit-breakers for UniSwitch and UniMix switchgear

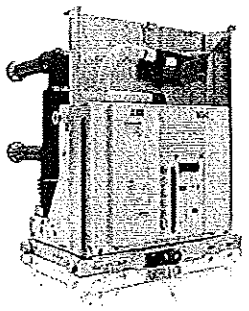
The basic versions of the withdrawable circuit-breakers are three-pole and fitted with:

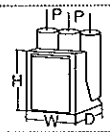
- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten circuit-breaker open/closed auxiliary contacts
  Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever built into operating mechanism for linear loading of closing spring
- isolating contacts
- cord with connector (plug only) for auxiliary circuits, with striker pin which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
- locking electromagnet in the truck. This prevents the circuit-breaker being racked into the panel with the auxiliary circuits disconnected (plug not inserted in the socket).

ВЕРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

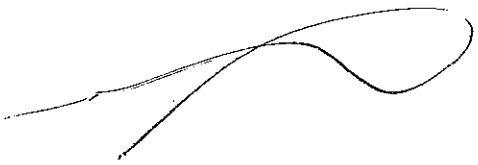
General characteristics of withdrawable circuit-breakers for UniSec switchgear (units WBC and WBS)



Circuit-breaker		VD4/SEC	VD4/P 12		VD4/P 17	
Standards	IEC 62271-100	•	•		•	
Rated voltage	Ur [kV]	24	12		17.5	
Rated insulation voltage	Us [kV]	24	12		17.5	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50	28		38	
Impulse withstand voltage	Up [kV]	125	75		95	
Rated frequency	fr [Hz]	50-60	50-60		50-60	
Rated normal current (40 °C) (1)	Ir [A]	630 - 1250	630	1250	630	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	16	16	16	16	16
		20	20	20	20	20
		25	25	25	25	25
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	16
		20	20	20	20	20
		25	25	25	25	25
Making capacity	Ip [kA]	40	40	40	40	40
		50	50	50	50	50
		63	63	63	63	63
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•
Opening time	[ms]	33 ... 60	33 ... 60			
Arcing time	[ms]	10 ... 15	10 ... 15			
Total breaking time	[ms]	43 ... 75	43 ... 75			
Closing time	[ms]	30 ... 60	30 ... 60			
Maximum overall dimensions 	H [mm]	743	628	628	632	632
	W [mm]	653	503	503	503	503
	D [mm]	742	662	662	664	664
	Pole distance P [mm]	210	150	150	150	150
Weight	[kg]	133	116	116	116	116
Standardised table of dimensions	1VCD	000190	7412 (2)	7412 (2)	7412 (2)	7412 (2)
Operating temperature	[°C]	- 5 ... + 40				
Tropicalization	IEC: 60068-2-30, 60721-2-1	•	•			
Electromagnetic compatibility	IEC 62271	•	•			

(1) Rated current guaranteed with withdrawable circuit-breaker installed in switchgear with 40 °C ambient temperature.
(2) Poles in polyamide.

ВЯРНО С ОРИГИНАЛА



Withdrawable circuit-breaker for UniSec switchgear					Circuit-breaker type
Ur	Isc	Rated uninterrupted current (40 °C) [A]			
kV	kA	P=150 u/l=205 ø=35	P=150 u/l=205 ø=35	P=210 u/l=310 ø=79	
12	16	630			VD4/P 12.06.16 p150
	20	630			VD4/P 12.06.20 p150
	25	630			VD4/P 12.06.25 p150
	16	1250			VD4/P 12.12.16 p150
	20	1250			VD4/P 12.12.20 p150
	25	1250			VD4/P 12.12.25 p150
17	16		630		VD4/P 17.06.16 p150
	20		630		VD4/P 17.06.20 p150
	25		630		VD4/P 17.06.25 p150
	16		1250		VD4/P 17.12.16 p150
	20		1250		VD4/P 17.12.20 p150
	25		1250		VD4/P 17.12.25 p150
24	16			630	VD4/SEC 24.06.16 p210
	20			630	VD4/SEC 24.06.20 p210
	25			630	VD4/SEC 24.06.25 p210
	16			1250	VD4/SEC 24.12.16 p210
	20			1250	VD4/SEC 24.12.20 p210
	25			1250	VD4/SEC 24.12.25 p210

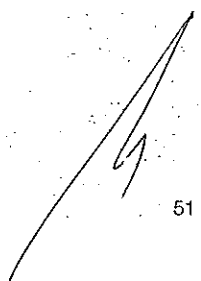
P = Horizontal centre distance between poles.
u/l = Distance between top and bottom terminal.
Ø = Diameter of the isolating contacts.

Standard fittings of withdrawable circuit-breakers for UniSec

The basic versions of the withdrawable circuit-breakers are three-pole and fitted with:

- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten circuit-breaker open/closed auxiliary contacts
  Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever built into operating mechanism for linear loading of closing spring
- isolating contacts
- cord with connector (plug only) for auxiliary circuits, with striker pin which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)

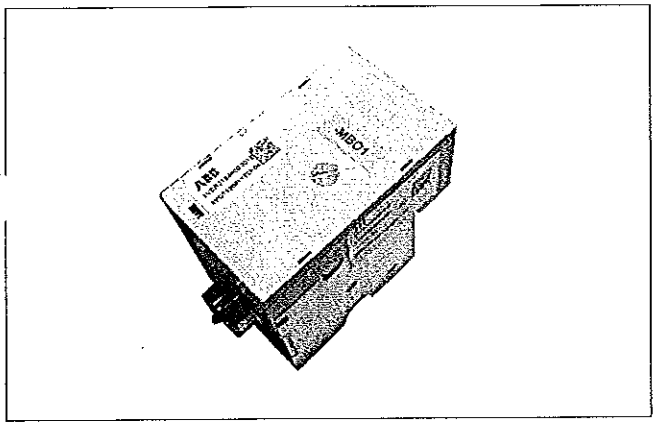
ВЯРНО С ОРИГИНАЛА



2. Selection and ordering
Optional accessories

The accessories identified with the same number are alternative to each other.

1 Shunt opening release (-MBO1)

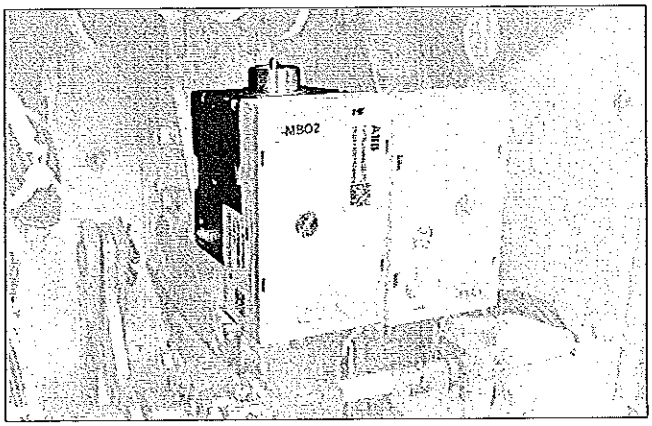


Allows opening command of apparatus to be enabled by remote control.
This release is suitable for both instantaneous and permanent duty. However, an auxiliary contact -BGB1 de-energizes it after circuit-breaker has opened. In the case of instantaneous service, the current impulse must last at least 100 ms.
This release can be controlled by the following devices: coil continuity control (CCC), opening circuit supervision (TCS)(*) or the ABB STU functionality control device (see accessory 21, supplied on request).

Characteristics	
Un	24-30-48-60-110...132-220...250 V DC
Un	48-60-110...127-220...250 V AC 50-60 Hz
Operating limits	65 ... 120% Un
Inrush power (Ps)	60...100 W / VA
Potenza di mantenimento (Pc)	1.5 W
Electronics self-consumption (no coil supplied); value independent of voltage applied	1.5 mA
Opening time	33...60 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

(*) The minimum current that the relay with TCS function (used for monitoring coil continuity) detects as a condition denoting that the trip circuit is operating correctly (specified for each relay in the relative manual), must be sensibly higher than the current consumption of the actual coil (~1.5 mA).
If this fails to occur, always add, in parallel to the TCS, a circuit able to absorb sufficient current to compensate the gap while preventing the total current in the TCS circuit from rising above the maximum threshold (Itcs < 10 mA for High Voltage coils - from 110V to 250V, and Itcs < 50 mA for Low Voltage coils from 24 V to 60 V).
A simple resistor can be sized for the purpose, depending on the parameters of the TCS and the auxiliary voltage range used.

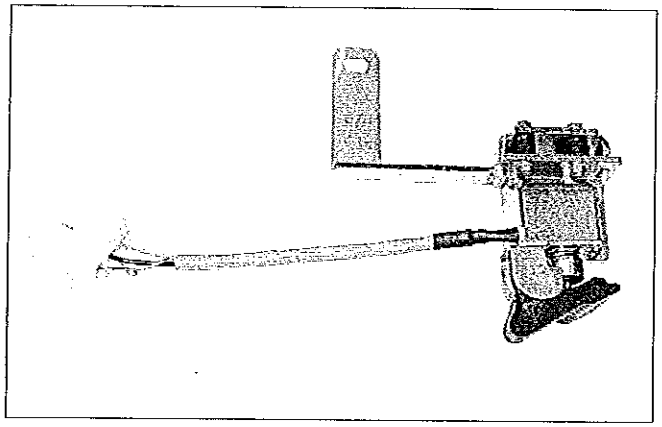
2 Additional shunt opening release (-MBO2)



Similarly to shunt opening release -MBO1, this allows the opening command of the apparatus to be transmitted by remote control. It can be powered by the same circuit as main shunt opening release -MBO1 or by a circuit that is completely separate from release -MBO1.
This release is suitable for both instantaneous and permanent duty. However, an auxiliary contact -BGB1 de-energizes it after the circuit-breaker has opened.
To guarantee the release action, the current impulse must last at least 100 ms.
Continuity functionality can be checked with a continuity control device (CCC), opening circuit supervision (TCS)(*) or the STU functionality control device (see accessory 21, supplied on request).
-MBO2 has the same electrical and operating characteristics as release -MBO1.

ВЯРНО С ОРИГИНАЛА

3 Opening solenoid (-MO3)



The opening solenoid (-MO3) is a special release with demagnetisation to be combined with an overcurrent protection relay of the self-supplied type.
It is located in the operating mechanism (in the left side piece) and is not alternative to the additional shunt opening release (-MO2).
It is not available for 40 and 50 kA circuit-breakers.
Should the application of this accessory be required, specify the request at the time of order since subsequent application by the customer is not possible.

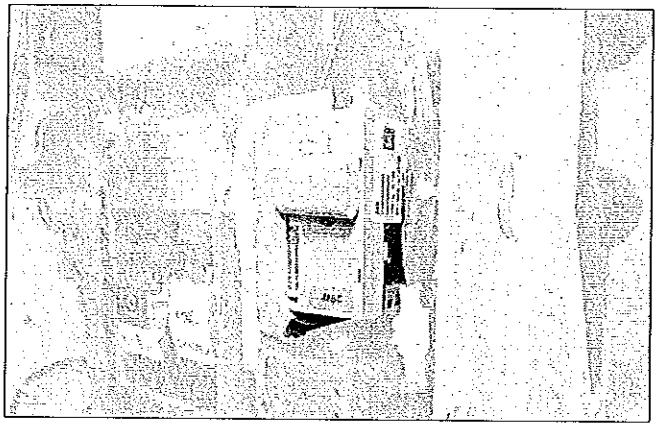
Note: for combination with the protection relays, please ask for the document: Data sheet 1VCD600854.

The opening solenoid (-MBO3) is available in two versions:
- For DC (release by discharging energy stored in protection relay against overcurrent of the self-supplied type)
- For AC (release by means of the energy supplied by an adder transformer on the secondaries of the protection current transformers (the TA is at customer's charge)

(*) The minimum current that the relay with TCS function (used for monitoring coil continuity) detects as a condition denoting that the trip circuit is operating correctly (specified for each relay in the relative manual), must be sensibly higher than the current consumption of the actual coil (~1.5 mA).
If this fails to occur, always add, in parallel to the TCS, a circuit able to absorb sufficient current to compensate the gap while preventing the total current in the TCS circuit from rising above the maximum threshold (Itcs < 10 mA for High Voltage coils - from 110V to 250V, and Itcs < 50 mA for Low Voltage coils from 24 V to 60 V).
A simple resistor can be sized for the purpose, depending on the parameters of the TCS and the auxiliary voltage range used.

ВЯРНО С ОРИГИНАЛА

4 Shunt closing release (-MC)

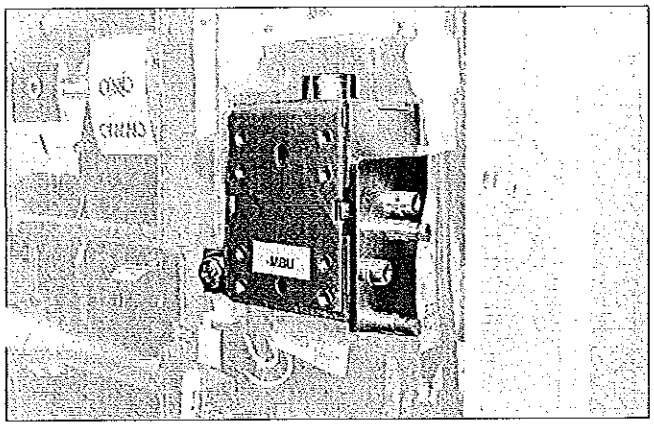


Allows closing command of apparatus to be transmitted by remote control.
This release is suitable for both instantaneous and permanent duty. An auxiliary contact that de-energizes it after the circuit-breaker has closed is not envisaged.
The permanently supplied release provides the electrical anti-pumping function with both electrical opening and re-closing commands maintained. To guarantee the closing action, the current impulse must last at least 100 ms.
If there is the same supply voltage for shunt closing release -MBC and under-voltage release -MBU and the circuit-breaker must close automatically when auxiliary voltage returns, there must be a delay of at least 50 ms between under-voltage release energizing and energizing of the shunt closing release to allow the closing operation to take place.Continuity functionality can be checked with a continuity control device (CCC), opening circuit supervision (TCS)(*) or the STU functionality control device (see accessory 21, supplied on request).

Characteristics	
Un	24-30-48-60-110...132-220...250 V DC
Un	48-60-110...127-220...250 V AC 50-60 Hz
Operating limits	65 ... 120% Un
Inrush power (Ps)	60...100 W / VA
Continuous power consumption (Pc)	1.5 W
Electronics self-consumption (no coil supplied; value independent of voltage applied	1.5 mA
Opening time	33...60 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

2. Selection and ordering
Optional accessories

5 Undervoltage release (-MBU)



The undervoltage release opens the circuit-breaker when there is a sensible reduction or lack of the voltage that powers it. The circuit-breaker can only close when the release is energized (the closing lock is obtained mechanically).
It can be used for remote release (by means of a pushbutton of the normally closed type), for locking on automatic closing/ opening in the absence of voltage in the auxiliary circuits.
Supplied by means of the secondary output of a voltage transformer, it provides locking upon automatic closing/ opening in the absence of voltage in the Medium Voltage main circuit.
If there is the same supply voltage for shunt closing release -MBC and under-voltage release -MBU and the circuit-breaker must close automatically when auxiliary voltage returns, there must be a delay of at least 50 ms between under-voltage release energizing and energizing of the shunt closing release to allow the closing operation to take place.

The undervoltage release is available in the following versions:

5A Undervoltage release (with supply shunted from a transformer on the supply side of the circuit-breaker or from an auxiliary power supply, regardless of the state in which the circuit-breaker is to be found).

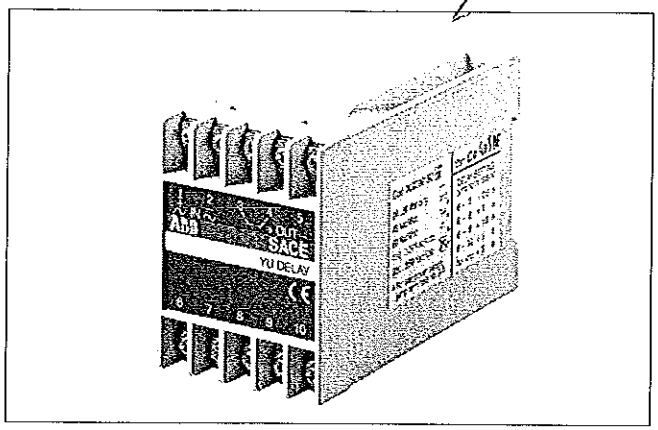
5B Undervoltage release with -KFT electronic time-lag device (0.5 - 1 - 1.5 - 2 - 3 s) (with power supply as indicated for 5A); this device is supplied with a 0.5 s setting (the adjustments are described in the Circuit diagrams chapter)

Characteristics	
Un	24-30-48-60-110...132-220...250 V DC
Un	48-60-110...127-220...250 V AC 50-60 Hz
Operating limits	– circuit-breaker opening: 35-70% Un
	– circuit-breaker closing: 85-110% Un
Inrush power (Ps)	150 W / VA
Continuous power consumption (Pc)	1.55 W
Electronics self-consumption (no coil supplied); value independent of voltage applied	1.5 mA
Opening time	60...80 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

Note
As an alternative to the undervoltage release, an additional shunt opening release (-MBO4) with the same electrical and operating specifications as shunt opening release (-MBO1) can be installed on request (only for circuit-breakers 12..17.5 kV up to 40 kA and 24 kV up to 31.5 kA).
Warning! Since installation of the additional shunt opening release (-MBO4) requires a special mounting plate for releases, ask for application (-MBO4) when ordering and not after delivery.

ВЕРНО С ОРИГИНАЛА

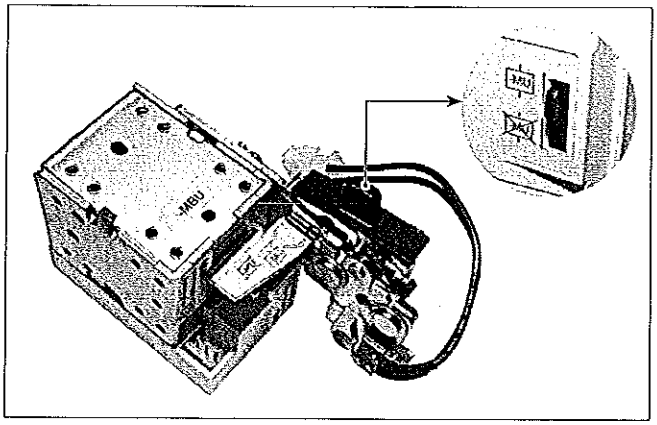
5a Electronic time delay device (-KFT)



The electronic time delay device must be mounted externally in relation to the circuit-breaker. It allows release trip delay with established and adjustable times.
The use of the undervoltage release is recommended in order to prevent trips when the power supply network of the release may be subject to cuts or voltage drops of short duration.
If it is not supplied, circuit-breaker closing is disabled.
The time delay device must be combined with an undervoltage release for d.c.
Rated voltage of the undervoltage release must be within the selected range of working of the time-delay device.

Characteristics of the time-delay device	
Un	24...30 - 48 - 60 - 110...127 - 220...250 V–
Un	48 - 60 - 110...127 - 220...240 - V~ 50/60 Hz
Adjustable opening time (release + time delay device): 0.5-1-1.5-2-3 sec	

6 Undervoltage release mechanical override

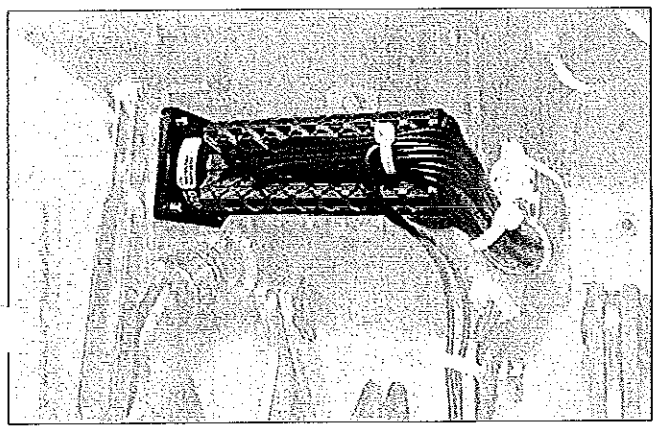


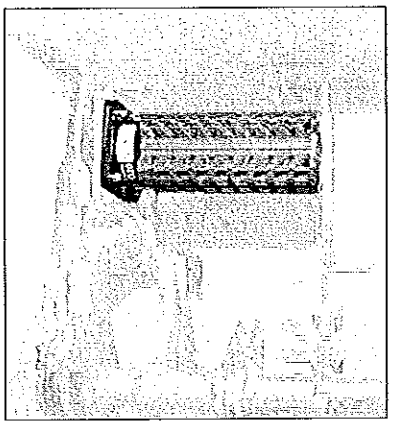
This is a mechanical device which allows the undervoltage release trip to be temporarily excluded.
It is always fitted with electrical signalling.
Should the application of this accessory be required, specify the request at the time of order since subsequent application by the customer is not possible.

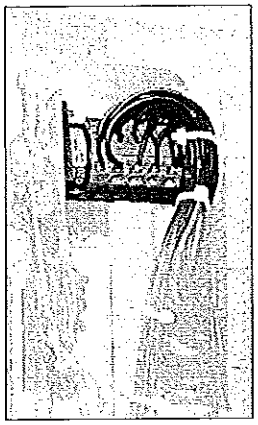
ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Optional accessories

7a Auxiliary contacts of the circuit-breaker (-BGB1) for 12 to 24 kV versions







Electrical signalling of circuit-breaker open/closed can be obtained with a group of 10, 16 or 20 auxiliary contacts for the fixed version and 10 or 16 auxiliary contacts for the withdrawable version. The standard equipment comprises 10 auxiliary contacts.

Note
The following are available using the standard group of ten auxiliary contacts and the maximum number of electrical accessories:
- for fixed circuit-breakers: three closing contacts "a" for signalling circuit-breaker open and five opening contacts "b" for signalling circuit-breaker closed;
- for withdrawable circuit-breakers: three closing contacts "a" for signalling circuit-breaker open and four opening contacts "b" for signalling circuit-breaker closed;

Circuit-breakers in the fixed version are available with two finishing accessories (to be specified when ordering):
- non-wired auxiliary contacts; wiring to the terminals of the contacts is at the customer's charge (photo below left; the terminal box to which the other electrical accessories are wired is at the top); ask for instructions 1VCD601204 (available in the main languages) which describe how to remove, wire auxiliary contacts more easily and fit auxiliary contacts unit back into its housing;
- auxiliary contacts already wired to the terminal box (see photo at top right)

Consult circuit diagrams 1VCD400151 for fixed circuit-breakers and 1VCD400155 for withdrawable circuit-breakers.

Note: The main shunt opening release and/or the additional shunt opening release use 1 and/or 2 closing contacts "a", thereby reducing the number of auxiliary contacts available. Always check the maximum number of contacts available with non-standard equipment.

The new diagrams are interchangeable with the existing ones, with the following exceptions:
- diagram 1VCD400151 (substitutes 1VCD400046 and 1VCD400099)
- fig. 34 on the previous diagrams is represented by fig. 31 + fig. 32 on the new diagram;
- fig. 33 and fig. 35 on the previous diagrams are not available with the new layout
- diagram 1VCD400155 (substitutes 1VCD400047)

ВЗЯТО С ОРИГИНАЛА

Auxiliary contacts –BGB1 conform to the following standards/ regulations/directives:

- IEC 62271-100
- IEEE C37.54
- EN 61373 cat.1 class B / impact and vibration test
- Germanish Loyd regulation / vibrations envisaged by the shipping registers
- UL 508
- EN 60947 (DC-21A DC-22A DC-23A AC-21A)
- RoHS Directive

General characteristics	
Insulation voltage to standard VDE 0110, Group C	660 V AC 800 V DC
Rated voltage	24 V ... 660 V
Test voltage	2 kV for 1 min
Maximum rated current	10 A - 50/60 Hz
Breaking capacity	Class 1 (IEC 62271-1)
Number of contacts	5
Groups of contacts	10 / 16 / 20
Contact travel	90°
Actuating force	0.66 Nm
Resistance	<6.5 mΩ
Storage temperature	–30 °C ... +120 °C
Operating temperature	–20 °C ... +70 °C (-30° ref. ANSI 37.09)
Contact overtemperature	10 K
Mechanical life	30,000 mechanical operations
Protection class	IP20
Cable section	1 mm²

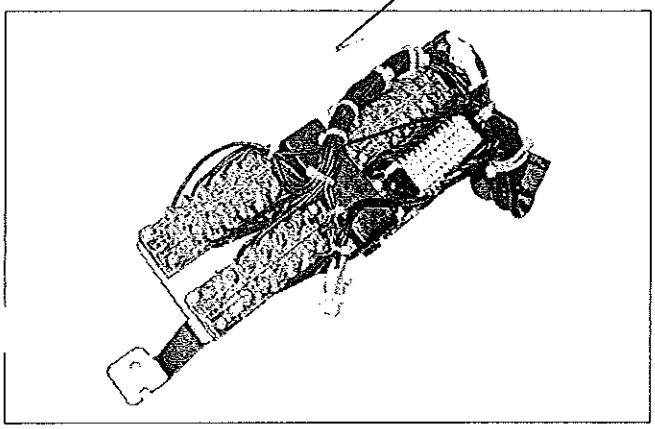
Electrical characteristics (according to IEC 60947)		
Rated current Un		Breaking capacity (10000 interruptions)
220 V AC	Cosφ = 0.70	20 A
220 V DC	Cosφ = 0.45	10 A
24 V DC	1 ms	12 A
	15 ms	9 A
	50 ms	6 A
60 V DC	1 ms	10 A
	15 ms	6 A
	50 ms	4,6 A
110 V DC	1 ms	7 A
	15 ms	4.5 A
	50 ms	3.5 A
220 V DC	1 ms	2 A
	15 ms	1.7 A
	50 ms	1.5 A
250 V DC	1 ms	2 A
	15 ms	1,4 A
	50 ms	1.2 A

Electrical characteristics (according to IEC 62271-100 class 1)	
Rated current Un	Breaking capacity
24 Vcc 20 ms	18,8 mA
60 Vcc 20 ms	7,4 mA
110 Vcc 20 ms	4,2 mA
250 Vcc 20 ms	1,8 mA

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Optional accessories

7b Circuit-breaker auxiliary contacts (-BGB1, -BGB2, -BGB3) for 36 kV version



General characteristics	
Insulation voltage to standard VDE 0110, Group C	660 V a.c. 800 V d.c.
Rated voltage	24 V ... 660 V a.c.
Test voltage	2 kV 50 Hz (for 1 min)
Rated overcurrent	10 A
Number of contacts	5
Contact run	6 mm ... 7 mm
Activation force	26 N
Resistance	3 mΩ
Storage temperature	–20 °C ... +120 °C
Operating temperature	–20 °C ... +70 °C
Contact overtemperature	20 K
Number of cycles	30.000
Unlimited breaking capacity if used with 10 A fuse in series	

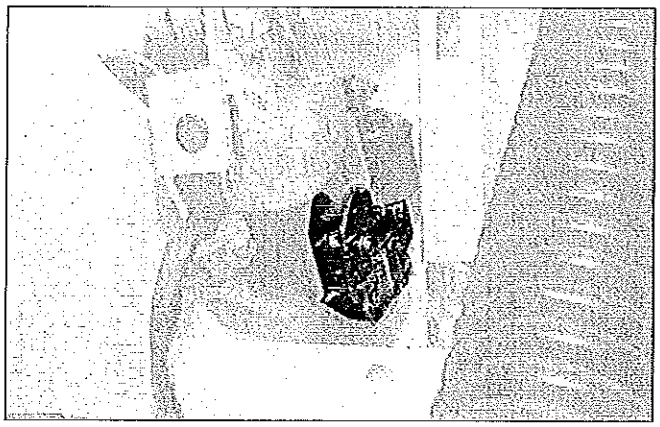
Electrical characteristics			
Un		Rated current	Breaking capacity
220 V a.c.	Cosφ = 0.7	2.5 A	25 A
380 V a.c.	Cosφ = 0.7	1.5 A	15 A
500 V a.c.	Cosφ = 0.7	1.5 A	15 A
660 V a.c.	Cosφ = 0.7	1.2 A	12 A
24 V d.c.	1 ms	10 A	12 A
	15 ms	10 A	12 A
	50 ms	8 A	10 A
	200 ms	6 A	7.7 A
60 V d.c.	1 ms	8 A	10 A
	15 ms	6 A	8 A
	50 ms	5 A	6 A
	200 ms	4 A	5.4 A
110 V d.c.	1 ms	6 A	8 A
	15 ms	4 A	5 A
	50 ms	2 A	4.6 A
	200 ms	1 A	2.2 A
220 V d.c.	1 ms	1.5 A	2 A
	15 ms	1 A	1.4 A
	50 ms	0.75 A	1.2 A
	200 ms	0.5 A	1 A

Electrical signalling of circuit-breaker open/closed can be provided with a set of 15 auxiliary contacts as an alternative to the 10 provided as standard.
Consult the following circuit diagrams for VD4 36 kV series with "7b" auxiliary contacts:
- for fixed circuit-breakers: 1VCD400236
- for withdrawable circuit-breakers: 1VCD400237

Note
With the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and five make contacts (signalling circuit-breaker closed) are available.
With the group of 15 auxiliary contacts, according to the electrical applications required, the following are available:
- for fixed circuit-breakers: thirteen auxiliary contacts, differently divided between break contacts and make contacts according to the figure selected of the electrical diagram;
- for withdrawable circuit-breakers, since the plug of the auxiliary circuits has a limited number of poles: five break contacts (signalling circuit-breaker open) and five make contacts (signalling circuit-breaker closed).

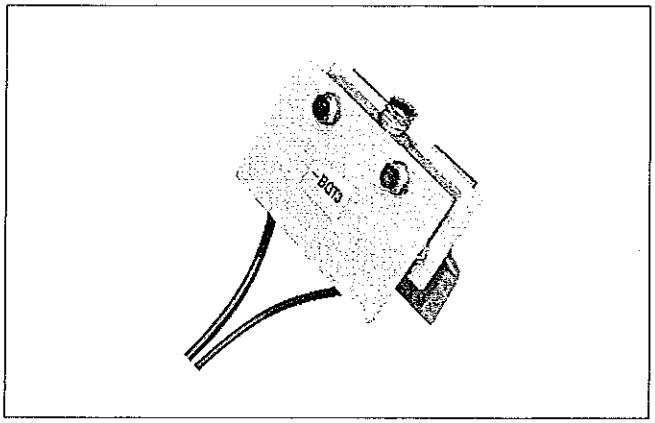
ВЯРНО С ОРИГИНАЛА

8 Transient contact (-BGB4)



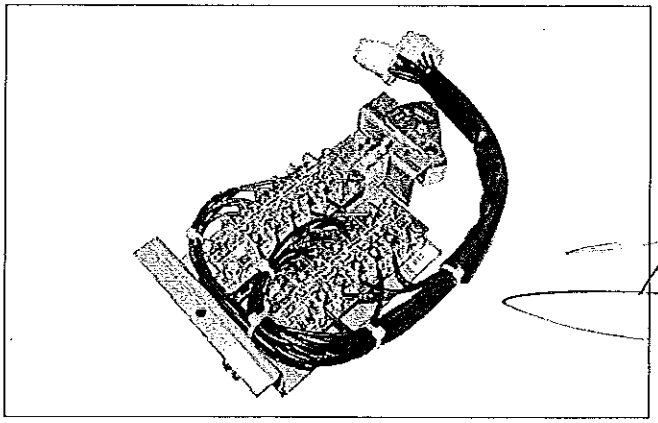
This contact closes momentarily (duration > 30 ms) on circuit-breaker opening controlled remotely with a shunt opening release.
The indication is not provided when opening is manual and local. In fact, a contact (-BGB11) is activated by the manual pushbutton and cuts off the transient contact closure (-BGB4).
The transient contact is activated directly from the main operating shaft when the indication is provided only on actual opening of the main circuit-breaker contacts.

9 Position contact (-BGT3)



This contact is used, together with the locking magnet in the operating mechanism **(-RLE1)** to prevent remote closing during traverse into the unit.
It is only supplied for the withdrawable version circuit-breakers for UniGear ZS1 switchgear and PowerCube modules.
It cannot be supplied when the transmitted contacts are requested in the truck **(-BGT1; -BGT2)**.

10 Transmitted contacts in the truck (-BGT1; -BGT2)

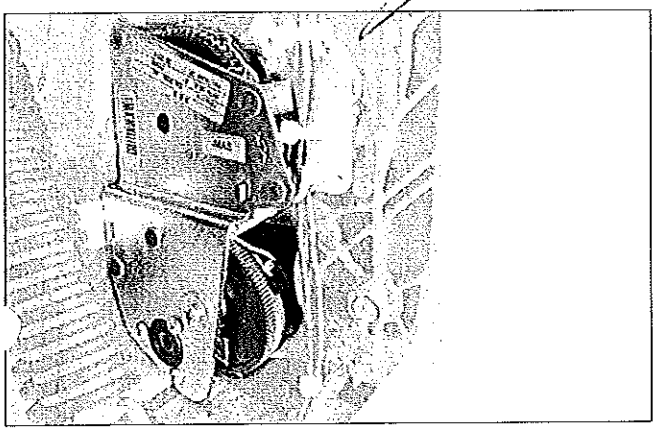


Transmitted contacts of the withdrawable circuit-breaker (installed in the circuit-breaker truck - only for VD4/P withdrawable circuit-breaker).
These contacts are either in addition or as an alternative to the position contacts (for signalling circuit-breaker racked out) located in the unit. They also carry out the function of the position contact **(-BGT3)**.
Contacts -BGT1 and BGT2 have the same general and electrical characteristics as auxiliary contacts "7b. -BGB1, -BGB2, -BGB3".

ВЕРНО С ОРИГИНАЛА

2. Selection and ordering
Optional accessories

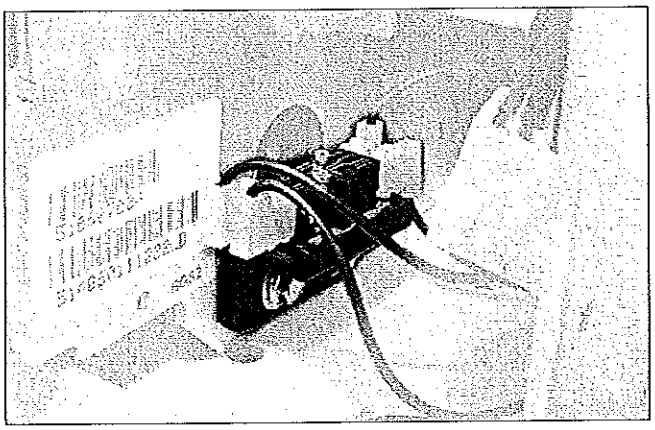
11 Motor operator (-MAS)



This carries out automatic charging of the circuit-breaker operating mechanism closing spring. After circuit-breaker closing, the geared motor immediately recharges the closing springs.
In the case of a power cut or during maintenance work, the closing spring can be charged manually in any case (by means of the special crank handle incorporated in the operating mechanism).

Characteristics		
Un	24...30 - 48...60 - 110...130 - 220...250 V–	
Un	100...130 - 220...250 V~ 50/60 Hz	
Operating limits	85 ... 110% Un	
ower on inrush (Ps)	≤ 40 kA	50 kA
	DC = 600 W; AC = 600 VA	DC = 900 W; AC = 900 VA
Rated power (Pn)	DC = 200 W; AC = 200 VA	DC = 350 W; AC = 350 VA
Charging time	0,2 s	0,2 s
Charging time	6-7 s	6-7 s
Insulating voltage	2000 V 50 Hz (for 1 min)	2000 V 50 Hz (for 1 min)

12 Contact for signalling closing spring charged/ discharged (-BGS2)



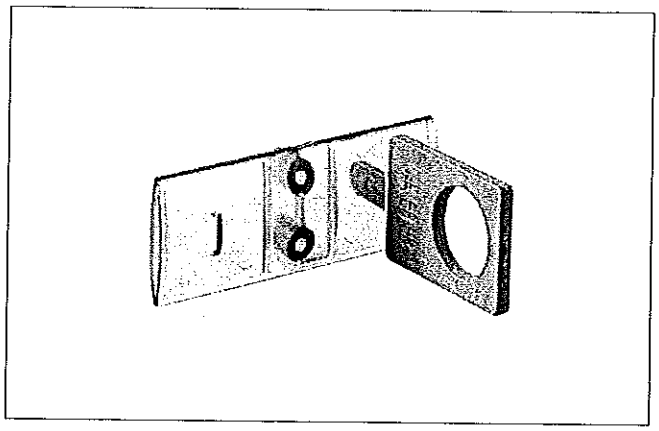
This consists of a microswitch which allows remote signalling of the state of the circuit-breaker operating mechanism closing pring.
The following signals are possible:
– contact open: signalling spring charged
– contact closed: signalling spring discharged.
The two signals must be used for circuits which have the same power supply voltage.

ВЯРНО С ОРИГИНАЛА

Protections and locks

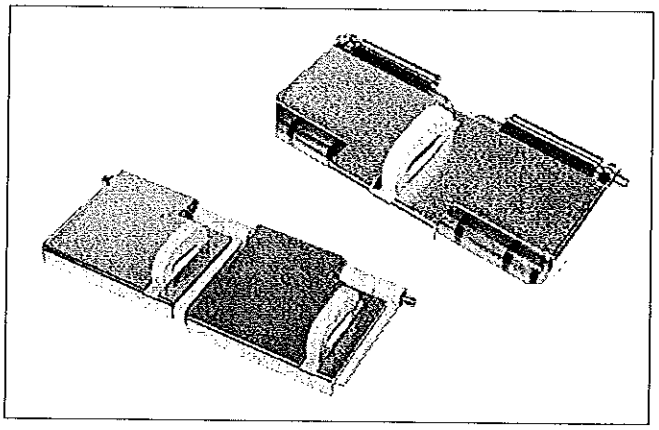
Various mechanical and electromechanical locking and protection devices are available.

13 Opening and closing pushbutton protection



The protection only allows the opening and closing pushbuttons to be operated using a special tool.

14 Opening and closing pushbutton padlock



The device allows the opening and closing pushbuttons to be locked using a maximum of three padlocks (not supplied): ø 4 mm. Also prevents closing using remote control.
This lock is available in two versions:

14A Possibility of padlocking both the pushbuttons without distinction

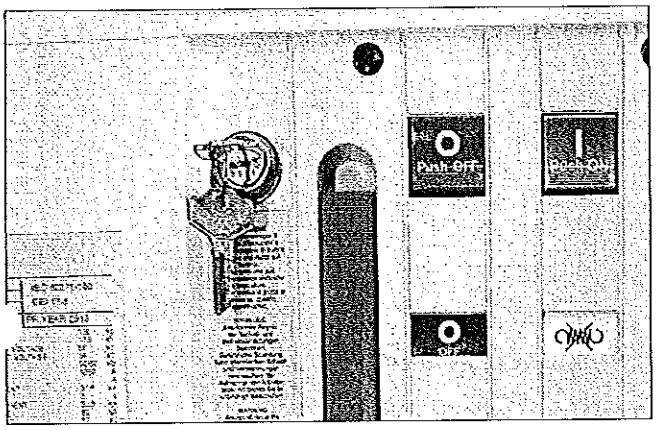
14B Separate padlocking of the opening and/or closing pushbutton.

N.B. Lock 14A prevents closure by remote control; lock 14B does not prevent closure by remote control.

ВЯРНО С ОРИГИНАЛА

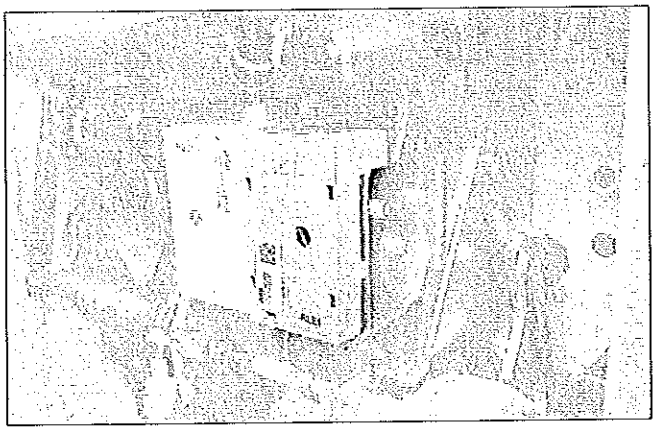
2. Selection and ordering
Optional accessories

15 Key lock in open position



The lock is activated by a special circular lock.
Different keys (for a single circuit-breaker) are available, or the same keys (for several circuit-breakers).
To activate the lock, keep the opening pushbutton pressed down, turn the key and remove it.
With the key removed, the opening pushbutton automatically remains in the pressed position preventing local manual closing and remote electrical closing.

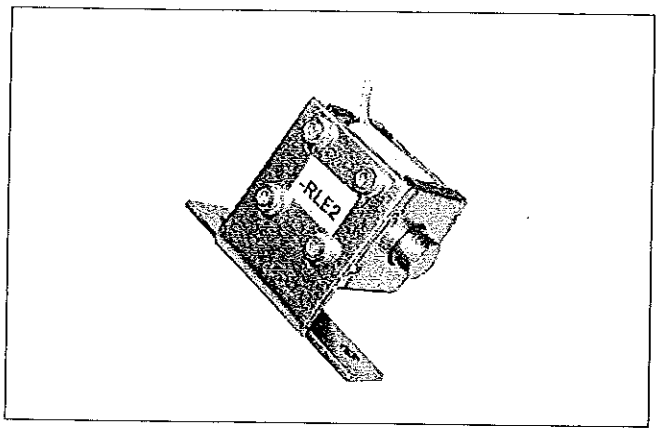
16 Locking magnet on the operating mechanism (-RLE1)



Only allows activation of the command with the electromagnet supplied.
The locking electromagnet in the operating mechanism has the same electrical characteristics as shunt closing release -MBC.

ВЯРНО С ОРИГИНАЛА

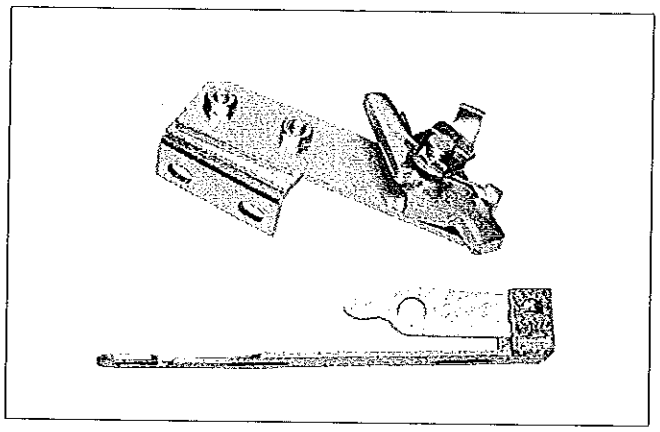
17 Locking magnet on the truck (-RLE2)



Compulsory accessory for the withdrawable versions for UniGear ZS1 switchgear and PowerCube modules, to prevent circuit-breaker racking into the switchgear with the auxiliary circuit plug disconnected.
The plug also makes the anti-insertion lock for a different rated current. Special striker pins do not allow insertion of the plug in the socket if the rated current of the circuit-breaker is lower than the rated current of the panel.
Note: a specific version for the circuit-breakers of ZS8.4 switchgear is available on request. This accessory is not available when the motor-operated truck is required.

Characteristics	
Un	24 - 30 - 48 - 60 - 110 - 125 - 127 - 132 - 220 - 240 V–
Un	24 - 30 - 48 - 60 - 110 - 125 - 127 - 220 - 230 ... 240 V~ 50/60 Hz
Operating limits	85 ... 110% Un
Nominal power (Pn)	DC 250 W; AC = 250 VA
Continuous power (Pc)	DC = 5 W; AC = 5 VA
Inrush duration	150 ms
Insulating voltage	2000 V 50 Hz (for 1 min)

18 Interlock for fixed circuit-breaker

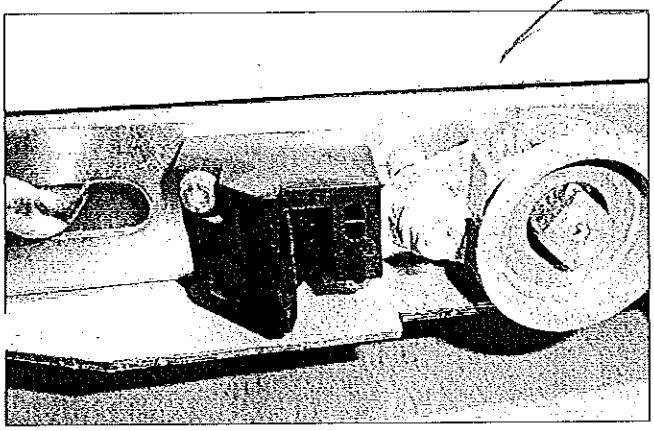


Device for fixed circuit-breakers which are converted into withdrawable ones by the customer. It allows a mechanical lock to be made, by the customer, which prevents racking-out/in with the circuit-breaker closed and prevents circuit-breaker closing during translation.
Note: The device must be requested when ordering since it must be assembled and tested in the factory.

ВЯРНО С ОРИГИНАЛА

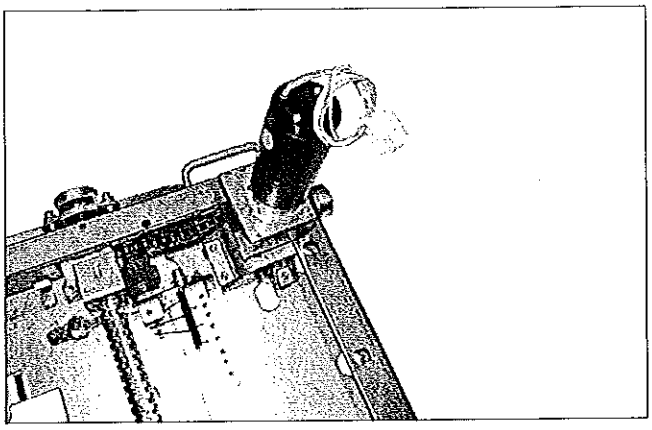
2. Selection and ordering
Optional accessories

19 Mechanical interlock with the door



This device prevents circuit-breaker racking-in when the switchgear door is open. It is only provided for circuit-breakers used in switchgear UniGear ZS1 and PowerCube modules, fitted with a special actuator on the door.

20 Motorised truck (-MAT)

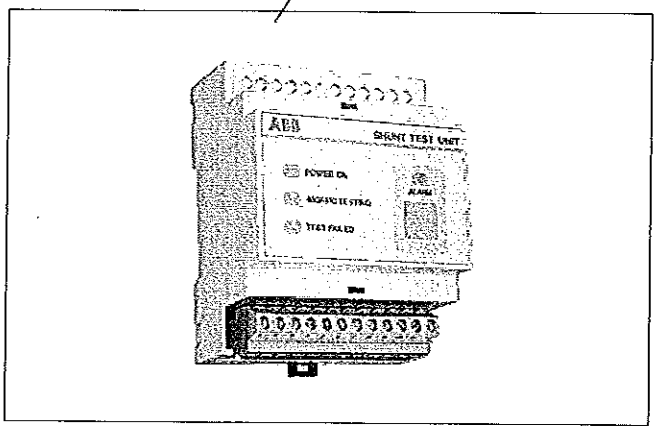


It allows racking-in and racking-out of the circuit-breaker in the switchgear to be carried out remotely, (only for circuit-breaker in withdrawable version for UniGear ZS1 and ZS8.4 switchgear and PowerCube modules).
The motor version with clutch can be ordered on request, so that racking-in/ out can be performed in an emergency if the truck motor fails to operate.

Characteristics	
Un	24 - 30 - 48 - 60 - 110 - 220 V–
Operating limits	85 ... 110% Un
Nominal power (Pn)	40 W

ВЯРНО С ОРИГИНАЛА

21 STU Shunt Test Unit



Due to the particular construction of these releases, checking the functionality of the shunt closing (-MBC) and opening (-MBO1, -MBO2) releases is not possible with dedicated relays (e.g. TCS Test Control Supervision, CCC Control Coil Continuity) or with the REF control and protection unit. The only device able to carry out a check of the functionality is the STU device. Please contact us if you want to carry out this control with devices other than STU.
This device can be combined with the shunt opening release **(-MBO1; -MBO2)** or with the shunt closing release **(-MBC)** to check functionality and continuity.

The control/monitoring Shunt Test Unit allows the continuity of releases with a rated operating voltage between 24 V and 250 V (AC and DC) to be checked, as well as the functionality of the electronic circuit of the release.
Checking continuity is carried out cyclically with an interval of 20 seconds between one test and the next.
The unit has optical signals by means of LEDs on the front. In particular the following information is indicated:
- POWER ON: power supply present
- (-MO) TESTING: test being carried out
- TEST FAILED: signal following a failed test or in the absence of auxiliary power supply
- ALARM: signal after three failed tests.

Two relays and a changeover are also available on board the unit, which allow remote signalling of the following two events:
- failure of a test (resetting is carried out automatically when the alarm stops)
- failure of three tests (resetting is only carried out by means of the manual - RESET – from the front of the unit).

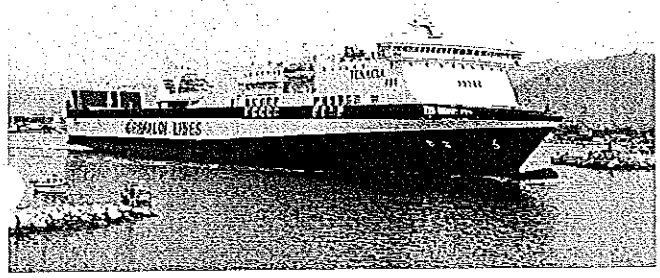
There is also a manual - RESET – button on the front of the unit.

Characteristics	
Un	24 ... 250 V AC/DC
Maximum interrupted current	6 A
Maximum interrupted voltage	250 V AC

ВЯРНО С ОРИГИНАЛА

3. Specific product characteristics

Resistance to vibrations



The VD4 circuit-breakers are designed to satisfy high levels of resistance to stresses caused by mechanical vibrations.
Many versions are able to satisfy both the approval criteria of the major International Shipping Registers (DNV, Lloyd's Register, RINA) and the qualification criteria of the International Seismic Standards (IEEE 344, IEEE 323 and IEC 60980).
For the versions approved by the shipping registers, please contact us.

Tropicalization

VD4 circuit-breakers are manufactured in compliance with the strictest regulations regarding use in hot-humid-saline climates.
All the more important metal parts are treated against corrosive substances corresponding **to standard EN 12500 class C5 atmospheric corrosion.**

Galvanisation is carried out in accordance with UNI ISO 2081 Standards, classification code Fe/Zn 12, with a thickness of $12x10^{-6}$ m, protected by a conversion layer mainly consisting of chromates in compliance with the UNI ISO 4520 Standard.

Altitude

The insulating property of air decreases as the altitude increases, therefore this must always be taken into account for external insulation of the apparatus (the internal insulation of the interrupters does not undergo any variations as it is guaranteed by the vacuum).
The phenomenon must always be taken into consideration during the design stage of the insulating components of apparatus to be installed over 1000 m above sea level.
In this case a correction coefficient must be considered, which can be taken from the graph on the next page, built up on the basis of the indications in the IEC 62271-1 Standards.
The following example is a clear interpretation of the indications given above.

ВЯРНО С ОРИГИНАЛА

Graph for determining the Ka correction factor according to the altitude

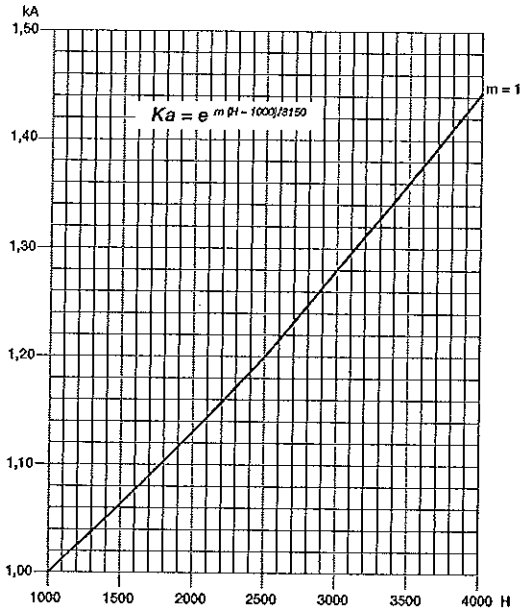
Example

- Installation altitude 2000 m
- Operation at the rated voltage of 12 kV
- Withstand voltage at power frequency 28 kV rms
- Impulse withstand voltage 75 kVp
- Ka factor obtained from graph = 1.13.

Considering the above parameters, the apparatus will have to withstand (under test and at zero altitude, i.e. at sea level):

- withstand voltage at power frequency equal to:
  28 x 1.13 = 31.6 kVrms
- impulse withstand voltage equal to:
  75 x 1.13 = 84.7 kVp.

From the above, it can be deduced that for installations at an altitude of 2000 m above sea level, with 12 kV service voltage, apparatus must be provided with 17.5 kV rated voltage, characterised by insulation levels at power frequency of 38 kVrms with 95 kVp impulse withstand voltage.

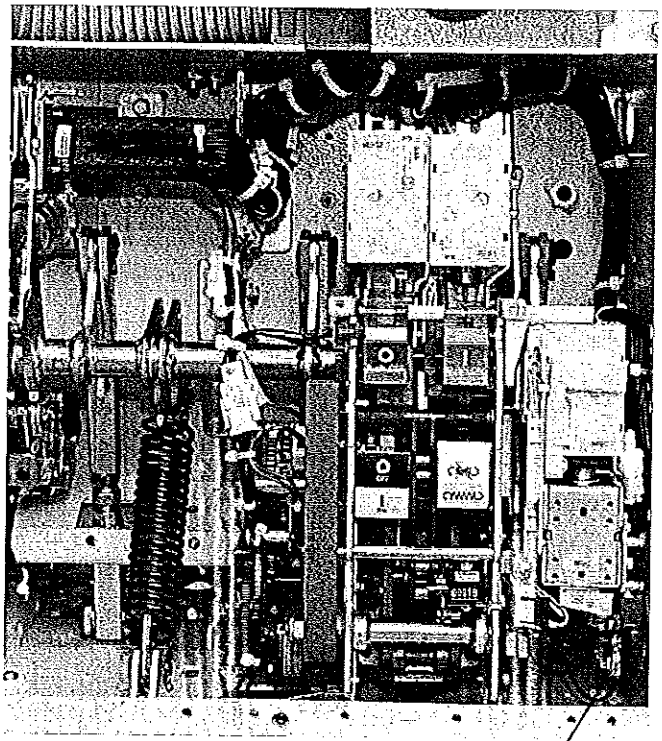


H = altitude in metres;
m = value referred to power frequency and the lightning impulse withstand voltages and those between phases.

Anti-pumping device

The EL operating mechanism of VD4 circuit-breakers (in all versions) is fitted with a mechanical anti-pumping device which prevents re-closing due to either electrical or mechanical commands.
Should both the closing command and any one of the opening commands (local or remote) be active at the same time, there would be a continuous succession of opening and closing commands.
The anti-pumping device avoids this situation, ensuring that each closing operation is only followed by an opening operation and that there is no other closing operation after this. To obtain a further closing operation, the closing command must be released and then re-launched.
Furthermore, the anti-pumping device only allows circuit-breaker closure if the following conditions are present at the same time:

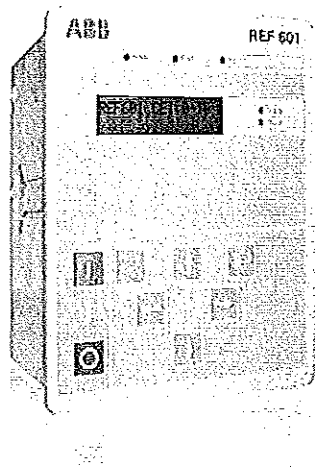
- operating mechanism spring fully charged
- opening pushbutton and/or shunt opening release (-MBO1/-MBO2) not activated
- circuit-breaker open.



ВЯРНО С ОРИГИНАЛА

3. Specific product characteristics

REF 601 protection Device



On request, the REF 601 switchgear protection device is available for protection of the installations, which requires an auxiliary power supply for its operation unlike the previous PR512 which was a self-supplied release.
The REF 601 has protections and trip curves in accordance with the IEC 255-3 Standard. It sees to the protection function against overload (51), against instantaneous and delayed short-circuit (50-51) and against instantaneous and delayed homopolar ground fault (50N and 51N). It also detects the second harmonic component to prevent unwarranted tripping on connection of a transformer (68).

The unit has 3 inputs from current sensors of the type with Rogowsky coil, one input from external toroidal CT and from the keyboard 4 rated currents can be set: 40, 80, 250 and 1250 A.
If the unit is connected to 3 current sensors, the 50N and 51N protection functions are carried out with the vectorial sum of the phase currents; if only 2 current sensors are used, then the external toroidal current transformer must be provided for functions 50N and 51N.
The external toroidal current transformer can be with openable core or closed and with any transformation ratio as long with a 1 A secondary current.
The ABB current sensors of the type with Rogowsky coil provided for REF 601, are only suitable for installation on MV insulated cables.

The characteristics of the device are:
- trip precision
- wide adjustment ranges
- single and simultaneous adjustment of the three phases
- no limitation (due to the current sensors) to the rated breaking capacity and at the short-time withstand current of the circuit-breaker
- pushbuttons for local electrical operation of the circuit-breaker (opening and closing pushbutton
- 5 distinct indicators: "relay in operation", "relay in trip threshold", "relay tripped", "relay tripped due to exceeding phase current", "relay tripped due to exceeding ground fault current"
- interface consisting of an LCD display and of "arrow" keys, "enter" and "esc" for easier navigation inside the "measurement", "data recording", "event recording", "settings", "configuration" and "test" menus
- three user levels: "operator" (only display, with free access, by keeping this key pressed for at least 5 sec.), "configurator" (like the previous one, but also with permission to set the protection parameters, i.e. times and thresholds, and communication, if present - access limited by a password), "administrator" (like the previous ones, but also with permission to set the password and configure the basic settings of the device, such as the rated current - access limited by a password)
- continual display of the current on the most highly loaded phase and of the round current
- recording of the value of the currents which caused the device to trip
- storage of the number of openings carried out by the device
- event log (storage of the parameters described above in the last 5 trips of the device) in a non-volatile memory
- curves "ß = 1" or "ß = 5" and curve "RI" specific for the Belgian market (only REF 601 IEC)
- circuit-breaker opening by means of an undervoltage release (only REF 601 CEI)
- version, on request, with RS485 4-wire serial communication
- MODBUS RTU full duplex protocol
- multi-voltage feeder 24 ... 240 V a.c.- d.c

ВЯРНО С ОРИГИНАЛА

Environmental protection programme

VD4 circuit-breakers are manufactured in accordance with the ISO 14000 Standards (Guidelines for environmental management).
The production processes are carried out in compliance with the Standards for environmental protection in terms of reduction in energy consumption as well as in raw materials and production of waste materials. All this is thanks to the medium voltage apparatus manufacturing facility environmental management system.
Assessment of the environmental impact of the life cycle of the product, obtained by minimising energy consumption and overall raw materials of the product, became a concrete matter during the design stage by means of targeted selection of the materials, processes and packing.
This is to allow maximum recycling at the end of the useful life cycle of the apparatus.

Spare parts

- Shunt opening release
- Additional shunt opening release
- Undervoltage release
- Time delay device for undervoltage release
- Shunt closing release
- Spring charging geared motor with electrical signalling of spring charged
- Contact signalling geared motor protection circuit-breaker open/closed
- Contact signalling closing spring charged/discharged
- Transient contact with momentary closing during circuit-breaker opening
- Circuit-breaker auxiliary contacts
- Locking electromagnet on the operating mechanism
- Position contact of the withdrawable truck
- Contacts signalling connected/isolated
- Opening solenoid
- Key lock in open position
- Isolation interlock with the door
- Protection for opening pushbutton
- Protection for closing pushbutton
- Locking electromagnet on the withdrawable truck
- Set of six isolating contacts.

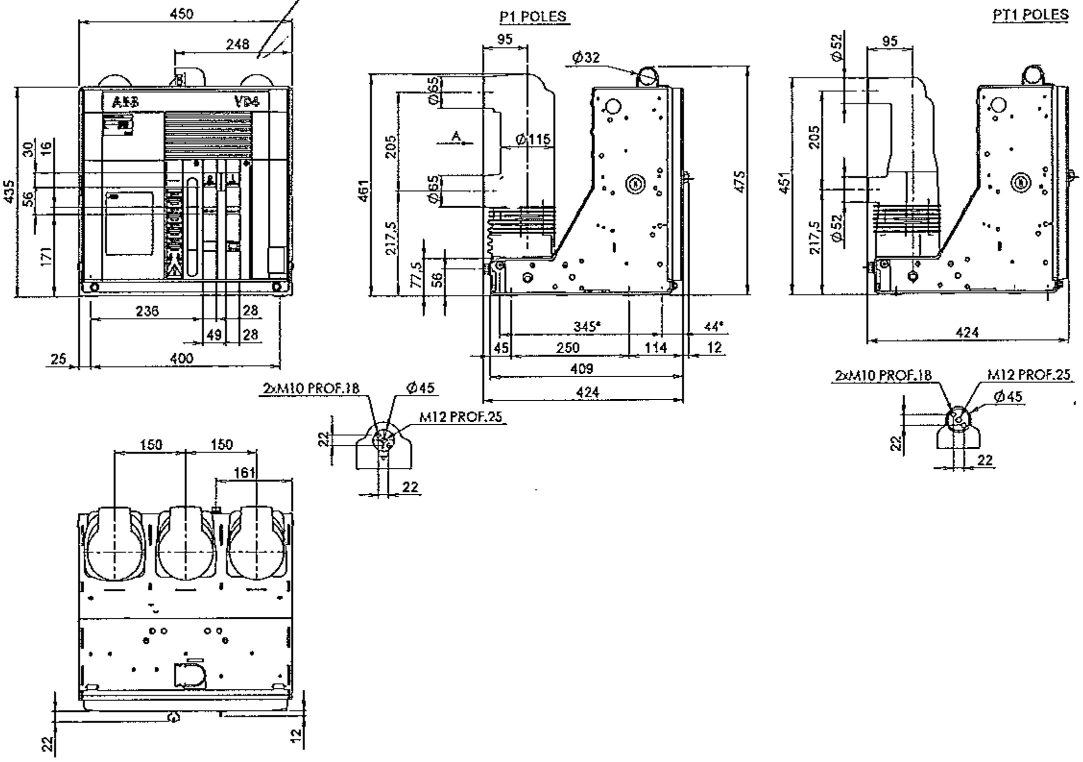
Ordering

For availability and to order spare parts, please contact our Service department, specifying the circuit-breaker serial number.

4. Overall dimensions

Fixed circuit-breakers

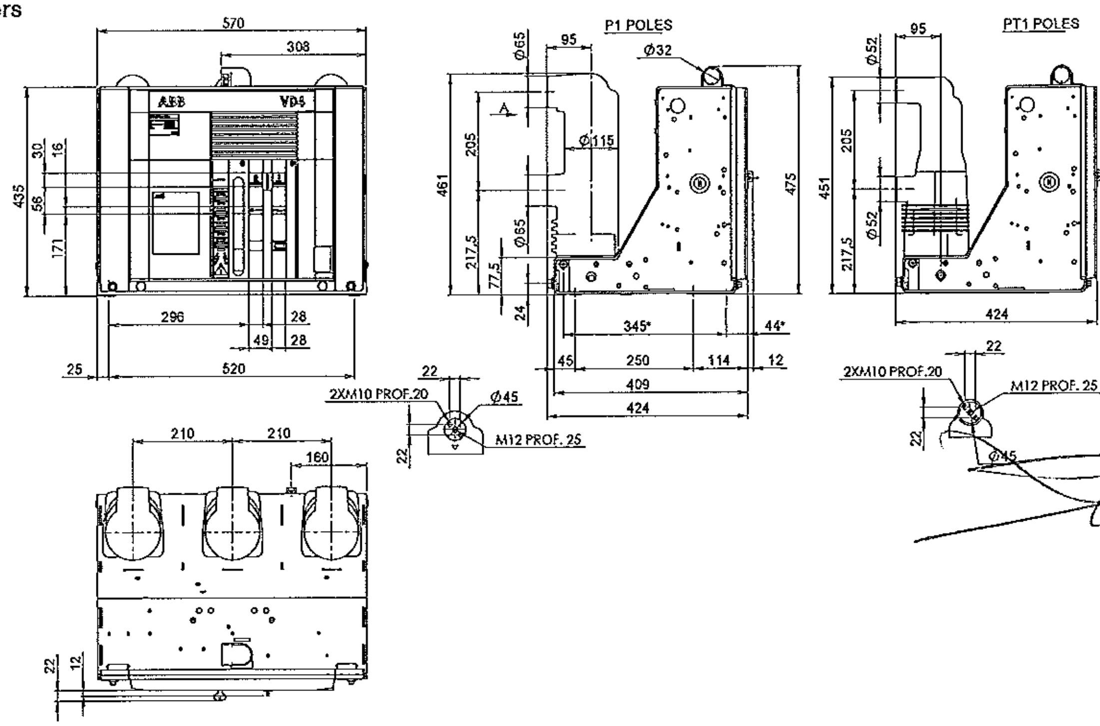
VD4		
TN	7405	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA



(*) Fixing interchangeability with previous series (345 x 400).

Fixed circuit-breakers

VD4		
TN	7406	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA

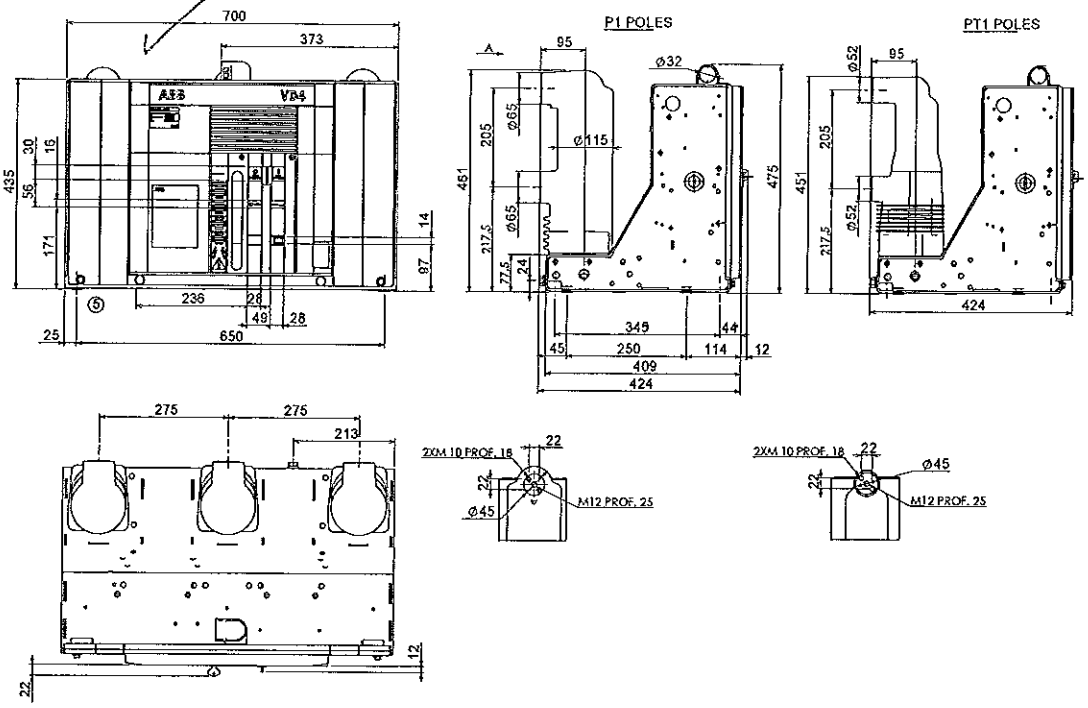


(*) Fixing interchangeability with previous series (345 x 520)

РНО С ОРИГИНАЛА

Fixed circuit-breakers

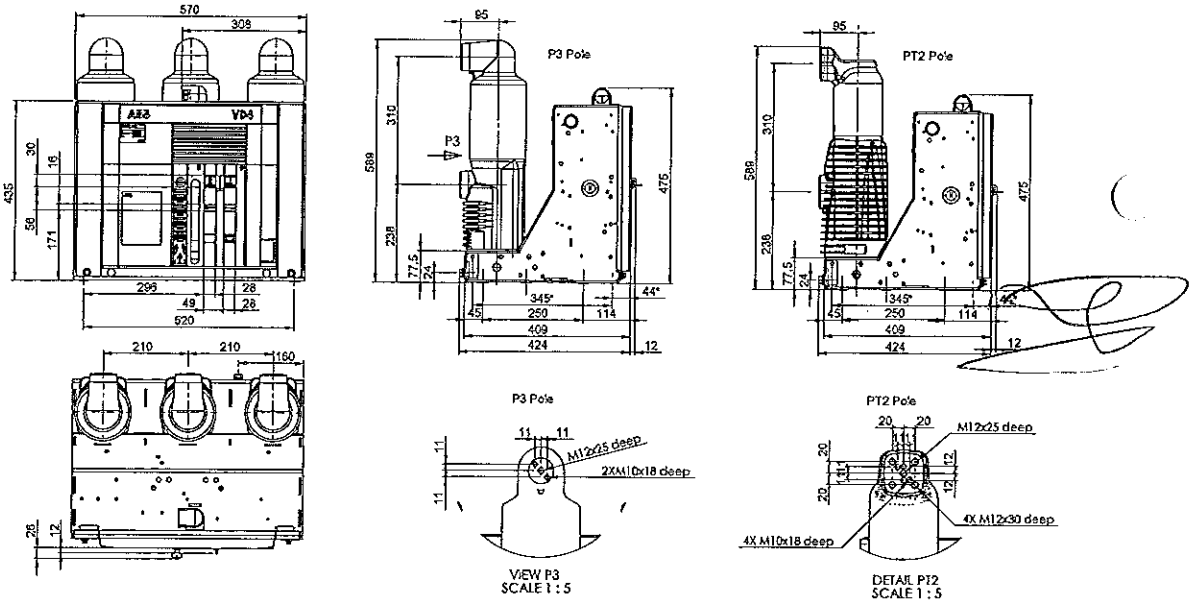
VD4		
TN	1VCD000051	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA



(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit-breakers

VD4		
TN	1VCD003282	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA



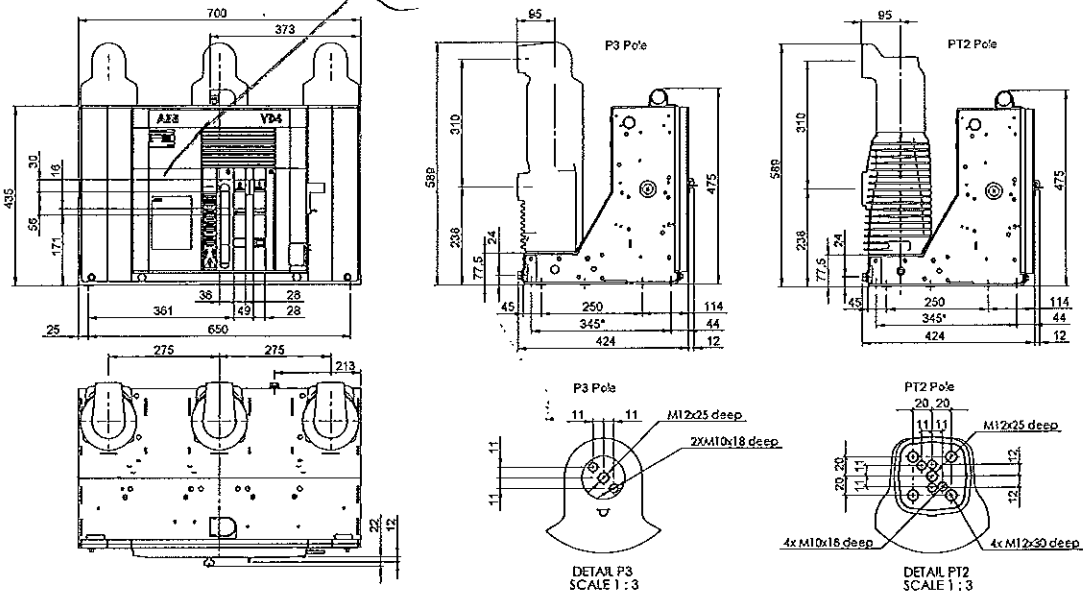
(*) Fixing interchangeability with previous series (345 x 650).

ВЯРНО С ОРИГИНАЛА

4. Overall dimensions

Fixed circuit-breakers

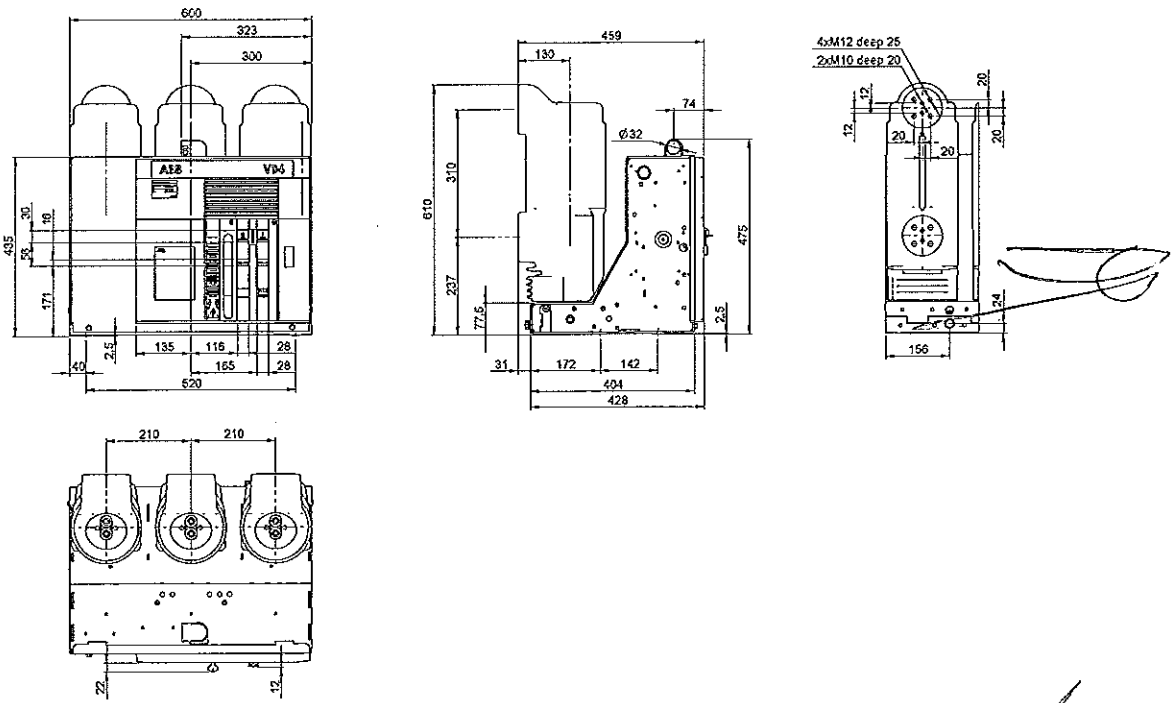
VD4		
TN	1VCD003285	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA



(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit-breakers

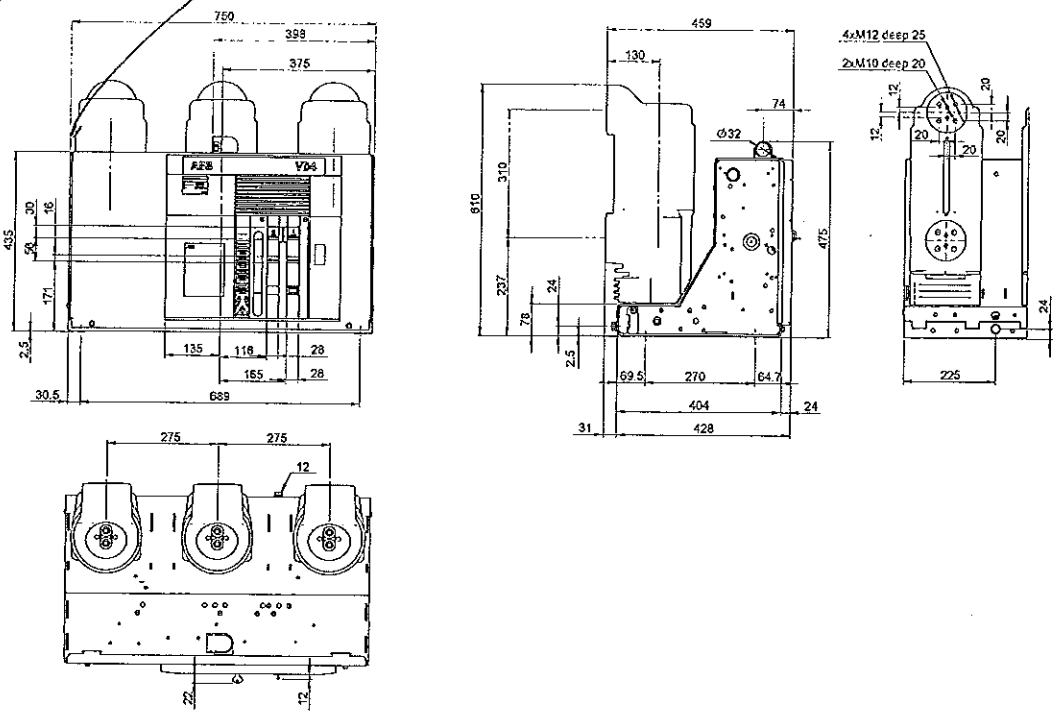
VD4		
TN	1VCD003440	
Ur	12	kV
	17.5	kV
	1250	A
	1600	A
	2000	A
Isc	50	kA



ВЗЯТО С ОРИГИНАЛА

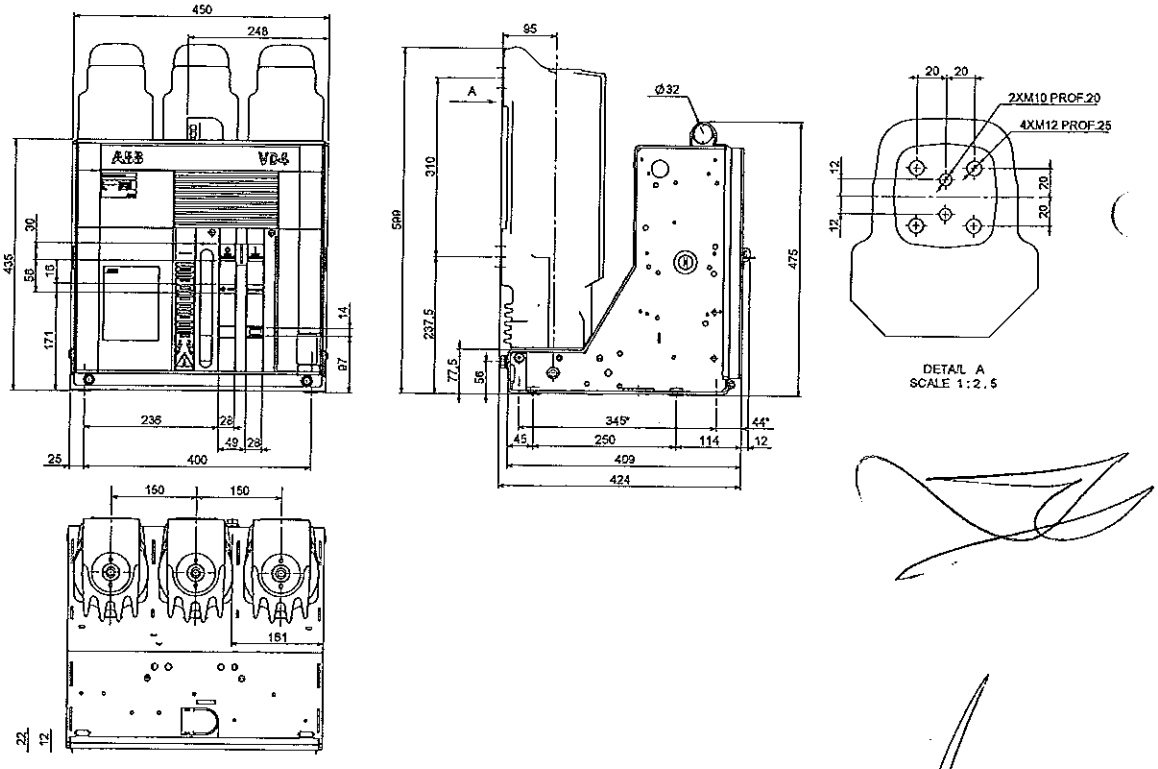
Fixed circuit-breakers

VD4		
TN	1VCD003441	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
	2000	A
	2500	A
Isc	50	kA



Fixed circuit-breakers

VD4		
TN	1VCD000050	
Ur	12	kV
Ir	1600	A
Isc	20	kA
	25	kA
	31.5	kA



(*) Fixing interchangeability with previous series (345 x 400).

ВЗЯТО С ОРИГИНАЛА

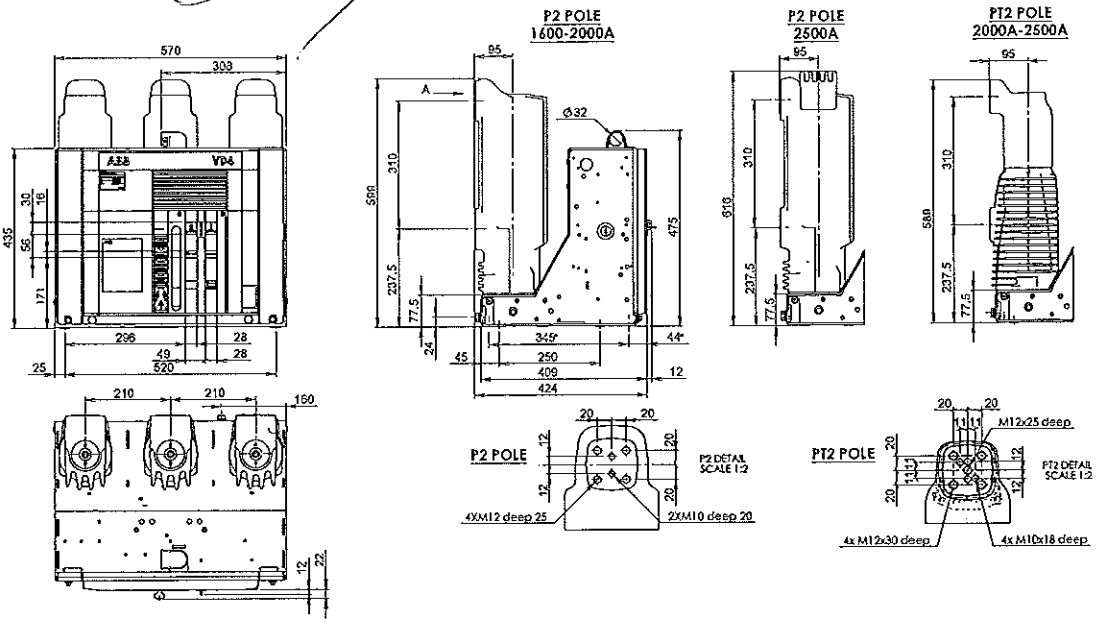
4. Overall dimensions

Fixed circuit-breakers

VD4		
TN	7407	
Ur	12-17.5	kV
Ir	1600	A
Isc	20	kA
	25	kA
	31.5	kA

VD4		
TN	7407	
Ur	12-17.5	kV
Ir	2000	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

VD4		
TN	7407	
Ur	12	kV
Ir	2500	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

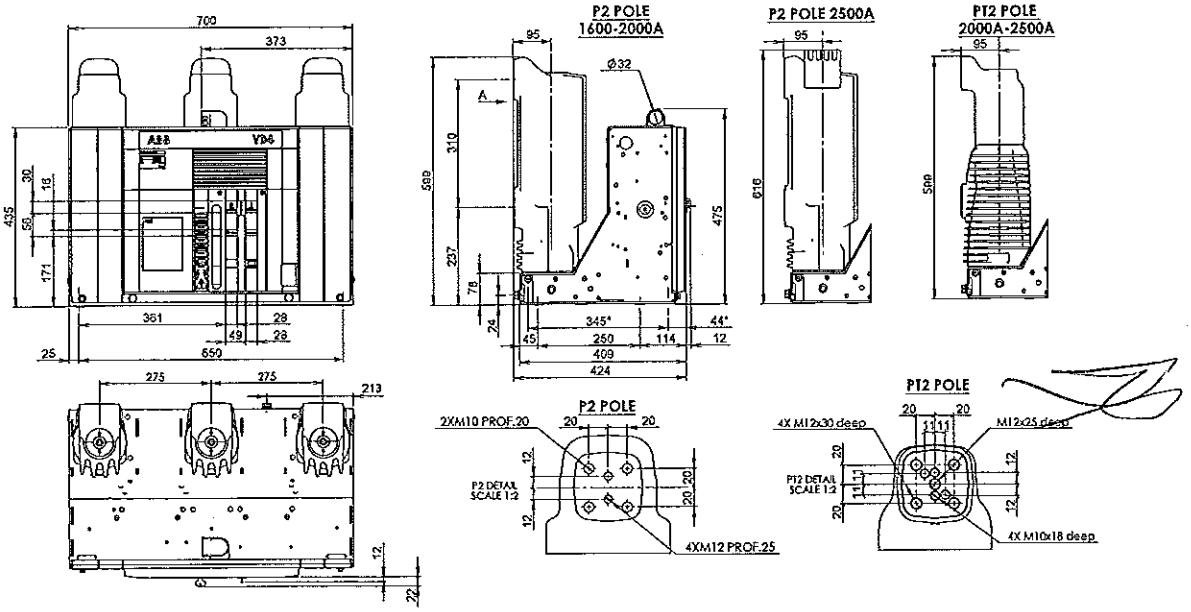


(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit-breakers

VD4		
TN	7408	
Ur	12	kV
	17.5	kV
Ir	1600	A
Isc	20	kA
	25	kA
	31.5	kA

VD4		
TN	7408	
Ur	12	kV
	17.5	kV
Ir	2000	A
	2500	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

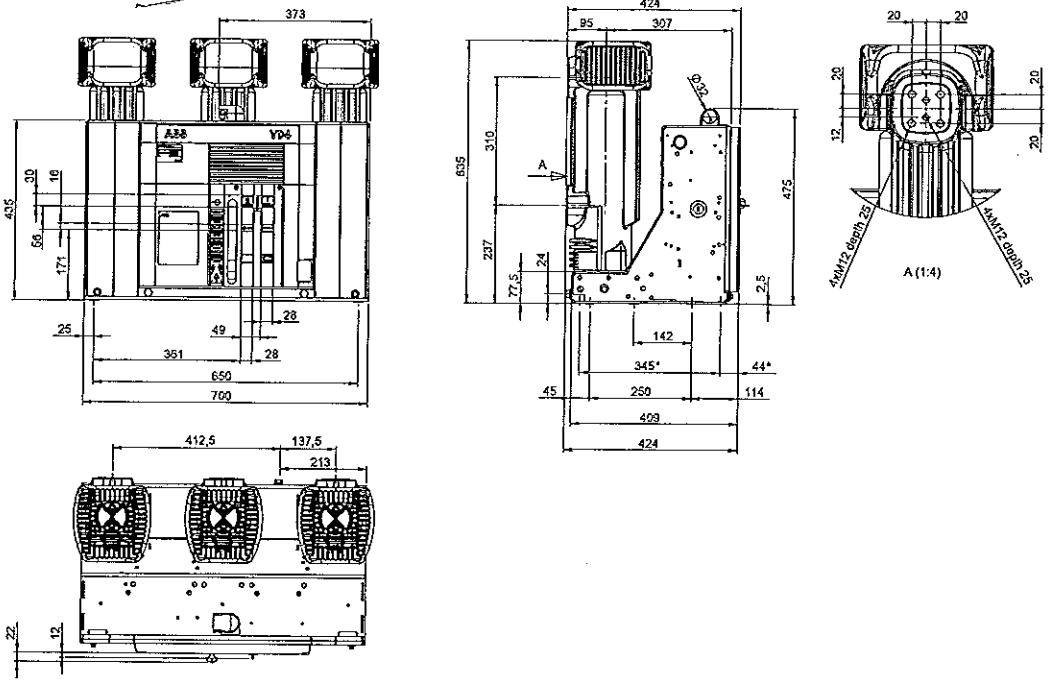


(*) Fixing interchangeability with previous series (345 x 650).

ВЯРНО С ОРИГИНАЛА

Fixed circuit-breakers

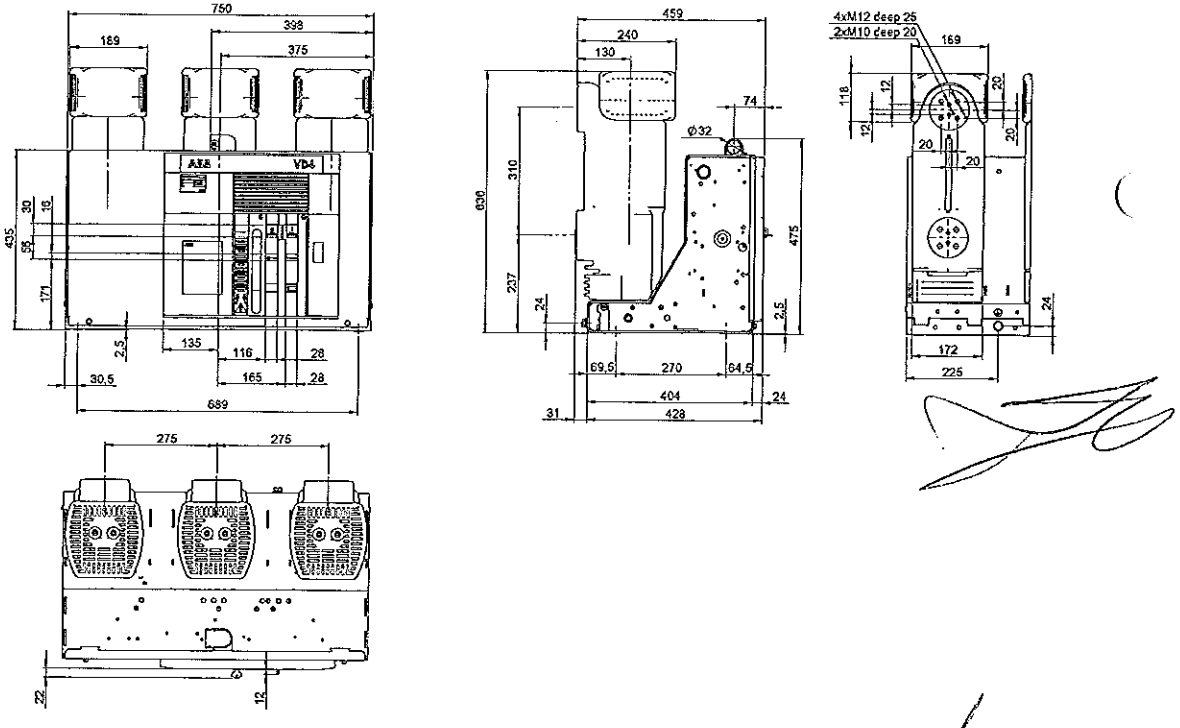
VD4		
TN	1VCD000149	
Ur	12	kV
	17.5	kV
Ir	3150	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA



(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit-breakers

VD4		
TN	1VCD003443	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	50	kA



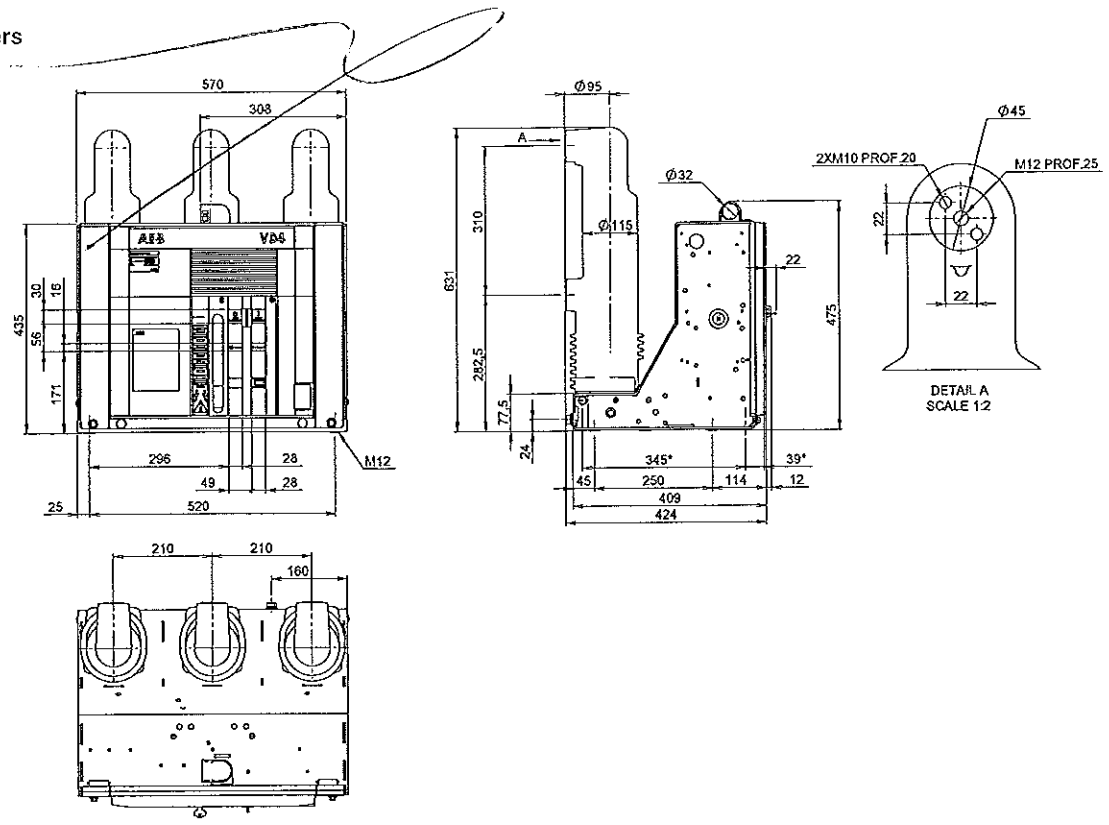
(*) 4000 A with forced ventilation.

ВЗЯТО С ОРИГИНАЛА

4. Overall dimensions

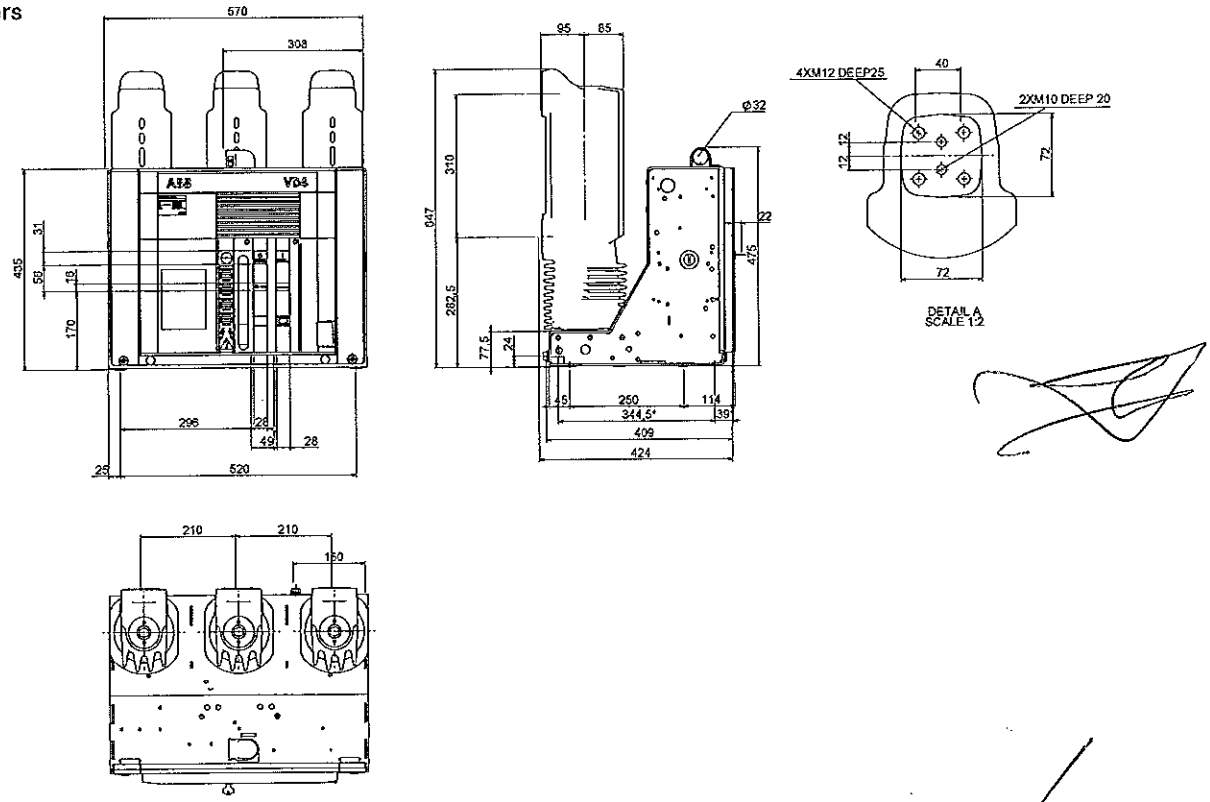
Fixed circuit-breakers

VD4		
TN	7409	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



Fixed circuit-breakers

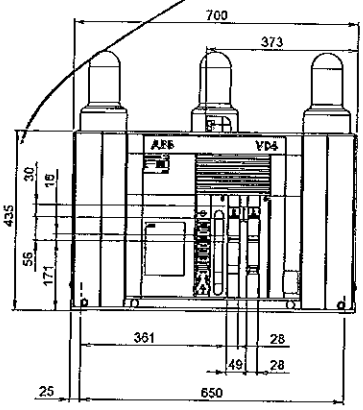
VD4		
TN	1VCD000172	
Ur	24	kV
Ir	630	A
	1250	A
Isc	31,5	kA

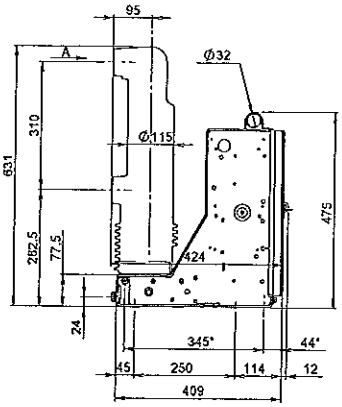


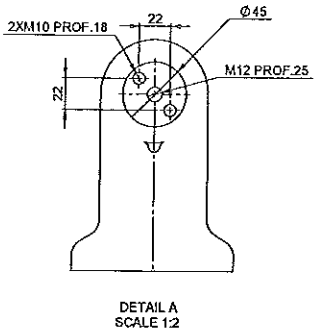
ВАРИАНТ С ОРИГИНАЛА

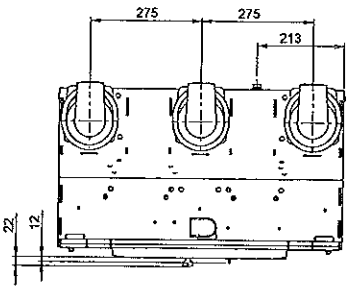
Fixed circuit-breakers

VD4		
TN	7410	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



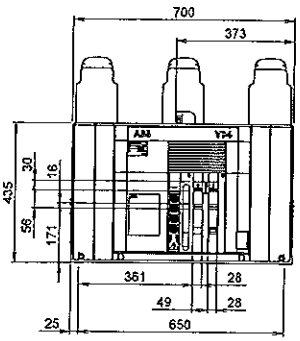


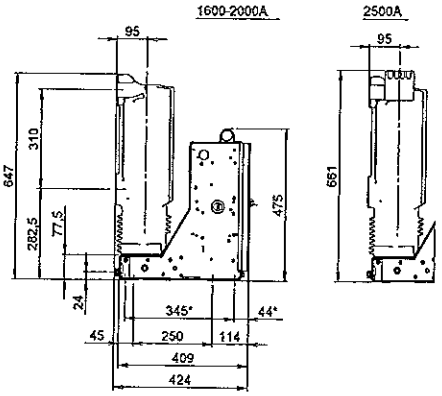


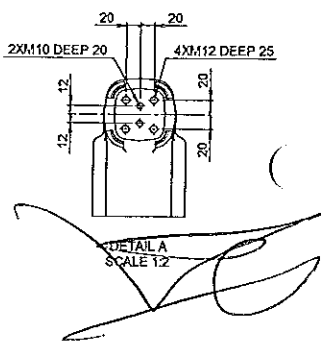


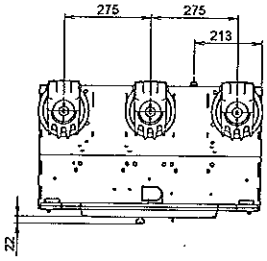
Fixed circuit-breakers

VD4		
TN	7411	
Ur	24	kV
Ir	1600	A
	2000	A
	2500	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA







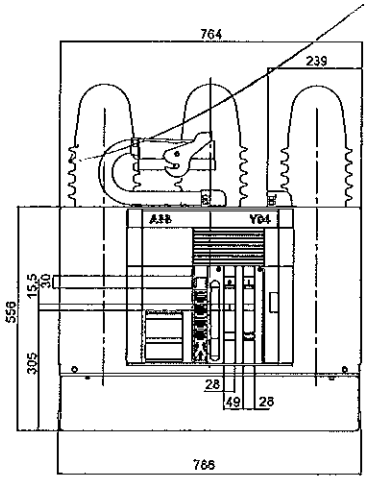


ВЯРНО С ОРИГИНАЛА

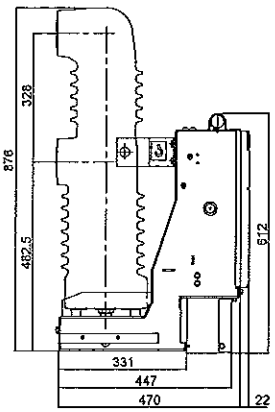
4. Overall dimensions

Fixed circuit-breakers

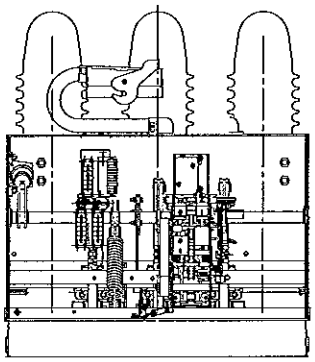
VD4		
TN	1VYN300901-LT	
Ur	36	kV
Ir	1250	A
	1600	A
	2000	A
	2500	A
Isc	20	kA
	25	kA
	31.5	kA



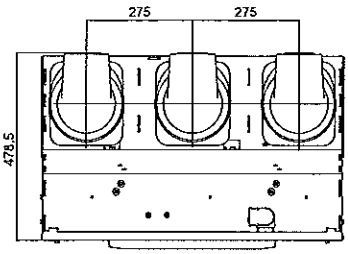
FRONT VIEW



SIDE VIEW



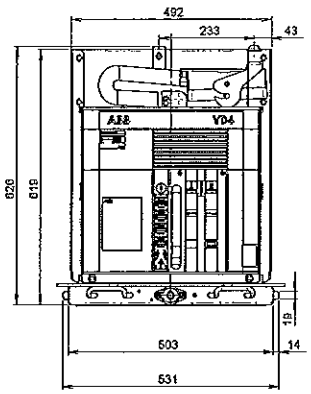
FRONT VIEW WITHOUT FRONT COVER

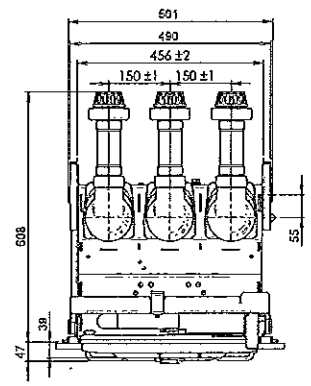


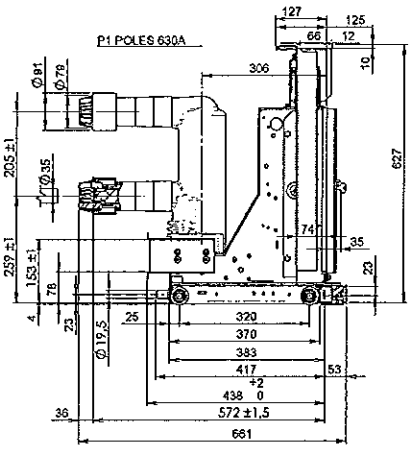
TOP

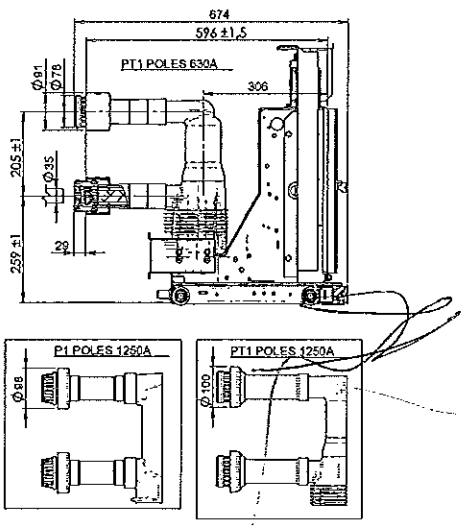
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube PB1 modules

VD4/P		
TN	7412	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31,5	kA









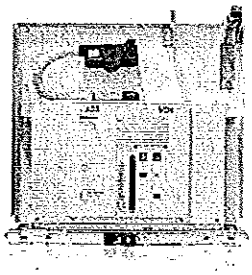
ВЯРНО С ОРИГИНАЛА

•											
12 (4)											
12											
28											
75											
50-60											
1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	3150 (2)	3150 (2)
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31.5	31.5	–	–	31.5	–	31.5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31.5	31.5	–	–	31.5	–	31.5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	50	50	–	–	50	–	50	–
–	–	–	–	63	63	–	–	63	–	63	–
–	–	–	–	80	80	–	–	80	–	80	–
100	100	–	–	100	100	–	–	100	–	100	–
–	–	125	125	–	–	125	125	–	125	–	125
•	•	•	•	•	•	•	•	•	•	•	•
33 ... 60											
10 ... 15											
43 ... 75											
30 ... 60											
691	691	691	691	691	691	691	691	691	691	730	742
653	853	681	853	653	853	681	853	853	853	853	853
641	642	643	643	642	642	643	643	640	643	640	643
210	275	210	275	210	275	210	275	275	275	275	275
174	176	180	193	160	166	190	205	186	225	221	240
–	–	–	–	7415(3)	7416(3)	–	–	7417(3)	–	–	–
003284(3)	003286(3)	003444	003445	–	–	003444	003445	–	003446	000153(3)	003447
- 5 ... + 40											
•											
•											

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

Withdrawable version circuit-breakers for UniGear ZS1 switchgear (17.5 kV) (4)



Circuit-breaker		VD4/P 17						
Standards	IEC 62271-100	•						
Rated voltage	Ur [kV]	17,5						
Rated insulation voltage	Us [kV]	17,5						
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38						
Impulse withstand voltage	Up [kV]	95						
Rated frequency	fr [Hz]	50-60						
Rated normal current (40 °C) (1)	Ir [A]	630	1250	1250	1250	1250	1600	1600
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	–	–	–	–	–
		20	20	–	–	–	20	20
		25	25	–	–	–	25	25
		31,5	31,5	–	–	–	31,5	31,5
		–	–	40	40	–	–	–
		–	–	–	–	50	–	–
Rated short-time withstand current (3s)	Ik [kA]	16	16	–	–	–	–	–
		20	20	–	–	–	20	20
		25	25	–	–	–	25	25
		31,5	31,5	–	–	–	31,5	31,5
		–	–	40	40	–	–	–
		–	–	–	–	50	–	–
Making capacity	Ip [kA]	40	40	–	–	–	–	–
		50	50	–	–	–	50	50
		63	63	–	–	–	63	63
		80	80	–	–	–	80	80
		–	–	100	100	–	–	–
		–	–	–	–	125	–	–
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60						
Arcing time	[ms]	10 ... 15						
Total breaking time	[ms]	43 ... 75						
Closing time	[ms]	30 ... 60						
Maximum overall dimensions	H [mm]	632	632	691	691	691	691	691
	W [mm]	503	503	653	853	681	653	853
	D [mm]	664	664	641	642	643	642	642
	Pole distance P [mm]	150	150	210	275	210	210	275
Weight	[kg]	116	116	174	176	180	160	166
Standardised table of dimensions	TN	7412(3)	7412(3)	–	–	–	7415(3)	7416(3)
	1VCD	–	–	003284(3)	003286(3)	003444	–	–
Operating temperature	[°C]	- 5 ... + 40						
Tropicalization	IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility	IEC: 62271-1	•						

(1) Rated current guaranteed with circuit-breaker installed in UniGear ZS1 switchgear and with 40 °C ambient temperature.
(2) Up to 4000 A with forced ventilation.
(3) Poles in polyamide
(4) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading, only possible with the door open, by means of a lever built into the front of the operating mechanism).

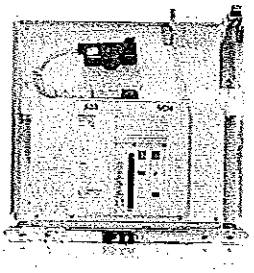
ВЯРНО С ОРИГИНАЛА

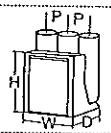
•											
17,5											
17,5											
38											
95											
50-60											
1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	3150 [2]	3150 [2]
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31,5	31,5	–	–	31,5	–	31,5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31,5	31,5	–	–	31,5	–	31,5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	50	50	–	–	50	–	50	–
–	–	–	–	63	63	–	–	63	–	63	–
–	–	–	–	80	80	–	–	80	–	80	–
100	100	–	–	100	100	–	–	100	–	100	–
–	–	125	125	–	–	125	125	–	125	–	125
•	•	•	•	•	•	•	•	•	•	•	•
33 ... 60											
10 ... 15											
43 ... 75											
30 ... 60											
691	691	691	691	691	691	691	691	691	691	730	742
653	853	681	853	653	853	681	853	853	853	853	853
641	642	643	643	642	642	643	643	640	643	640	643
210	275	210	275	210	275	210	275	275	275	275	275
174	176	180	193	160	166	190	205	186	225	221	240
–	–	–	–	7415[3]	7416[3]	–	–	7417[3]	–	–	–
003284[3]	003286[3]	003444	003445	–	–	003444	003445	–	003446	000153[3]	003447
- 5 ... + 40											
•											
•											

ВЯРНО С ОРИГИНАЛ

2. Selection and ordering
Withdrawable circuit-breakers

Withdrawable version circuit-breakers for UniGear ZS1 switchgear (24 kV) (5)

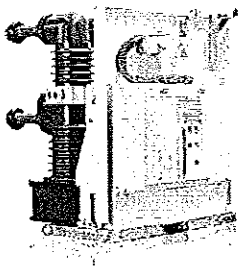


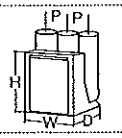
Circuit-breaker		VD4/P 24							
Standards	IEC 62271-100	•							
Rated voltage	Ur [kV]	24							
Rated insulation voltage	Us [kV]	24							
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50							
Impulse withstand voltage	Up [kV]	125							
Rated frequency	fr [Hz]	50-60							
Rated normal current (40 °C) (1)	Ir [A]	630	630	1250	1250	1600	2000	2500 (2)	3150 (3)
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	16	–
		20	20	20	20	20	20	20	–
		25	25	25	25	25	25	25	–
		–	–	31,5	31,5	31,5	31,5	31,5	31,5
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	16	–
		20	20	20	20	20	20	20	–
		25	25	25	25	25	25	25	–
		–	–	31,5	31,5	31,5	31,5	31,5	31,5
Making capacity	Ip [kA]	40	40	40	40	40	40	40	–
		50	50	50	50	50	50	50	–
		63	63	63	63	63	63	63	–
		–	–	80	80	80	80	80	80
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60							
Arcing time	[ms]	10 ... 15							
Total breaking time	[ms]	43 ... 75							
Closing time	[ms]	30 ... 60							
Maximum overall dimensions 	H [mm]	794	794	794	794	838	838	838	838
	W [mm]	653	853	653	853	853	853	853	853
	D [mm]	802	802	802	802	790	790	790	790
	Pole distance P [mm]	210	275	210	275	275	275	275	275
Weight	[kg]	140	148	140/146 (4)	148	228	228	228	277
Standardised table of dimensions	TN	7413	7414	7413	7414	7418	7418	7418	–
	1VCD	–	–	000173 (4)	000174 (4)	–	–	–	000177
Operating temperature	[°C]	- 5 ... + 40							
Tropicalization	IEC: 60068-2-30, 60721-2-1	•							
Electromagnetic compatibility	IEC: 62271-1	•							

(1) Rated current guaranteed with circuit-breaker installed in UniGear ZS1 switchgear and with 40 °C ambient temperature.
(2) 2300 A rated current guaranteed with natural ventilation; 2500 A rated current guaranteed with forced ventilation.
(3) 2700 A rated current guaranteed with natural ventilation; 3150 A rated current guaranteed with forced ventilation.
(4) 31.5 kA version.
(5) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading, only possible with the door open, by means of a lever built into the front of the operating mechanism).

ВЕРНО С ОРИГИНАЛА

General characteristics of withdrawable circuit-breakers for UniGear ZS2 and PowerCube modules (36 kV)



Circuit-breaker		VD4/W 36			
Standards	IEC 62271-100	•			
Rated voltage	Ur [kV]	36			
Rated insulation voltage	Us [kV]	36			
Withstand voltage at 50 Hz	Ud (1 min) [kV]	70			
Impulse withstand voltage	Up [kV]	170			
Rated frequency	fr [Hz]	50			
Rated normal current (40 °C)	Ir [A]	1250	1600	2000	2500 (1)
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31.5
Rated short-time withstand current (3s)	Ik [kA]	20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31.5
Making capacity	Ip [kA]	50	50	50	50
		63	63	63	63
		80	80	80	80
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•
Opening time	[ms]	33 ... 60			
Arcing time	[ms]	10 ... 15			
Total breaking time	[ms]	45 ... 75			
Closing time	[ms]	30 ... 60			
Maximum overall dimensions 	H [mm]	973	973	973	973
	W [mm]	842	842	842	842
	D [mm]	788	788	788	788
	Pole distance P [mm]	275	275	275	275
Weight	[kg]	230	230	230	230
Standardised table of dimensions	TN	1VYN300901-KG	1VYN300901-KG	1VYN300901-KG	1VYN300901-KG
Operating temperature	[°C]	- 5 ... + 40			
Tropicalization	IEC: 60068-2-30, 60721-2-1	•			
Electromagnetic compatibility	IEC: 62271-1	•			

(1) Up to 2500 A with forced ventilation.

ВЕРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

Types of withdrawable version circuit-breakers available for UniGear ZS1 switchgear

Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4 (12 kV) withdrawable circuit-breaker

Ur	Isc	Rated uninterrupted current (40 °C) [A]					Circuit-breaker type
		W=650	W=800	W=1000	W=1000	W=1000	
		P=150	P=210	P=275	P=275	P=275	
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	u/l=310	
		ø=35	ø=79	ø=79	ø=109	ø=109	
12	16	630					VD4/P 12.06.16 p150
	20	630					VD4/P 12.06.20 p150
	25	630					VD4/P 12.06.25 p150
	31.5	630					VD4/P 12.06.32 p150
	16	1250					VD4/P 12.12.16 p150
	20	1250					VD4/P 12.12.20 p150
	25	1250					VD4/P 12.12.25 p150
	31.5	1250					VD4/P 12.12.32 p150
	40		1250				VD4/P 12.12.40 p210
	50		1250				VD4/P 12.12.50 p210
	20		1600				VD4/P 12.16.20 p210
	25		1600				VD4/P 12.16.25 p210
	31.5		1600				VD4/P 12.16.32 p210
	40		1600				VD4/P 12.16.40 p210
	50		1600				VD4/P 12.16.50 p210
	20		2000				VD4/P 12.20.20 p210
	25		2000				VD4/P 12.20.25 p210
	31.5		2000				VD4/P 12.20.32 p210
	40		2000				VD4/P 12.20.40 p210
	50		2000				VD4/P 12.20.50 p210
	40			1250			VD4/P 12.12.40 p275
	20			1600			VD4/P 12.16.20 p275
	25			1600			VD4/P 12.16.25 p275
	31.5			1600			VD4/P 12.16.32 p275
	40			1600			VD4/P 12.16.40 p275
	50			1600			VD4/P 12.16.50 p275
	20			2000			VD4/P 12.20.20 p275
	25			2000			VD4/P 12.20.25 p275
	31.5			2000			VD4/P 12.20.32 p275
	40			2000			VD4/P 12.20.40 p275
	50			2000			VD4/P 12.20.50 p275

W = Switchboard width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.

ВЗЯТО С ОРИГИНАЛА

VD4 (12 kV) withdrawable circuit-breaker

Ur	Isc	Rated uninterrupted current (40 °C) [A]					Circuit-breaker type
kV	kA	W=650 P=150 u/l=205 ø=35	W=800 P=210 u/l=310 ø=79	W=1000 P=275 u/l=310 ø=79	W=1000 P=275 u/l=310 ø=109	W=1000 P=275 u/l=310 ø=109	
12	20				2500		VD4/P 12.25.20 p275
	25				2500		VD4/P 12.25.25 p275
	31,5				2500		VD4/P 12.25.32 p275
	40				2500		VD4/P 12.25.40 p275
	50				2500		VD4/P 12.25.50 p275
	20					3150 (1)	VD4/P 12.32.20 p275
	25					3150 (1)	VD4/P 12.32.25 p275
	31,5					3150 (1)	VD4/P 12.32.32 p275
	40					3150 (1)	VD4/P 12.32.40 p275
	50					3150 (1)	VD4/P 12.32.50 p275

W = Switchboard width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A with forced ventilation.

ВЕРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

VD4 (17.5 kV) withdrawable circuit-breaker for UniGear ZS1 switchboard

Ur	Isc	Rated uninterrupted current (40 °C) [A]					Circuit-breaker type
		W=650	W=800	W=1000	W=1000	W=1000	
		P=150	P=210	P=275	P=275	P=275	
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	u/l=310	
		ø=35	ø=79	ø=79	ø=109	ø=109	
	16	630					VD4/P 17.06.16 p150
	20	630					VD4/P 17.06.20 p150
	25	630					VD4/P 17.06.25 p150
	31.5	630					VD4/P 17.06.32 p150
	16	1250					VD4/P 17.12.16 p150
	20	1250					VD4/P 17.12.20 p150
	25	1250					VD4/P 17.12.25 p150
	31.5	1250					VD4/P 17.12.32 p150
	40		1250				VD4/P 17.12.40 p210
	50		1250				VD4/P 17.12.50 p210
	20		1600				VD4/P 17.16.20 p210
	25		1600				VD4/P 17.16.25 p210
	31.5		1600				VD4/P 17.16.32 p210
	40		1600				VD4/P 17.16.40 p210
	50		1600				VD4/P 17.16.50 p210
17.5	20		2000				VD4/P 17.20.20 p210
	25		2000				VD4/P 17.20.25 p210
	31.5		2000				VD4/P 17.20.32 p210
	40		2000				VD4/P 17.20.40 p210
	50		2000				VD4/P 17.20.50 p210
	40			1250			VD4/P 17.12.40 p275
	20			1600			VD4/P 17.16.20 p275
	25			1600			VD4/P 17.16.25 p275
	31.5			1600			VD4/P 17.16.32 p275
	40			1600			VD4/P 17.16.40 p275
	50			1600			VD4/P 17.16.50 p275
	20			2000			VD4/P 17.20.20 p275
	25			2000			VD4/P 17.20.25 p275
	31.5			2000			VD4/P 17.20.32 p275
	40			2000			VD4/P 17.20.40 p275
	50			2000			VD4/P 17.20.50 p275

W = Switchboard width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.

ВЯРНО С ОРИГИНАЛА

VD4 (17.5 kV) withdrawable circuit-breaker for UniGear ZS1 switchboard

Ur	Isc	Rated uninterrupted current (40 °C) [A]					Circuit-breaker type
		W=650	W=800	W=1000	W=1000	W=1000	
kV	kA	P=150	P=210	P=275	P=275	P=275	
		u/l=205	u/l=310	u/l=310	u/l=310	u/l=310	
		ø=35	ø=79	ø=79	ø=109	ø=109	
17.5	20				2500		VD4/P 17.25.20 p275
	25				2500		VD4/P 17.25.25 p275
	31.5				2500		VD4/P 17.25.32 p275
	40				2500		VD4/P 17.25.40 p275
	50				2500		VD4/P 17.25.50 p275
	20					3150 (1)	VD4/P 17.32.20 p275
	25					3150 (1)	VD4/P 17.32.25 p275
	31.5					3150 (1)	VD4/P 17.32.32 p275
	40					3150 (1)	VD4/P 17.32.40 p275
	50					3150 (1)	VD4/P 17.32.50 p275

W = Switchboard width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A with forced ventilation.

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

VD4 (24 kV) withdrawable circuit-breaker for UniGear ZS1 switchboard

Ur	Isc	Rated uninterrupted current (40 °C) [A]				Circuit-breaker type
		W=800	W=1000	W=1000	W=1000	
		P=210	P=275	P=275	P=275	
kV	kA	u/l=310	u/l=310	u/l=310	u/l=310	
		ø=35	ø=35	ø=79	ø=109	
24	16	630				VD4/P 24.06.16 p210
	20	630				VD4/P 24.06.20 p210
	25	630				VD4/P 24.06.25 p210
	16	1250				VD4/P 24.12.16 p210
	20	1250				VD4/P 24.12.20 p210
	25	1250				VD4/P 24.12.25 p210
	31.5	1250				VD4/P 24.12.32 p210
	16		630			VD4/P 24.06.16 p275
	20		630			VD4/P 24.06.20 p275
	25		630			VD4/P 24.06.25 p275
	16		1250			VD4/P 24.12.16 p275
	20		1250			VD4/P 24.12.20 p275
	25		1250			VD4/P 24.12.25 p275
	31.5		1250			VD4/P 24.12.32 p275
	16			1600		VD4/P 24.16.16 p275
	20			1600		VD4/P 24.16.20 p275
	25			1600		VD4/P 24.16.25 p275
	31.5			1600		VD4/P 24.16.32 p275
	16			2000		VD4/P 24.20.16 p275
	20			2000		VD4/P 24.20.20 p275
	25			2000		VD4/P 24.20.25 p275
	31.5			2000		VD4/P 24.20.32 p275
	16			2300 (1)		VD4/P 24.25.16 p275
	20			2300 (1)		VD4/P 24.25.20 p275
	25			2300 (1)		VD4/P 24.25.25 p275
	31.5			2300 (1)		VD4/P 24.25.32 p275
	31.5				2700 (2)	VD4/P 24.32.32 p275

W = Switchboard width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) 2500 A rated current guaranteed with forced ventilation.
(2) 3150 A rated current guaranteed with forced ventilation.

ВЯРНО С ОРИГИНАЛА

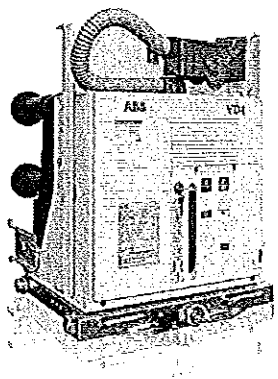
VD4 (36 kV) withdrawable circuit-breaker

Ur	Isc	Rated uninterrupted current (40 °C) [A]				
		H = 951				
		D = 788				
kV	kA	W = 778				Circuit-breaker type
		u/l = 380				
		ø = 399				
		P= 275				
36	20	1250 A				VD4/W 36.12.20 p275
	25	1250 A				VD4/W 36.12.25 p275
	31.5	1250 A				VD4/W 36.12.32 p275
	20		1600 A			VD4/W 36.16.20 p275
	25		1600 A			VD4/W 36.16.25 p275
	31.5		1600 A			VD4/W 36.16.32 p275
	20			2000 A		VD4/W 36.20.20 p275
	25			2000 A		VD4/W 36.20.25 p275
	31.5			2000 A		VD4/W 36.20.32 p275
	20				2500 A (1)	VD4/W 36.25.20 p275
	25				2500 A (1)	VD4/W 36.25.25 p275
	31.5				2500 A (1)	VD4/W 36.25.32 p275

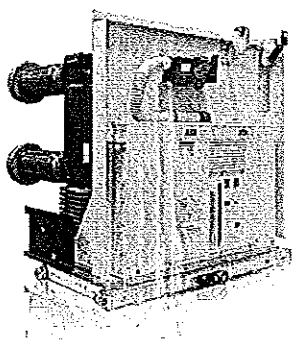
H = Height of the circuit-breaker.
D = Depth of the circuit-breaker.
W = Width of the circuit-breaker.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
P = Pole horizontal centre distance.
(1) 2500 A rated current guaranteed with forced ventilation

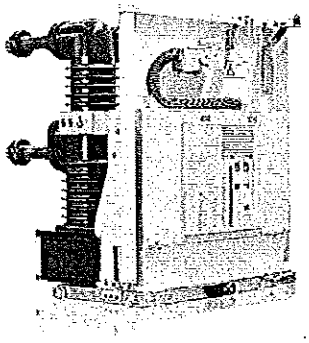
Standard fittings of withdrawable circuit-breakers for UniGear ZS1, ZS2 switchgear and similar panels

The basic versions of the withdrawable circuit-breakers are three-pole and fitted with:
- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten circuit-breaker open/closed auxiliary contacts
  Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever built into operating mechanism for linear loading of closing spring
- isolating contacts
- cord with connector (plug only) for auxiliary circuits, with striker pins which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is lower than the rated current of the panel
- racking-out/in lever (the quantity must be defined according to the number of pieces of apparatus ordered)
- locking electromagnet in the truck (compulsory for ABB switchgear). This device prevents racking the circuit-breaker into the switchgear with the auxiliary circuits disconnected (plug not inserted in the socket)
- door interlock (compulsory for ABB switchgear): this device prevents racking the circuit-breaker into the switchgear when the switchgear door is open.



VD4 with poles in polyamide



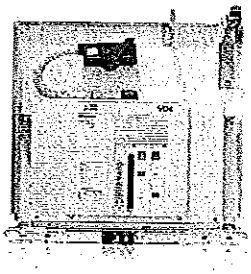


VD4 - 36 kV

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

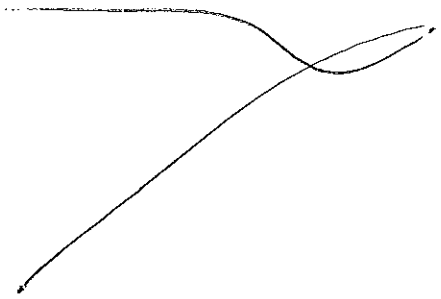
Withdrawable version circuit-breakers for PowerCube modules (12 kV) (5)



Circuit-breaker		VD4/P 12		VD4/W 12 (6)	
PowerCube module		PB1		PB2	
Standards	IEC 62271-100	•		•	
Rated voltage	Ur [kV]	12 (4)		12 (4)	
Rated insulation voltage	Us [kV]	12		12	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28		28	
Impulse withstand voltage	Up [kV]	75		75	
Rated frequency	fr [Hz]	50-60		50-60	
Rated normal current (40 °C) (1)	Ir [A]	630	1250	630	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16
		20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31.5
		—	—	—	—
		—	—	—	—
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16
		20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31.5
		—	—	—	—
		—	—	—	—
Making capacity	Ip [kA]	40	40	40	40
		50	50	50	50
		63	63	63	63
		80	80	80	80
		—	—	—	—
		—	—	—	—
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•		•	
Opening time	[ms]	33 ... 60		33 ... 60	
Arcing time	[ms]	10 ... 15		10 ... 15	
Total breaking time	[ms]	43 ... 75		43 ... 75	
Closing time	[ms]	30 ... 60		30 ... 60	
Maximum overall dimensions	H [mm]	628	628	691	691
	W [mm]	503	503	653	853
	D [mm]	662	662	642	642
	Pole distance P [mm]	150	150	210	210
Weight	[kg]	116	116	135	135
Standardised table of dimensions	TN	7412 (3)	7412 (3)	7420 (3)	7420 (3)
	1VCD	—	—	—	—
Operating temperature	[°C]	- 5 ... + 40		- 5 ... + 40	
Tropicalization	IEC: 60068-2-30, 60721-2-1	•		•	
Electromagnetic compatibility	IEC: 62271-1	•		•	

(1) Rated current guaranteed with circuit-breaker installed in PowerCube enclosure and with 40 °C ambient temperature
(2) Up to 4000 A with forced ventilation.
(3) Poles in polyamide
(4) Available in 10 kV voltage version in accordance with GOST standards
(5) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading, only possible with the door open, by means of a lever built into the front of the operating mechanism).
(6) VD4/W does not need insulation for the feed-through and tulip contacts in module PB2. On request, the same circuit-breaker with insulated feed-through and tulip contacts is available for installation in enclosures not produced by ABB (version VD4/PW).

ВЯРНО С ОРИГИНАЛА

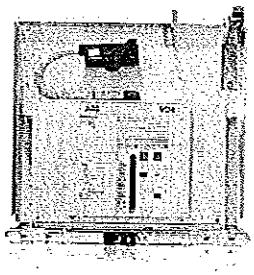


	VD4/P 12									VD4/W 12	
	PB2							PB3		PB3	
	•							•		•	
	12 (4)							12 (4)		12 (4)	
	12							12		12	
	28							28		28	
	75							75		75	
	50-60							50-60		50-60	
	1250	1250	1600	1600	1600	2000	2000	2500	2500	3150 (2)	3150 (2)
	—	—	—	—	—	—	—	—	—	—	—
	—	—	20	—	—	20	—	20	—	20	—
	—	—	25	—	—	25	—	25	—	25	—
	—	—	31.5	—	—	31.5	—	31.5	—	31,5	—
	40	—	—	40	—	40	—	40	—	40	—
	—	50	—	—	50	—	50	—	50	—	50
	—	—	—	—	—	—	—	—	—	—	—
	—	—	20	—	—	20	—	20	—	20	—
	—	—	25	—	—	25	—	25	—	25	—
	—	—	31.5	—	—	31.5	—	31.5	—	31,5	—
	40	—	—	40	—	40	—	40	—	40	—
	—	50	—	—	50	—	50	—	50	—	50
	—	—	—	—	—	—	—	—	—	—	—
	—	—	50	—	—	50	—	50	—	50	—
	—	—	63	—	—	63	—	63	—	63	—
	—	—	80	—	—	80	—	80	—	80	—
	100	—	—	100	—	100	—	100	—	100	—
	—	125	—	—	125	—	125	—	125	—	125
	•							•		•	
	33 ... 60							33 ... 60		33 ... 60	
	10 ... 15							10 ... 15		10 ... 15	
	43 ... 75							43 ... 75		43 ... 75	
	30 ... 60							30 ... 60		30 ... 60	
	691	691	691	691	691	690	691	691	691	730	691
	653	681	653	653	681	653	681	853	853	853	853
	641	643	642	641	643	642	643	640	643	640	643
	210	210	210	210	210	210	210	275	275	275	275
	174	180	160	174	180	160	190	186	225	221	240
	—	—	7415 (3)	—	—	7415 (3)	—	7417 (3)	—	—	—
	003284 (3)	003444	—	003284 (3)	003444	—	003444	—	003445	000152 (3)	003596
	- 5 ... + 40							- 5 ... + 40		- 5 ... + 40	
	•							•		•	
	•							•		•	

ВЯРНО С ОРИГИНАЛА

2. Selection and ordering
Withdrawable circuit-breakers

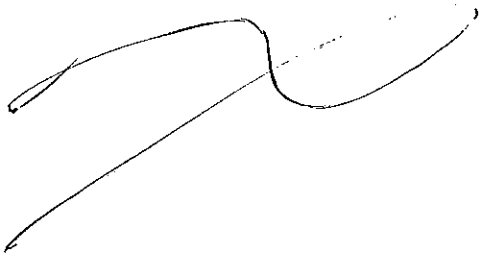
Withdrawable version circuit-breakers for PowerCube modules (17.5 kV) (4)



Circuit-breaker		VD4/P 17		VD4/W 17 (5)	
PowerCube module		PB1		PB2	
Standards	IEC 62271-100	•		•	
Rated voltage	Ur [kV]	17,5		17,5	
Rated insulation voltage	Us [kV]	17,5		17,5	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38		38	
mpulse withstand voltage	Up [kV]	95		95	
Rated frequency	fr [Hz]	50-60		50-60	
Rated normal current (40 °C) (1)	Ir [A]	630	1250	630	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16
		20	20	20	20
		25	25	25	25
		31,5	31,5	31,5	31,5
		–	–	–	–
		–	–	–	–
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16
		20	20	20	20
		25	25	25	25
		31,5	31,5	31,5	31,5
		–	–	–	–
		–	–	–	–
Making capacity	Ip [kA]	40	40	40	40
		50	50	50	50
		63	63	63	63
		80	80	80	80
		–	–	–	–
		–	–	–	–
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•		•	
Opening time	[ms]	33 ... 60		33 ... 60	
Arcing time	[ms]	10 ... 15		10 ... 15	
Total breaking time	[ms]	43 ... 75		43 ... 75	
Closing time	[ms]	30 ... 60		30 ... 60	
Maximum overall dimensions	H [mm]	628	628	691	691
	W [mm]	503	503	653	653
	D [mm]	662	662	642	642
	Pole distance P [mm]	150	150	210	210
Weight	[kg]	116	116	135	135
Standardised table of dimensions	TN	7412 (3)	7412 (3)	7420 (3)	7420 (3)
	1VCD	–	–	–	–
Operating temperature	[°C]	- 5 ... + 40		- 5 ... + 40	
Tropicalization	IEC: 60068-2-30, 60721-2-1	•		•	
Electromagnetic compatibility	IEC: 62271-1	•		•	

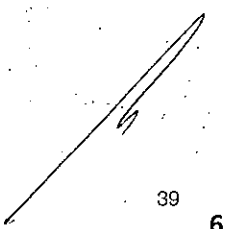
(1) Rated current guaranteed with circuit-breaker installed in PowerCube enclosure and with 40 °C ambient temperature.
(2) Up to 4000 A with forced ventilation.
(3) Poles in polyamide.
(4) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading, only possible with the door open, by means of a lever built into the front of the operating mechanism).
(5) VD4/W does not need insulation for the feed-through and tulip contacts in module PB2. On request, the same circuit-breaker with insulated feed-through and tulip contacts is available for installation in enclosures not produced by ABB (version VD4/PW).

ВЫПИСЬ С ОРИГИНАЛА



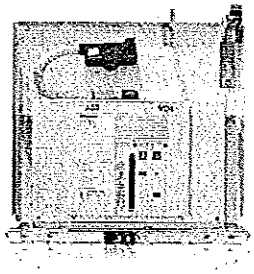
	VD4/P 17									VD4/W 17	
	PB2							PB3		PB3	
	•							•		•	
	17,5							17,5		17,5	
	17,5							17,5		17,5	
	38							38		38	
	95							95		95	
	50-60							50-60		50-60	
	1250	1250	1600	1600	1600	2000	2000	2500	2500	3150 [2]	3150 [2]
	–	–	–	–	–	–	–	–	–	–	–
	–	–	20	–	–	20	–	20	–	20	–
	–	–	25	–	–	25	–	25	–	25	–
	–	–	31,5	–	–	31,5	–	31,5	–	31,5	–
	40	–	–	40	–	40	–	40	–	40	–
	–	50	–	–	50	–	50	–	50	–	50
	–	–	–	–	–	–	–	–	–	–	–
	–	–	20	–	–	20	–	20	–	20	–
	–	–	25	–	–	25	–	25	–	25	–
	–	–	31,5	–	–	31,5	–	31,5	–	31,5	–
	40	–	–	40	–	40	–	40	–	40	–
	–	50	–	–	50	–	50	–	50	–	50
	–	–	–	–	–	–	–	–	–	–	–
	–	–	50	–	–	50	–	50	–	50	–
	–	–	63	–	–	63	–	63	–	63	–
	–	–	80	–	–	80	–	80	–	80	–
	100	–	–	100	–	100	–	100	–	100	–
	–	125	–	–	125	–	125	–	125	–	125
	•							•		•	
	33 ... 60							33 ... 60		33 ... 60	
	10 ... 15							10 ... 15		10 ... 15	
	43 ... 75							43 ... 75		43 ... 75	
	30 ... 60							30 ... 60		30 ... 60	
	691	691	691	691	691	690	691	691	691	730	691
	653	681	653	653	681	653	681	853	853	853	853
	641	643	642	641	643	642	643	640	643	640	643
	210	210	210	210	210	210	210	275	275	275	275
	174	180	160	174	180	160	190	186	225	221	240
	–	–	7415 [3]	–	–	7415 [3]	–	7417 [3]	–	–	–
	003284 [3]	003444	–	003284 [3]	003444	–	003444	–	003445	000152 [3]	003596
	- 5 ... + 40							- 5 ... + 40		- 5 ... + 40	
	•							•		•	
	•							•		•	

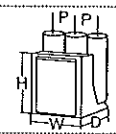
КОПИЯ С ОРИГИНАЛА



2. Selection and ordering
Withdrawable circuit-breakers

Withdrawable version circuit-breakers for PowerCube modules (24 kV) (4)



Circuit-breaker		VD4/P 24				
PowerCube module		PB4		PB5		
Standards	IEC 62271-100	•		•		
Rated voltage	Ur [kV]	24		24		
Rated insulation voltage	Us [kV]	24		24		
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50		50		
Impulse withstand voltage	Up [kV]	125		125		
Rated frequency	fr [Hz]	50-60		50-60		
Rated normal current (40 °C) (1)	Ir [A]	630	1250	1600	2000	2500 (2)
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16
		20	20	20	20	20
		25	25	25	25	25
		–	31,5	31,5	31,5	31,5
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16
		20	20	20	20	20
		25	25	25	25	25
		–	31,5	31,5	31,5	31,5
Making capacity	Ip [kA]	40	40	40	40	40
		50	50	50	50	50
		63	63	63	63	63
		–	80	80	80	80
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•
Opening time	[ms]	33 ... 60		33 ... 60		
Arcing time	[ms]	10 ... 15		10 ... 15		
Total breaking time	[ms]	43 ... 75		43 ... 75		
Closing time	[ms]	30 ... 60		30 ... 60		
Maximum overall dimensions 	H [mm]	794	794	838	838	838
	W [mm]	653	653	853	853	853
	D [mm]	802	802	790	790	790
	Pole distance P [mm]	210	210	275	275	275
Weight	[kg]	140	140/146 (3)	228	228	228
Standardised table of dimensions	TN	7413	7413	7418	7418	7418
	1VCD	–	000173 (3)	–	–	–
Operating temperature	[°C]	- 5 ... + 40				
Tropicalization	IEC: 60068-2-30, 60721-2-1	•				
Electromagnetic compatibility	IEC: 62271-1	•				

(1) Rated current guaranteed with circuit-breaker installed in PowerCube enclosure and with 40 °C ambient temperature.
(2) 2300 A rated uninterrupted current guaranteed with natural ventilation; 2500 A rated current guaranteed with forced ventilation.
(3) 31.5 kA version.
(4) On request, the closing spring can be loaded by means of a removable crank handle outside operating mechanism (instead of linear loading, only possible with the door open, by means of a lever built into the front of the operating mechanism).

ЗС ОРИГИНАЛА

Types of withdrawable version circuit-breakers available for PowerCube modules

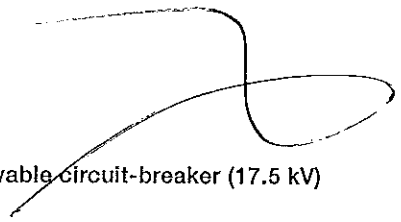
Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4 withdrawable circuit-breaker (12 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]				
		W=650	W=750	W=750	W=1000	
		P=150	P=210	P=210	P=275	Circuit-breaker type
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	
		ø=35	ø=35	ø=79	ø=109	
12	16	630				VD4/P 12.06.16 p150
	20	630				VD4/P 12.06.20 p150
	25	630				VD4/P 12.06.25 p150
	31.5	630				VD4/P 12.06.32 p150
	16	1250				VD4/P 12.12.16 p150
	20	1250				VD4/P 12.12.20 p150
	25	1250				VD4/P 12.12.25 p150
	31.5	1250				VD4/P 12.12.32 p150
	16		630			VD4/W 12.06.16 p210
	20		630			VD4/W 12.06.20 p210
	25		630			VD4/W 12.06.25 p210
	31.5		630			VD4/W 12.06.32 p210
	16		1250			VD4/W 12.12.16 p210
	20		1250			VD4/W 12.12.20 p210
	25		1250			VD4/W 12.12.25 p210
	31.5		1250			VD4/W 12.12.32 p210
	40			1250		VD4/P 12.12.40 p210
	50			1250		VD4/P 12.12.50 p210
	20			1600		VD4/P 12.16.20 p210
	25			1600		VD4/P 12.16.25 p210
	31.5			1600		VD4/P 12.16.32 p210
	40			1600		VD4/P 12.16.40 p210
	50			1600		VD4/P 12.16.50 p210
	20			2000		VD4/P 12.20.20 p210
	25			2000		VD4/P 12.20.25 p210
	31.5			2000		VD4/P 12.20.32 p210
	40			2000		VD4/P 12.20.40 p210
	50			2000		VD4/P 12.20.50 p210
	20				2500	VD4/P 12.25.20 p275
	25				2500	VD4/P 12.25.25 p275
	31.5				2500	VD4/P 12.25.32 p275
	40				2500	VD4/P 12.25.40 p275
	50				2500	VD4/P 12.25.50 p275
	20				3150 (1)	VD4/W 12.32.20 p275
	25				3150 (1)	VD4/W 12.32.25 p275
	31.5				3150 (1)	VD4/W 12.32.32 p275
	40				3150 (1)	VD4/W 12.32.40 p275
	50				3150 (1)	VD4/W 12.32.50 p275

W = Enclosure width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A with forced ventilation.

2. Selection and ordering
Withdrawable circuit-breakers



VD4 withdrawable circuit-breaker (17.5 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]				Circuit-breaker type
		W=650	W=750	W=750	W=1000	
		P=150	P=210	P=210	P=275	
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	
		ø=35	ø=35	ø=79	ø=109	
	16	630				VD4/P 17.06.16 p150
	20	630				VD4/P 17.06.20 p150
	25	630				VD4/P 17.06.25 p150
	31.5	630				VD4/P 17.06.32 p150
	16	1250				VD4/P 17.12.16 p150
	20	1250				VD4/P 17.12.20 p150
	25	1250				VD4/P 17.12.25 p150
	31.5	1250				VD4/P 17.12.32 p150
	16		630			VD4/W 17.06.16 p210
	20		630			VD4/W 17.06.20 p210
	25		630			VD4/W 17.06.25 p210
	31.5		630			VD4/W 17.06.32 p210
	16		1250			VD4/W 17.12.16 p210
	20		1250			VD4/W 17.12.20 p210
	25		1250			VD4/W 17.12.25 p210
	31.5		1250			VD4/W 17.12.32 p210
	40			1250		VD4/P 17.12.40 p210
	50			1250		VD4/P 17.12.50 p210
	20			1600		VD4/P 17.16.20 p210
17.5	25			1600		VD4/P 17.16.25 p210
	31.5			1600		VD4/P 17.16.32 p210
	40			1600		VD4/P 17.16.40 p210
	50			1600		VD4/P 17.16.50 p210
	20			2000		VD4/P 17.20.20 p210
	25			2000		VD4/P 17.20.25 p210
	31.5			2000		VD4/P 17.20.32 p210
	40			2000		VD4/P 17.20.40 p210
	50			2000		VD4/P 17.20.50 p210
	20				2500	VD4/P 17.25.20 p275
	25				2500	VD4/P 17.25.25 p275
	31.5				2500	VD4/P 17.25.32 p275
	40				2500	VD4/P 17.25.40 p275
	50				2500	VD4/P 17.25.50 p275
	20				3150 (1)	VD4/W 17.32.20 p275
	25				3150 (1)	VD4/W 17.32.25 p275
	31.5				3150 (1)	VD4/W 17.32.32 p275
	40				3150 (1)	VD4/W 17.32.40 p275
	50				3150 (1)	VD4/W 17.32.50 p275

W = Enclosure width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A with forced ventilation.

КОПИЯ С ОРИГИНАЛА

VD4 withdrawable circuit-breaker (24 kV)

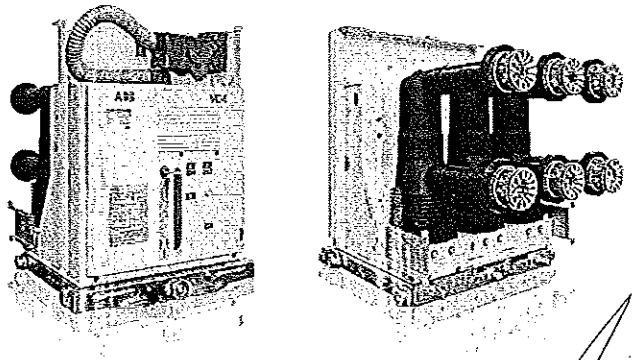
Ur	Isc	Rated uninterrupted current (40 °C) [A]		Circuit-breaker type
		W=800	W=1000	
kV	kA	P=210	P=275	
		u/l=310	u/l=310	
		ø=35	ø=79	
24	16	630		VD4/P 24.06.16 p210
	20	630		VD4/P 24.06.20 p210
	25	630		VD4/P 24.06.25 p210
	16	1250		VD4/P 24.12.16 p210
	20	1250		VD4/P 24.12.20 p210
	25	1250		VD4/P 24.12.25 p210
	31.5	1250		VD4/P 24.12.32 p210
	16		1600	VD4/P 24.16.16 p275
	20		1600	VD4/P 24.16.20 p275
	25		1600	VD4/P 24.16.25 p275
	31.5		1600	VD4/P 24.16.32 p275
	16		2000	VD4/P 24.20.16 p275
	20		2000	VD4/P 24.20.20 p275
	25		2000	VD4/P 24.20.25 p275
	31.5		2000	VD4/P 24.20.32 p275
	16		2300 (1)	VD4/P 24.25.16 p275
	20		2300 (1)	VD4/P 24.25.20 p275
	25		2300 (1)	VD4/P 24.25.25 p275
	31.5		2300 (1)	VD4/P 24.25.32 p275

W = Enclosure width.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
Ø = Diameter of the isolating contact.
(1) Up to 2500 A rated current guaranteed with forced ventilation.

Standard fittings of withdrawable circuit-breakers for PowerCube modules

The basic versions of the withdrawable circuit-breakers are always three-pole and fitted with:

- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten circuit-breaker open/closed auxiliary contacts
  Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever built into operating mechanism for linear loading of closing spring
- isolating contacts
- cord with connector (plug only) for auxiliary circuits, with striker pin which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
- locking electromagnet in the truck. This prevents the circuit-breaker being racked into the panel with the auxiliary circuits disconnected (plug not inserted in the socket).
- door interlock (compulsory for ABB switchgear); this device prevents racking the circuit-breaker into the switchgear when the switchgear door is open.



VD4 with poles in polyamide

ВЗЯТО С ОРИГИНАЛА

4. Handling

Before carrying out any operations, always make sure that the operating mechanism spring is discharged and that the apparatus is in the open position.
To lift and handle the circuit-breaker, proceed as follows (fig. 2):

- use a special lifting tool (1) (not supplied) fitted with ropes with safety hooks (2);
- insert the hooks (2) in the supports (3) fixed to the frame of the circuit-breaker and lift. Put the hooks (2) into the support holes (3) according to the type of apparatus (see table);
- on completion of the operation (and in any case before putting into service) unhook the lifting tool (1) and dismantle the supports (3) from the frame.

During handling, take great care not to stress the insulating parts and the terminals of the circuit-breaker.

⚠ **The apparatus must not be handled by putting lifting devices directly under the apparatus itself. Should it be necessary to use this technique, put the circuit-breaker onto a pallet or a sturdy supporting surface (see fig. 3).**
In any case, it is always advisable to carry out lifting using the supports (3).

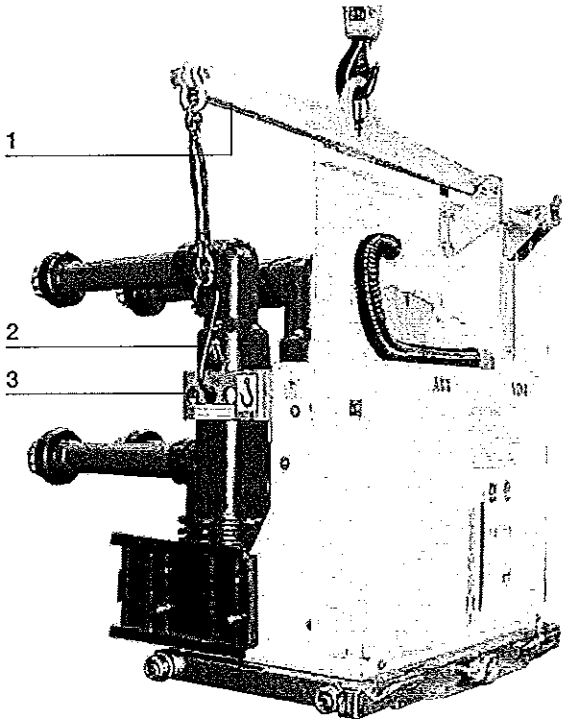
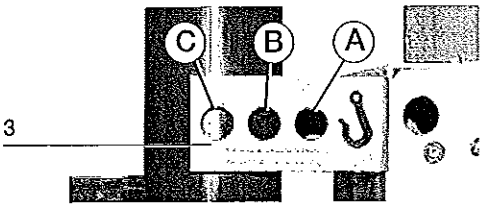


Fig. 2



Version	Pole centre distance	Rated current	Hole
Fixed	150-210 mm	up to 1250 A	A
Fixed	275 mm	from 1600 to 3150 A	A
Fixed	210 mm	from 1600 to 2000 A	A
Fixed	210-275 mm	up to 4000 A	C
Withdrawable	150 mm	up to 1250 A	A
Withdrawable	210 mm	from 1600 to 2500 A	B
Withdrawable	275 mm	up to 1250 A	B
Withdrawable	275 mm	from 1600 to 3150 A	C
Withdrawable	210 mm	up to 1250 A	C
Withdrawable	210-275 mm	up to 4000 A	C

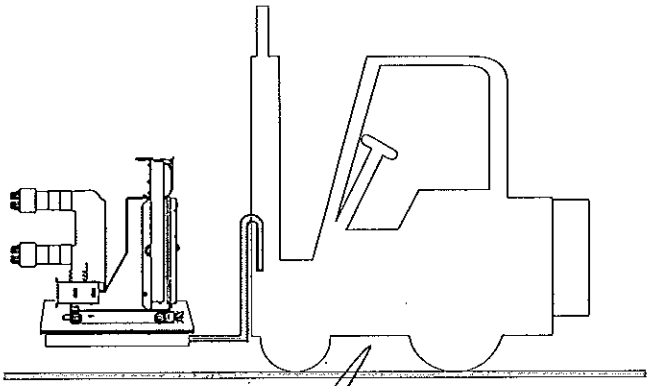


Fig. 3

ВЯРНО С ОРИГИНАЛА

5. Description

5.1. General

The VD4 are vacuum circuit-breaker for indoor installation. For the electrical performances, please refer to the corresponding technical catalogue code 1VCP000001.
For special installation requirements, please contact ABB.
The following versions are available:
- fixed
- withdrawable for UniGear ZS1 switchgear and PowerCube modules.

5.2. Reference Standards

The VD4 circuit-breakers conform to the IEC 62271-100, CEI - VDE - BS Standards are equivalent to IEC Standards due to harmonization with IEC.

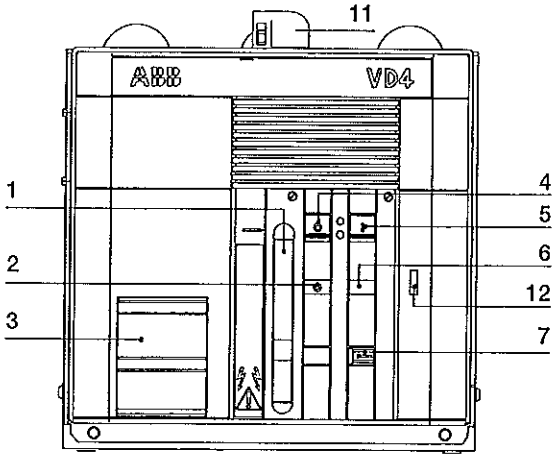
5.3. EL operating mechanism

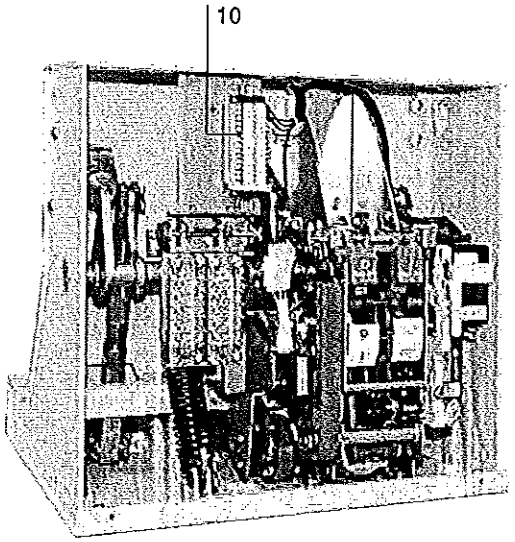
VD4 circuit-breakers are equipped with modular EL spring operating mechanisms. The operating mechanism is designed to cover the whole range of performances as shown in the following table:

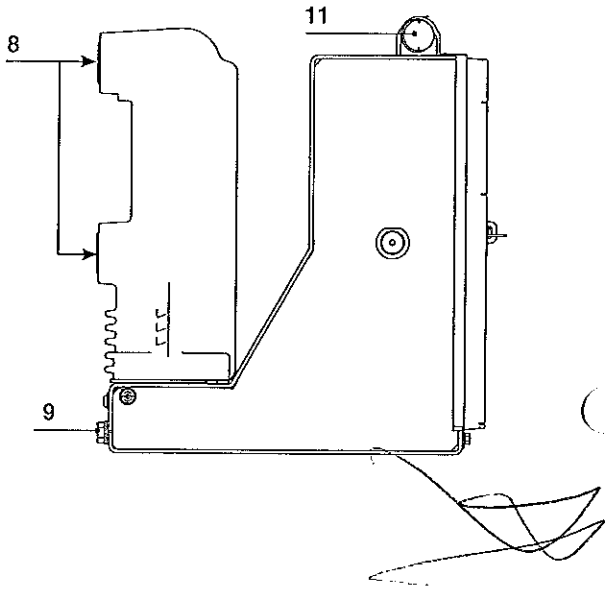
Type of operating mechanism	Rated short-circuit current
EL1 - EL2	Up to 31.5 kA
EL3	Up to 40 kA - 24 kV, 31.5 kA
EL1 TWIN	Up to 50 kA (rated current up to 2000 A)
EL2 TWIN	Up to 50 kA (rated current ≥ 2500 A)

5.4. Fixed circuit-breakers

The fixed circuit-breaker (fig. 4) is the basic version complete with structure and front protection screen. The fixing holes are made in the lower part of the structure.
For the electrical connections of the circuit-breaker auxiliary circuits, the terminal box (10) is available (also see par. 7.8.1.).
The earthing screw is placed in the rear part of the circuit-breaker. For further details please see the caption to figure 4.





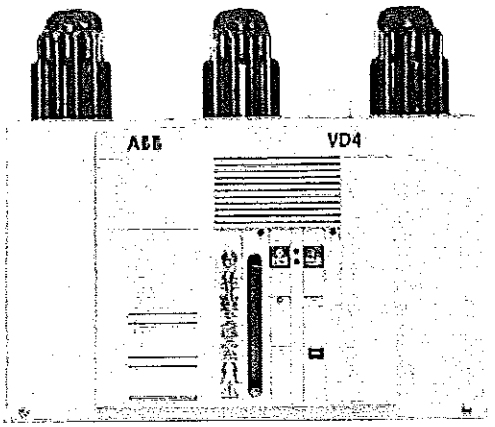


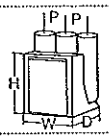
Caption
1 Lever for manual closing spring charging
2 Signalling device for circuit-breaker open/closed
3 Rating plate
4 Opening pushbutton
5 Closing pushbutton
6 Signalling device for closing spring charged/discharged
7 Operation counter
8 Terminals
9 Earthing screw
10 Delivery terminal box
11 Cabling connection
12 Mechanical override of the undervoltage release (on request)

Fig. 4

ВЯРНО С ОРИГИНАЛА

General characteristics of fixed circuit-breakers (12 kV)



Circuit-breaker		VD4 12 (1)									
Standards	IEC 62271-100	•									
	VDE 0671; CEI EN 62271-100- File 7642	•									
Rated voltage	Ur [kV]	12									
Rated insulation voltage	Us [kV]	12									
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28									
Impulse withstand voltage	Up [kV]	75									
Rated frequency	fr [Hz]	50-60									
Rated normal current (40 °C)	Ir [A]	630	630	630	1250	1250	1250	1250	1250	1250	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	–	–	–	–
		20	20	20	20	20	20	–	–	–	–
		25	25	25	25	25	25	–	–	–	–
		31.5	31.5	31.5	31.5	31.5	31.5	–	–	–	–
		–	–	–	–	–	–	40	40	–	–
		–	–	–	–	–	–	–	–	50	50
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	–	–	–	–
		20	20	20	20	20	20	–	–	–	–
		25	25	25	25	25	25	–	–	–	–
		31.5	31.5	31.5	31.5	31.5	31.5	–	–	–	–
		–	–	–	–	–	–	40	40	–	–
		–	–	–	–	–	–	–	–	50	50
Making capacity	Ip [kA]	40	40	40	40	40	40	–	–	–	–
		50	50	50	50	50	50	–	–	–	–
		63	63	63	63	63	63	–	–	–	–
		80	80	80	80	80	80	–	–	–	–
		–	–	–	–	–	–	100	100	–	–
		–	–	–	–	–	–	–	–	125	125
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60									
Arcing time	[ms]	10 ... 15									
Total breaking time	[ms]	43 ... 75									
Closing time	[ms]	60 ... 80									
Maximum overall dimensions 	H [mm]	461	461	461	461	461	461	589	589	610	610
	W [mm]	450	570	700	450	570	700	570	700	600	750
	D [mm]	424	424	424	424	424	424	424	424	459	459
	Pole distance P [mm]	150	210	275	150	210	275	210	275	210	275
Weight	[kg]	73	75	79	73	75	79	84	84	146	158
Standardised table of dimensions	TN	7405	7406	–	7405	7406	–	–	–	–	–
	1VCD	–	–	000051	–	–	000051	003282	003285	003440	003441
Operating temperature	[°C]	- 5 ... + 40									
Tropicalization	IEC: 60068-2-30, 60721-2-1	•									
Electromagnetic compatibility	IEC: 62271-1	•									

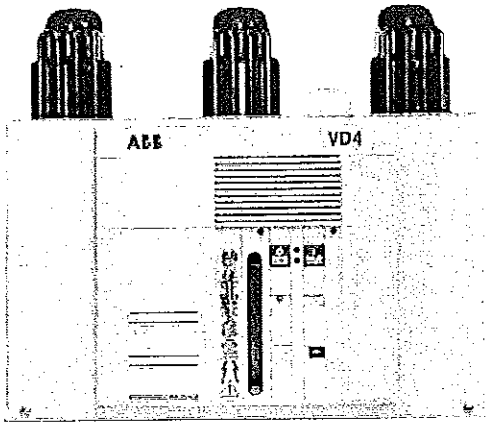
(1) Circuit-breakers up to 1250 A and 31.5 kA have polyamide poles.

ВЯРНО С ОРИГИНАЛА

	•															
	•															
	12															
	12															
	28															
	75															
	50-60															
	1600	1600	1600	1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	2500	3150	3150
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	20	20	—	—	—	—	20	20	—	—	20	20	—	20	—
	25	25	25	—	—	—	—	25	25	—	—	25	25	—	25	—
	31.5	31.5	31.5	—	—	—	—	31.5	31.5	—	—	31,5	31,5	—	31.5	—
	—	—	—	40	40	—	—	40	40	—	—	—	40	—	40	—
	—	—	—	—	—	50	50	—	—	50	50	—	—	50	—	50
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	20	20	—	—	—	—	20	20	—	—	20	20	—	20	—
	25	25	25	—	—	—	—	25	25	—	—	25	25	—	25	—
	31.5	31.5	31.5	—	—	—	—	31.5	31.5	—	—	31.5	31.5	—	31.5	—
	—	—	—	40	40	—	—	40	40	—	—	—	40	—	40	—
	—	—	—	—	—	50	50	—	—	50	50	—	—	50	—	50
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	50	50	50	—	—	—	—	50	50	—	—	50	50	—	50	—
	63	63	63	—	—	—	—	63	63	—	—	63	63	—	63	—
	80	80	80	—	—	—	—	80	80	—	—	80	80	—	80	—
	—	—	—	100	100	—	—	100	100	—	—	—	100	—	100	—
	—	—	—	—	—	125	125	—	—	125	125	—	—	125	—	125
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	—
	33 ... 60															
	10 ... 15															
	43 ... 75															
	60 ... 80															
	599	599	599	589	589	610	610	599	599	610	610	599	599	610	635	636
	450	570	700	570	700	600	750	570	700	600	750	570	700	750	700	750
	424	424	424	424	424	459	459	424	424	459	459	424	424	459	424	459
	150	210	275	210	275	210	275	210	275	210	275	210	275	275	275	275
	93	98	105	84	84	146	158	98	105	146	158	98	105	163	140	177
	—	7407	7408	—	—	—	—	7407	7408	—	—	7407	7408	—	—	—
	000050	—	—	003282	003285	003440	003441	—	—	003440	003441	—	—	003441	000149	003443
	- 5 ... + 40															
	•															
	•															

ВЯРНО С ОРИГИНАЛА

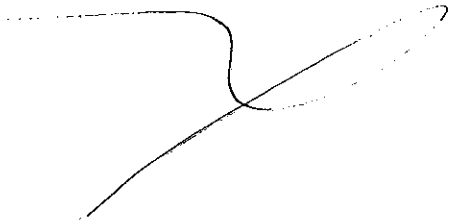
General characteristics of fixed circuit-breakers (17.5 kV)



Circuit-breaker		VD4 17 (1)									
Standards	IEC 62271-100	•									
	VDE 0671; CEI EN 62271-100- File 7642	•									
Rated voltage	Ur [kV]	17.5									
Rated insulation voltage	Us [kV]	17.5									
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38									
Impulse withstand voltage	Up [kV]	95									
Rated frequency	fr [Hz]	50-60									
Rated normal current (40 °C)	Ir [A]	630	630	630	1250	1250	1250	1250	1250	1250	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	–	–	–	–
		20	20	20	20	20	20	–	–	–	–
		25	25	25	25	25	25	–	–	–	–
		31.5	31.5	31.5	31.5	31.5	31.5	–	–	–	–
		–	–	–	–	–	–	40	40	–	–
		–	–	–	–	–	–	–	–	50	50
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	–	–	–	–
		20	20	20	20	20	20	–	–	–	–
		25	25	25	25	25	25	–	–	–	–
		31.5	31.5	31.5	31.5	31.5	31.5	–	–	–	–
		–	–	–	–	–	–	40	40	–	–
		–	–	–	–	–	–	–	–	50	50
Making capacity	Ip [kA]	40	40	40	40	40	40	–	–	–	–
		50	50	50	50	50	50	–	–	–	–
		63	63	63	63	63	63	–	–	–	–
		80	80	80	80	80	80	–	–	–	–
		–	–	–	–	–	–	100	100	–	–
		–	–	–	–	–	–	–	–	125	125
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60									
Arcing time	[ms]	10 ... 15									
Total breaking time	[ms]	43 ... 75									
Closing time	[ms]	60 ... 80									
Maximum overall dimensions	H [mm]	461	461	461	461	461	461	589	589	610	610
	W [mm]	450	570	700	450	570	700	570	700	600	750
	D [mm]	424	424	424	424	424	424	424	424	459	459
	Pole distance P [mm]	150	210	275	150	210	275	210	275	210	275
Weight	[kg]	73	75	79	73	75	79	84	84	146	158
Standardised table of dimensions	TN	7405	7406	–	7405	7406	–	–	–	–	–
	1VCD	–	–	000051	–	–	000051	003282	003285	003440	003441
Operating temperature	[°C]	- 5 ... + 40									
Tropicalization	IEC: 60068-2-30, 60721-2-1	•									
Electromagnetic compatibility	IEC: 62271	•									

(1) Circuit-breakers up to 1250 A and 31.5 kA have polyamide poles.

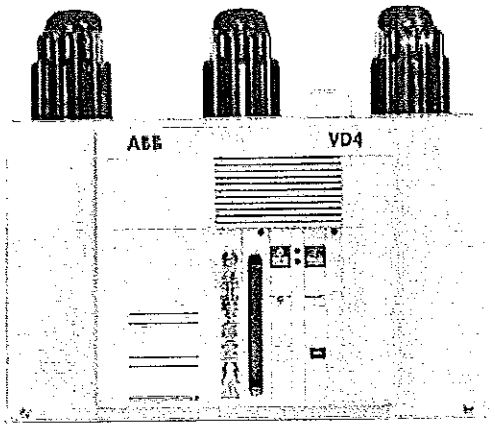
ВЯРНО С ОРИГИНАЛА

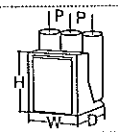


•														
•														
17.5														
17.5														
38														
95														
50-60														
1600	1600	1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	2500	3150	3150
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
20	20	–	–	–	–	20	20	–	–	20	20	–	20	–
25	25	–	–	–	–	25	25	–	–	25	25	–	25	–
31.5	31.5	–	–	–	–	31.5	31.5	–	–	31.5	31.5	–	31.5	–
–	–	40	40	–	–	40	40	–	–	–	40	–	40	–
–	–	–	–	50	50	–	–	50	50	–	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
20	20	–	–	–	–	20	20	–	–	20	20	–	20	–
25	25	–	–	–	–	25	25	–	–	25	25	–	25	–
31.5	31.5	–	–	–	–	31.5	31.5	–	–	31.5	31.5	–	31.5	–
–	–	40	40	–	–	40	40	–	–	–	40	–	40	–
–	–	–	–	50	50	–	–	50	50	–	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
50	50	–	–	–	–	50	50	–	–	50	50	–	50	–
63	63	–	–	–	–	63	63	–	–	63	63	–	63	–
80	80	–	–	–	–	80	80	–	–	80	80	–	80	–
–	–	100	100	–	–	100	100	–	–	–	100	–	100	–
–	–	–	–	125	125	–	–	125	125	–	–	125	–	125
•	•	•	•	•	•	•	•	•	•	•	•	•	•	–
33 ... 60														
10 ... 15														
43 ... 75														
60 ... 80														
599	599	589	589	610	610	599	599	610	610	599	599	610	635	636
570	700	570	700	600	750	570	700	600	750	570	700	750	700	750
424	424	424	424	459	459	424	424	459	459	424	424	459	424	459
210	275	210	275	210	275	210	275	210	275	210	275	275	275	275
98	105	84	84	146	158	98	105	146	158	98	105	163	140	177
7407	7408	–	–	–	–	7407	7408	–	–	7407	7408	–	–	–
–	–	003282	003285	003440	003441	–	–	003440	003441	–	–	003441	000149	003443
- 5 ... + 40														
•														
•														

ВЯРНО С ОРИГИНАЛА

General characteristics of fixed circuit-breakers (24 kV)

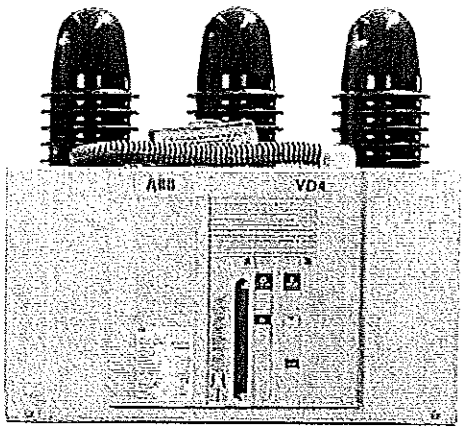


Circuit-breaker		VD4 24						
Standards	IEC 62271-100	•						
	VDE 0671; CEI EN 62271-100- File 7642	•						
Rated voltage	Ur [kV]	24						
Rated insulation voltage	Us [kV]	24						
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50						
Impulse withstand voltage	Up [kV]	125						
Rated frequency	fr [Hz]	50-60						
Rated normal current (40 °C)	Ir [A]	630	630	1250	1250	1600	2000	2500
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	–
		20	20	20	20	20	20	–
		25	25	25	25	25	25	25
		–	–	31.5	–	31.5	31.5	31.5
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	–
		20	20	20	20	20	20	–
		25	25	25	25	25	25	25
		–	–	31.5	–	31.5	31.5	31.5
Making capacity	Ip [kA]	40	40	40	40	40	40	–
		50	50	50	50	50	50	–
		63	63	63	63	63	63	63
		–	–	80	–	80	80	80
Operation sequence	(O - 0.3 s - CO - 15 s - CO)	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60						
Arcing time	[ms]	10 ... 15						
Total breaking time	[ms]	43 ... 75						
Closing time	[ms]	60 ... 80						
Maximum overall dimensions 	H [mm]	631	631	631	631	642	642	642
	W [mm]	570	700	570	700	700	700	700
	D [mm]	424	424	424	424	424	424	424
	Pole distance P [mm]	210	275	210	275	275	275	275
Weight	[kg]	100	104	100/106 (1)	104	110	110	110
Standardised table of dimensions	TN	7409	7410	7409	7410	7411	7411	7411
	1VCD	–	–	000172 (1)	–	–	–	–
Operating temperature	[°C]	- 5 ... + 40						
Tropicalization	IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility	IEC: 62271-1	•						

(1) 31.5 kA version.

ВЯРНО С ОРИГИНАЛА

General characteristics of fixed circuit-breakers (36 kV)



Circuit-breaker		VD4 36			
Standards	IEC 62271-100	•			
	VDE 0671; CEI EN 62271-100- File 7642	•			
Rated voltage	Ur [kV]	36			
Rated insulation voltage	Us [kV]	36			
Withstand voltage at 50 Hz	Ud (1 min) [kV]	70			
Impulse withstand voltage	Up [kV]	170			
Rated frequency	fr [Hz]	50-60			
Rated normal current (40 °C)	Ir [A]	1250	1600	2000	2500 (*)
		–	–	–	–
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	31.5	31.5	31.5	31.5
		–	–	–	–
		–	–	–	–
Rated short-time withstand current (3s)	Ik [kA]	31.5	31.5	31.5	31.5
		–	–	–	–
		–	–	–	–
Making capacity	Ip [kA]	80	80	80	80
		–	–	–	–
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•
Opening time	[ms]	35 ... 60			
Arcing time	[ms]	10 ... 15			
Total breaking time	[ms]	45 ... 75			
Closing time	[ms]	60 ... 80			
Maximum overall dimensions	H [mm]	564	564	564	–
	W [mm]	778	778	778	–
	D [mm]	468	468	468	–
	Pole distance P [mm]	275	275	275	–
Weight	[kg]	150	150	170	–
Standardised table of dimensions	TN	1VYN300901-LT	1VYN300901-LT	1VYN300901-LT	–
Operating temperature	[°C]	- 5 ... + 40			
Tropicalization	IEC: 60068-2-30, 60721-2-1	•			
Electromagnetic compatibility	IEC: 62271-1	•			

(*) Contact ABB

ВЯРНО С ОРИГИНАЛА

5.4.2. Types of circuit-breakers available in the fixed version

VD4 fixed circuit-breaker without bottom and top terminals (12 kV)

Ur	Isc	Rated uninterrupted current (40°C) [A]											
		H=461			H=589		H=599			H=610		H=636	
		D=424			D=424		D=424			D=459		D=459	
		u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	Circuit-breaker type
kV	kA	l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
	16	630											VD4 12.06.16 p150
	20	630											VD4 12.06.20 p150
	25	630											VD4 12.06.25 p150
	31.5	630											VD4 12.06.32 p150
	16	1250											VD4 12.12.16 p150
	20	1250											VD4 12.12.20 p150
	25	1250											VD4 12.12.25 p150
	31.5	1250											VD4 12.12.32 p150
	20						1600						VD4 12.16.20 p150
	25						1600						VD4 12.16.25 p150
	31.5						1600						VD4 12.16.32 p150
	16		630										VD4 12.06.16 p210
	20		630										VD4 12.06.20 p210
	25		630										VD4 12.06.25 p210
	31.5		630										VD4 12.06.32 p210
	16		1250										VD4 12.12.16 p210
	20		1250										VD4 12.12.20 p210
	25		1250										VD4 12.12.25 p210
	31.5		1250										VD4 12.12.32 p210
	40				1250								VD4 12.12.40 p210
	50									1250			VD4 12.12.50 p210
	20							1600					VD4 12.16.20 p210
12	25							1600					VD4 12.16.25 p210
	31.5							1600					VD4 12.16.32 p210
	40				1600								VD4 12.16.40 p210
	50									1600			VD4 12.16.50 p210
	20							2000					VD4 12.20.20 p210
	25							2000					VD4 12.20.25 p210
	31.5							2000					VD4 12.20.32 p210
	40							2000					VD4 12.20.40 p210
	50									2000			VD4 12.20.50 p210
	20							2500					VD4 12.25.20 p210
	25							2500					VD4 12.25.25 p210
	31.5							2500					VD4 12.25.32 p210
	16			630									VD4 12.06.16 p275
	20			630									VD4 12.06.20 p275
	25			630									VD4 12.06.25 p275
	31.5			630									VD4 12.06.32 p275
	16			1250									VD4 12.12.16 p275
	20			1250									VD4 12.12.20 p275
	25			1250									VD4 12.12.25 p275
	31.5			1250									VD4 12.12.32 p275
	40					1250							VD4 12.12.40 p275
	50										1250		VD4 12.12.50 p275

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

ВЯРНО С ОРИГИНАЛА

Ur	Isc	Rated uninterrupted current (40 °C) [A]											Circuit-breaker type
		H=461			H=589		H=599			H=610		H=636	
		D=424			D=424		D=424			D=459		D=459	
kV	kA	u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	
		l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
12	20								1600				VD4 12.16.20 p275
	25								1600				VD4 12.16.25 p275
	31.5								1600				VD4 12.16.32 p275
	40					1600							VD4 12.16.40 p275
	50										1600		VD4 12.16.50 p275
	20								2000				VD4 12.20.20 p275
	25								2000				VD4 12.20.25 p275
	31.5								2000				VD4 12.20.32 p275
	40								2000				VD4 12.20.40 p275
	50										2000		VD4 12.20.50 p275
	20								2500				VD4 12.25.20 p275
	25								2500				VD4 12.25.25 p275
	31.5								2500				VD4 12.25.32 p275
	40								2500				VD4 12.25.40 p275
	50										2500		VD4 12.25.50 p275
	20											3150	VD4 12.32.20 p275
	25											3150	VD4 12.32.25 p275
	31.5											3150	VD4 12.32.32 p275
	40											3150	VD4 12.32.40 p275
	50											3150	VD4 12.32.50 p275

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

VD4 fixed circuit-breaker without bottom and top terminals (17.5 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]											Circuit-breaker type
		H=461			H=589		H=599			H=610		H=635	
		D=424			D=424		D=424			D=459		D=459	
kV	kA	u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	
		l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237.5	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
17.5	16	630											VD4 17.06.16 p150
	20	630											VD4 17.06.20 p150
	25	630											VD4 17.06.25 p150
	31.5	630											VD4 17.06.32 p150
	16	1250											VD4 17.12.16 p150
	20	1250											VD4 17.12.20 p150
	25	1250											VD4 17.12.25 p150
	31.5	1250											VD4 17.12.32 p150
	16		630										VD4 17.06.16 p210
	20		630										VD4 17.06.20 p210
	25		630										VD4 17.06.25 p210
	31.5		630										VD4 17.06.32 p210

ВЯРНО С ОРИГИНАЛА

Ur	Isc	Rated uninterrupted current (40 °C) [A]											
		H=461			H=589		H=599			H=610		H=635	
		D=424			D=424		D=424			D=459		D=459	
		u/l=205			u/l=310		u/l=310			u/l=310		u/l=310	Circuit-breaker type
kV	kA	l/g=217.5			l/g=238		l/g=237.5			l/g=237		l/g=237.5	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=210	P=275	P=275	
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=600	W=750	W=750	
	16		1250										VD4 17.12.16 p210
	20		1250										VD4 17.12.20 p210
	25		1250										VD4 17.12.25 p210
	31.5		1250										VD4 17.12.32 p210
	40				1250								VD4 17.12.40 p210
	50									1250			VD4 17.12.50 p210
	20							1600					VD4 17.16.20 p210
	25							1600					VD4 17.16.25 p210
	31.5							1600					VD4 17.16.32 p210
	40				1600								VD4 17.16.40 p210
	50									1600			VD4 17.16.50 p210
	20							2000					VD4 17.20.20 p210
	25							2000					VD4 17.20.25 p210
	31.5							2000					VD4 17.20.32 p210
	40							2000					VD4 17.20.40 p210
	50									2000			VD4 17.20.50 p210
	20							2500					VD4 17.25.20 p210
	25							2500					VD4 17.25.25 p210
	31.5							2500					VD4 17.25.32 p210
	16			630									VD4 17.06.16 p275
	20			630									VD4 17.06.20 p275
	25			630									VD4 17.06.25 p275
	31.5			630									VD4 17.06.32 p275
	16			1250									VD4 17.12.16 p275
17.5	20			1250									VD4 17.12.20 p275
	25			1250									VD4 17.12.25 p275
	31.5			1250									VD4 17.12.32 p275
	40					1250							VD4 17.12.40 p275
	50										1250		VD4 17.12.50 p275
	20								1600				VD4 17.16.20 p275
	25								1600				VD4 17.16.25 p275
	31.5								1600				VD4 17.16.32 p275
	40					1600							VD4 17.16.40 p275
	50										1600		VD4 17.16.50 p275
	20								2000				VD4 17.20.20 p275
	25								2000				VD4 17.20.25 p275
	31.5								2000				VD4 17.20.32 p275
	40								2000				VD4 17.20.40 p275
	50										2000		VD4 17.20.50 p275
	20								2500				VD4 17.25.20 p275
	25								2500				VD4 17.25.25 p275
	31.5								2500				VD4 17.25.32 p275
	40								2500				VD4 17.25.40 p275
	50										2500		VD4 17.25.50 p275
	20											3150	VD4 17.32.20 p275
	25											3150	VD4 17.32.25 p275
	31.5											3150	VD4 17.32.32 p275
	40											3150	VD4 17.32.40 p275
	50											3150	VD4 17.32.50 p275

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

ВЯРНО С ОРИГИНАЛА

VD4 fixed circuit-breaker without bottom and top terminals (24 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]			
		H=631		H=642	
		D=424		D=424	
kV	kA	u/l=310		u/l=310	Circuit-breaker type
		l/g=282.5		l/g=282.5	
		P=210	P=275	P=275	
		W=570	W=700	W=700	
24	16	630			VD4 24.06.16 p210
	20	630			VD4 24.06.20 p210
	25	630			VD4 24.06.25 p210
	16	1250			VD4 24.12.16 p210
	20	1250			VD4 24.12.20 p210
	25	1250			VD4 24.12.25 p210
	31.5	1250			VD4 24.12.32 p210
	16		630		VD4 24.06.16 p275
	20		630		VD4 24.06.20 p275
	25		630		VD4 24.06.25 p275
	16		1250		VD4 24.12.16 p275
	20		1250		VD4 24.12.20 p275
	25		1250		VD4 24.12.25 p275
	16			1600	VD4 24.16.16 p275
	20			1600	VD4 24.16.20 p275
	25			1600	VD4 24.16.25 p275
	31.5			1600	VD4 24.16.32 p275
	16			2000	VD4 24.20.16 p275
	20			2000	VD4 24.20.20 p275
	25			2000	VD4 24.20.25 p275
	31.5			2000	VD4 24.20.32 p275
	25			2500	VD4 24.25.25 p275
	31.5			2500	VD4 24.25.32 p275

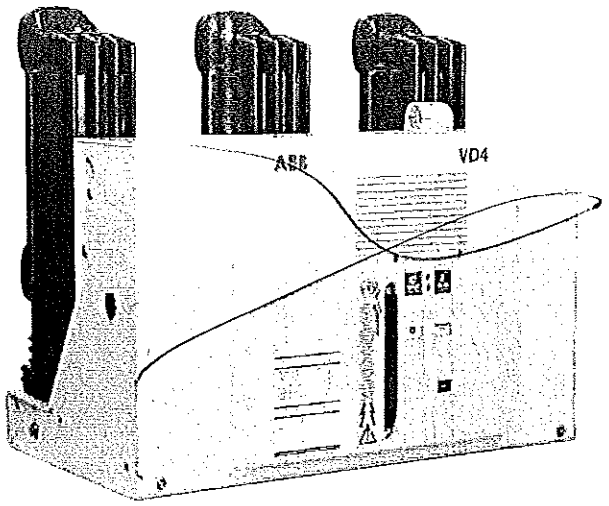
H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.

VD4 fixed circuit-breaker without bottom and top terminals (36 kV)

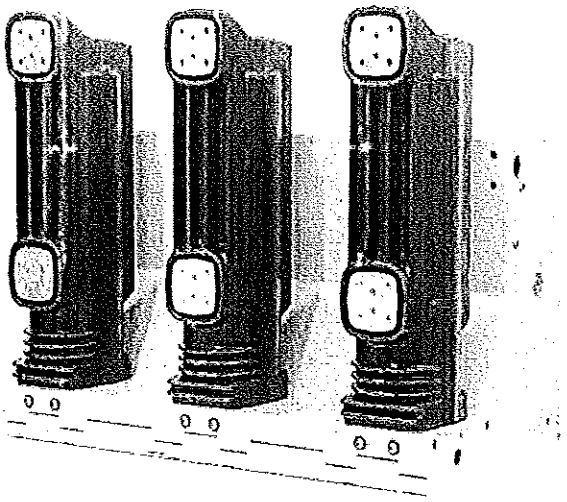
Ur	Isc	Rated uninterrupted current (40 °C) [A]	
		H=876	
		D=478.5	
kV	kA	u/l=328	Circuit-breaker type
		l/g=428.5	
		P=275	
		W=786	
36	31.5	1250 A	VD4 36.12.32 p275
		1600 A	VD4 36.16.32 p275
		2000 A	VD4 36.20.32 p275
		2500 A (*)	VD4 36.25.32 p275

H = Height of the circuit-breaker.
W = Width of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
l/g = Distance between the bottom terminal and the resting surface of the circuit-breaker.
P = Pole horizontal centre distance.
(*) = To be released. Contact ABB.

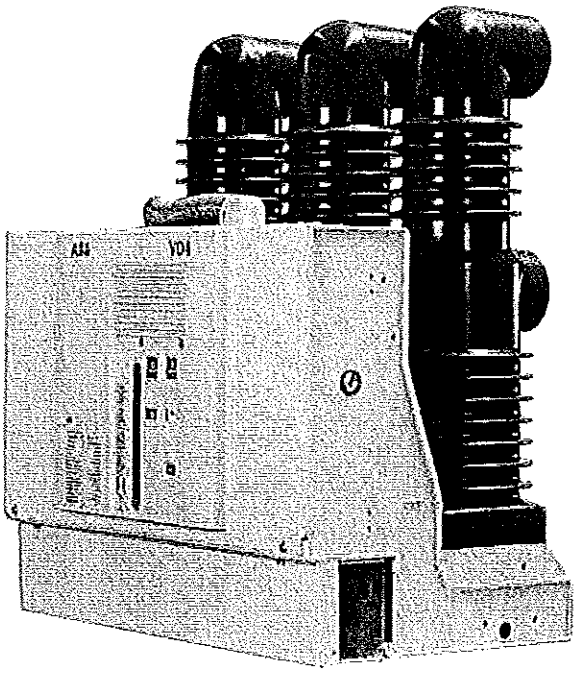
ВЕРНО С ОРИГИНАЛА



VD4 – up to 24 kV



VD4 – up to 24 kV



VD4 - 36 kV

5.4.3. Standard fittings for fixed circuit-breakers

The basic versions of the fixed circuit-breakers are three-pole and fitted with:

- EL type manual operating mechanism
- mechanical signalling device for closing spring charged/ discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton, opening pushbutton and operation counter
- set of ten circuit-breaker open/closed auxiliary contacts
  Note: with the set of ten auxiliary contacts supplied as standard and the maximum number of electrical applications possible, three make contacts (signalling circuit-breaker open) and five break contacts (signalling circuit-breaker closed) are available.
- lever for manual closing spring charging
- auxiliary circuit support terminal box.

ВЯРНО С ОРИГИНАЛА

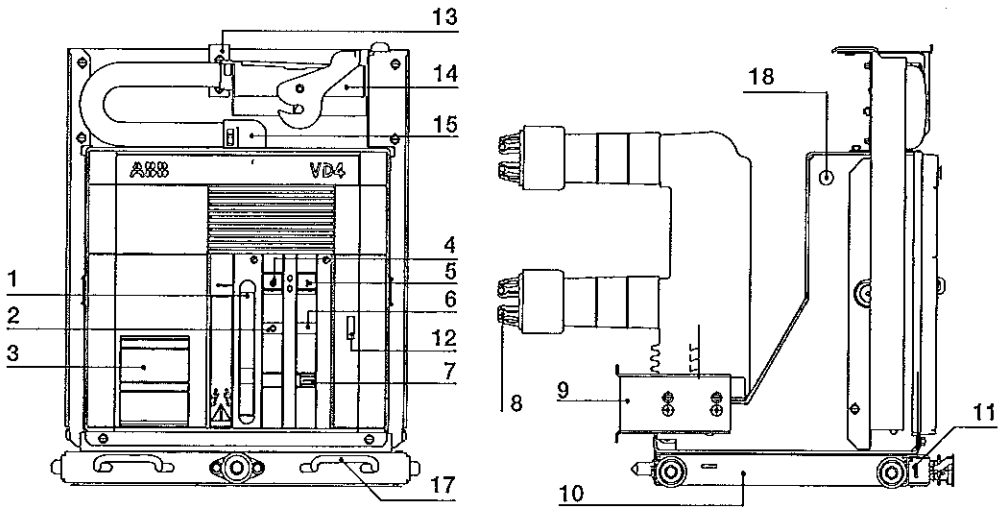
5.5. Withdrawable circuit-breakers

The withdrawable circuit-breakers up to 24 kV are available for UniGear ZS1 and UniSec switchgear, PowerCube modules (see fig. 5a) and for ZS8.4 switchgear (see fig. 5b).
The 36 kV circuit-breakers are available for ZS2 switchgear. They consist of a truck on which the supporting structure of the circuit-breaker is fixed.

Circuit-breakers for UniGear ZS1 and UniSec switchgear and for PowerCube modules (fig. 5a)

The cord with the connector (14) (plug) for connection of the operating mechanism electrical accessories comes out of the connection (15).
The strikers for operating the contacts (connected/isolated) placed in the switchgear are fixed in the top part of the circuit-breaker.
The shutter actuator (9) (roller (18) for UniSec version) are provided for operating the segregation shutters of the medium voltage contacts of the enclosure or of the switchgear are fixed on the sides of the circuit-breaker.
The crosspiece with the handles (17) for hooking up the circuit-breaker for the racking-in/out operations by means of the special operating lever (16) is mounted on the front part of the circuit-breaker truck.
The circuit-breaker is completed with the isolating contacts (8).
The withdrawable circuit-breaker is fitted with special locks on the front crosspiece, which allow hooking up into the corresponding couplings of the switchgear.
The locks can only be activated by the handles with the truck fully resting against the crosspiece.
The operating lever (16) must be fully inserted (also see par. 7.5.). A lock prevents the truck from advancing into the enclosure or fixed part when the earthing switch is closed.
Another lock prevents racking-in and racking-out with the circuit-breaker closed. With the truck in an intermediate position between isolated and connected, a further lock prevents circuit-breaker closing (either mechanical or electrical).
A locking magnet is also mounted on the truck which, when de-energised, prevents the truck racking-in operation.
On request, an interlock is available which prevents racking-in of the circuit-breaker with the door open, and door opening with the circuit-breaker closed.
The lever for loading the closing spring (1) in the manual mode is built into the operating mechanism. The spring is loaded by repeatedly lowering the lever with linear movements until the yellow indicator (6) appears to show that loading is complete.
The spring can only be loaded with the switchgear door open.
Comply with the instructions in the UniGear switchgear manual for the operations that can be performed with the door open.

Note: on request, the closing spring loading device for withdrawable circuit-breakers for UniGear switchgear can be supplied with the lever outside the operating mechanism and a rotary loading movement. This device is part of the standard equipment for VD4/ZS8 withdrawable circuit-breakers only (see detail 1 of Fig. 5b on the next page). This rotary loading device allows the closing spring to be loaded with the switchgear door closed.



Caption

1 Lever for manually charging the closing spring
2 Signalling device for circuit-breaker open/closed
3 Rating plate
4 Opening pushbutton
5 Closing pushbutton
6 Signalling device for closing spring charged/discharged
7 Operation counter
8 Isolating contacts
9 Slide for operating the switchgear shutters (UniGear ZS1, PowerCube, ZS8.4)
10 Truck
11 Locks for hooking into the fixed part
12 Mechanical override of the undervoltage release (on request)
13 Strikers for activating the contacts placed in the enclosure
14 Connector (plug)
15 Cabling connection
16 Operating lever for circuit-breaker racking-in/out
17 Handles for activating the locks (11)
18 Shutters actuator (for UniSec version only)

Fig. 5a

ВЕРНО С ОРИГИНАЛА

Circuit-breakers for ZS8.4 switchgear (fig. 5b)

The socket (13) takes the connector (plug) placed in the switchgear.
The slides (9) for operating the segregation shutters of the medium voltage contacts of the switchgear are fixed on the sides of the circuit-breaker.
The crosspiece with the handles (17) for hooking up the circuit-breaker for the racking-in/out operations by means of the special operating lever (16) is mounted on the front part of the circuit-breaker truck.
The circuit-breaker is completed with the isolating contacts (8).
The withdrawable circuit-breaker is fitted with special locks, described below (see fig. 5c - 5d).

1) Prevention of traverse with circuit-breaker closed

With the circuit-breaker closed, the feeler pin (16 - fig. 5c) prevents the shutter sliding (19 - fig. 5c) and therefore insertion of the lever (20 - fig. 5c) for traverse of the apparatus.

2) Prevention of traverse with socket-plug disconnected

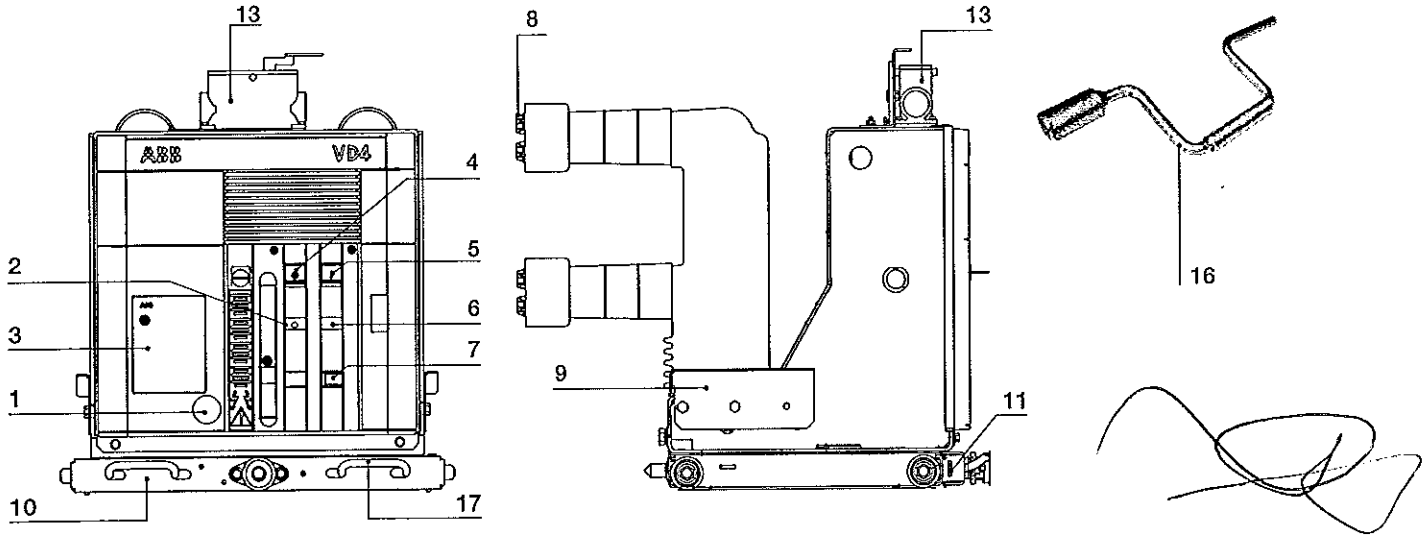
When the plug is not inserted in the socket (13), the stem (21 - fig. 5c) prevents the plate (22 - fig. 5c) lifting and traverse of the apparatus.

3) Prevention of switchgear door closing with socket-plug disconnected (*)

When the plug is not inserted in the socket (13), the feeler pin (23 - fig. 5d) prevents door closing.

4) Prevention of circuit-breaker racking-out with the socket-plug connected (*)

When the plug is inserted in the socket (13), the lock bolt (29 - fig. 5d) hits the pin (30 - fig. 5d) preventing the apparatus from being racked out of the switchgear.



Caption

1 Coupling for the manual closing spring charging lever (*)
2 Signalling device for circuit-breaker open/closed
3 Rating plate
4 Opening pushbutton
5 Closing pushbutton
6 Signalling device for closing spring charged/discharged
7 Operation counter
8 Isolating contacts
9 Slide for operating the switchgear shutters
10 Truck
11 Locks for hooking into the fixed part
13 Connector (plug)
16 Operating lever for circuit-breaker racking-in/out (a special version is provided for VD4/ZS8 Preussen Elektra EON circuit-breakers)
17 Handles for activating the locks (11)

(*) Only VD4/ZS8 Preussen - Elektra EON version.

Fig. 5b

ВЯРНО С ОРИГИНАЛА

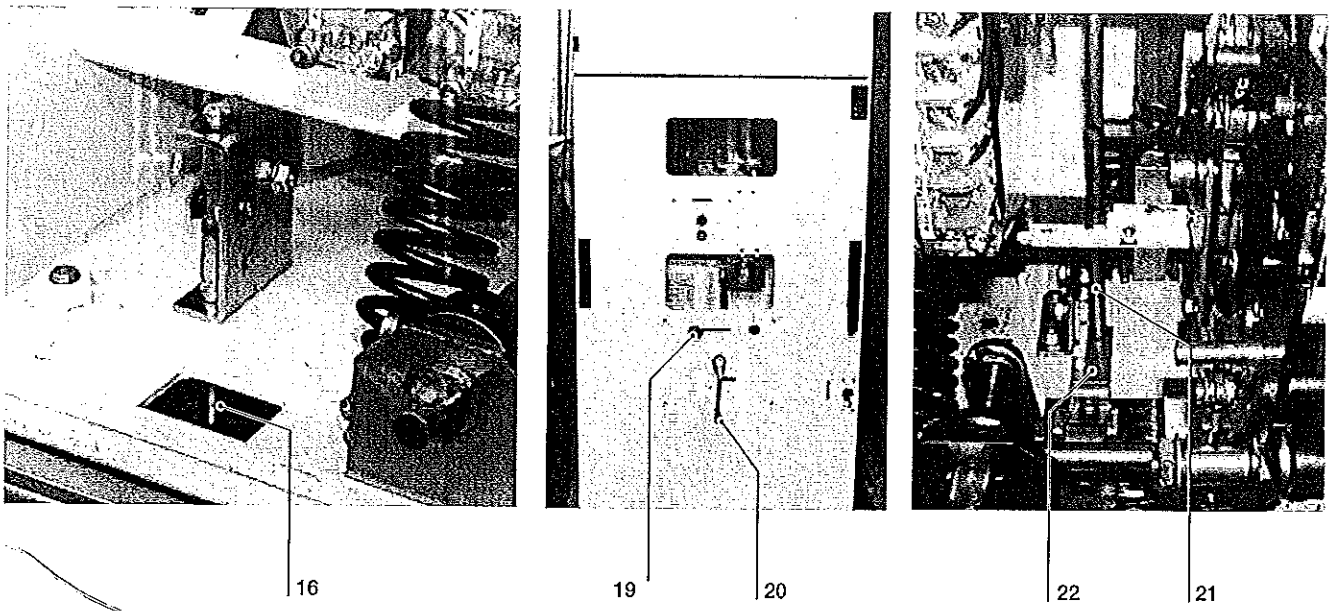


Fig. 5c

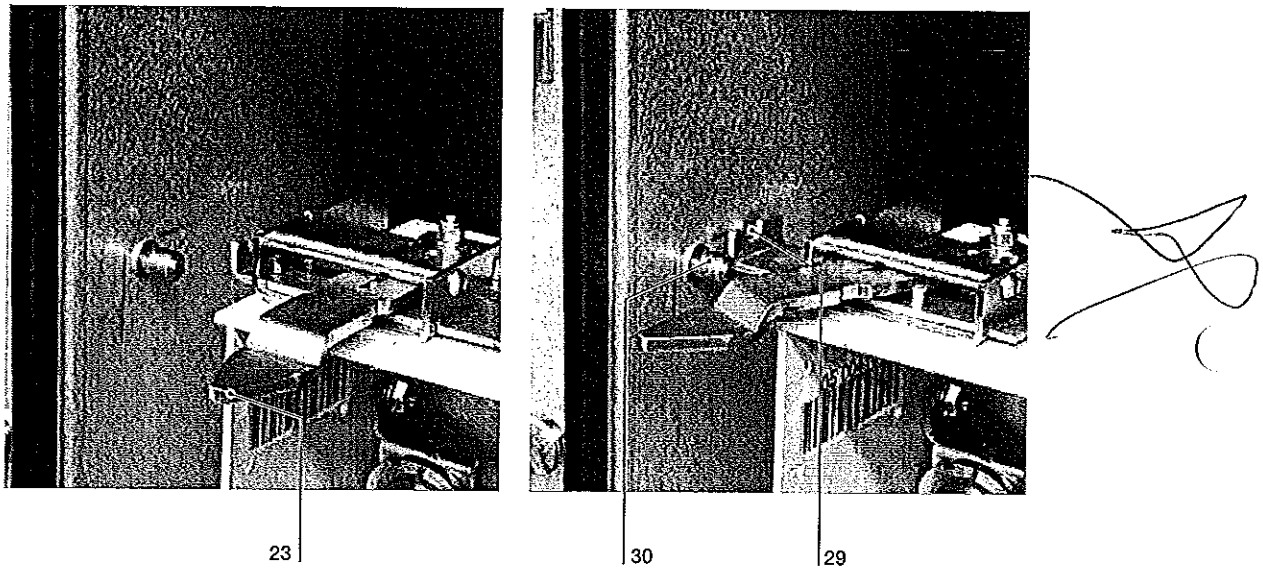
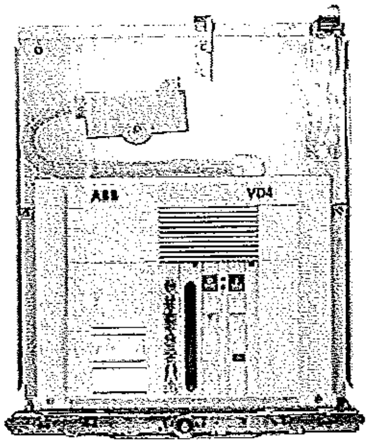


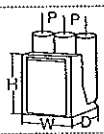
Fig. 5d

ВЯРНО С ОРИГИНАЛА

5.5.1. General characteristics of withdrawable circuit-breakers for UniGear ZS1 switchgear

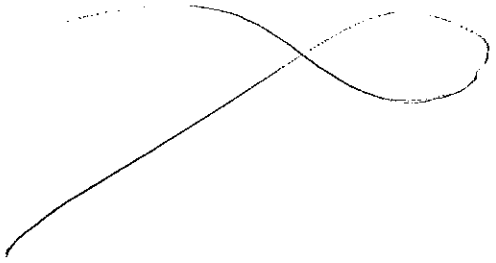
General characteristics of withdrawable circuit-breakers for UniGear ZS1 switchgear (12 kV)



Circuit-breaker		VD4/P 12 (3)						
Standards	IEC 62271-100	•						
	VDE 0671; CEI EN 62271-100- File 7642	•						
Rated voltage	Ur [kV]	12						
Rated insulation voltage	Us [kV]	12						
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28						
Impulse withstand voltage	Up [kV]	75						
Rated frequency	fr [Hz]	50-60						
Rated normal current (40 °C) (1)	Ir [A]	630	1250	1250	1250	1250	1600	1600
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	–	–	–	–	–
		20	20	–	–	–	20	20
		25	25	–	–	–	25	25
		31.5	31.5	–	–	–	31.5	31.5
		–	–	40	40	–	–	–
		–	–	–	–	50	–	–
Rated short-time withstand current (3s)	Ik [kA]	16	16	–	–	–	–	–
		20	20	–	–	–	20	20
		25	25	–	–	–	25	25
		31.5	31.5	–	–	–	31.5	31.5
		–	–	40	40	–	–	–
		–	–	–	–	50	–	–
Making capacity	Ip [kA]	40	40	–	–	–	–	–
		50	50	–	–	–	50	50
		63	63	–	–	–	63	63
		80	80	–	–	–	80	80
		–	–	100	100	–	–	–
		–	–	–	–	125	–	–
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60						
Arcing time	[ms]	10 ... 15						
Total breaking time	[ms]	43 ... 75						
Closing time	[ms]	60 ... 80						
Maximum overall dimensions 	H [mm]	628	628	691	691	691	691	691
	W [mm]	503	503	653	853	681	653	853
	D [mm]	662	662	641	642	643	642	642
	Pole distance P [mm]	150	150	210	275	210	210	275
Weight	[kg]	116	116	174	176	180	160	166
Standardised table of dimensions	TN	7412	7412	–	–	–	7415	7416
	1VCD	–	–	003284	003286	003444	–	–
Operating temperature	[°C]	- 5 ... + 40						
Tropicalization	IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility	IEC: 62271-1	•						

(1) Rated current guaranteed with circuit-breaker installed in UniGear ZS1 switchgear and with 40 °C ambient temperature.
(2) Up to 4000 A with forced ventilation.
(3) Circuit-breakers up to 1250 A and 31.5 kA have polyamide poles.

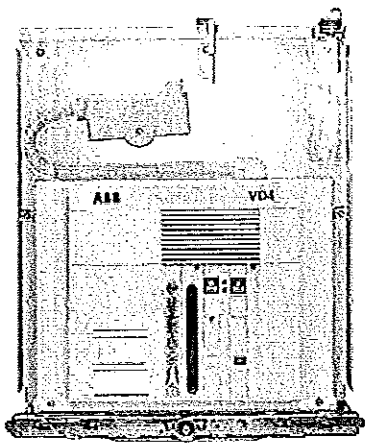
ВЕРНО С ОРИГИНАЛОМ

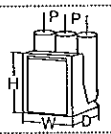


•											
•											
12											
12											
28											
75											
50-60											
1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	3150 ⍉	3150 ⍉
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31.5	31.5	–	–	31.5	–	31.5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31.5	31.5	–	–	31.5	–	31.5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	50	50	–	–	50	–	50	–
–	–	–	–	63	63	–	–	63	–	63	–
–	–	–	–	80	80	–	–	80	–	80	–
100	100	–	–	100	100	–	–	100	–	100	–
–	–	125	125	–	–	125	125	–	125	–	125
•	•	•	•	•	•	•	•	•	•	•	•
33 ... 60											
10 ... 15											
43 ... 75											
60 ... 80											
691	691	691	691	691	691	691	691	691	691	730	742
653	853	681	853	653	853	681	853	853	853	853	853
641	642	643	643	642	642	643	643	640	643	640	643
210	275	210	275	210	275	210	275	275	275	275	275
174	176	180	193	160	166	190	205	186	225	221	240
–	–	–	–	7415	7416	–	–	7417	–	–	–
003284	003286	003444	003445	–	–	003444	003445	–	003446	000153	003447
- 5 ... + 40											
•											
•											

ВЯРНО С ОРИГИНАЛА

General characteristics of withdrawable circuit-breakers for UniGear ZS1 switchgear (17.5 kV)



Circuit-breaker			VD4/P 17 (3)							
Standards		IEC 62271-100	•							
		VDE 0671; CEI EN 62271-100- File 7642	•							
Rated voltage		Ur [kV]	17.5							
Rated insulation voltage		Us [kV]	17.5							
Withstand voltage at 50 Hz		Ud (1 min) [kV]	38							
Impulse withstand voltage		Up [kV]	95							
Rated frequency		fr [Hz]	50-60							
Rated normal current (40 °C) (1)		Ir [A]	630	1250	1250	1250	1250	1600	1600	
Rated breaking capacity (rated short-circuit breaking current symmetrical)		Isc [kA]	16	16	–	–	–	–	–	
			20	20	–	–	–	20	20	
			25	25	–	–	–	25	25	
			31.5	31.5	–	–	–	31.5	31.5	
			–	–	40	40	–	–	–	
			–	–	–	–	50	–	–	
Rated short-time withstand current (3s)		Ik [kA]	16	16	–	–	–	–	–	
			20	20	–	–	–	20	20	
			25	25	–	–	–	25	25	
			31.5	31.5	–	–	–	31.5	31.5	
			–	–	40	40	–	–	–	
			–	–	–	–	50	–	–	
Making capacity		Ip [kA]	40	40	–	–	–	–	–	
			50	50	–	–	–	50	50	
			63	63	–	–	–	63	63	
			80	80	–	–	–	80	80	
			–	–	100	100	–	–	–	
			–	–	–	–	125	–	–	
Operation sequence		[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	
Opening time		[ms]	33 ... 60							
Arcing time		[ms]	10 ... 15							
Total breaking time		[ms]	43 ... 75							
Closing time		[ms]	60 ... 80							
Maximum overall dimensions		H [mm]	632	632	691	691	691	691	691	
		W [mm]	503	503	653	853	681	653	853	
		D [mm]	664	664	641	642	643	642	642	
		Pole distance P [mm]	150	150	210	275	210	210	275	
Weight		[kg]	116	116	174	176	180	160	166	
Standardised table of dimensions		TN	7412	7412	–	–	–	7415	7416	
		1VCD	–	–	003284	003286	003444	–	–	
Operating temperature		[°C]	- 5 ... + 40							
Tropicalization		IEC: 60068-2-30, 60721-2-1	•							
Electromagnetic compatibility		IEC: 62271-1	•							

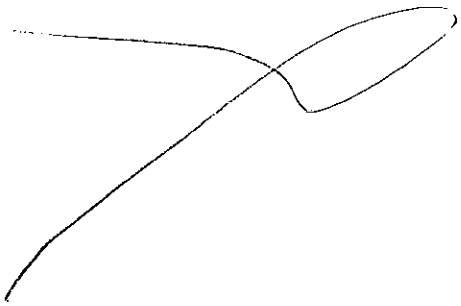
(1) Rated current guaranteed with circuit-breaker installed in UniGear ZS1 switchgear and with 40 °C ambient temperature.
(2) Up to 4000 A with forced ventilation.
(3) Circuit-breakers up to 1250 A and 31.5 kA have polyamide poles.

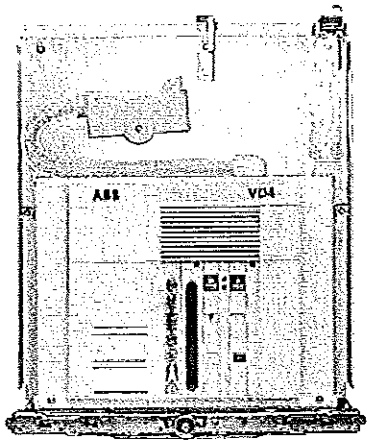
ВЯРНО С ОРИГИНАЛА

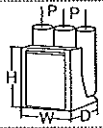
•											
•											
17.5											
17.5											
38											
95											
50-60											
1600	1600	1600	1600	2000	2000	2000	2000	2500	2500	3150 ⊠	3150 ⊠
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31.5	31.5	–	–	31.5	–	31.5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	20	20	–	–	20	–	20	–
–	–	–	–	25	25	–	–	25	–	25	–
–	–	–	–	31.5	31.5	–	–	31.5	–	31.5	–
40	40	–	–	40	40	–	–	40	–	40	–
–	–	50	50	–	–	50	50	–	50	–	50
–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	50	50	–	–	50	–	50	–
–	–	–	–	63	63	–	–	63	–	63	–
–	–	–	–	80	80	–	–	80	–	80	–
100	100	–	–	100	100	–	–	100	–	100	–
–	–	125	125	–	–	125	125	–	125	–	125
•	•	•	•	•	•	•	•	•	•	•	•
33 ... 60											
10 ... 15											
43 ... 75											
60 ... 80											
691	691	691	691	691	691	691	691	691	691	730	742
653	853	681	853	653	853	681	853	853	853	853	853
641	642	643	643	642	642	643	643	640	643	640	643
210	275	210	275	210	275	210	275	275	275	275	275
174	176	180	193	160	166	190	205	186	225	221	240
–	–	–	–	7415	7416	–	–	7417	–	–	–
003284	003286	003444	003445	–	–	003444	003445	–	003446	000153	003447
- 5 ... + 40											
•											
•											

ВЯРНО С ОРИГИНАЛА

General characteristics of withdrawable circuit-breakers for UniGear ZS1 switchgear (24 kV)



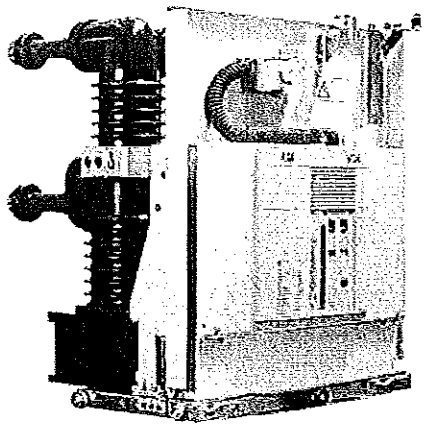


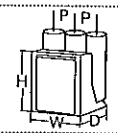
Circuit-breaker		VD4/P 24							
Standards	IEC 62271-100	•							
	VDE 0671; CEI EN 62271-100- File 7642	•							
Rated voltage	Ur [kV]	24							
ated insulation voltage	Us [kV]	24							
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50							
Impulse withstand voltage	Up [kV]	125							
Rated frequency	fr [Hz]	50-60							
Rated normal current (40 °C) (1)	Ir [A]	630	630	1250	1250	1600	2000	2500 (2)	3150 (3)
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16	16	16	–
		20	20	20	20	20	20	20	–
		25	25	25	25	25	25	25	–
		–	–	31.5	–	31.5	31.5	31.5	31.5
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16	16	16	–
		20	20	20	20	20	20	20	–
		25	25	25	25	25	25	25	–
		–	–	31.5	–	31.5	31.5	31.5	31.5
Making capacity	Ip [kA]	40	40	40	40	40	40	40	–
		50	50	50	50	50	50	50	–
		63	63	63	63	63	63	63	–
		–	–	80	–	80	80	80	80
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60							
cing time	[ms]	10 ... 15							
Total breaking time	[ms]	43 ... 75							
Closing time	[ms]	60 ... 80							
Maximum overall dimensions 	H [mm]	794	794	794	794	838	838	838	838
	W [mm]	653	853	653	853	853	853	853	853
	D [mm]	802	802	802	802	790	790	790	790
	Pole distance P [mm]	210	275	210	275	275	275	275	275
Weight	[kg]	140	148	140/146 (4)	148	228	228	228	277
Standardised table of dimensions	TN	7413	7414	7413	7414	7418	7418	7418	–
	1VCD	–	–	000173 (4)	–	–	–	–	000177
Operating temperature	[°C]	- 5 ... + 40							
Tropicalization	IEC: 60068-2-30, 60721-2-1	•							
Electromagnetic compatibility	IEC: 62271-1	•							

(1) Rated current guaranteed with circuit-breaker installed in UniGear ZS1 switchgear and with 40 °C ambient temperature.
(2) 2300 A rated current guaranteed with natural ventilation; 2500 A rated current guaranteed with forced ventilation.
(3) 2700 A rated current guaranteed with natural ventilation; 3150 A rated current guaranteed with forced ventilation.
(4) 31.5 kA version.

ВЯРНО С ОРИГИНАЛА

General characteristics of withdrawable circuit-breakers for UniGear ZS2 switchgear and PowerCube modules (36 kV)



Circuit-breaker			VD4/W 36			
Standards		IEC 62271-100	•			
		VDE 0671; CEI EN 62271-100- File 7642	•			
Rated voltage		Ur [kV]	36			
Rated insulation voltage		Us [kV]	36			
Withstand voltage at 50 Hz		Ud (1 min) [kV]	70			
Impulse withstand voltage		Up [kV]	170			
Rated frequency		fr [Hz]	50-60			
Rated normal current (40 °C) (1)		Ir [A]	1250	1600	2000	2500 (*)
Rated breaking capacity (rated short-circuit breaking current symmetrical)		Isc [kA]	–	–	–	–
			31.5	31.5	31.5	31.5
			–	–	–	–
Rated short-time withstand current (3s)		Ik [kA]	–	–	–	–
			31.5	31.5	31.5	31.5
			–	–	–	–
Making capacity		Ip [kA]	–	–	–	–
			80	80	80	80
			–	–	–	–
Operation sequence		[O - 0.3 s - CO - 15 s - CO]	•	•	•	•
Opening time		[ms]	33 ... 60			
Arcing time		[ms]	10 ... 15			
Total breaking time		[ms]	45 ... 75			
Closing time		[ms]	60 ... 80			
Maximum overall dimensions		H [mm]	973	973	973	973
		W [mm]	842	842	842	842
		D [mm]	788	788	788	788
		Pole distance P [mm]	275	275	275	275
Weight		[kg]	230	230	230	–
Standardised table of dimensions		TN	1VYN300901-KG	1VYN300901-KG	1VYN300901-KG	–
Operating temperature		[°C]	- 5 ... + 40			
Tropicalization		IEC: 60068-2-30, 60721-2-1	•			
Electromagnetic compatibility		IEC: 62271-1	•			

(*) Ask ABB

ВЯРНО С ОРИГИНАЛА

5.5.2. Types of withdrawable circuit-breakers available for UniGear ZS1 switchgear

VD4 withdrawable circuit-breaker (12 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]					Circuit-breaker type
		W=650	W=800	W=1000	W=1000	W=1000	
		P=150	P=210	P=275	P=275	P=275	
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	u/l=310	
		ø=35	ø=79	ø=79	ø=109	ø=109	
	16	630					VD4/P 12.06.16 p150
	20	630					VD4/P 12.06.20 p150
	25	630					VD4/P 12.06.25 p150
	31.5	630					VD4/P 12.06.32 p150
	16	1250					VD4/P 12.12.16 p150
	20	1250					VD4/P 12.12.20 p150
	25	1250					VD4/P 12.12.25 p150
	31.5	1250					VD4/P 12.12.32 p150
	40		1250				VD4/P 12.12.40 p210
	50		1250				VD4/P 12.12.50 p210
	20		1600				VD4/P 12.16.20 p210
	25		1600				VD4/P 12.16.25 p210
	31.5		1600				VD4/P 12.16.32 p210
	40		1600				VD4/P 12.16.40 p210
	50		1600				VD4/P 12.16.50 p210
	20		2000				VD4/P 12.20.20 p210
	25		2000				VD4/P 12.20.25 p210
	31.5		2000				VD4/P 12.20.32 p210
	40		2000				VD4/P 12.20.40 p210
	50		2000				VD4/P 12.20.50 p210
12	40			1250			VD4/P 12.12.40 p275
	20			1600			VD4/P 12.16.20 p275
	25			1600			VD4/P 12.16.25 p275
	31.5			1600			VD4/P 12.16.32 p275
	40			1600			VD4/P 12.16.40 p275
	50			1600			VD4/P 12.16.50 p275
	20			2000			VD4/P 12.20.20 p275
	25			2000			VD4/P 12.20.25 p275
	31.5			2000			VD4/P 12.20.32 p275
	40			2000			VD4/P 12.20.40 p275
	50			2000			VD4/P 12.20.50 p275
	20				2500		VD4/P 12.25.20 p275
	25				2500		VD4/P 12.25.25 p275
	31.5				2500		VD4/P 12.25.32 p275
	40				2500		VD4/P 12.25.40 p275
	50				2500		VD4/P 12.25.50 p275
	20					3150 (1)	VD4/P 12.32.20 p275
	25					3150 (1)	VD4/P 12.32.25 p275
	31.5					3150 (1)	VD4/P 12.32.32 p275
	40					3150 (1)	VD4/P 12.32.40 p275
	50					3150 (1)	VD4/P 12.32.50 p275

W = Width of the circuit-breaker.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A rated current guaranteed with forced ventilation.

ВЯРНО С ОРИГИНАЛА

VD4 withdrawable circuit-breaker (17.5 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]					
		W=650	W=800	W=1000	W=1000	W=1000	
		P=150	P=210	P=275	P=275	P=275	
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	u/l=310	Circuit-breaker type
		ø=35	ø=79	ø=79	ø=109	ø=109	
	16	630					VD4/P 17.06.16 p150
	20	630					VD4/P 17.06.20 p150
	25	630					VD4/P 17.06.25 p150
	31.5	630					VD4/P 17.06.32 p150
	16	1250					VD4/P 17.12.16 p150
	20	1250					VD4/P 17.12.20 p150
	25	1250					VD4/P 17.12.25 p150
	31.5	1250					VD4/P 17.12.32 p150
	40		1250				VD4/P 17.12.40 p210
	50		1250				VD4/P 17.12.50 p210
	20		1600				VD4/P 17.16.20 p210
	25		1600				VD4/P 17.16.25 p210
	31.5		1600				VD4/P 17.16.32 p210
	40		1600				VD4/P 17.16.40 p210
	50		1600				VD4/P 17.16.50 p210
	20		2000				VD4/P 17.20.20 p210
	25		2000				VD4/P 17.20.25 p210
	31.5		2000				VD4/P 17.20.32 p210
	40		2000				VD4/P 17.20.40 p210
	50		2000				VD4/P 17.20.50 p210
17.5	40			1250			VD4/P 17.12.40 p275
	20			1600			VD4/P 17.16.20 p275
	25			1600			VD4/P 17.16.25 p275
	31.5			1600			VD4/P 17.16.32 p275
	40			1600			VD4/P 17.16.40 p275
	50			1600			VD4/P 17.16.50 p275
	20			2000			VD4/P 17.20.20 p275
	25			2000			VD4/P 17.20.25 p275
	31.5			2000			VD4/P 17.20.32 p275
	40			2000			VD4/P 17.20.40 p275
	50			2000			VD4/P 17.20.50 p275
	20				2500		VD4/P 17.25.20 p275
	25				2500		VD4/P 17.25.25 p275
	31.5				2500		VD4/P 17.25.32 p275
	40				2500		VD4/P 17.25.40 p275
	50				2500		VD4/P 17.25.50 p275
	20					3150 (1)	VD4/P 17.32.20 p275
	25					3150 (1)	VD4/P 17.32.25 p275
	31.5					3150 (1)	VD4/P 17.32.32 p275
	40					3150 (1)	VD4/P 17.32.40 p275
	50					3150 (1)	VD4/P 17.32.50 p275

W = Width of the circuit-breaker.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A rated current guaranteed with forced ventilation.

ВЯРНО С ОРИГИНАЛА

VD4 withdrawable circuit-breaker (24 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]				Circuit-breaker type
		W=800	W=1000	W=1000	W=1000	
		P=210	P=275	P=275	P=275	
kV	kA	u/l=310	u/l=310	u/l=310	u/l=310	
		ø=35	ø=35	ø=79	ø=109	
24	16	630				VD4/P 24.06.16 p210
	20	630				VD4/P 24.06.20 p210
	25	630				VD4/P 24.06.25 p210
	16	1250				VD4/P 24.12.16 p210
	20	1250				VD4/P 24.12.20 p210
	25	1250				VD4/P 24.12.25 p210
	31.5	1250				VD4/P 24.12.32 p210
	16		630			VD4/P 24.06.16 p275
	20		630			VD4/P 24.06.20 p275
	25		630			VD4/P 24.06.25 p275
	16		1250			VD4/P 24.12.16 p275
	20		1250			VD4/P 24.12.20 p275
	25		1250			VD4/P 24.12.25 p275
	16			1600		VD4/P 24.16.16 p275
	20			1600		VD4/P 24.16.20 p275
	25			1600		VD4/P 24.16.25 p275
	31.5			1600		VD4/P 24.16.32 p275
	16			2000		VD4/P 24.20.16 p275
	20			2000		VD4/P 24.20.20 p275
	25			2000		VD4/P 24.20.25 p275
	31.5			2000		VD4/P 24.20.32 p275
	16			2300 (1)		VD4/P 24.25.16 p275
	20			2300 (1)		VD4/P 24.25.20 p275
	25			2300 (1)		VD4/P 24.25.25 p275
	31.5			2300 (1)		VD4/P 24.25.32 p275
	31.5				2700 (2)	VD4/P 24.32.32 p275

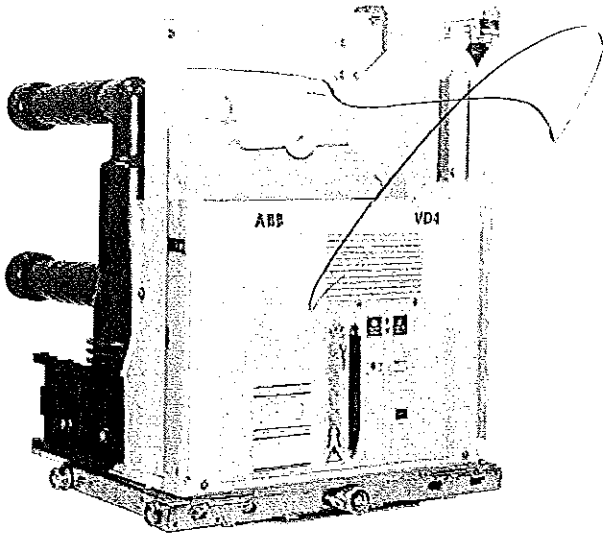
W = Width of the switchgear.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) 2500 A rated current guaranteed with forced ventilation.
(2) 3150 A rated current guaranteed with forced ventilation.

VD4 withdrawable circuit-breaker (36 kV)

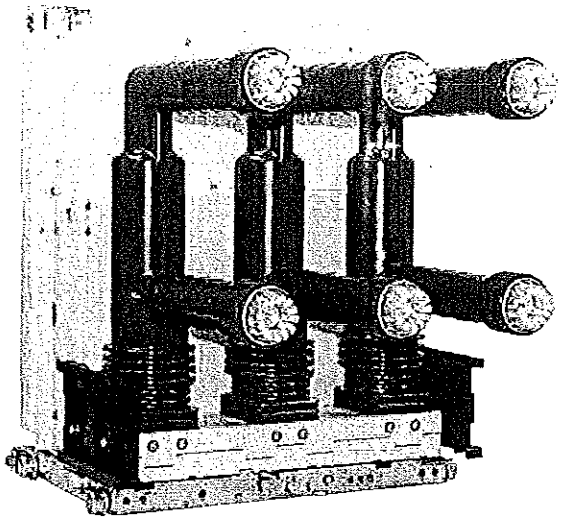
Ur	Isc	Rated uninterrupted current (40 °C) [A]	Circuit-breaker type
		H=951	
		D=788	
kV	kA	u/l=380	
		ø=399	
		P=275	
		W=778	
36	31.5	1250 A	VD4/W 36.12.32 p275
		1600 A	VD4/W 36.16.32 p275
		2000 A	VD4/W 36.20.32 p275
		2500 A (*)	VD4/W 36.25.32 p275

H = Height of the circuit-breaker.
D = Depth of the circuit-breaker.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
P = Pole horizontal centre distance.
W = Width of the circuit-breaker.
(*) = To be released. Contact ABB

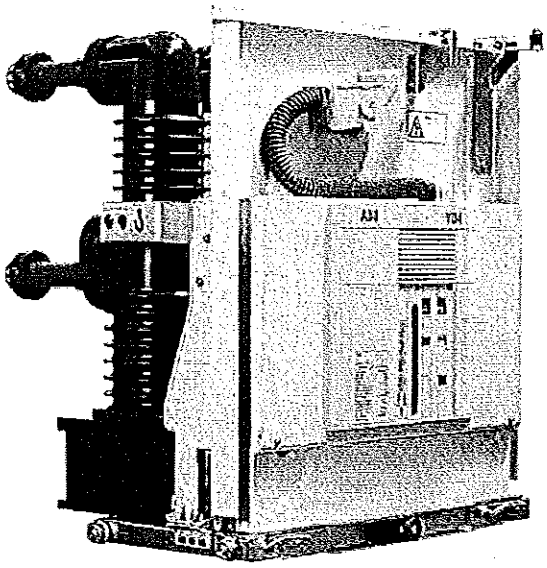
ВЯРНО С ОРИГИНАЛА



VD4 – up to 24 kV



VD4 – up to 24 kV



VD4 - 36 kV

5.5.3. Standard fittings of withdrawable circuit-breakers for UniGear ZS1 switchgear (up to 24 kV) - UniGear ZS2 and PowerCube modules (VD4 36 kV)

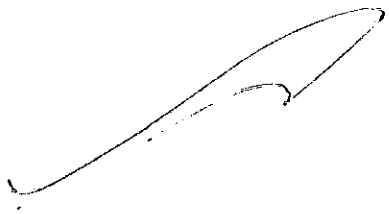
The basic versions of the withdrawable circuit-breakers are three-pole and fitted with:

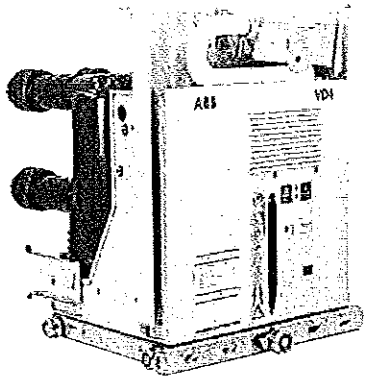
- EL type manual operating mechanism
- mechanical signalling device for closing spring charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten auxiliary circuit-breaker open/closed contacts

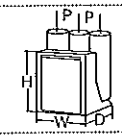
  Note: with the set of ten auxiliary contacts supplied as standard and the maximum number of electrical applications possible, three make contacts (signalling circuit-breaker open) and four break contacts (signalling circuit-breaker closed) are available.
- lever for manually charging the closing spring
- isolating contacts
- cord with connector (plug only) for auxiliary circuits, with striker pin which does not allow connection of the plug in the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
- locking electromagnet in the truck. This prevents the circuit-breaker from being racked into the panel with auxiliary circuits not connected (plug not inserted in the socket).

ВЯРНО С ОРИГИНАЛА

General characteristics of withdrawable circuit-breakers for PowerCube modules (12 kV)

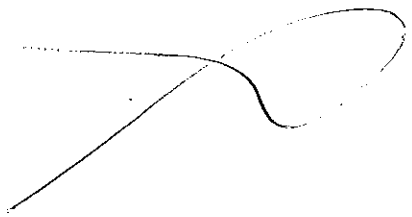




Circuit-breaker		VD4/P 12 (3)		VD4/W 12 (3)	
PowerCube module		PB1		PB2	
Standards	IEC 62271-100	•		•	
	VDE 0671; CEI EN 62271-100- File 7642	•		•	
Rated voltage	Ur [kV]	12		12	
ated insulation voltage	Us [kV]	12		12	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28		28	
Impulse withstand voltage	Up [kV]	75		75	
Rated frequency	fr [Hz]	50-60		50-60	
Rated normal current (40 °C) (1)	Ir [A]	630	1250	630	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16
		20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31.5
		–	–	–	–
		–	–	–	–
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16
		20	20	20	20
		25	25	25	25
		31.5	31.5	31.5	31.5
		–	–	–	–
		–	–	–	–
Making capacity	Ip [kA]	40	40	40	40
		50	50	50	50
		63	63	63	63
		80	80	80	80
		–	–	–	–
		–	–	–	–
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•		•	
Opening time	[ms]	33 ... 60		33 ... 60	
Arcing time	[ms]	10 ... 15		10 ... 15	
Total breaking time	[ms]	43 ... 75		43 ... 75	
Closing time	[ms]	60 ... 80		60 ... 80	
Maximum overall dimensions 	H [mm]	628	628	691	691
	W [mm]	503	503	653	853
	D [mm]	662	662	642	642
	Pole distance P [mm]	150	150	210	210
Weight	[kg]	116	116	135	135
Standardised table of dimensions	TN	7412	7412	7420	7420
	1VCD	–	–	–	–
Operating temperature	[°C]	- 5 ... + 40		- 5 ... + 40	
Tropicalization	IEC: 60068-2-30, 60721-2-1	•		•	
Electromagnetic compatibility	IEC: 62271-1	•		•	

(1) Rated current guaranteed with circuit-breaker installed in PowerCube enclosure and with 40 °C ambient temperature
(2) Up to 4000 A with forced ventilation.
(3) Circuit-breakers up to 1250 A and 31.5 kA have polyamide poles.

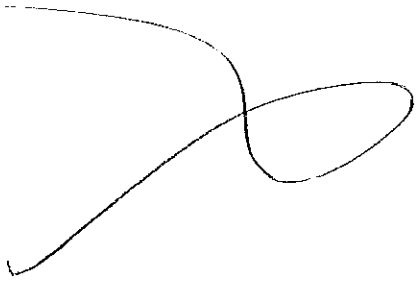
ХРНОЗ С ОРИГИНАЛА

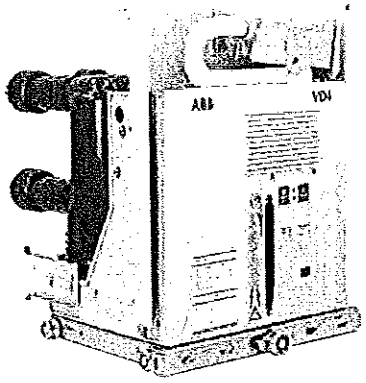


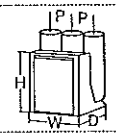
	VD4/P 12									VD4/W 12	
	PB2								PB3	PB3	
	•								•	•	
	•								•	•	
	12								12	12	
	12								12	12	
	28								28	28	
	75								75	75	
	50-60								50-60	50-60	
	1250	1250	1600	1600	1600	2000	2000	2500	2500	3150 ⍉	3150 ⍉
	–	–	–	–	–	–	–	–	–	–	–
	–	–	20	–	–	20	–	20	–	20	–
	–	–	25	–	–	25	–	25	–	25	–
	–	–	31.5	–	–	31.5	–	31.5	–	31.5	–
	40	–	–	40	–	40	–	40	–	40	–
	–	50	–	–	50	–	50	–	50	–	50
	–	–	–	–	–	–	–	–	–	–	–
	–	–	20	–	–	20	–	20	–	20	–
	–	–	25	–	–	25	–	25	–	25	–
	–	–	31.5	–	–	31.5	–	31.5	–	31.5	–
	40	–	–	40	–	40	–	40	–	40	–
	–	50	–	–	50	–	50	–	50	–	50
	–	–	–	–	–	–	–	–	–	–	–
	–	–	50	–	–	50	–	50	–	50	–
	–	–	63	–	–	63	–	63	–	63	–
	–	–	80	–	–	80	–	80	–	80	–
	100	–	–	100	–	100	–	100	–	100	–
	–	125	–	–	125	–	125	–	125	–	125
	•								•	•	
	33 ... 60								33 ... 60	33 ... 60	
	10 ... 15								10 ... 15	10 ... 15	
	43 ... 75								43 ... 75	43 ... 75	
	60 ... 80								60 ... 80	60 ... 80	
	691	691	691	691	691	690	691	691	691	730	691
	653	681	653	653	681	653	681	853	853	853	853
	641	643	642	641	643	642	643	640	643	640	643
	210	210	210	210	210	210	210	275	275	275	275
	174	180	160	174	180	160	190	186	225	221	240
	–	–	7415	–	–	7415	–	7417	–	–	–
	003284	003444	–	003284	003444	–	003444	–	003445	000152	003596
	- 5 ... + 40								- 5 ... + 40	- 5 ... + 40	
	•								•	•	
	•								•	•	

ВЕРНО С ОРИГИНАЛА

General characteristics of withdrawable circuit-breakers for PowerCube modules (17.5 kV)





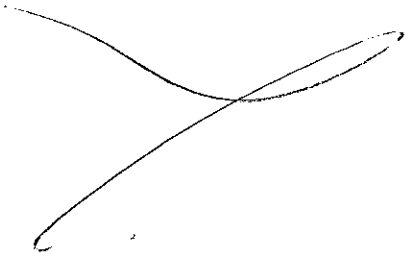
Circuit-breaker			VD4/P 17 (3)		VD4/W 17 (3)	
PowerCube module			PB1		PB2	
Standards		IEC 62271-100	•		•	
	VDE 0671; CEI EN 62271-100- File 7642		•		•	
Rated voltage		Ur [kV]	17.5		17.5	
Rated insulation voltage		Us [kV]	17.5		17.5	
Withstand voltage at 50 Hz		Ud (1 min) [kV]	38		38	
Impulse withstand voltage		Up [kV]	95		95	
Rated frequency		fr [Hz]	50-60		50-60	
Rated normal current (40 °C) (1)		Ir [A]	630	1250	630	1250
Rated breaking capacity (rated short-circuit breaking current symmetrical)		Isc [kA]	16	16	16	16
			20	20	20	20
			25	25	25	25
			31.5	31.5	31.5	31.5
			–	–	–	–
			–	–	–	–
Rated short-time withstand current (3s)		Ik [kA]	16	16	16	16
			20	20	20	20
			25	25	25	25
			31.5	31.5	31.5	31.5
			–	–	–	–
			–	–	–	–
Making capacity		Ip [kA]	40	40	40	40
			50	50	50	50
			63	63	63	63
			80	80	80	80
			–	–	–	–
			–	–	–	–
Operation sequence		[O - 0.3 s - CO - 15 s - CO]	•		•	
Opening time		[ms]	33 ... 60		33 ... 60	
Arcing time		[ms]	10 ... 15		10 ... 15	
Total breaking time		[ms]	43 ... 75		43 ... 75	
Closing time		[ms]	60 ... 80		60 ... 80	
Maximum overall dimensions		H [mm]	628	628	691	691
		W [mm]	503	503	653	853
		D [mm]	662	662	642	642
		Pole distance P [mm]	150	150	210	210
Weight		[kg]	116	116	135	135
Standardised table of dimensions		TN	7412	7412	7420	7420
		1VCD	–	–	–	–
Operating temperature		[°C]	- 5 ... + 40		- 5 ... + 40	
Tropicalization		IEC: 60068-2-30, 60721-2-1	•		•	
Electromagnetic compatibility		IEC: 62271-1	•		•	

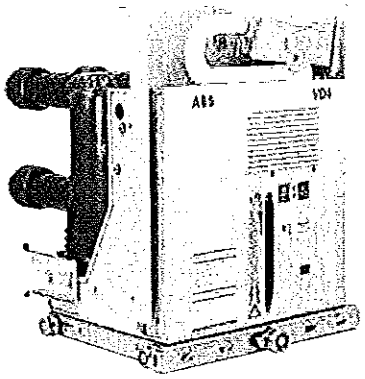
(1) Rated current guaranteed with circuit-breaker installed in PowerCube enclosure and with 40 °C ambient temperature.
(2) Up to 4000 A with forced ventilation.
(3) Circuit-breakers up to 1250 A and 31.5 kA have polyamide barriers.

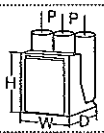
	VD4/P 17									VD4/W 17	
	PB2							PB3		PB3	
	•							•		•	
	•							•		•	
	17.5							17.5		17.5	
	17.5							17.5		17.5	
	38							38		38	
	95							95		95	
	50-60							50-60		50-60	
	1250	1250	1600	1600	1600	2000	2000	2500	2500	3150 ⌀	3150 ⌀
	–	–	–	–	–	–	–	–	–	–	–
	–	–	20	–	–	20	–	20	–	–	20
	–	–	25	–	–	25	–	25	–	–	25
	–	–	31.5	–	–	31.5	–	31.5	–	–	31.5
	40	–	–	40	–	40	–	40	–	–	40
	–	50	–	–	50	–	50	–	50	50	–
	–	–	–	–	–	–	–	–	–	–	–
	–	–	20	–	–	20	–	20	–	–	20
	–	–	25	–	–	25	–	25	–	–	25
	–	–	31.5	–	–	31.5	–	31.5	–	–	31.5
	40	–	–	40	–	40	–	40	–	–	40
	–	50	–	–	50	–	50	–	50	50	–
	–	–	–	–	–	–	–	–	–	–	–
	–	–	50	–	–	50	–	50	–	–	50
	–	–	63	–	–	63	–	63	–	–	63
	–	–	80	–	–	80	–	80	–	–	80
	100	–	–	100	–	100	–	100	–	–	100
	–	125	–	–	125	–	125	–	125	125	–
	•							•		•	
	33 ... 60							33 ... 60		33 ... 60	
	10 ... 15							10 ... 15		10 ... 15	
	43 ... 75							43 ... 75		43 ... 75	
	60 ... 80							60 ... 80		60 ... 80	
	691	691	691	691	691	690	691	691	691	691	730
	653	681	653	653	681	653	681	853	853	853	853
	641	643	642	641	643	642	643	640	643	643	640
	210	210	210	210	210	210	210	275	275	275	275
	174	180	160	174	180	160	190	186	225	240	221
	–	–	7415	–	–	7415	–	7417	–	–	–
	003284	003444	–	003284	003444	–	003444	–	003445	003596	000152
	- 5 ... + 40							- 5 ... + 40		- 5 ... + 40	
	•							•		•	
	•							•		•	

ЯРНО С ОРИГИНАЛА

General characteristics of withdrawable circuit-breakers for PowerCube modules (24 kV)





Circuit-breaker		VD4/P 24				
PowerCube module		PB4		PB5		
Standards	IEC 62271-100	•		•		
	VDE 0671; CEI EN 62271-100- File 7642	•		•		
Rated voltage	Ur [kV]	24		24		
Rated insulation voltage	Us [kV]	24		24		
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50		50		
Impulse withstand voltage	Up [kV]	125		125		
Rated frequency	fr [Hz]	50-60		50-60		
Rated normal current (40 °C) (1)	Ir [A]	630	1250	1600	2000	2500 (2)
Rated breaking capacity (rated short-circuit breaking current symmetrical)	Isc [kA]	16	16	16	16	16
		20	20	20	20	20
		25	25	25	25	25
		–	31.5	31.5	31.5	31.5
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	16
		20	20	20	20	20
		25	25	25	25	25
		–	31.5	31.5	31.5	31.5
Making capacity	Ip [kA]	40	40	40	40	40
		50	50	50	50	50
		63	63	63	63	63
		–	80	80	80	80
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•	•
Opening time	[ms]	33 ... 60		33 ... 60		
Arcing time	[ms]	10 ... 15		10 ... 15		
Total breaking time	[ms]	43 ... 75		43 ... 75		
Closing time	[ms]	60 ... 80		60 ... 80		
Maximum overall dimensions 	H [mm]	794	794	838	838	838
	W [mm]	653	653	853	853	853
	D [mm]	802	802	790	790	790
	Pole distance P [mm]	210	210	275	275	275
Weight	[kg]	140	140/146 (3)	228	228	228
Standardised table of dimensions	TN	7413	7413	7418	7418	7418
	1VCD	–	000173 (3)	–	–	–
Operating temperature	[°C]	- 5 ... + 40				
Tropicalization	IEC: 60068-2-30, 60721-2-1	•				
Electromagnetic compatibility	IEC: 62271-1	•				

(1) Rated current guaranteed with circuit-breaker installed in PowerCube enclosure and with 40 °C ambient temperature.
(2) 2300 A rated uninterrupted current guaranteed with natural ventilation; 2500 A rated current guaranteed with forced ventilation.
(3) 31.5 kA version.

ФРАГМЕНТ С ОРИГИНАЛА

5.5.5. Types of withdrawable circuit-breakers available for PowerCube modules

VD4 withdrawable circuit-breaker (12 kV)

Ur	Isc	Rated uninterrupted current (40 °C) [A]					
		W=650	W=800	W=1000	W=1000	W=1000	
		P=150	P=210	P=275	P=275	P=275	
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	u/l=310	Circuit-breaker type
		ø=35	ø=79	ø=79	ø=109	ø=109	
	16	630					VD4/P 12.06.16 p150
	20	630					VD4/P 12.06.20 p150
	25	630					VD4/P 12.06.25 p150
	31.5	630					VD4/P 12.06.32 p150
	16	1250					VD4/P 12.12.16 p150
	20	1250					VD4/P 12.12.20 p150
	25	1250					VD4/P 12.12.25 p150
	31.5	1250					VD4/P 12.12.32 p150
	16		630				VD4/W 12.06.16 p210
	20		630				VD4/W 12.06.20 p210
	25		630				VD4/W 12.06.25 p210
	31.5		630				VD4/W 12.06.32 p210
	16		1250				VD4/W 12.12.16 p210
	20		1250				VD4/W 12.12.20 p210
	25		1250				VD4/W 12.12.25 p210
	31.5		1250				VD4/W 12.12.32 p210
	40		1250				VD4/P 12.12.40 p210
	50		1250				VD4/P 12.12.50 p210
	20			1600			VD4/P 12.16.20 p210
12	25			1600			VD4/P 12.16.25 p210
	31.5			1600			VD4/P 12.16.32 p210
	40			1600			VD4/P 12.16.40 p210
	50			1600			VD4/P 12.16.50 p210
	20			2000			VD4/P 12.20.20 p210
	25			2000			VD4/P 12.20.25 p210
	31.5			2000			VD4/P 12.20.32 p210
	40			2000			VD4/P 12.20.40 p210
	50			2000			VD4/P 12.20.50 p210
	20				2500		VD4/P 12.25.20 p275
	25				2500		VD4/P 12.25.25 p275
	31.5				2500		VD4/P 12.25.32 p275
	40				2500		VD4/P 12.25.40 p275
	50				2500		VD4/P 12.25.50 p275
	20					3150 (1)	VD4/W 12.32.20 p275
	25					3150 (1)	VD4/W 12.32.25 p275
	31.5					3150 (1)	VD4/W 12.32.32 p275
	40					3150 (1)	VD4/W 12.32.40 p275
	50					3150 (1)	VD4/W 12.32.50 p275

W = Width of the switchgear.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A rated current guaranteed with forced ventilation. Available on request.

ОРИГИНАЛА

VD4 withdrawable circuit-breaker (17.5 kV)

Ur	Isc	Rated uninterrupted current (40 °C) (A)					
		W=650	W=800	W=1000	W=1000	W=1000	
		P=150	P=210	P=275	P=275	P=275	
kV	kA	u/l=205	u/l=310	u/l=310	u/l=310	u/l=310	Circuit-breaker type
		ø=35	ø=79	ø=79	ø=109	ø=109	
	16	630					VD4/P 17.06.16 p150
	20	630					VD4/P 17.06.20 p150
	25	630					VD4/P 17.06.25 p150
	31.5	630					VD4/P 17.06.32 p150
	16	1250					VD4/P 17.12.16 p150
	20	1250					VD4/P 17.12.20 p150
	25	1250					VD4/P 17.12.25 p150
	31.5	1250					VD4/P 17.12.32 p150
	16		630				VD4/W 17.06.16 p210
	20		630				VD4/W 17.06.20 p210
	25		630				VD4/W 17.06.25 p210
	31.5		630				VD4/W 17.06.32 p210
	16		1250				VD4/W 17.12.16 p210
	20		1250				VD4/W 17.12.20 p210
	25		1250				VD4/W 17.12.25 p210
	31.5		1250				VD4/W 17.12.32 p210
	40		1250				VD4/P 17.12.40 p210
	50		1250				VD4/P 17.12.50 p210
	20			1600			VD4/P 17.16.20 p210
17.5	25			1600			VD4/P 17.16.25 p210
	31.5			1600			VD4/P 17.16.32 p210
	40			1600			VD4/P 17.16.40 p210
	50			1600			VD4/P 17.16.50 p210
	20			2000			VD4/P 17.20.20 p210
	25			2000			VD4/P 17.20.25 p210
	31.5			2000			VD4/P 17.20.32 p210
	40			2000			VD4/P 17.20.40 p210
	50			2000			VD4/P 17.20.50 p210
	20				2500		VD4/P 17.25.20 p275
	25				2500		VD4/P 17.25.25 p275
	31.5				2500		VD4/P 17.25.32 p275
	40				2500		VD4/P 17.25.40 p275
	50				2500		VD4/P 17.25.50 p275
	20					3150 (1)	VD4/W 17.32.20 p275
	25					3150 (1)	VD4/W 17.32.25 p275
	31.5					3150 (1)	VD4/W 17.32.32 p275
	40					3150 (1)	VD4/W 17.32.40 p275
	50					3150 (1)	VD4/W 17.32.50 p275

W = Width of the switchgear.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
ø = Diameter of the isolating contact.
(1) Up to 4000 A rated current guaranteed with forced ventilation. Available on request.

ВЯРНО С ОРИГИНАЛА

VD4 withdrawable circuit-breaker (24 kV)

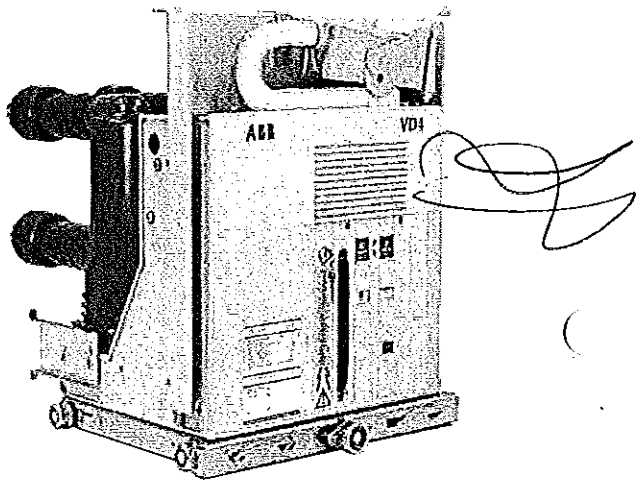
Ur	Isc	Rated uninterrupted current (40 °C) [A]		Circuit-breaker type
kV	kA	W=800 P=210 u/l=310 ø=35	W=1000 P=275 u/l=310 ø=79	
24	16	630		VD4/P 24.06.16 p210
	20	630		VD4/P 24.06.20 p210
	25	630		VD4/P 24.06.25 p210
	16	1250		VD4/P 24.12.16 p210
	20	1250		VD4/P 24.12.20 p210
	25	1250		VD4/P 24.12.25 p210
	31.5	1250		VD4/P 24.12.32 p210
	16		1600	VD4/P 24.16.16 p275
	20		1600	VD4/P 24.16.20 p275
	25		1600	VD4/P 24.16.25 p275
	31.5		1600	VD4/P 24.16.32 p275
	16		2000	VD4/P 24.20.16 p275
	20		2000	VD4/P 24.20.20 p275
	25		2000	VD4/P 24.20.25 p275
	31.5		2000	VD4/P 24.20.32 p275
	16		2300 (1)	VD4/P 24.25.16 p275
	20		2300 (1)	VD4/P 24.25.20 p275
	25		2300 (1)	VD4/P 24.25.25 p275
	31.5		2300 (1)	VD4/P 24.25.32 p275

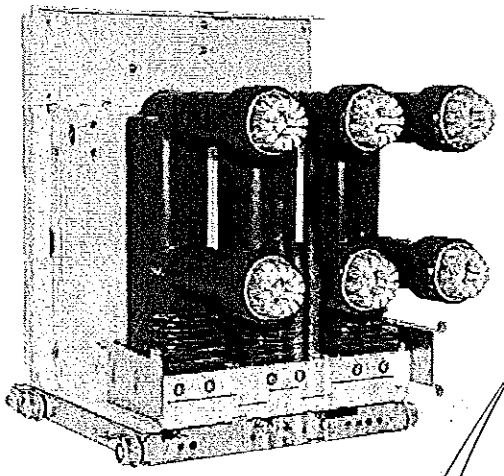
W = Width of the switchgear.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
Ø = Diameter of the isolating contact.
(1) Up to 2500 A rated current guaranteed with forced ventilation.

5.5.6. Standard fittings for withdrawable circuit-breakers for PowerCube modules

The basic versions of the withdrawable circuit-breakers are always three-pole and fitted with:

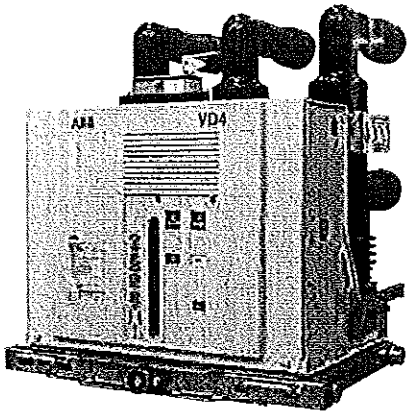
- EL type manual operating mechanism
- mechanical signalling device for closing spring charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten auxiliary circuit-breaker open/closed contacts
  Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three make contacts (signalling circuit-breaker open) and four break contacts (signalling circuit-breaker closed) are available.
- lever for manually charging the closing spring
- isolating contacts
- cord with connector (only plug) for auxiliary circuits, with striker pin which does not allow connection of the plug in the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
- locking electromagnet in the truck. This prevents racking-in of the circuit-breaker in the panel with auxiliary circuits not connected (plug not inserted in the socket).

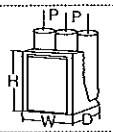




НО С ОРИГИНАЛА

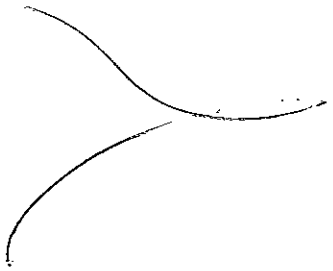
5.5.7. General characteristics of withdrawable circuit-breakers for ZS8.4 switchgear



Circuit-breaker		VD4/Z8					
	Panel without partitions	•					
	Panel with partitions	–					
	Preussen Elektra - EON [2]	–					
	Width [kV]	650	650	650	650	800	800
	Depth [kV]	1000	1000	1000	1000	1200	1200
Standards	IEC 62271-100	•					
	VDE 0671	•					
Rated voltage	Ur [kV]	12	12	17.5	17.5	24	24
Rated insulation voltage	Us [kV]	12	12	17.5	17.5	24	24
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28	28	38	38	50	50
Impulse withstand voltage	Up [kV]	75	75	95	95	125	125
Rated frequency	fr [Hz]	50-60					
Rated normal current (40 °C) [1]	Ir [A]	630	1250	630	1250	630	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	–	–	–	–	16	16
		20	20	20	20	20	20
		25	25	25	25	25	25
Rated short-time withstand current (3 s)	Ik [kA]	–	–	–	–	16	16
		20	20	20	20	20	20
		25	25	25	25	25	25
Making capacity	Ip [kA]	–	–	–	–	40	40
		18,5 mm	50	50	50	50	50
		63	63	63	63	63	63
Operation sequence	[O-0.3s-CO-15s-CO]	•					
Opening time	[ms]	33...60					
Arcing time	[ms]	10...15					
Total breaking time	[ms]	43...75					
Closing time	[ms]	60...80					
Maximum overall dimensions 	H [mm]	579	579	579	579	680	680
	W [mm]	503	503	503	503	653	653
	D [mm]	548	548	548	548	646	646
	Pole distance P [mm]	150	150	150	150	210	210
Weight	[kg]	116	116	116	116	140	140
Standardised table of dimensions	1VCD	000092	000137	000137	000137	000089	000138
Operating temperature	[°C]	– 5 ... + 40					
Tropicalisation	IEC 60068-2-30	•					
	IEC 60721-2-1	•					
Electromagnetic compatibility	IEC 62271-1	•					

(1) Rated current guaranteed with circuit-breaker installed in switchgear with 40 °C ambient temperature.
(2) Special type with device for charging the closing spring by means of a rotary handle outside the operating mechanism.

ВЕРНО С ОРИГИНАЛА



	VD4/ZT8						VD4/ZS8			
	–						–			
	•						–			
	–						•			
	650	650	650	650	800	800	650	650	800	800
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	•						•			
	•						•			
	12	12	17.5	17.5	24	24	12	12	24	24
	12	12	17.5	17.5	24	24	12	12	24	24
	28	28	38	38	50	50	28	28	50	50
	75	75	95	95	125	125	75	75	125	125
	50-60						50-60			
	630	1250	630	1250	630	1250	630	1250	630	1250
	–	–	–	–	16	16	–	–	16	16
	20	20	20	20	20	20	20	20	20	20
	25	25	25	25	25	25	25	25	25	25
	–	–	–	–	16	16	–	–	16	16
	20	20	20	20	20	20	20	20	20	20
	25	25	25	25	25	25	25	25	25	25
	–	–	–	–	40	40	–	–	40	40
	50	50	50	50	50	50	50	50	50	50
	63	63	63	63	63	63	63	63	63	63
	•						•			
	33...60						40...60			
	10...15						10...15			
	43...75						50...75			
	60...80						60...80			
	579	579	579	579	680	680	579	579	680	680
	503	503	503	503	653	653	503	503	653	653
	638	638	638	638	646	646	638	638	646	646
	150	150	150	150	210	210	150	150	210	210
	116	116	116	116	140	140	116	116	140	140
	000093	000134	000134	000134	000090	000136	000091	000133	000088	000135
	– 5 ... + 40						– 5 ... + 40			
	•						•			
	•						•			
	•						•			

ВЗЯТО С ОРИГИНАЛА

5.5.8. General characteristics of withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZS8 - VD4/ZT8 - VD4/Z8 withdrawable circuit-breaker for ZS8.4 switchgear

Ur	Isc	Rated uninterrupted current (40 °C) [A]						Circuit-breaker type
		Panel without partition		Panel with partition		Special panel EON		
		W = 650	W = 800	W = 650	W = 800	W = 650	W = 800	
kV	kA	P = 150	P = 210	P = 150	P = 210	P = 150	P = 210	
		u/l = 205	u/l = 310	u/l = 205	u/l = 310	u/l = 205	u/l = 310	
		ø = 35	ø = 35	ø = 35	ø = 35	ø = 35	ø = 35	
12	20	630						VD4/Z8 12.06.20 p150
	25	630						VD4/Z8 12.06.25 p150
	20	1250						VD4/Z8 12.12.20 p150
	25	1250						VD4/Z8 12.12.25 p150
	20			630				VD4/ZT8 12.06.20 p150
	25			630				VD4/ZT8 12.06.25 p150
	20			1250				VD4/ZT8 12.12.20 p150
	25			1250				VD4/ZT8 12.12.25 p150
	20					630		VD4/ZS8 12.06.20 p150
	25					630		VD4/ZS8 12.06.25 p150
	20					1250		VD4/ZS8 12.12.20 p150
	25					1250		VD4/ZS8 12.12.25 p150
17.5	20	630						VD4/Z8 17.06.20 p150
	25	630						VD4/Z8 17.06.25 p150
	20	1250						VD4/Z8 17.12.20 p150
	25	1250						VD4/Z8 17.12.25 p150
	20			630				VD4/ZT8 17.06.20 p150
	25			630				VD4/ZT8 17.06.25 p150
	20			1250				VD4/ZT8 17.12.20 p150
	25			1250				VD4/ZT8 17.12.25 p150
24	16		630					VD4/Z8 24.06.16 p210
	20		630					VD4/Z8 24.06.20 p210
	25		630					VD4/Z8 24.06.25 p210
	16		1250					VD4/Z8 24.12.16 p210
	20		1250					VD4/Z8 24.12.20 p210
	25		1250					VD4/Z8 24.12.25 p210
	16				630			VD4/ZT8 24.06.16 p210
	20				630			VD4/ZT8 24.06.20 p210
	25				630			VD4/ZT8 24.06.25 p210
	16				1250			VD4/ZT8 24.12.16 p210
	20				1250			VD4/ZT8 24.12.20 p210
	25				1250			VD4/ZT8 24.12.25 p210
	16						630	VD4/ZS8 24.06.16 p210
	20						630	VD4/ZS8 24.06.20 p210
	25						630	VD4/ZS8 24.06.25 p210
	16						1250	VD4/ZS8 24.12.16 p210
	20						1250	VD4/ZS8 24.12.20 p210
	25						1250	VD4/ZS8 24.12.25 p210

W = Width of the switchgear.
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
Ø = Diameter of the isolating contact.

КОПИЯ С ОРИГИНАЛА

5.5.9. Standard fittings for withdrawable circuit-breakers for ZS8.4 switchgear

The basic versions of the withdrawable circuit-breakers are always three-pole and fitted with:

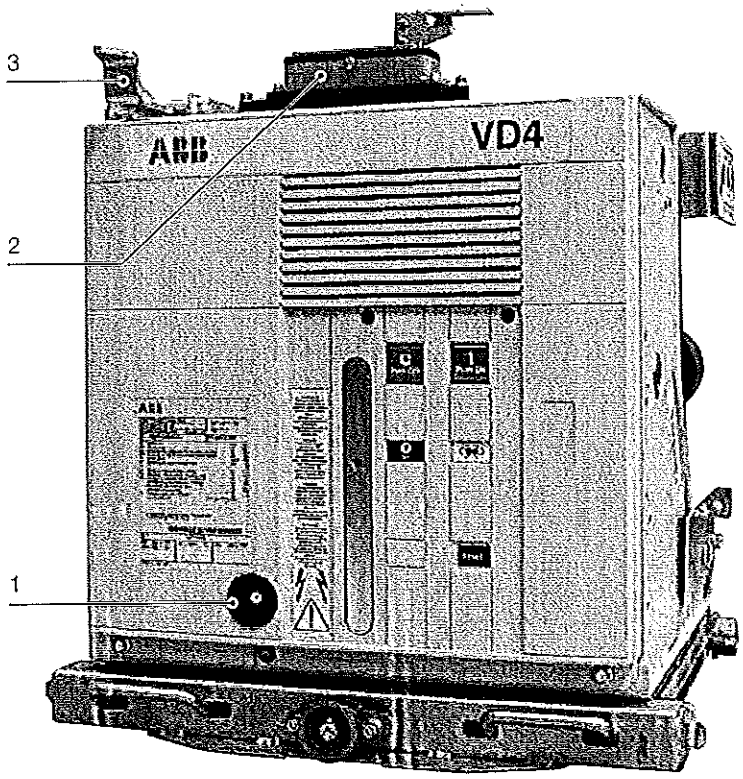
- EL type manual operating mechanism
- mechanical signalling device for closing spring charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten auxiliary circuit-breaker open/closed contacts
  Note: with the set of ten auxiliary contacts supplied as standard and the maximum number of electrical applications possible, three make contacts (signalling circuit-breaker open) and four break contacts (signalling circuit-breaker closed) are available.
- lever for manually charging the closing springs incorporated in the operating mechanism for VD4/Z8 and VD4/ZT8, external with rotary movement for VD4/ZS8
- isolating contacts
- cord with connector (only plug) for auxiliary circuits, with striker pin which does not allow connection of the plug in the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)

5.5.10. VD4/ZS8 (Preussen Elektra-EON version)

- Device for recharging the closing spring, with door closed, by means of removable rotary handle and outside the operating mechanism and the switchgear
- 64-pin Harting socket with mechanical interlock which prevents traverse of the circuit-breaker when the plug is not inserted in the socket
- Interlock with the door which prevents insertion of the spring charging lever when the circuit-breaker is closed
- Interlock with the door and the 64-pin Harting socket which prevents door closure when the plug is not inserted in the socket.

5.5.11. VD4/Z8 - VD4/ZT8

- Harting 64-pin socket with mechanical interlock which prevents traverse of the circuit-breaker when the plug is not inserted in the socket.

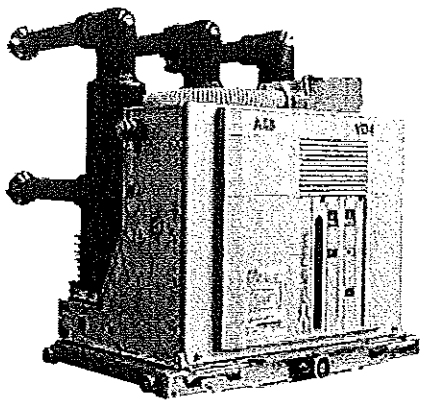


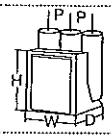
Caption

1) Device for spring charging with rotary handle
2) Harting 64-pin socket with mechanical interlock which prevents traverse when the socket is not inserted
3) Door-socket-spring charging device interlock (only VD4/ZS8 version)

КОПИЯ С ОРИГИНАЛА

5.5.12. General characteristics of withdrawable circuit-breakers for UniSwitch switchgear and UniMix (24 kV) switchgear



Circuit-breaker		VD4/US 24 [3]		VD4/US 24 [4]	
	UniSwitch (unit CBW type)	•	•	–	–
	UniMix (unit P1/E type)	–	–	•	•
Standards	IEC 62271-100	•	•	•	•
	VDE 0671; CEI EN 62271-100- File 7642	•	•	•	•
Rated voltage	Ur [kV]	24	24	24	24
Rated insulation voltage	Us [kV]	24	24	24	24
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50	50	50	50
Impulse withstand voltage	Up [kV]	125	125	125	125
Rated frequency	fr [Hz]	50-60	50-60	50-60	50-60
Rated normal current (40 °C) [1]	Ir [A]	630	1250	630	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	16 (20) [5]	16 (25) [5]	16	16
		20 (25) [5]	20 (25) [5]	20	20
		–	–	25	25
Rated short-time withstand current (3 s) [2]	Ik [kA]	16 (20) [5]	16 (25) [5]	16	16
		20 (25) [5]	20 (25) [5]	20	20
		–	–	25	25
Making capacity	Ip [kA]	40 (50) [5]	40 (50) [5]	40	40
		50 (63) [5]	50 (63) [5]	50	50
		–	–	63	63
Operation sequence	[O - 0.3 s - CO - 15 s - CO]	•	•	•	•
Opening time	[ms]	33 ... 60	33 ... 60	33 ... 60	33 ... 60
Arcing time	[ms]	10 ... 15	10 ... 15	10 ... 15	10 ... 15
Total breaking time	[ms]	43 ... 75	43 ... 75	43 ... 75	43 ... 75
Closing time	[ms]	60 ... 80	60 ... 80	60 ... 80	60 ... 80
Maximum overall dimensions 	H [mm]	680	680	680	680
	W [mm]	653	653	653	653
	D [mm]	742	742	742	742
	Pole distance P [mm]	210	210	210	210
Weight	[kg]	125	125	125	125
Standardised table of dimensions	1VCD	000047	000047	000047	000047
Operating temperature	[°C]	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40
Tropicalization	IEC: 60068-2-30, 60721-2-1	•	•	•	•
Electromagnetic compatibility	IEC 62271	•	•	•	•

(1) Rated current guaranteed with withdrawable circuit-breaker installed in switchgear with 40 °C ambient temperature
(2) The value and duration of the rated short-time withstand current depends on the switchgear. See the specific catalogues of the UniSwitch and UniMix switchgear
(3) The top shutter activation wheels of the UniSwitch switchgear (CBW unit) are mounted and adjusted by the manufacturer of the UniSwitch switchgear
(4) The top shutter activation wheels of the UniMix switchgear (P1/E unit) are available on request
(5) The values in brackets refer to the 12 kV rated voltage.

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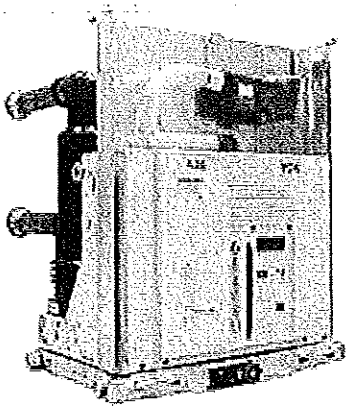
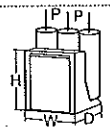
5.5.13. General characteristics of withdrawable circuit-breakers for UniSec switchgear



Circuit-breaker			VD4/SEC
Standards		IEC 62271-100	•
		VDE 0671; CEI EN 62271-100- File 7642	•
Rated voltage		Ur [kV]	24
Rated insulation voltage		Us [kV]	24
Withstand voltage at 50 Hz		Ud (1 min) [kV]	50
Impulse withstand voltage		Up [kV]	125
Rated frequency		fr [Hz]	50-60
Rated normal current (40 °C) (1)		Ir [A]	630 - 1250
Rated breaking capacity (rated symmetrical short-circuit current)		Isc [kA]	16
			20
			25
Rated short-time withstand current (3 s)		Ik [kA]	16
			20
			25
Making capacity		Ip [kA]	40
			50
			63
Operation sequence		[O - 0.3 s - CO - 15 s - CO]	•
Opening time		[ms]	33 ... 60
Arcing time		[ms]	10 ... 15
Total breaking time		[ms]	43 ... 75
Closing time		[ms]	60 ... 80
Maximum overall dimensions		H [mm]	743
		W [mm]	653
		D [mm]	742
		Pole distance P [mm]	210
Weight		[kg]	133
Standardised table of dimensions		1VCD	000190
Operating temperature		[°C]	- 5 ... + 40
Tropicalization		IEC: 60068-2-30, 60721-2-1	•
Electromagnetic compatibility		IEC 62271	•

(1) Rated current guaranteed with withdrawable circuit-breaker installed in switchgear with 40 °C ambient temperature.

ВЯРНО С ОРИГИНАЛА

5.5.14. Standard fittings for withdrawable circuit-breakers for UniSwitch, UniMix and UniSec switchgear

The basic versions of the withdrawable circuit-breakers are three-pole and provided with:

- EL type manual operating mechanism
- Mechanical signalling device for closing spring charged/discharged
- Mechanical signalling device for circuit-breaker open/closed
- Closing pushbutton
- Opening pushbutton
- Operation counter
- Set of ten circuit-breaker open/closed auxiliary contacts
  Note: with the set of ten auxiliary contacts supplied as standard and the maximum electrical accessories, three break contacts are available (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed).
- Lever for manual charging of the closing spring incorporated in the operating mechanism
- Isolating contacts
- Racking-out/racking-in lever (the quantity must be established according to the number of pieces of apparatus ordered).

VD4 withdrawable circuit-breaker for switchgear UniSwitch (type unit CBW) and UniMix (type unit P1/E)

Ur	Isc	Rated uninterrupted current (40 °C) [A]		
		UniSwitch CBW	UniMix P1/E	
kV	kA	P=210	P=210	Circuit-breaker type
		u/l=310	u/l=310	
		ø=35	ø=35	
24	16	630 (1)	630	VD4/US 24.06.16 p210
	20	630 (1)	630	VD4/US 24.06.20 p210
	25	–	630	VD4/US 24.06.25 p210
	16	1250 (1)	1250	VD4/US 24.12.16 p210
	20	1250 (1)	1250	VD4/US 24.12.20 p210
	25	–	1250	VD4/US 24.12.25 p210

(1) 25 kA Isc at the 12 kV rated voltage
P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
Ø = Diameter of the isolating contact.

VD4 withdrawable circuit-breaker for switchgear UniSec

Ur	Isc	Rated uninterrupted current (40 °C) [A]	
		P=210	
kV	kA	u/l=310	Circuit-breaker type
		ø=35	
24	16	630	VD4/SEC 24.06.16 p210
	20	630	VD4/SEC 24.06.20 p210
	25	630	VD4/SEC 24.06.25 p210
	16	1250	VD4/SEC 24.12.16 p210
	20	1250	VD4/SEC 24.12.20 p210
	25	1250	VD4/SEC 24.12.25 p210

P = Pole horizontal centre distance.
u/l = Distance between bottom and top terminal.
Ø = Diameter of the isolating contact.

5.6. Characteristics of the electrical accessories

- **Shunt opening release (-MO1)**
- **Additional shunt opening release (-MO2)**
- **Shunt closing release (-MC)**
- **Locking magnet on the actuator (-RL1)**

Un	24 - 30 - 48 - 60 - 110 - 125 - 220 - 250 V–
Un	48 - 60 - 110 - 120 - 127 - 220 ... 240 V~ 50 Hz
Un	110 - 120 - 127 - 220 - 240 V~ 60 Hz
Operating limits	70 ... 110% Un
Inrush power (Ps)	DC 200 W; AC = 200 VA
Inrush time	approx. 100 ms
Continuous power (Pc)	DC = 5 W; AC = 5 VA
Opening time	35 ... 60 ms
Closing time	30 ... 80 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

Undervoltage release (-MU)

Un	24 - 30 - 48 - 60 - 110 - 125 - 220 - 250 V–
Un	48 - 60 - 110 - 120 - 127 - 220 ... 240 V~ 50 Hz
Un	110 - 120 ... 127 - 220 ... 240 V~ 60 Hz
Operating limits	
– circuit-breaker opening	35-70% Un
– circuit-breaker closing	85-110% Un
Inrush power (Ps)	DC 200 W; AC = 200 VA
Inrush time	approx. 100 ms
Continuous power	DC = 5 W; AC = 5 VA
Opening time	60 ... 80 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

Electronic time delay device for undervoltage release (mounted outside the circuit-breaker)

Un	24 ... 30 - 48 - 60 - 110 ... 127 - 220 ... 250 V–
Un	48 - 60 - 110 ... 127 - 220 ... 240 V~ 50/60 Hz
Adjustable opening time (release + time delay device)	0.5-1-1.5-2-3 s

ВЯРНО С ОРИГИНАЛА

Motor for motorised truck (-MT) (only for withdrawable circuit-breakers for UniGear ZS1, UniSec and ZS8.4 switchgear)

Un	24-30-48-60-110-220 V DC
Operating limits	85 ... 110% Un
Rated power (Pn)	40 W

Motor operator (-MS)

Characteristics		
Un	24...30 - 48...60 - 110...130 - 220...250 V--	
Un	100...130 - 220...250 V ~ 50/60 Hz	
Operating limits	85 ... 110% Un	
Inrush power (Ps)	≤ 40 kA	50 kA
	DC=600 W; AC=600 VA	DC=900 W; AC=900 VA
Rated power (Pn)	DC=200 W; AC=200 VA	DC=350 W; AC=350 VA
Inrush time	0.2 s	0.2 s
Charging time	6-7 s	6-7 s
Insulation voltage	2000 V 50 Hz (for 1 min)	2000 V 50 Hz (for 1 min)

Auxiliary contacts of the circuit-breaker

Rated insulation voltage according to VDE 0110, Group C	660 V AC 800 V DC
Rated voltage	24 V... 660 V
Insulation-test test voltage	2.5 kV
Maximum rated current	10 A
Number of contacts	5
Stroke	6 mm ... 7 mm
Contact force	26 N
On resistance	3 mΩ
Storing temperature range	- 20° C ... + 120 °C
Operating temperature range	- 20° C ... + 70 °C
Contact over temperature	20 K
Operating cycles	30,000

Unlimited short circuit stability by using fuses of max. 10 A time-lag

Cosφ	Rated current	Breaking capacity	
220 V AC	0.7	2.5 A	25 A
380 V AC	0.7	1.5 A	15 A
500 V AC	0.7	1.5 A	15 A
660 V AC	0.7	1.2 A	12 A
	Time constant		
24 V DC	1 ms	10 A	12 A
	15 ms	10 A	12 A
	50 ms	8 A	10 A
	200 ms	4 A	7.7 A
60 V DC	1 ms	8 A	10 A
	15 ms	6 A	8 A
	50 ms	5 A	6 A
	200 ms	4 A	5.4 A
110 V DC	1 ms	6 A	8 A
	15 ms	4 A	5 A
	50 ms	2 A	4.6 A
	200 ms	1 A	2.2 A
220 V DC	1 ms	1.5 A	2 A
	15 ms	1 A	1.4 A
	50 ms	0.75 A	1.2 A
	200 ms	0.5 A	1 A

Note
With the set of 10 auxiliary contacts supplied as standard, the following are available:
- 3 NO contacts + 5 NC contacts for fixed circuit-breakers
- 3 NO contacts + 4 NC contacts for withdrawable circuit-breakers

With the set of 15 auxiliary contacts (+5 contacts on request compared to the 10 supplied as standard), the following are available:
- for fixed circuit-breaker, as desired, 6 NO contacts + 7 NC contacts or 5 NO contacts + 8 NC contacts or 3 NO contacts + 10 NC contacts
- for withdrawable circuit-breakers, depending on the applications required, a maximum of 6 NO contacts + 6 NC contacts and a minimum of 5 NO contacts + 5 NC contacts are available.

Locking magnet on the truck (-RL2) (*)

Un	24 - 30 - 48 - 60 - 110 - 125 - 127 - 132 - 220 - 240 V--
Un	24 - 30 - 48 - 60 - 110 - 125 - 127 - 220 - 230 ... 240 V~ 50/60 Hz
Operating limits	85 ... 110% Un
Inrush power (Ps)	DC = 250 W; AC = 250 VA
Continuous power (Pc)	DC = 5 W; AC = 5 VA
Inrush time	150 ms

(*) Not available for versions with motorized truck.

ВЯРНО С ОРИГИНАЛА

6. Instructions for operating the circuit-breaker

6.1. Safety indications

⚠ The VD4 circuit-breakers guarantee a minimum IP2X degree of protection when installed in the following conditions:

- fixed circuit-breaker, installed behind a protective metal net
- withdrawable circuit-breaker, installed in switchgear.

Under these conditions the operator is totally guaranteed against accidental contact with moving parts.

Should mechanical operations be carried out on the circuit-breaker outside of the switchgear, take great care of the moving parts.

If the operations are prevented, do not force the mechanical interlocks and check that the operating sequence is correct.

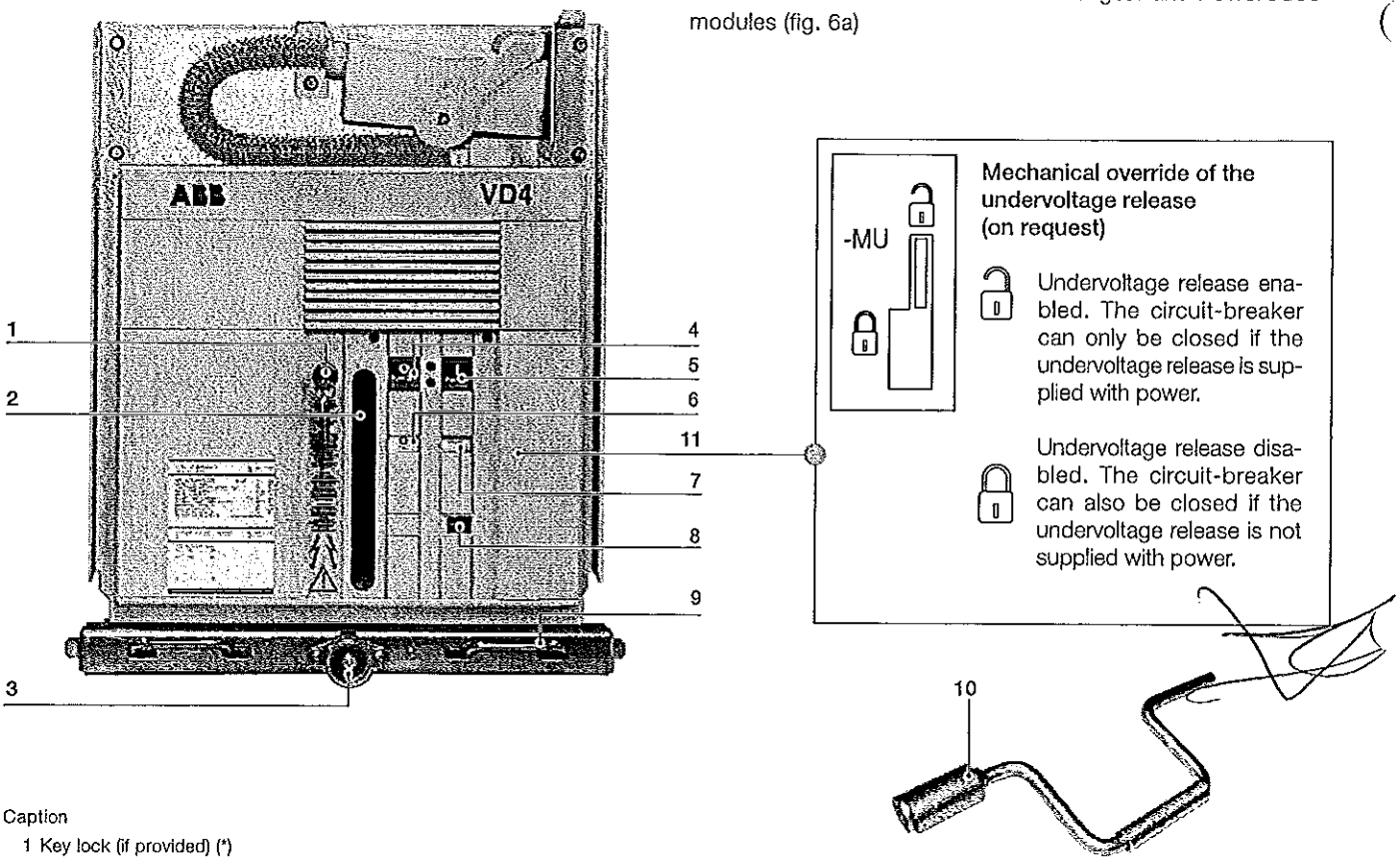
Racking the circuit-breaker in and out of the switchgear must be done gradually to avoid shocks which may deform the mechanical interlocks.

Due to safety reasons, the circuit-breaker has to be treated as "switched on" if the switching position cannot be clearly determined.

In this case all high voltage connections to the circuit-breaker have to be de-energized and zero potential on the primary side of the circuit-breaker has to be confirmed prior to commissioning, operation, maintenance or repair work.

6.2. Switching and signalling parts

VD4 circuit-breakers for UniGear switchgear and PowerCube modules (fig. 6a)



Caption

1 Key lock (if provided) (*)
2 Lever for manually charging the closing spring (except version VD4/ZS8 - see figure 6b)
3 Coupling lever for racking-out operation (withdrawable circuit-breakers only)
4 Opening pushbutton
5 Closing pushbutton
6 Signalling device for circuit-breaker open/closed
7 Signalling device for closing springs charged/discharged
8 Operation counter.
9 Handles for operating the truck locks (only for withdrawable circuit-breakers)
10 Operating lever for circuit-breaker racking-in/out (there is a special version for VD4/ZS8)
11 Mechanical undervoltage release override (on request).
(*) Warning! To activate the key lock: open the circuit-breaker, keep the opening pushbutton depressed, then turn the key and remove it from the housing.

Fig. 6a

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6.3. Circuit-breaker closing and opening operations

Circuit-breaker operation can be either manual or electrical (fig. 6 - fig. 7).

a1) Manual closing spring charging for VD4 circuit-breakers for UniGear switchgear and PowerCube modules (fig. 7a)

Repeatedly activate the charging lever (2) (maximum rotation angle of the lever: about 90°) until the yellow indicator (7) appears.
The maximum forces which can normally be applied to the lever are ≤ 150 N for the EL1 operating mechanism, ≤ 200 N for the EL2 operating mechanism and ≤ 250 N for EL3 operating mechanism.
EL1 Twin and EL2 Twin type operating mechanisms are provided for circuit-breakers with 50 kA breaking capacity.
For manual charging, the additional lever (1) should be inserted fully, as indicated in fig. 7c. In this way, the maximum force to be applied is ≤ 200 N. For the type of operating mechanism, please refer to the rating plate in fig. 1.

a2) Closing spring loading in the manual mode for withdrawable VD4 circuit-breakers for UniGear switchgear equipped with a hand-operated rotary loading device for the closing spring (refer to fig. 6b for indicative details)

Rotate the charging lever (2) (rotate about 12 times) until the yellow indicator (7) appears. The maximum force which can normally be applied to the lever is ≤ 150 N for the EL1 operating mechanism and ≤ 230 N for the EL3 operating mechanism.
The operation can be carried out with the door either open or closed and the circuit-breaker either withdrawn or connected.

WARNING (fig. 6b): Fit the hand-operated loading lever of the closing spring (2b) into its housing (2a). Turn the lever clockwise (about 12 times) until the yellow indicator (7) appears to show that loading is complete. Once this happens, the lever will continue for half a turn without loading (without exercising any force), after which it will lock owing to a sudden load increase. Do not exercise force or try to continue loading as this will damage the device.

VD4 circuit-breakers for ZS8.4 switchgear (fig. 6b)

a3) Manual closing spring charging for VD4 circuit-breakers (fig. 7b)

Rotate the charging lever (2) until the yellow indicator (7) appears. The maximum force which can normally be applied to the lever is ≤ 150 N for the EL1 operating mechanism and ≤ 230 N for the EL3 operating mechanism.
The operation can be carried out with the door either open or closed and the circuit-breaker either withdrawn or connected.

WARNING (fig. 6b): Fit the hand-operated loading lever of the closing spring (2b) into its housing (2a). Turn the lever clockwise (about 12 times) until the yellow indicator (7) appears to show that loading is complete. Once this happens, the lever will continue for half a turn without loading (without exercising any force), after which it will lock owing to a sudden load increase. Do not exercise force or try to continue loading as this will damage the device.

b) Electrical spring charging operation

On request, the circuit-breaker can be fitted with the following accessories for electrical operation:
- geared motor for automatic closing spring charging
- shunt closing release
- shunt opening release.

The geared motor automatically recharges the spring after each closing operation until the yellow indicator (7) appears.
If the power is cut off during charging, the geared motor stops and automatically starts recharging the springs again when the power returns.
In any case, it is always possible to complete the charging operation manually.

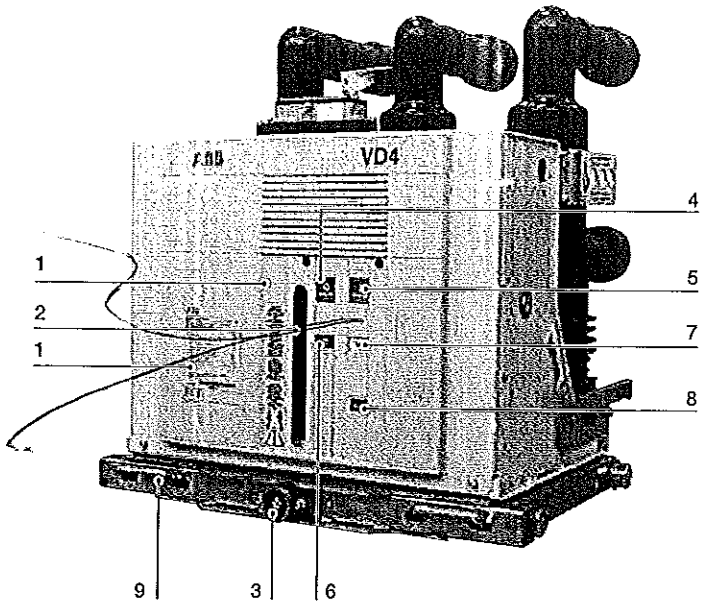
c) Circuit-breaker closing

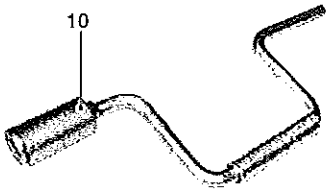
The operation can only be carried out with the closing spring completely charged.
For manual closing, press the pushbutton (5 - fig. 6b).
When there is a shunt closing release, the operation can also be carried out remotely by means of a special control circuit.
Closing having taken place is indicated by the signalling device (6 - fig. 6b).

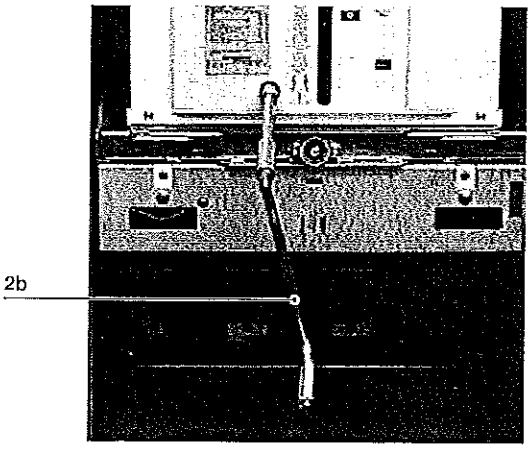
d) Circuit-breaker opening

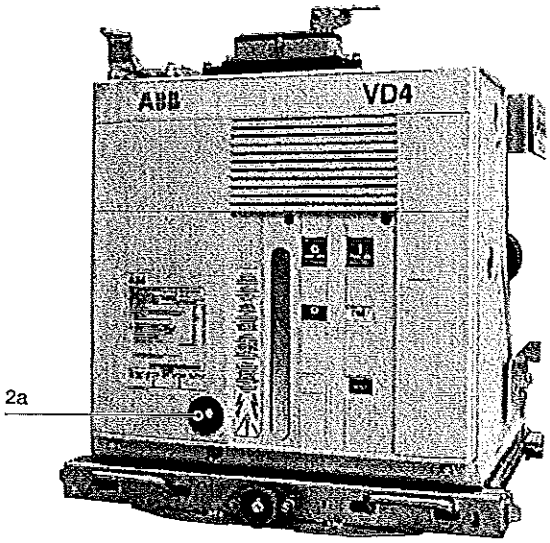
For manual opening, press the pushbutton (4 - fig. 6b).
When there is a shunt opening release, the operation can also be carried out remotely by means of a special control circuit.
Opening having taken place is indicated by the signalling device (6 - fig. 6b).

ВЯРНО С ОРИГИНАЛ









Caption

1 Key lock (if provided)
2 Lever for manually charging the closing spring
2a Coupling for manual closing spring charging (when lever 2 is not provided)
2b Lever for manual closing spring charging for rotary charging device
3 Coupling for racking-out operation lever (only for withdrawable circuit-breakers)
4 Opening pushbutton
5 Closing pushbutton
6 Signalling device for circuit-breaker open/closed
7 Signalling device for closing spring charged/discharged
8 Operation counter.
9 Handles for operating the truck locks (only for withdrawable circuit-breakers)
10 Operating lever for circuit-breaker racking-in/out.

Fig. 6b

ЯРНО С ОРИГИНАЛА

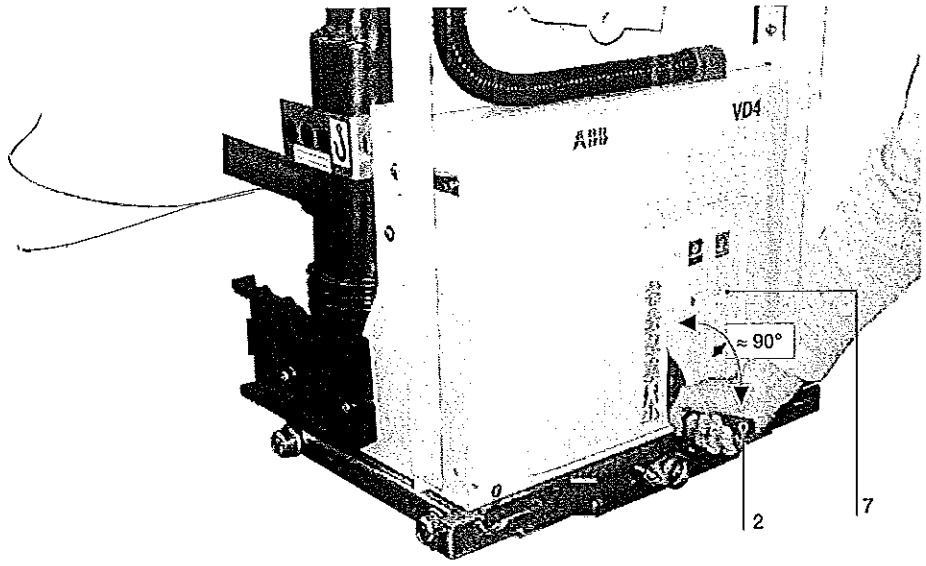


Fig. 7a

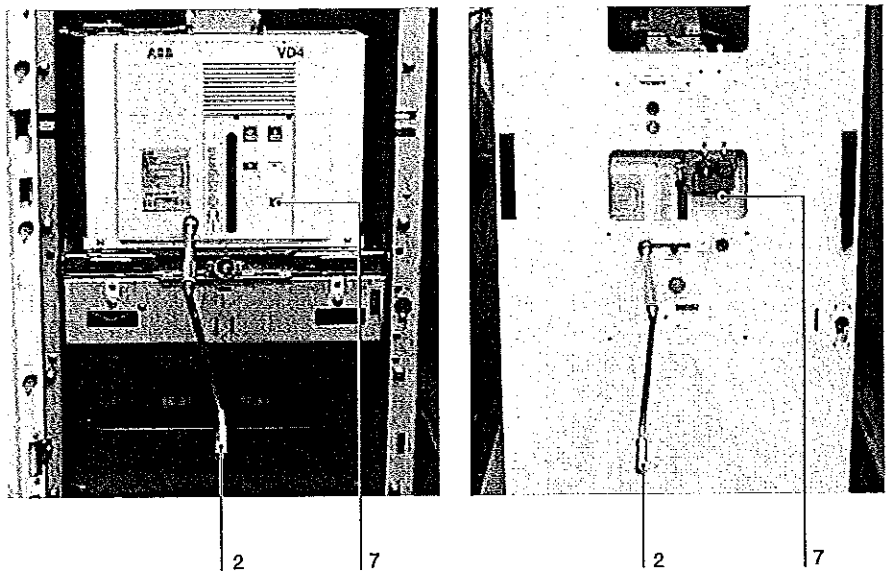


Fig. 7b

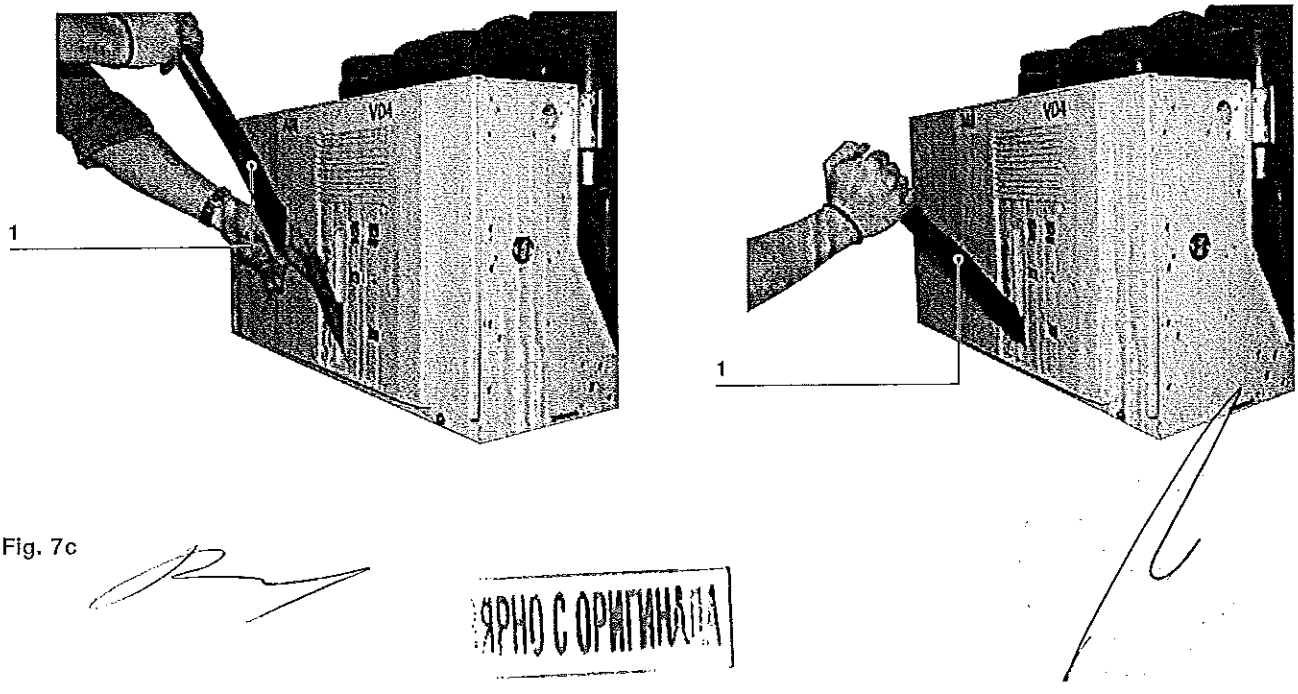


Fig. 7c

ЯРНО С ОРИГИНАЛА

7. Installation

7.1. General

⚠ **Correct installation is of primary importance. The manufacturer's instructions must be carefully studied and followed. It is good practice to use gloves for handling the pieces during installation.**

7.2. Installation and operating conditions

The following Standards must be taken into particular consideration during installation and service:
- IEC 62271-1/DIN VDE 0101
- VDE 0105: Electrical installation service
- DIN VDE 0141: Earthing systems for installations with rated voltage above 1 kV
- All the accident prevention regulations in force in the relative countries.

7.2.1. Normal conditions

Follow the recommendations in the IEC 62271-1 and 62271-100 Standards. In more detail:

Ambient temperature	
Maximum	+ 40 °C
Average maximum over 24 hours	+ 35 °C
Minimum (according to class – 5), apparatus for indoor installation	– 5°

Humidity
The average value of the relative humidity, measured for a period longer than 24 hours, must not exceed the 95%.
The average value of the pressure of the water vapour, measured for a period longer than 24 hours, must not exceed 2.2 kPa.
The average value of the relative humidity, measured for a period longer than 1 month, must not exceed the 90%.
The average value of the pressure of the water vapour, measured for a period longer than 1 month, must not exceed 1.8 kPa.

Altitude
≤ 1000 m above sea level.

7.2.2. Special conditions

Installations over 1000 m a.s.l.
Possible within the limits permitted by reduction of the dielectric resistance of the air.
Increase in the ambient temperature
Reduction in the rated current.
Encourage heat dissipation with appropriate additional ventilation.

Climate
To avoid the risk of corrosion or other damage in areas:
– with a high level of humidity, and/or – with rapid and big temperature variations, take appropriate steps (for example, by using suitable electric heaters) to prevent condensation phenomena.

For special installation requirements or other operating conditions, please contact ABB.

⚠ **The areas involved by the passage of power conductors or auxiliary circuit conductors must be protected against access of any animals which might cause damage or disservices.**

7.2.3. Trip curves

The following graphs show the number of closing-opening cycles (No.) allowed, of the vacuum interrupters, according to the breaking capacity (Ia).

Caption (Figs. 8...)
No. Number of closing-opening cycles allowed for the vacuum interrupters.
Ia: Breaking capacity of the vacuum interrupters.

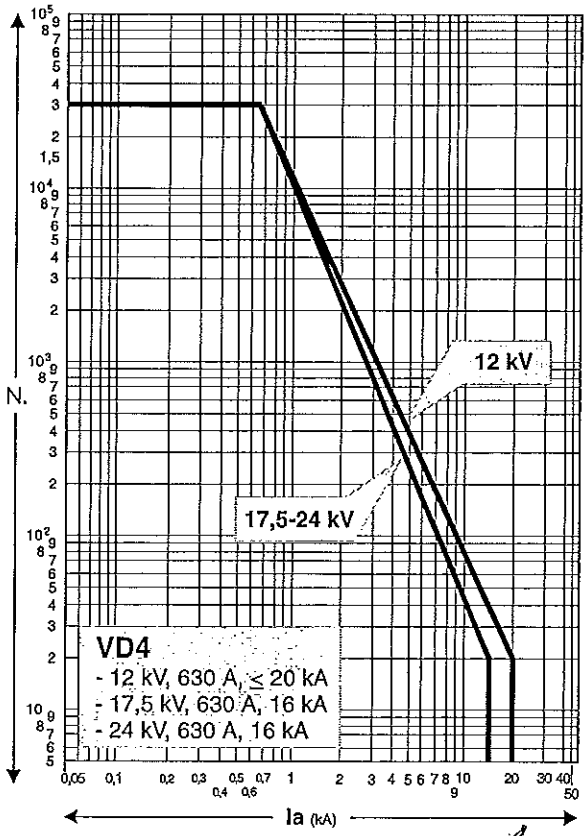


Fig. 8a

ОНО С ОРИГИНАЛА

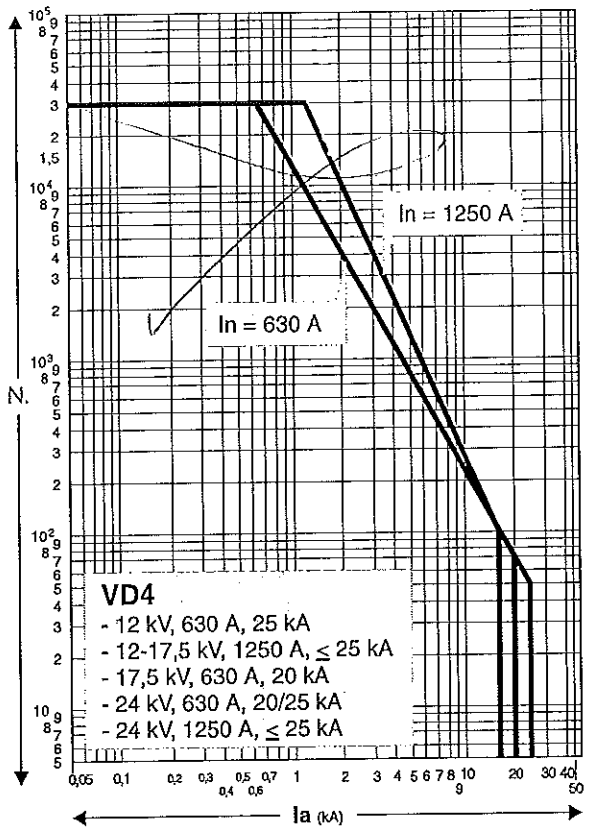


Fig. 8b

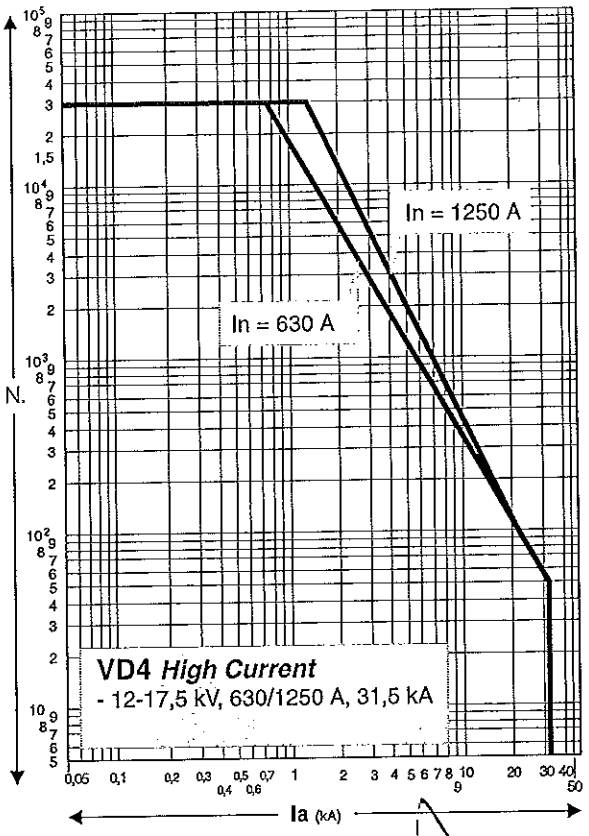


Fig. 8c

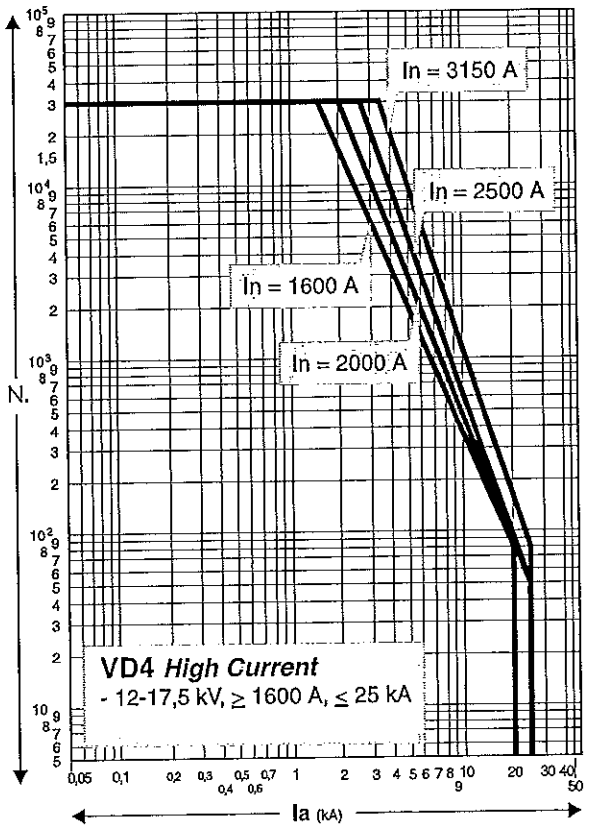


Fig. 8d

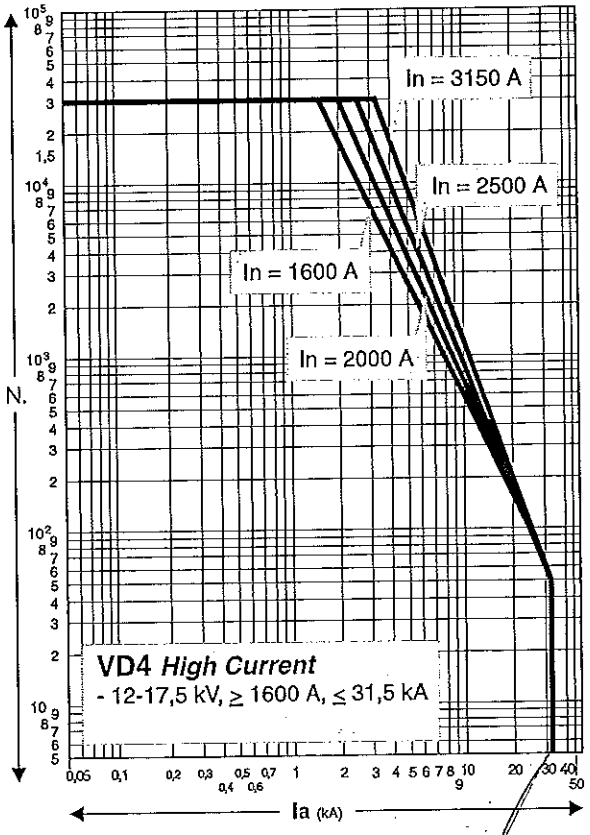


Fig. 8e

ВЕРНО С ОРИГИНАЛА

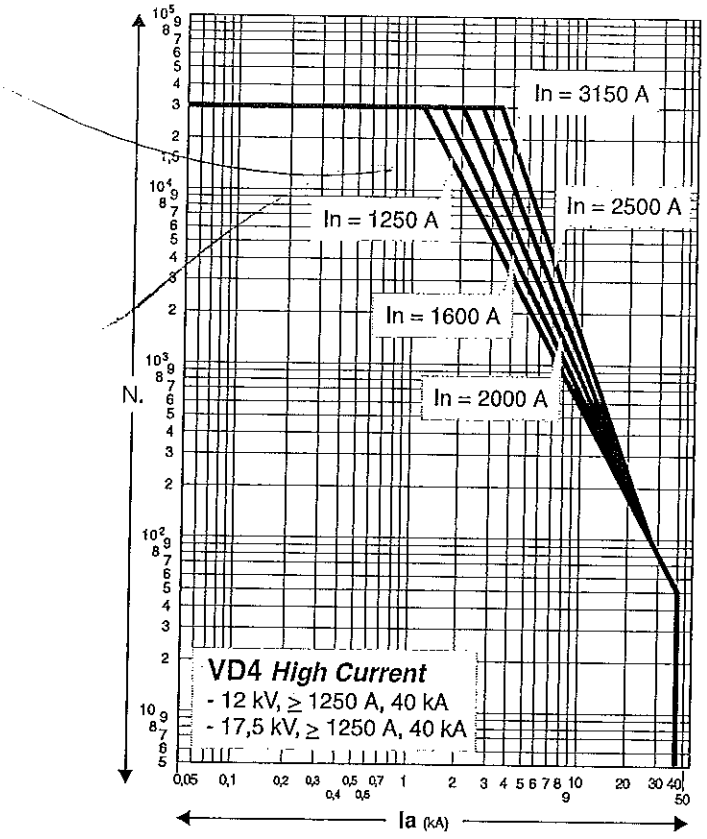


Fig. 8f

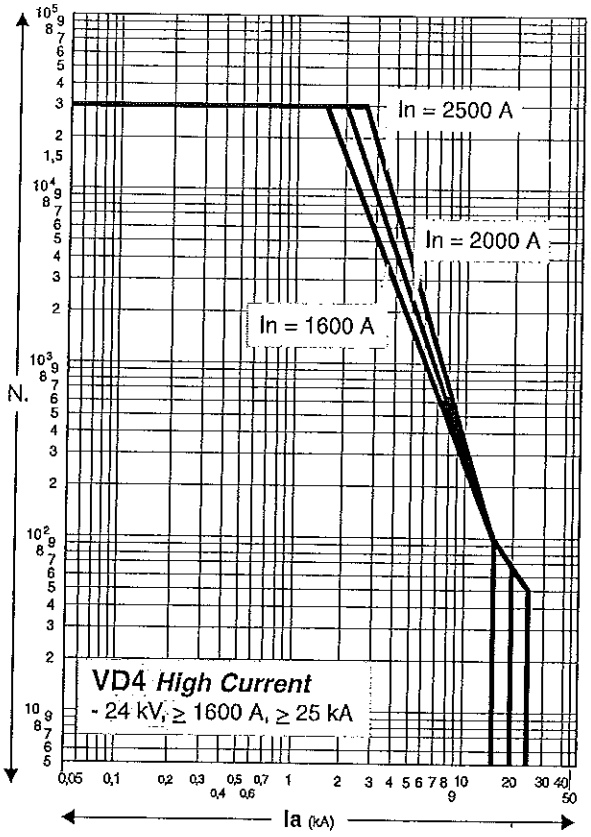


Fig. 8g

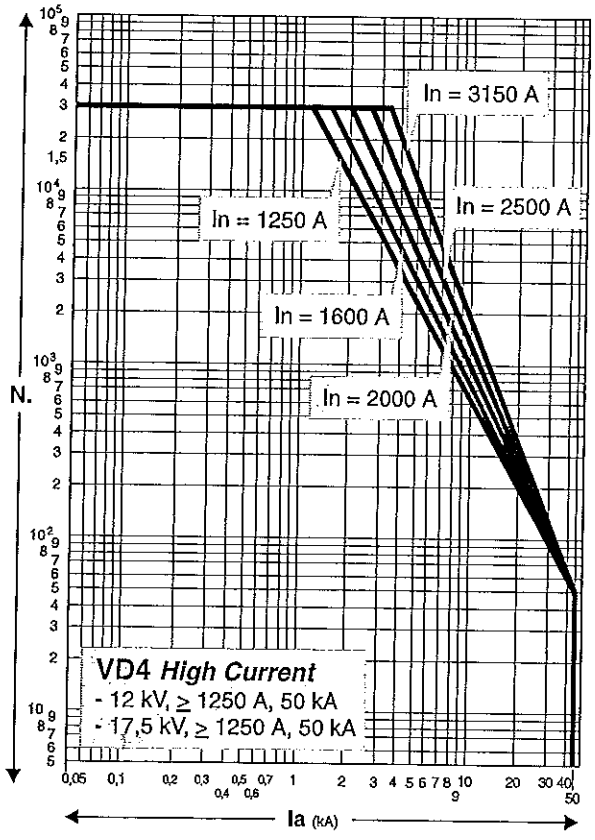


Fig. 8h

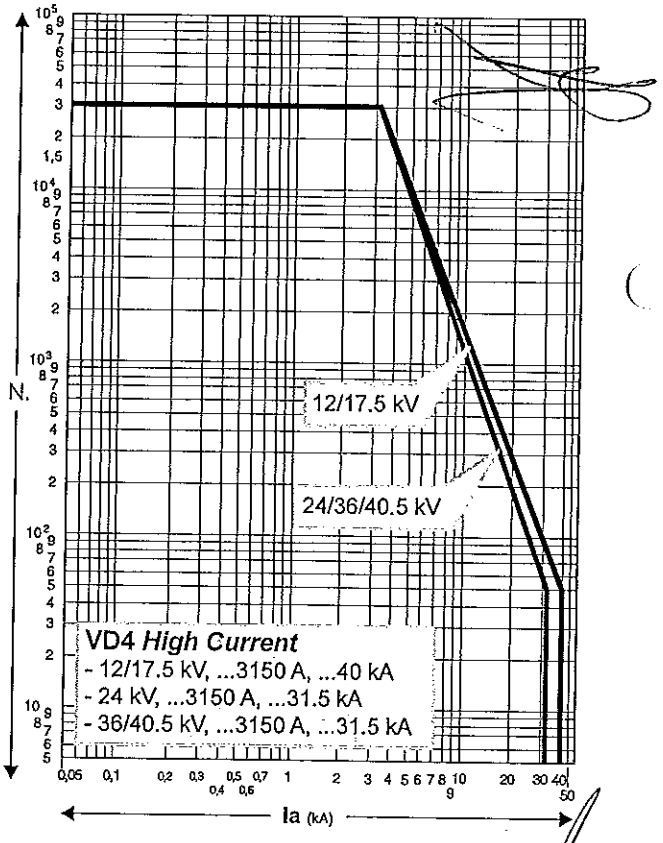


Fig. 8i

ВЕРНО С ОРИГИНАЛОМ

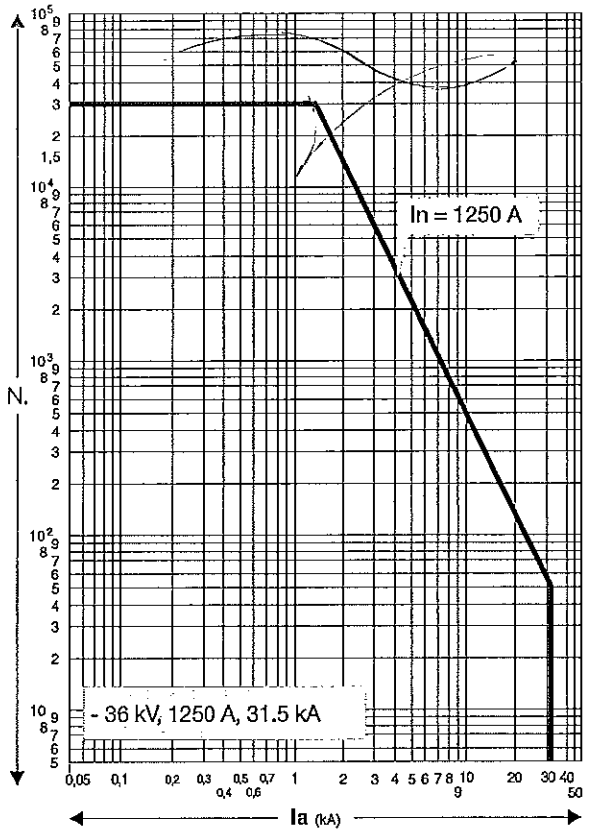


Fig. 8l

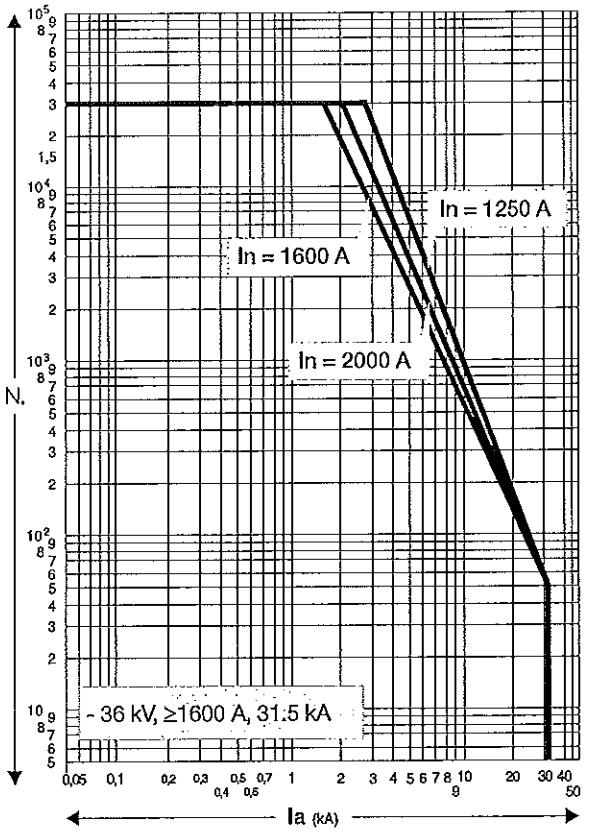


Fig. 8m

7.3. Preliminary operations

- Clean the insulating parts with clean dry cloths.
- Check that the top and bottom terminals are clean and free of any deformation caused by shocks received during transport or storage.

7.4. Installation of fixed circuit-breakers

The circuit-breaker can be mounted directly on supporting frames to be provided by the customer, or on a special supporting truck (available on request).
The circuit-breaker, with supporting truck, must be suitably fixed to the floor of its own compartment by the customer.
The floor surface in correspondence with the truck wheels must be carefully levelled.
A minimum degree of protection (IP2X) must be guaranteed from the front towards live parts.

7.4.1. Mounting the circuit-breaker on a truck made by other manufacturers

The VD4 circuit-breakers which are not installed on ABB trucks, but on trucks made by the customer, must be fitted with one or two additional auxiliary contacts (activated by the mechanical lock and by the circuit-breaker release device) to carry out the function of interrupting the shunt closing release circuit (-MC) during traverse from isolated and vice versa.
In ABB trucks, this function is carried out by the -BT1 and -BT2 auxiliary contacts which cut of the release power supply during and before activation of the mechanical lock of the screw truck racking-in device. This means that the shunt closing release power supply can only by applied at the end of activation of the mechanical lock. In this way it is certain that no electrical impulse can activate the shunt closing release with the circuit-breaker in an intermediate position.

7.5. Installation of withdrawable circuit-breaker

The withdrawable circuit-breakers are preset for use in UniGear ZS1, UniGear ZS2, UniSec switchgear and PowerCube modules.
For racking-in/racking-out of the switchgear, fully insert the lever (1) (fig. 9) in the appropriate seat (2) and work it clockwise for racking-in, and anti-clockwise for racking-out, until the limit switch positions are reached.
Circuit-breaker racking-in/-out must be carried out gradually to avoid shocks which may deform the mechanical interlocks and the limit switches.

The torque normally required to carry out racking-in and racking-out is <25 Nm.
This value must not be exceeded. If operations are prevented or difficult, do not force them and check that the operating sequence is correct.

Note
To complete the racking-in/out operation, about 20 rotations of the lever are required for circuit-breakers up to 17.5 kV, and about 30 rotations for 24 kV circuit-breakers.

When the circuit-breaker has reached the isolated for test/ isolated position, it can be considered racked into the switchgear and, at the same time, earthed by means of the truck wheels.
Withdrawable circuit-breakers of the same version, and therefore with the same dimensions, are interchangeable. However, when, for example, different electrical accessory fittings are provided, a different code for the plug of the auxiliary circuits does not allow incorrect combinations between panels and circuit-breakers.
For the circuit-breaker installation operations, also refer to the technical documentation of the above-mentioned switchgear.

⚠
- **The racking-in/-out operations must always be carried out with the circuit-breaker open.**
- **When putting into service for the first time, it is advisable to charge the circuit-breaker operating mechanisms manually so as not to overload the auxiliary power suply circuit.**

7.5.1. Circuit-breakers with withdrawable motorized truck

Carry out the racking-in/racking-out test of the motorized truck in the same way as for a manual truck, following the instructions below:
- Rack the circuit-breaker into the switchgear in the open and isolated position, with the power supply to the motor circuit cut off and with the enclosure door closed.
- Insert the manual racking-in lever (1) in the special coupling (2) Fig. 9, and take the motorized truck to about half its run between the isolated for test and the connected position. The torque needed to carry out truck handling is ≤ 25 Nm. In the case of accidental inversion of the truck motor power supply polarity, this operation allows a possible error in direction to be dealt with without any damage. Verification checks:

a) motor rotation **clockwise** during circuit-breaker racking-in.
b) motor rotation **anticlockwise** during circuit-breaker racking-out.

- Remove the manual lever (1) from the coupling (2) Fig. 9
- Supply the truck motor circuit.
- Activate the control for the electrical racking-in operation. When racking-in has taken place, check correct changeover of the relative auxiliary contact.
- On completion, activate the control for the electrical racking-out operation. When racking-out has taken place, check correct changeover of the relative auxiliary contact.
- In the case of a motor fault during a racking-in or racking-out operation, in an emergency the truck can be taken to the end of its run manually, after first cutting off the power supply to the motor power supply circuit and then, using the manual lever, work in the same way as with the manual truck.

Note
By means of the chain transmission, truck handling carried out using the manual lever makes the truck motor armature rotate which, behaving like a generator, can cause inverse voltage at the connection terminals.
This may damage the permanent magnet of the motor, therefore all the truck racking-in and racking-out operations carried out using the manual lever must be done without power supply in the motor circuit.

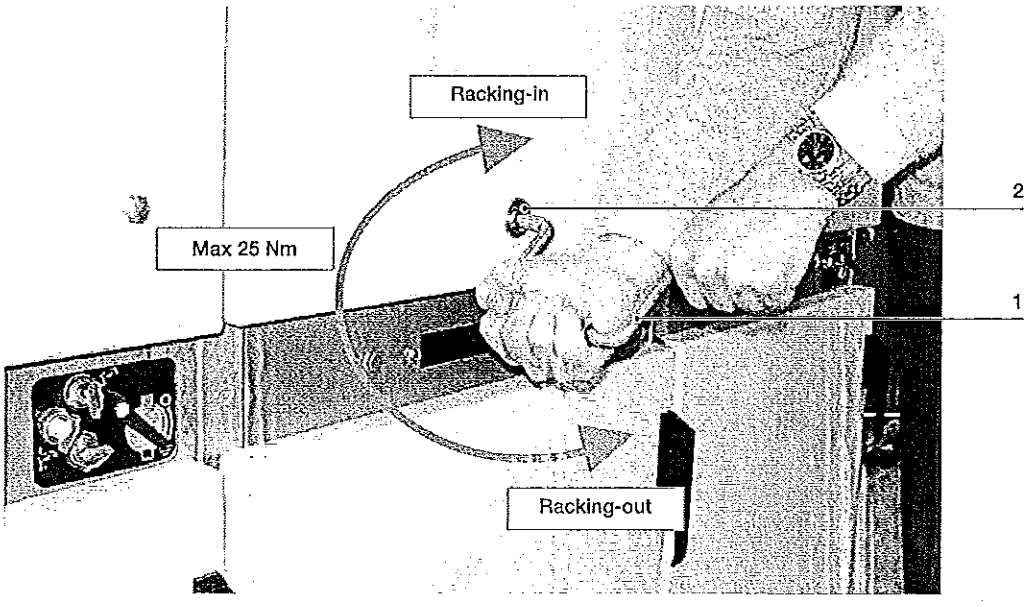


Fig. 9

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7.6. Power circuit connections of fixed circuit-breakers

7.6.1. General recommendations

- Select the cross-section of the conductors according to the service current and the short-circuit current of the installation.
- Prepare special pole insulators, near the terminals of the fixed circuit-breaker or of the enclosure, sized according to the electrodynamic forces deriving from the short-circuit current of the installation.

7.6.2. Assembly of the connections

- Check that the contact surfaces of the connections are flat, and are free of any burrs, traces of oxidation or deformation caused by drilling or impacts received.
- According to the conductor material and the surface treatment used, carry out the operations indicated in table T1 on the contact surface of the conductor.

Assembly procedure

- Put the connections in contact with the circuit-breaker terminals, taking care to avoid mechanical stresses (traction / compression) on, for example, the conducting busbars on the terminals.
- Interpose a spring washer and a flat washer between the head of the bolt and the connection.
- It is advisable to use bolts according to DIN class 8.8 Standards, also referring to what is indicated in table T2.
- In the case of cable connections, strictly follow the manufacturer's instructions to make the terminals.

T1

Bare copper
– Clean with a fine file or emery cloth.
– Tighten fully and cover the contact surfaces with 5RX Moly type grease.
Copper or silver-plated aluminium
– Clean with a rough dry cloth.
– Only in the case of obstinate traces of oxidation, clean with a very fine grain emery cloth taking care not to remove the surface layer.
– If necessary, restore the surface treatment.
Bare aluminium
– Clean with a metal brush or emery cloth.
– Cover the contact surfaces again immediately with neutral grease.
– Insert the copper-aluminium bimetal with surfaces shined (copper side in contact with the terminal; aluminium side in contact with the connection) between the aluminium connection and the copper terminal.

T2

Bolt	Recommended tightening torque (1)	
	Without lubricant	With lubricant (2)
M6	10,5 Nm	4.5 Nm
M8	26 Nm	10 Nm
M10	50 Nm	20 Nm
M12	86 Nm	40 Nm
M16	200 Nm	80 Nm

(1) The nominal tightening torque is based on a friction coefficient of the thread of 0.14 (distributed value the thread is subjected to which, in some cases, is not negligible). The nominal tightening torque with lubricant is according to the DIN 43673 Standards.

(2) Oil or grease. The thread and surfaces in contact with the lubricated heads. Take into account the deviations from the general Standards table (for example, for systems in contact or terminals) as foreseen in the specific technical documentation. The thread and surfaces in contact with the heads of bolts must be slightly oiled or greased, so as to obtain a correct nominal tightening torque.

7.7. Earthing

For the fixed version circuit-breaker, carry out earthing by means of the special screw marked with the relative symbol. Clean and degrease the area around the screw to a diameter of about 30 mm and, on completion of assembly, cover the joint again with Vaseline grease. Use a conductor (busbar or braid) with a cross-section conforming to the Standards in force.

7.8. Connection of the auxiliary circuits

Note: the minimum cross-section of the wires used for the auxiliary circuits must not be less than the one used for the internal cabling. Furthermore, they must be insulated for 3 kV of test.

7.8.1. Fixed circuit-breaker

Connection of the circuit-breaker auxiliary circuits must be made by means of the terminal box (1) (fig. 10) mounted inside the circuit-breaker and the cables must pass through the connector (2).
Outside the connector, the cables must pass through a suitable metal protective cover (pipe, wiring duct, etc.), which must be earthed.

To prevent the cabling wires outside the circuit-breaker (carried out by the customer) from accidentally coming into contact with moving parts and therefore undergoing damage to the insulation, it is recommended to fix the wires as shown in fig. 10a.

⚠ **Before removing the operating mechanism cover to access the terminal box, check that the circuit-breaker is open and the closing spring discharged.**

7.8.2. Withdrawable circuit-breakers

The auxiliary circuits of withdrawable circuit-breakers are fully cabled in the factory as far as the connector (fig. 11).
For the external connections, refer to the electric wiring diagram of the switchgear.

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VD4 circuit-breaker for UniGear switchgear and PowerCube module.

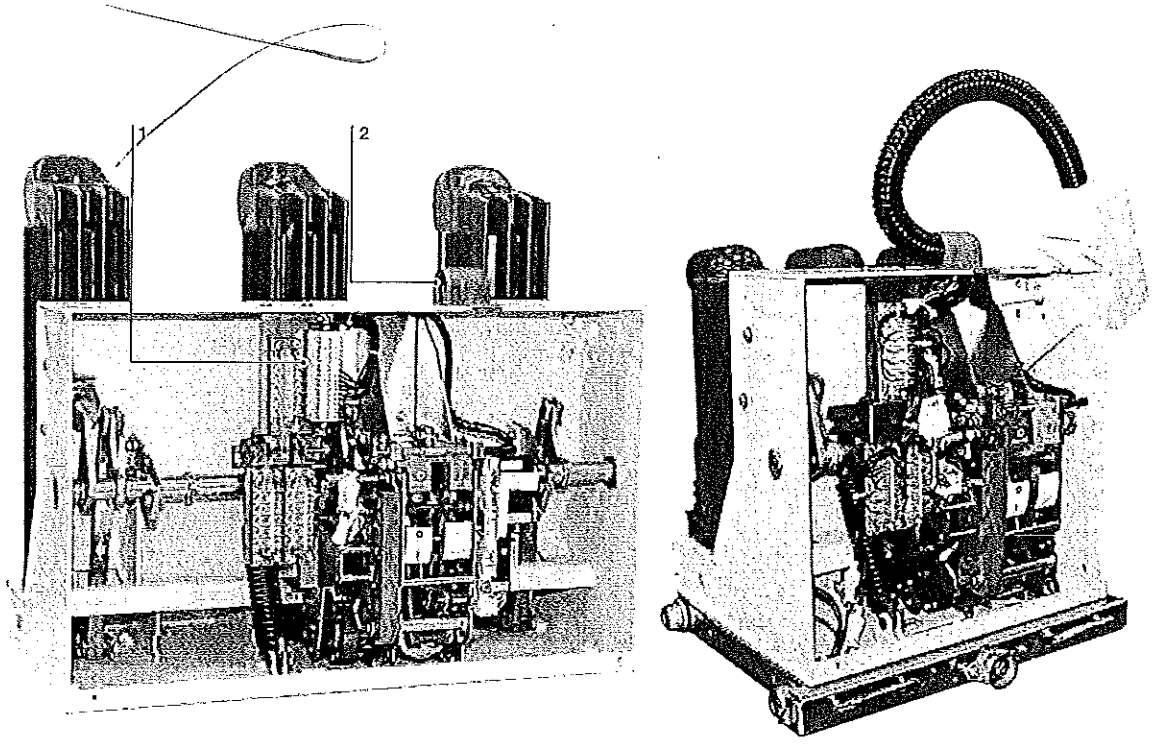

Fig. 10

VD4 circuit-breaker for ZS8.4 switchgear
(VD4/ZS8 version with rotary charging).

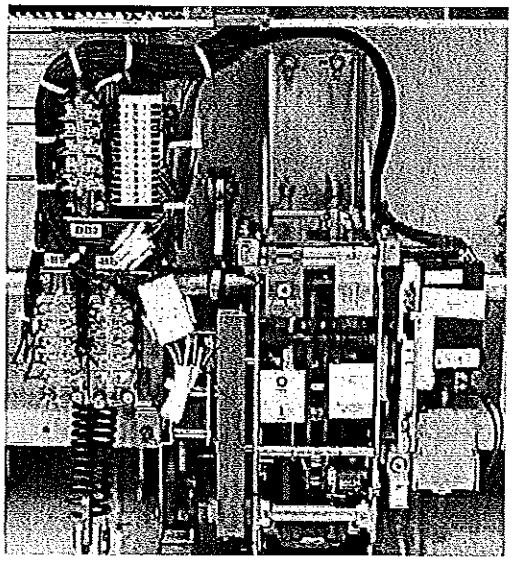

Fig. 10a

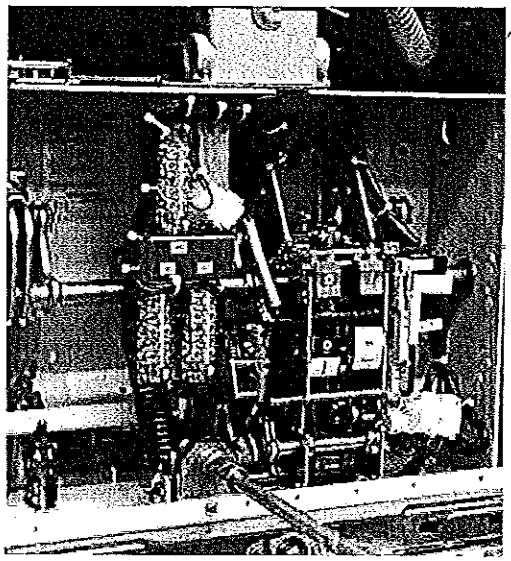

Fig. 11

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8. Putting into service

8.1. General procedures

⚠ **All the operations regarding putting into service must be carried out by ABB personnel or by suitably qualified customer personnel with in-depth knowledge of the apparatus and of the installation. Should the operations be prevented, do not force the mechanical interlocks and check that the operating sequence is correct.**
The operating forces which can be applied for racking-in withdrawable circuit-breakers are indicated in paragraph 7.5.

Before putting the circuit-breaker into service, carry out the following operations:
- check tightness of the power connections to the circuit-breaker terminals;
- establish the setting of the primary electronic overcurrent release (if provided);
- check that the value of the power supply voltage of the auxiliary circuits is between 85% and 110% of the rated voltage of the electrical accessories;
- check that no foreign bodies, such as bits of packing, have got into the moving parts;
- check that there is a sufficient exchange of air in the installation place to avoid overtemperatures;
- also carry out the checks indicated in table T3.

T3

ITEM INSPECTED		PROCEDURE	POSITIVE CHECK
1	Insulation resistance.	Medium voltage circuit With a 2500 V megger, measure the insulation resistance between the phases and the exposed conductive part of the circuit.	The insulation resistance should be at least 50 Mohm and in any case constant over time.
		Auxiliary circuits With a 500 V megger (if the apparatus installed allows this), measure the insulation resistance between the auxiliary circuits and the exposed conductive part.	The insulation resistance should be a few Mohm and in any case constant over time.
2	Auxiliary circuits.	Check that the connections to the control circuit are correct: proceed at the relative power supply.	Operations and signals normal.
3	Manual operating mechanism.	Carry out a few closing and opening operations (see cap. 6). N.B. Supply the undervoltage release and the locking magnet on the operating mechanism at the relative rated voltage (if provided).	The operations and relative signals take place normally.
4	Motor operator (if provided).	Supply the spring charging geared motor at the relative rated voltage.	The spring is charged normally. The signals are normal. With the spring charged, the geared motor stops.
		Carry out a few closing and opening operations.N.B. Supply the undervoltage release and the locking magnet on the operating mechanism at the relative rated voltage (if provided).	The geared motor recharges the spring after each closing operation.
5	Undervoltage release (if provided).	Supply the undervoltage release at the relative rated voltage and carry out the circuit-breaker closing operation.	The circuit-breaker closes normally. The signals are normal.
		Cut off power to the release.	The circuit-breaker opens. The signalling changes over.
6	Shunt opening release and additional shunt opening release (if provided).	Close the circuit-breaker and supply the shunt opening release at the relative rated voltage.	The circuit-breaker opens normally. The signals are normal.
7	Shunt closing release (if provided).	Open the circuit-breaker and supply the shunt closing release at the relative rated voltage.	The circuit-breaker opens normally. The signals are normal.
8	Key lock (if provided).	Open the circuit-breaker, keep the opening pushbutton depressed, then turn the key and remove it from the housing. Attempt the circuit-breaker closing operation.	Neither manual nor electrical closing takes place.
		Put the key back in and turn it 90°. Carry out the closing operation.	Both electrical and manual closing take place normally; in this position the key cannot be removed.
9	Locking electromagnet (-RL1) (if provided).	With the circuit-breaker open, spring charged and locking electromagnet not supplied, attempt circuit-breaker closing both manually and electrically.	Closing is not possible.
10	Auxiliary contacts in the operating mechanism.	Insert the auxiliary contacts in suitable signalling circuits. Carry out a few closing and opening operations.	Signals take place normally.
11	Locking electromagnet on the truck circuit-breaker (-RL2) (if provided).	With the circuit-breaker open, in the isolated for test position and the locking electromagnet not supplied, attempt racking-in of the circuit-breaker.	Racking-in is not possible.
		Supply the locking electromagnet and carry out the racking-in operation.	Racking-in takes place correctly.
12	Auxiliary transmitted contacts for signalling circuit-breaker racked-in, isolated (UniGear switchgear or PowerCube modules).	Insert the auxiliary contacts in suitable signalling circuits. With the circuit-breaker racked into the enclosure, carry out a few traverse operations from the isolated for test position to the connected position. Take the circuit-breaker to the racked-out position.	The signals due to the relative operations take place normally.

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9. Maintenance

The maintenance operations are aimed at keeping the apparatus in good working condition for as long as possible. In accordance with what is specified in the IEC 61208 / DIN 31 051 Standards, the following operations must be carried out.

Inspection: Finding out the actual conditions
Overhauling: Measures to be taken to maintain the specific conditions
Repairs: Measures to be taken to restore the specific conditions.

9.1. General

The vacuum circuit-breakers are characterised by simple, sturdy construction and a long life.
The operating mechanism requires maintenance and functional inspections to reach the expected operating-life (see par. 9.3.2.).
The vacuum interrupters are maintenance-free for their whole operating life.
Vacuum interruption does not produce any harmful effects even when there are frequent interruptions at the rated and short-circuit current.
The interventions during service and their aim are determined by the ambient conditions, by the sequence of operations and by the short-circuit interruptions.

Note
Respect the following Standards for maintenance work:
- the relative specifications given in the chapter on "Standards and Specifications";
- work safety regulations in the chapter on "Putting into service and operations";
- standards and specifications of the country where the apparatus is installed.

The maintenance operations must only be carried out by trained personnel and who follow all the safety regulations. Furthermore, it is advisable to call on ABB personnel, at least in cases for checking the performances in service and for repairs.
Cut the power supply off and put the apparatus under safe conditions during the maintenance operations.

⚠ **Before carrying out any operations, check that the circuit-breaker is open, with the spring discharged and that it is not supplied (medium voltage circuit and auxiliary circuits).**

9.1.1. Operating life expectancy

The operating life expectancy for the VD4 circuit-breakers is as follows:
- vacuum interrupters: up to 30,000 operations, according to their type (see par. 7.2.3. Trip curves);
- switching device, actuator and transmission system: up to 30,000 operations, under normal operating conditions, according to the type of circuit-breaker and with regular maintenance (see par. 9.3.2.);
- with operations correctly executed it is possible to carry out up to 1000 racking-out/in operations (as prescribed in the IEC 60271-200 Standards);
- the data regarding the operating life are basically applicable to all the components which cannot be directly affected by operator activity. The manually operated components (moving parts of isolatable parts, etc.) can vary their behaviour.

9.2. Inspections and functionality tests

9.2.1. Interruption devices in general

- Check the conditions of the interruption devices with regular inspections.
- Inspection at fixed intervals can be avoided when the apparatus is permanently under the control of qualified personnel.
- The checks must, first of all, include visual inspection to check for any contamination, traces of corrosion or electrical discharge phenomena.
- Carry out more frequent inspections when there are unusual operating conditions (including severe climatic conditions) and in the case of environmental pollution (e.g. high level of contamination or an atmosphere with aggressive agents).
- Visual inspection of the isolating contacts.
  It is recommended to turn the contact system alternately in order to keep the internal surface of the contact areas clean. The contact areas must be cleaned when there are signs of overheating (discoloured surface) (also see Repairs).
- In the case of abnormal conditions, take suitable overhauling measures (see Overhauling par.).

9.2.2. Stored energy operating mechanism

Carry out the functional test of the operating mechanism after 5,000 operations or during ordinary maintenance operations as specified in par. 9.2.1.
Before doing the test, open the circuit-breaker and carry out the following operations:
- in the case of withdrawable circuit-breakers, take the circuit-breaker to the isolated for test position
- in the case of fixed circuit-breakers: cut off the power supply to the medium voltage circuit.

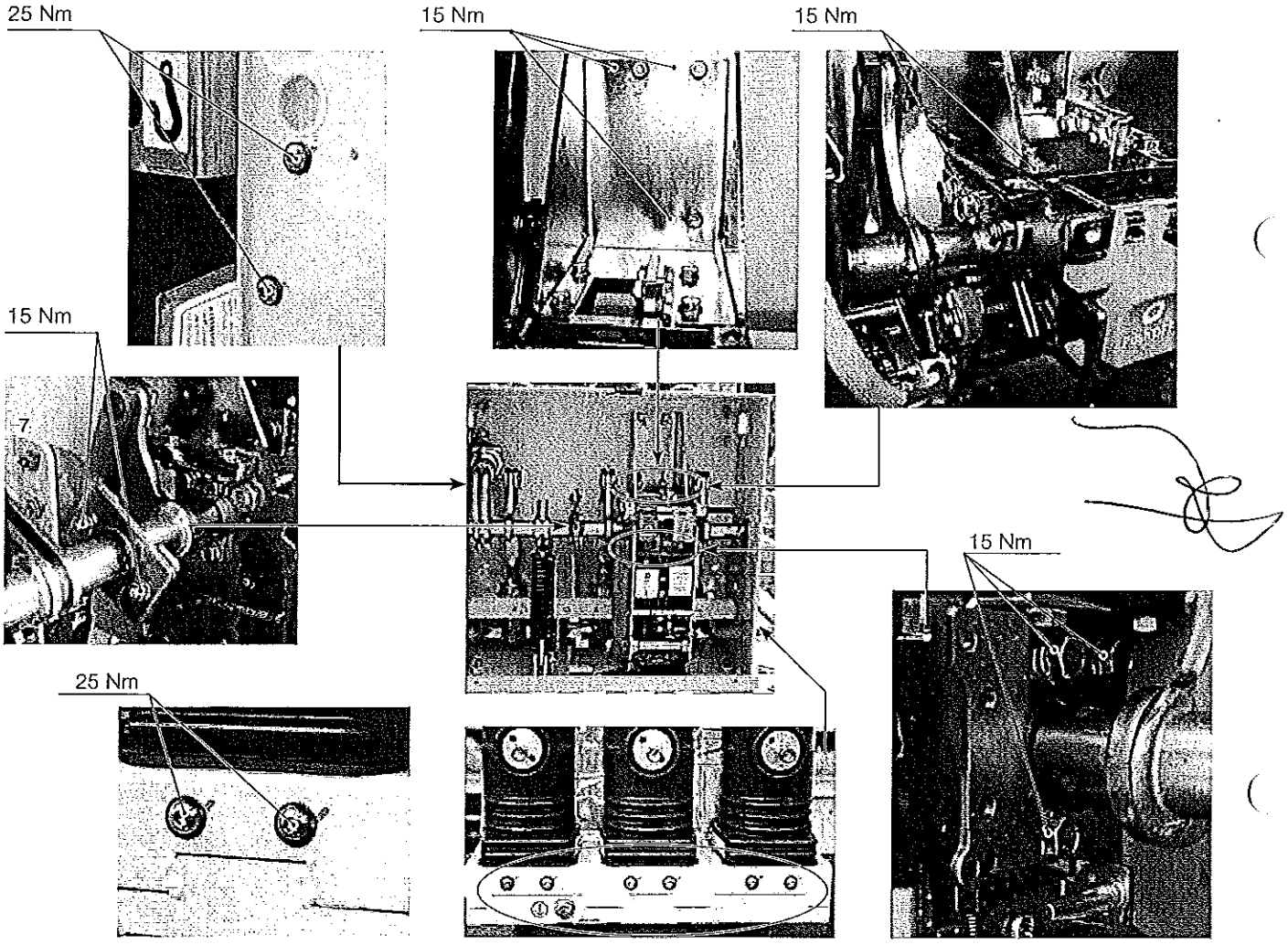
Note
Insulate the work area and make it safe, following the safety regulations specified in the IEC/DIN VDE Standards.

ВЕРНО С ОРИГИНАЛА

Functional test

- With the circuit-breaker not connected to the load, carry out a few opening and closing operations.
- If foreseen, cut the power supply to the spring charging motor off. Discharge the spring by closing and opening the circuit-breaker by means of the closing and opening pushbuttons.
- Visually inspect the lubrication conditions of the tulip isolating contacts, of the sliding surfaces, etc.
- Check correct electrical and mechanical operation of the various devices, with particular attention to the interlocks.
- The screws and nuts are tightened in the factory and correct tightening is marked with a collared sign. No further tightening operations are foreseen during the operating life of the circuit-breaker. However, following any maintenance interventions, should it be necessary to re-tighten the screws or nuts, it is recommended to always replace the screws and nuts and to keep to the values indicated in fig. 12.

Checking tightness of the screws



EL Twin actuator - 50 kA

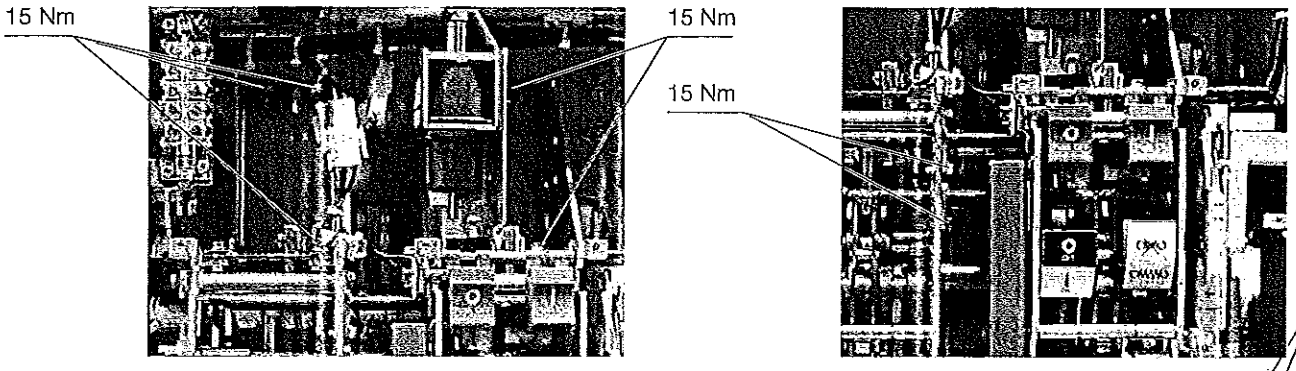


Fig. 12

ВЗЯТО С ОРИГИНАЛА

9.2.3. Circuit-breaker pole

No other check except what has already been specified in par. 9.2.1. is necessary.

9.2.4. Withdrawable assembly (truck and circuit-breaker)

Visually inspect the components, especially those which may be damaged by incorrect operations (also see table in chap. 8).
Visually inspect the isolating contacts and that all the contact elements are clean, especially in cases where signs of overheating are found (also see par. 9.4.).
Visually inspect and carry out the functional tests of the locks, checking their correct operation and activation without abnormal force – maximum 25 N (also see table in chap. 8).

9.3. Overhauling

9.3.1. Interruption devices in general

Should it have been necessary to clean the devices during the inspections, according to what is specified in par. 9.2.1., use the following procedure:

- insulate the work area and make it safe, following the safety regulations specified in the IEC/DIN VDE Standards;
- general cleaning of the surfaces:
  - dry and eliminate light deposits of dirt with a soft dry cloth;
  - more resistant deposits of dirt can be removed using slightly alkaline domestic type detergent or Rivolta BWR 210 type detergent;
- cleaning insulating surfaces and conductive parts:
  - light dirt: with Rivolta BWR 210 detergent;
  - resistant dirt: with cold detergent type 716.

After cleaning, rinse thoroughly with clean water and dry carefully.

Note
Only use detergents without halogens and never 1.1.1-trichloroethane, trichloroethylene or carbon tetrachloride!

9.3.2. Tripping device: actuator and transmission system

Circuit-breakers up to 17.5 kV, 2500 A, 31.5 kA and up to 24 kV, 2500 A, 25 kA

To ensure correct operation of the circuit-breaker, inspection and maintenance of the tripping devices is recommended every 10,000 operations. For this purpose, please contact the ABB Service office.
Complete replacement of the actuator, shock absorber and of the other transmission system parts (shaft, main levers, safety rings, etc.) must be carried out after 30,000 operations.

Circuit-breakers up to 17.5 kV, 40 kA and 24 kV, 31.5 kA

To ensure correct operation of the circuit-breaker, inspection and maintenance of the tripping devices is recommended every 10,000 operations. For this purpose, please contact the ABB Service office.

Complete replacement of the actuator must be carried out every 10,000 operations.
Complete replacement of the shock absorber and of the other transmission system parts (shaft, main levers, safety rings, etc.) must be carried out after 30,000 operations.

Circuit-breakers up to 17.5 kV, 3150 A, 40 kA

To ensure correct operation of the circuit-breaker, inspection and maintenance of the tripping devices must be carried out every 5,000 operations. For this purpose, please contact the ABB Service office.
Complete replacement of the shock absorber and of the other part of the transmission system (shaft, main levers, safety rings, etc.) must be carried out after 10,000 operations.

Circuit-breakers up to 17.5 kV, 50 kA and EL twin actuator

To ensure correct operation of the circuit-breaker, inspection and maintenance of the tripping devices must be carried out every 10,000 operations. For this purpose, please contact ABB Service.
Complete replacement of the shock-absorber and of the other parts of the transmission system (shaft, main levers, safety rings, etc.) must be carried out every 10,000 operations.

Note
Dismantling and replacement of the operating mechanism (trip box) can only be carried out by ABB personnel or by skilled and specially trained personnel, particularly for the necessary adjustments.

Details regarding overhauling

- When foreseen, cut of the power supply to the spring charging motor and manually discharge the operating mechanism spring by closing and opening the circuit-breaker.
- Replace the parts subjected to mechanical stress or stress due to particular environmental conditions, (contact and ABB service centre).

Note
These operations can only be carried out by ABB personnel or by skilled and specially trained personnel.

ВЯРНО С ОРИГИНАЛА

9.3.3. Circuit-breaker pole

The circuit-breaker pole and relative vacuum interrupter are maintenance-free until the maximum number of electrical operations for the type of interrupter is reached (see par. 7.2.3. Trip curves).
The operating life of the vacuum interrupter is defined by the sum of the ultimate currents corresponding to the specific type of interrupter in accordance with what is indicated in the graphs of par. 7.2.3. Trip curves: when the sum of the ultimate currents is reached, the whole pole must be replaced.

Note
Dismantling and replacement of the pole can only be carried out by ABB personnel or by skilled and specially trained personnel, particularly for the necessary adjustments.

To carry out the interrupter test without dismantling the circuit-breaker pole, use:

- the VIDAR vacuum tester, made by the company Programma Electric GmbH, Bad Homberg v.d.H.

To check vacuum tightness of the interrupter, the following test values must be set on the VIDAR tester:

Rated voltage of the circuit-breaker	d.c. test voltage
12 kV	40 kV
17.5 kV	40 kV
24 kV - 36 kV	60 kV

The test must always be carried out with the circuit-breaker open with the contacts at the nominal distance.
Procedure for testing the degree of vacuum of the interrupter of the circuit-breaker poles:

- turn the power supply off and make the working area safe by following the safety regulations specified in the IEC/DIN VDE Standards;
- open the circuit-breaker;
- earth a terminal of each circuit-breaker pole;
- connect the earth terminal of the VIDAR tester to the circuit-breaker structure;
- connect the high voltage terminal of the VIDAR tester to the terminal of the circuit-breaker pole not connected to earth (L1 phase) and carry out the test. Repeat the test for phases L2 and L3.

Note
The tester connection cables can produce an indication due to the capacitive effect. In this case the cables must not be removed.

9.4. Repairs

Replacement of spare parts and accessories must only be carried out by ABB personnel or suitably qualified and specially trained personnel.
Always work with the circuit-breaker open and locked so that it cannot be closed again, with the work area insulated and made safe.
The operating mechanism spring must be discharged.
All power supply sources must be disconnected and made safe against any reclosing during removal and installation work.

⚠ **Should maintenance be carried out by the customer's personnel, responsibility for the interventions remains with the customer.**
The replacement of parts not included in the "List of spare parts/accessories" (par. 12.1.) must only be carried out by ABB personnel. In particular:
- **complete pole with bushings/connections**
- **actuator and transmission system**
- **closing spring set**
- **opening spring**
- **shock-absorber.**

С ОРИГИНАЛА

10. Application of the X-ray emission Standards

One of the physical properties of vacuum insulation is the possibility of X-ray emission when the interrupter contacts are open.
The specific tests carried out at the PTB laboratories (Physikalisch-Technische Bundesanstalt, in Brunswick - Germany) show that local emission at a distance of 10 cm from the interrupter or pole surface, does not exceed 1 mSv/h.

It follows that:

- at the rated service voltage the use of vacuum interrupters is absolutely safe;
- application of the withstand voltage at power frequency, according to the IEC 62271-100 and VDE 0670 Standards, is safe;
- application of a voltage higher than the withstand voltage at power frequency or of a test voltage in direct current, specified in the IEC and VDE Standards, cannot be used;
- limitation of the above-mentioned local phenomena, with interrupters with open contacts, depends on keeping the specific distance between the contacts.
  This condition is intrinsically guaranteed by correct operation of the operating mechanism and by the adjustments of the transmission system.

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11. Spare parts and accessories

⚠ **All assembly operations of spare parts/accessories must be carried out following the instructions enclosed with the spare parts, by ABB personnel or by suitably qualified customer personnel with in-depth knowledge of the apparatus (IEC 60694) and of all the Standards aimed at carrying out these interventions in safe conditions. Should the maintenance be carried out by the customer's personnel, responsibility for the interventions remains with the customer. Before carrying out any operation, always make sure that the circuit-breaker is open, the spring discharged and that it is not energised (medium voltage circuit and auxiliary circuits).**

To order circuit-breaker spare parts/accessories, refer to the ordering sales codes indicated in the technical catalogue and always state the following:
- type of circuit-breaker
- rated voltage of the circuit-breaker
- rated normal current of the circuit-breaker
- breaking capacity of the circuit-breaker
- serial number of the circuit-breaker
- rated voltage of any electrical spare parts.

For availability and to order spare parts, please contact our Service office.

11.1. List of spare parts

- Shunt opening release
- Additional shunt opening release
- Undervoltage release
- Contact for signalling undervoltage release energised/de-energised
- Time delay device for undervoltage release
- Mechanical override for undervoltage release
- Shunt closing release
- Spring charging geared motor with electrical signalling of spring charged
- Contact signalling protection circuit-breaker of the geared motor open/closed
- Contact signalling closing spring charged/discharged
- Transient contact with momentary closing during circuit-breaker opening
- Circuit-breaker auxiliary contacts
- Locking electromagnet on the operating mechanism
- Position contact of the withdrawable truck
- Contacts signalling connected/isolated
- Opening solenoid
- Key lock in open position
- Isolation interlock with the door
- Protection for opening pushbutton
- Protection for closing pushbutton
- Locking electromagnet on the withdrawable truck
- Set of six tulip contacts.

КОПИЯ СОРИГИНАЛ

12. Electric circuit diagrams

The standard VD4 circuit-breaker electric circuit diagrams are as follows:

- 1VCD400046: Fixed circuit-breakers
- 1VCD400099: Fixed circuit-breakers 50 kA
- 1VCD400055: Fixed circuit-breakers with 64-pole connector
- 1VCD400064: Fixed circuit-breakers with 58-pole connector
- 1VCD400078: Fixed circuit-breakers with truck
- 1VCD400047: Withdrawable circuit-breakers
- 1VCD400048: Withdrawable circuit-breakers with motorized truck
- 1VCD400100: Withdrawable circuit-breakers 50 kA
- 1VCD400080: Withdrawable circuit-breakers for ZS8.4 switchgear VD4/ZS8, ZT8 and Z8 with circuit-breaker
- 1VCD400080: Withdrawable circuit-breakers for ZS8.4 switchgear with VD4/ZS8, ZT8 and Z8 circuit-breaker with motorized truck
- 1VCD400102: Withdrawable circuit-breakers with motorized truck 50 kA.

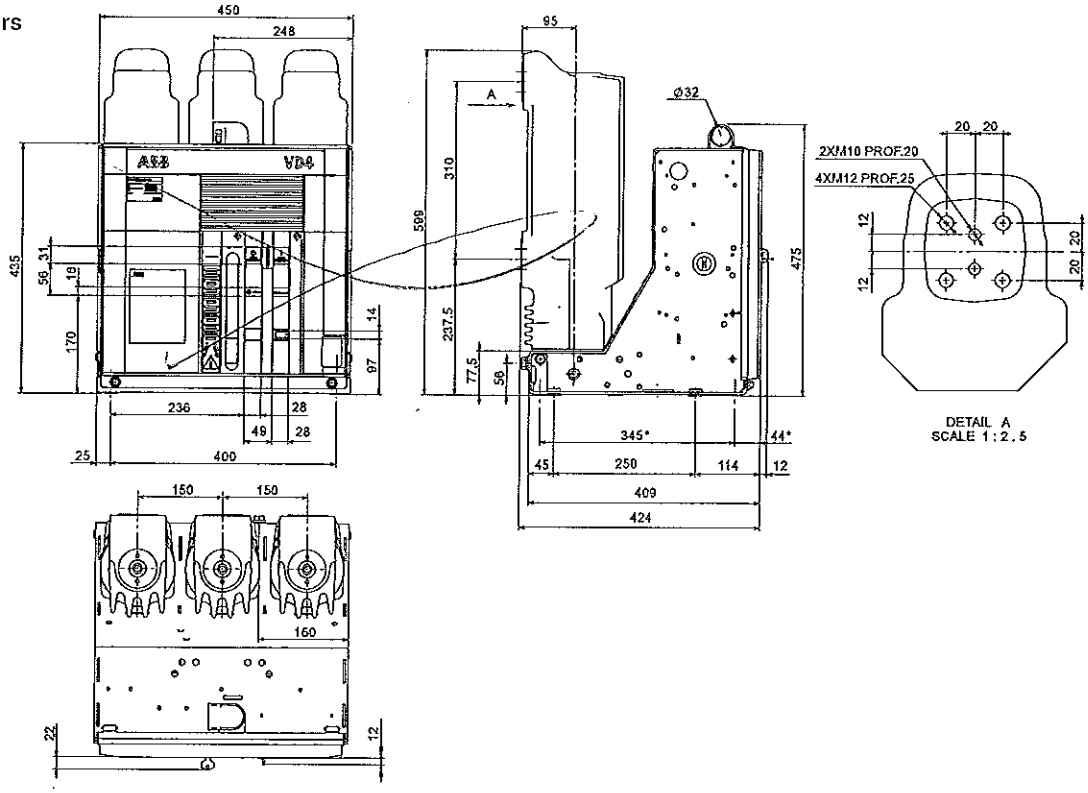
Each circuit-breaker is always provided with the standard electric diagram or with a specific diagram in the case of a circuit-breaker with non-standard cabling.

ВЯРНО С ОРИГИНАЛА

13. Overall dimensions

Fixed circuit-breakers

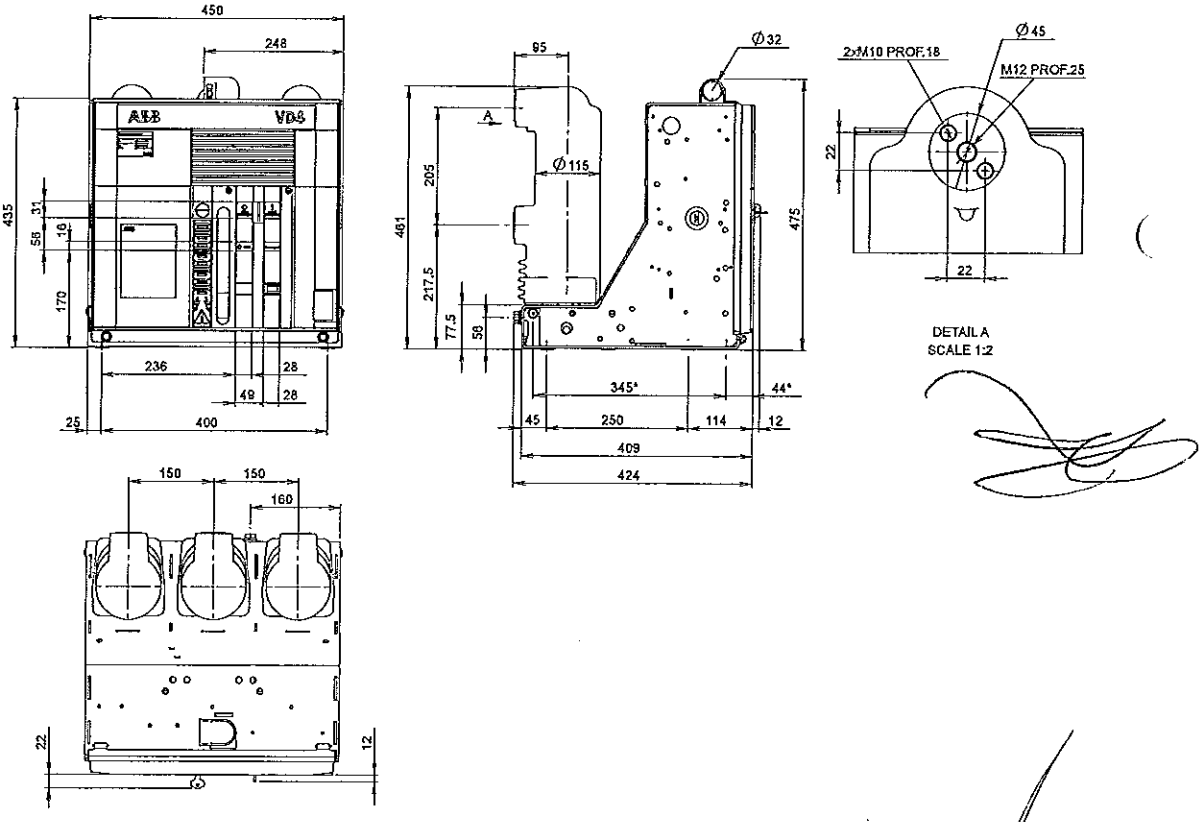
VD4		
TN	1VCD000050	
Ur	12	kV
	17.5	kV
Ir	1600	A
Isc	20	kA
	25	kA
	31.5	kA



(*) Fixing interchangeability with previous series (345 x 400).

Fixed circuit-breakers

VD4		
TN	7405	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA

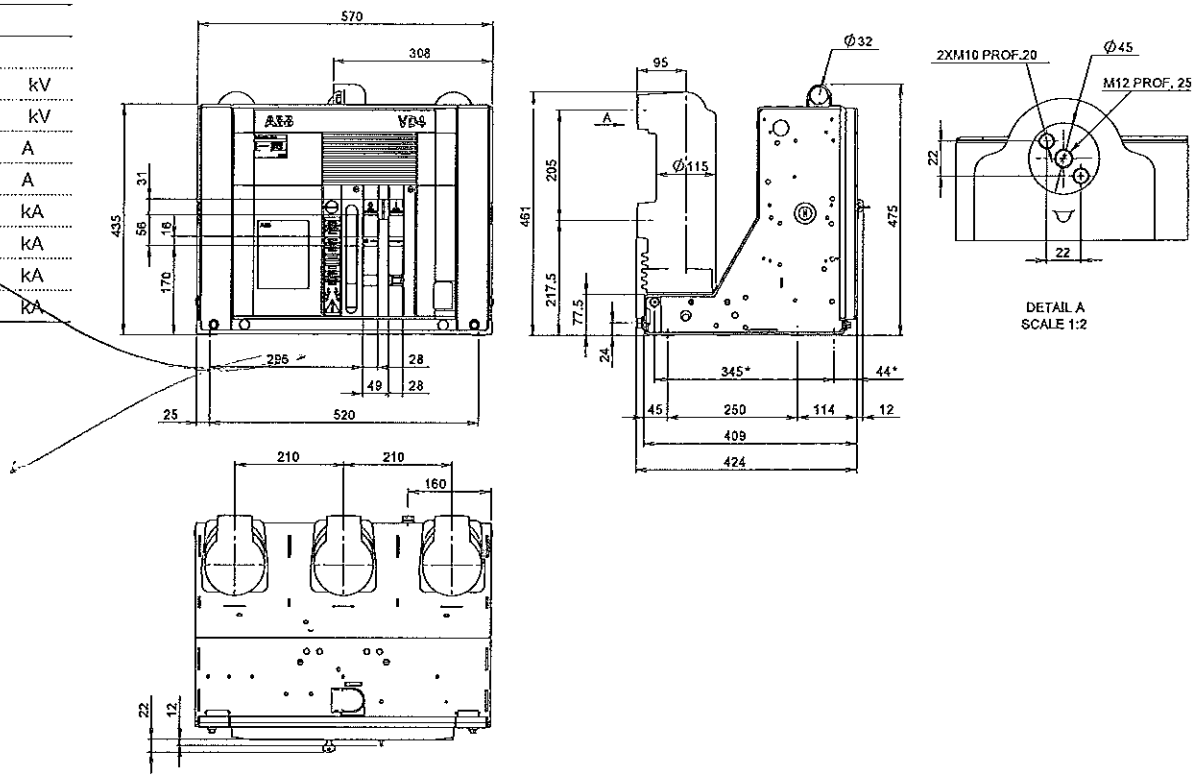


(*) Fixing interchangeability with previous series (345 x 400).

ВЕРНО С ОРИГИНАЛА

Fixed circuit-breakers

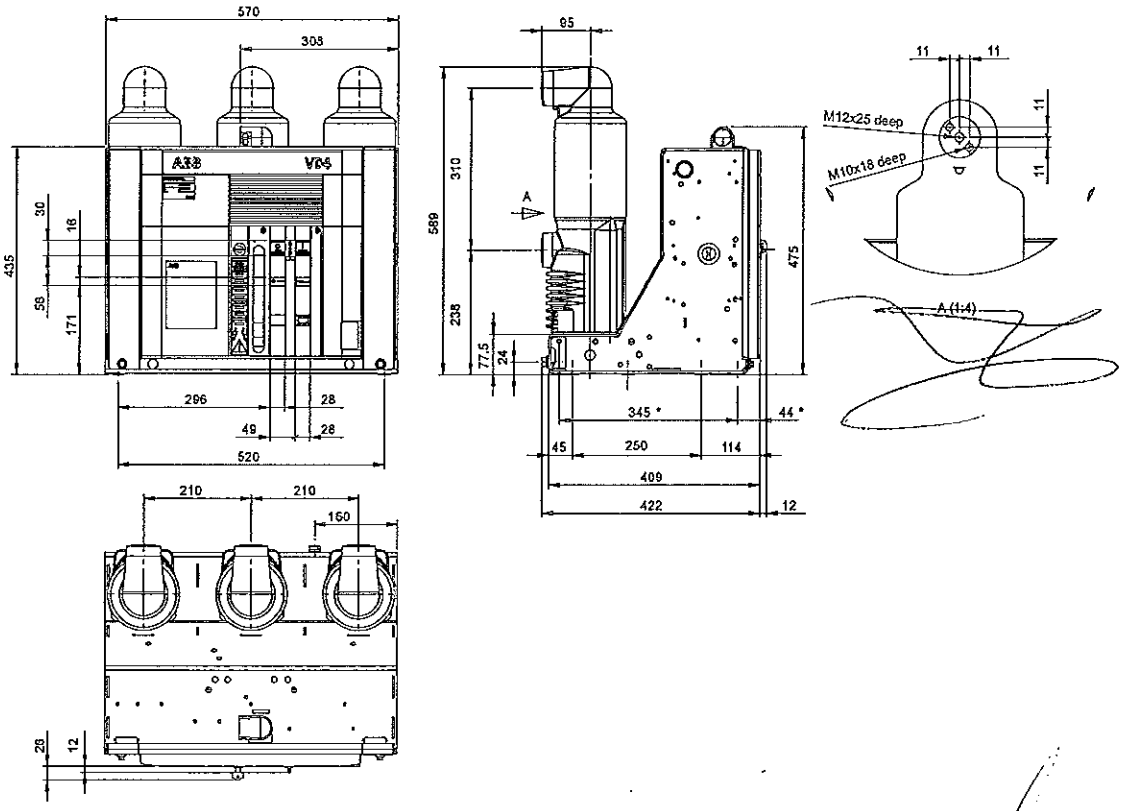
VD4		
TN	7406	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA



(*) Fixing interchangeability with previous series (345 x 520).

Fixed circuit-breakers

VD4		
TN	1VCD003282	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA

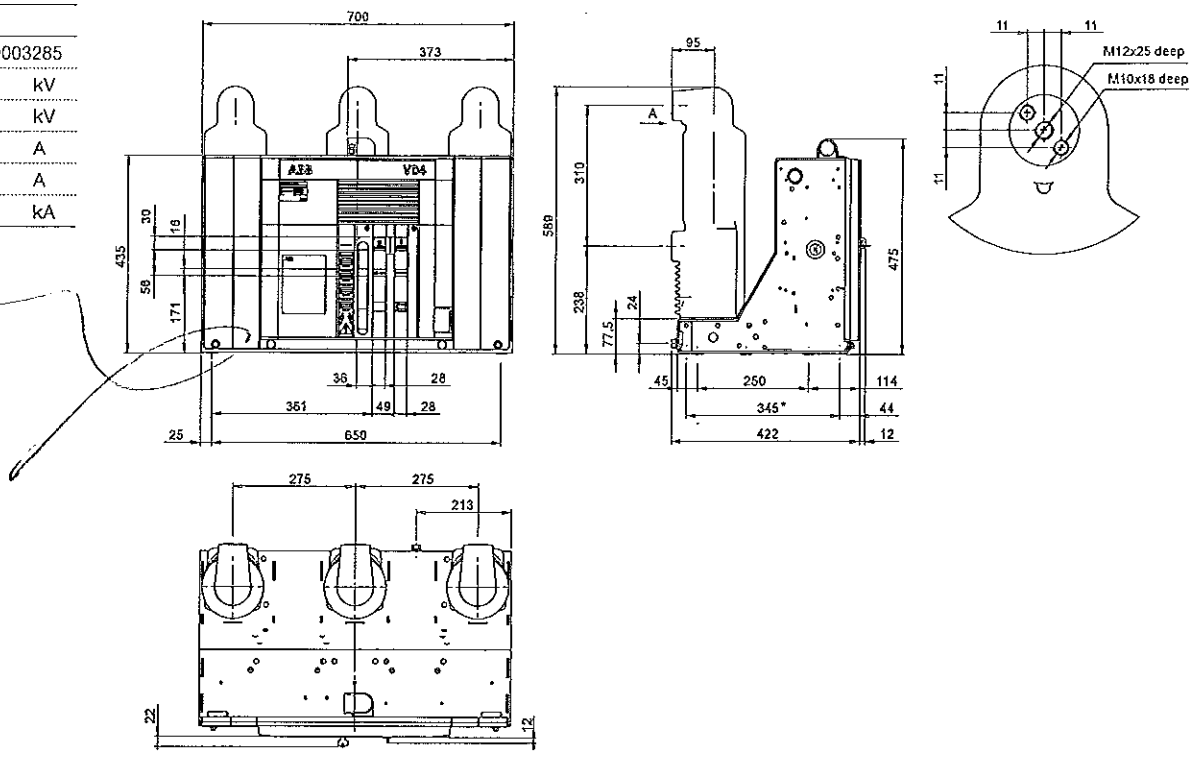


(*) Fixing interchangeability with previous series (345 x 650).

ВЗЯТО С ОРИГИНАЛА

Fixed circuit-breakers

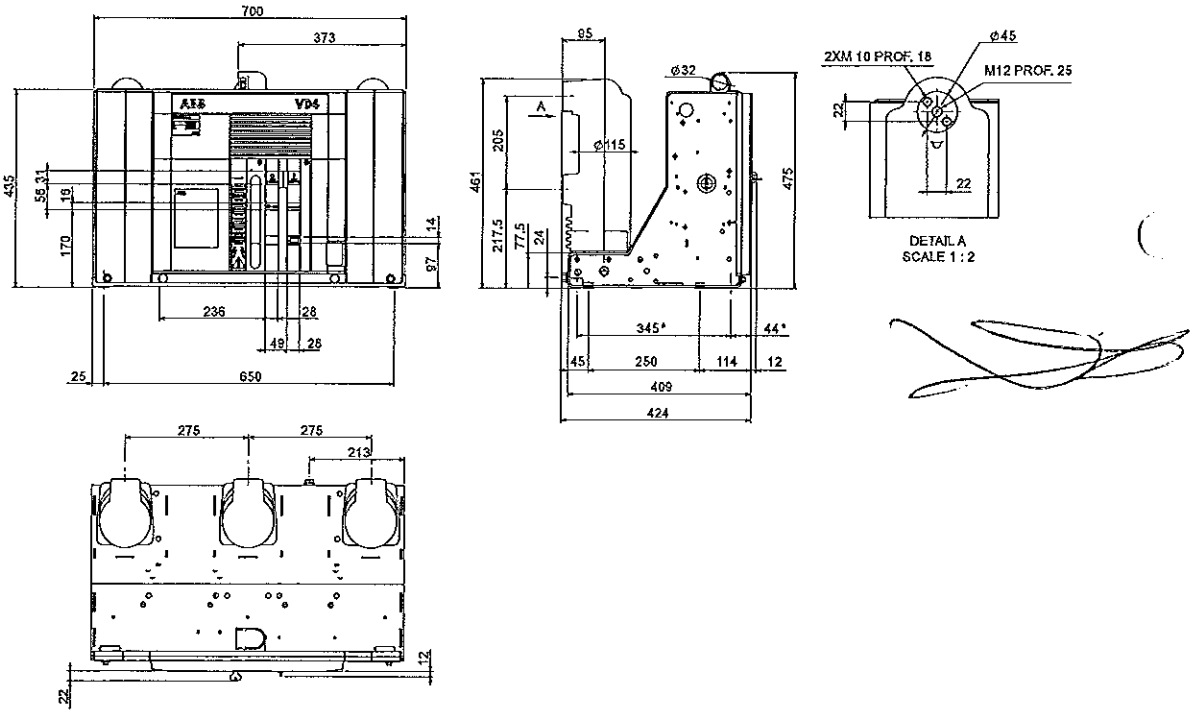
VD4		
TN	1VCD003285	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA



(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit-breakers

VD4		
TN	1VCD000051	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA



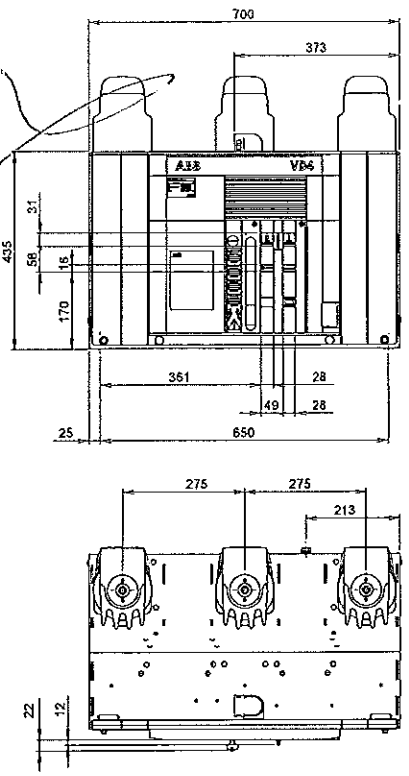
РИО С ОРИГИНАЛА

(*) Fixing interchangeability with previous series (345 x 650).

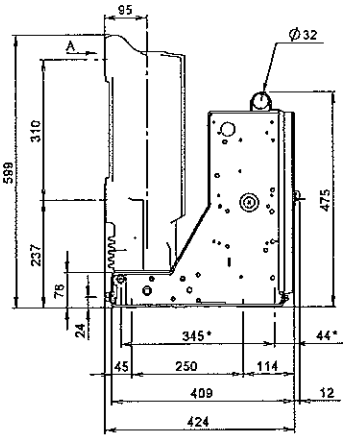
Fixed circuit-breakers

VD4		
TN	7408	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
	2500	A
Isc	20	kA
	25	kA
	31.5	kA

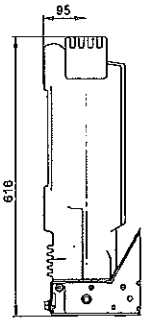
VD4		
TN	7408	
Ur	12	kV
	17.5	kV
Ir	2000	A
	2500	A
Isc	40	kA

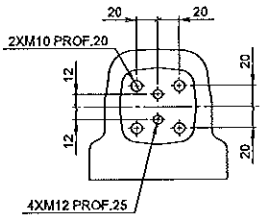


1600-2000A



2500A





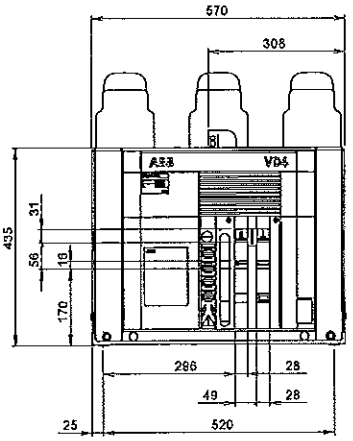
DETAIL A
SCALE 1:2

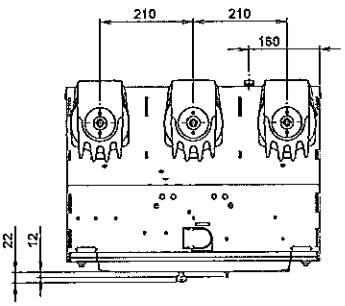
(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit-breakers

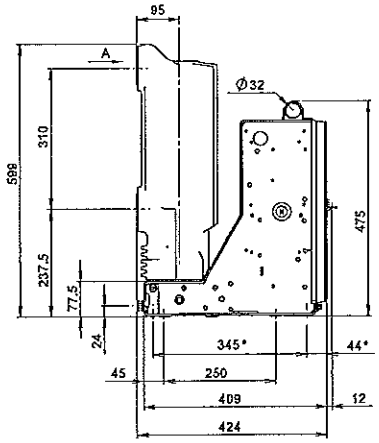
VD4		
TN	7407	
Ur	12	kV
Ir	2500	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

VD4		
TN	7407	
Ur	12-17.5	kV
Ir	1600	A
	2000	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

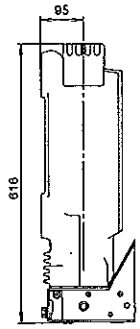


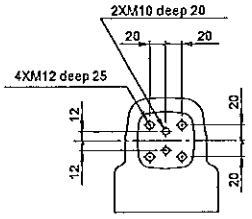


1600-2000A



2500A





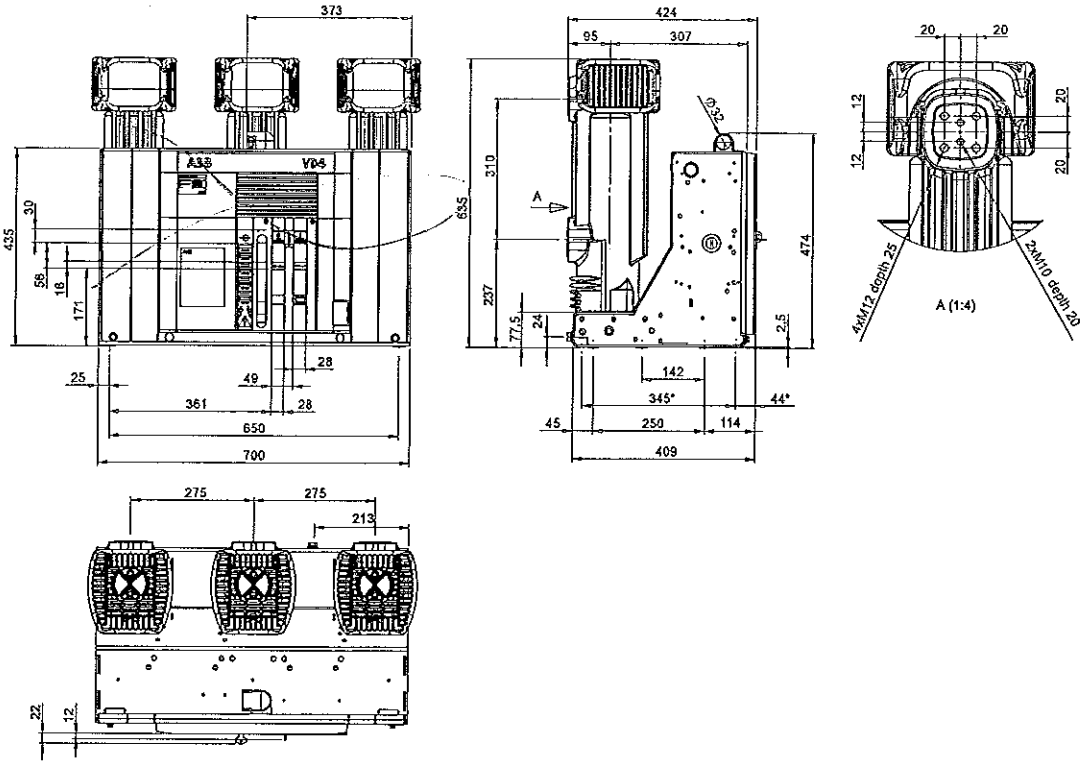
DETAIL A
SCALE 1:2

(*) Fixing interchangeability with previous series (345 x 650).

ВЕРНО С ОРИГИНАЛА

Fixed circuit-breakers

VD4		
TN	1VCD000149	
Ur	12	kV
	17.5	kV
Ir	3150	A
	4000	A (**)
Isc	20	kA
	25	kA
	31.5	kA
	40	kA
	50	kA

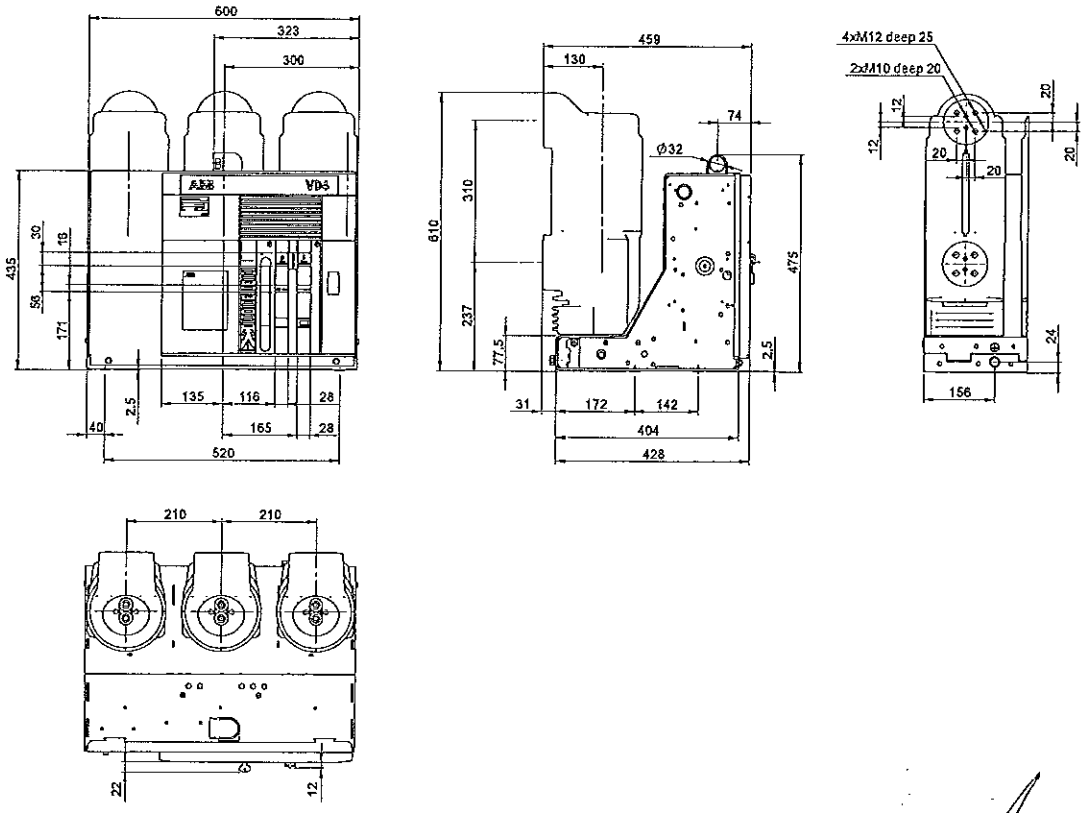


(*) Fixing interchangeability with previous series (345 x 650).

(**) With forced ventilation.

Fixed circuit-breakers

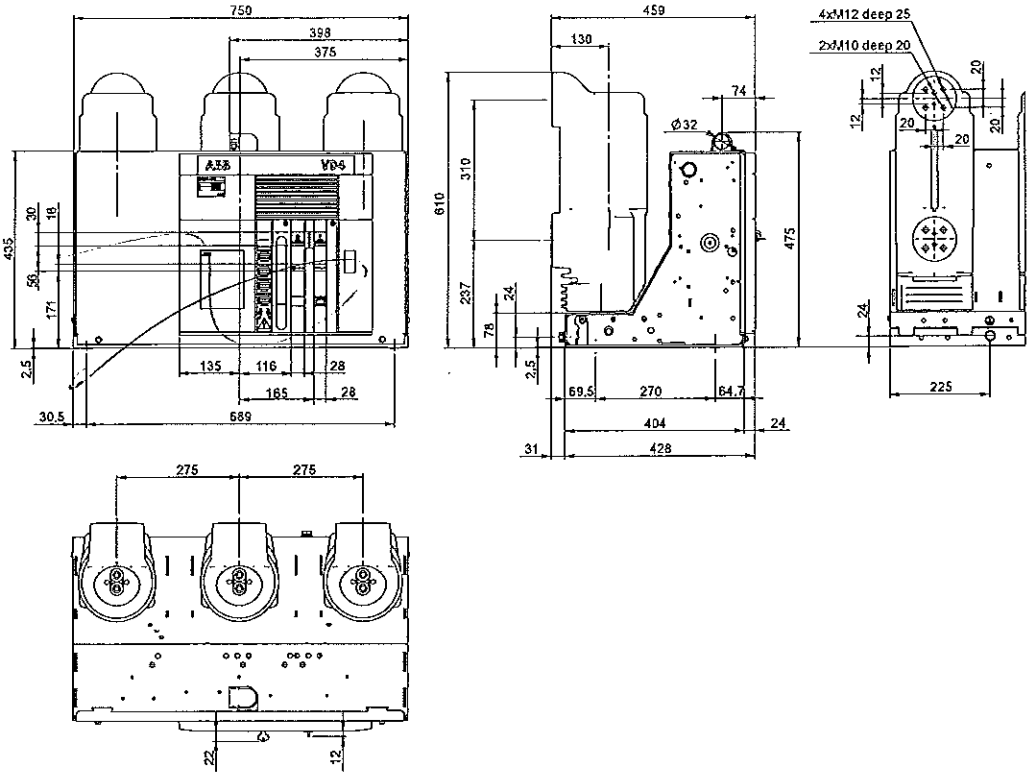
VD4		
TN	1VCD003440	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
	2000	A
sc	50	kA



ВЯРНО С ОРИГИНАЛА

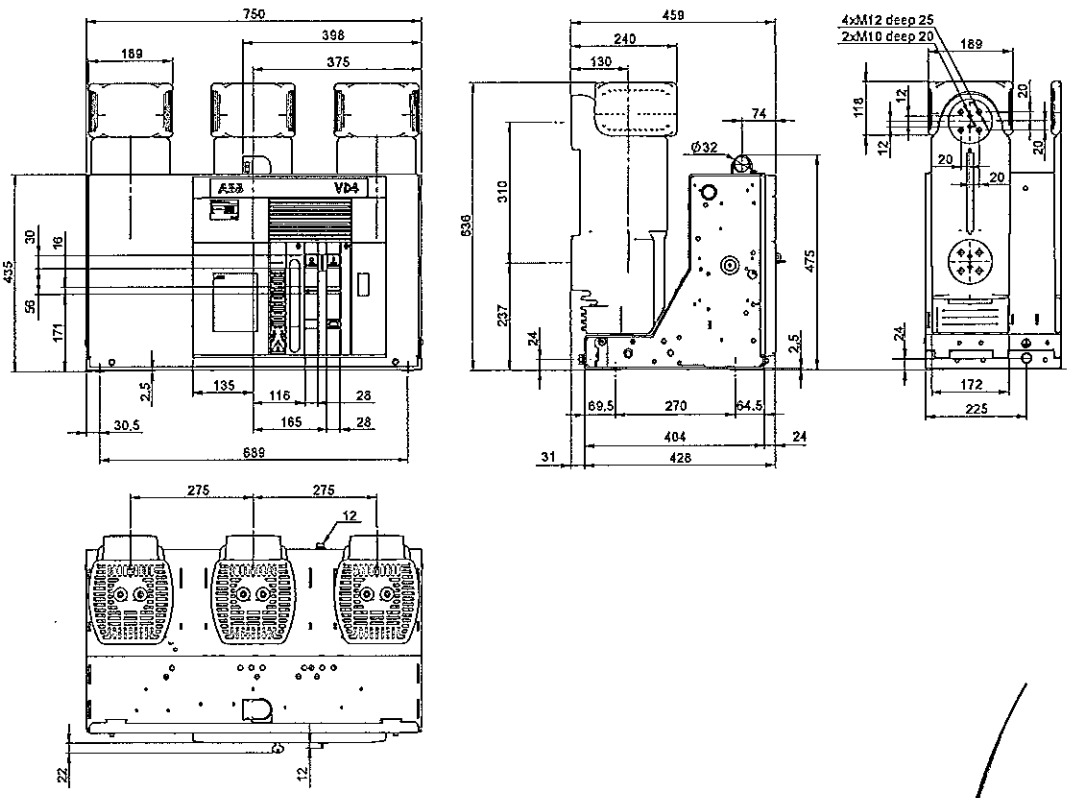
Fixed circuit-breakers

VD4		
TN	1VCD003441	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
	2000	A
	2500	A
Isc	50	kA



Fixed circuit-breakers

VD4		
TN	1VCD003443	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	50	kA

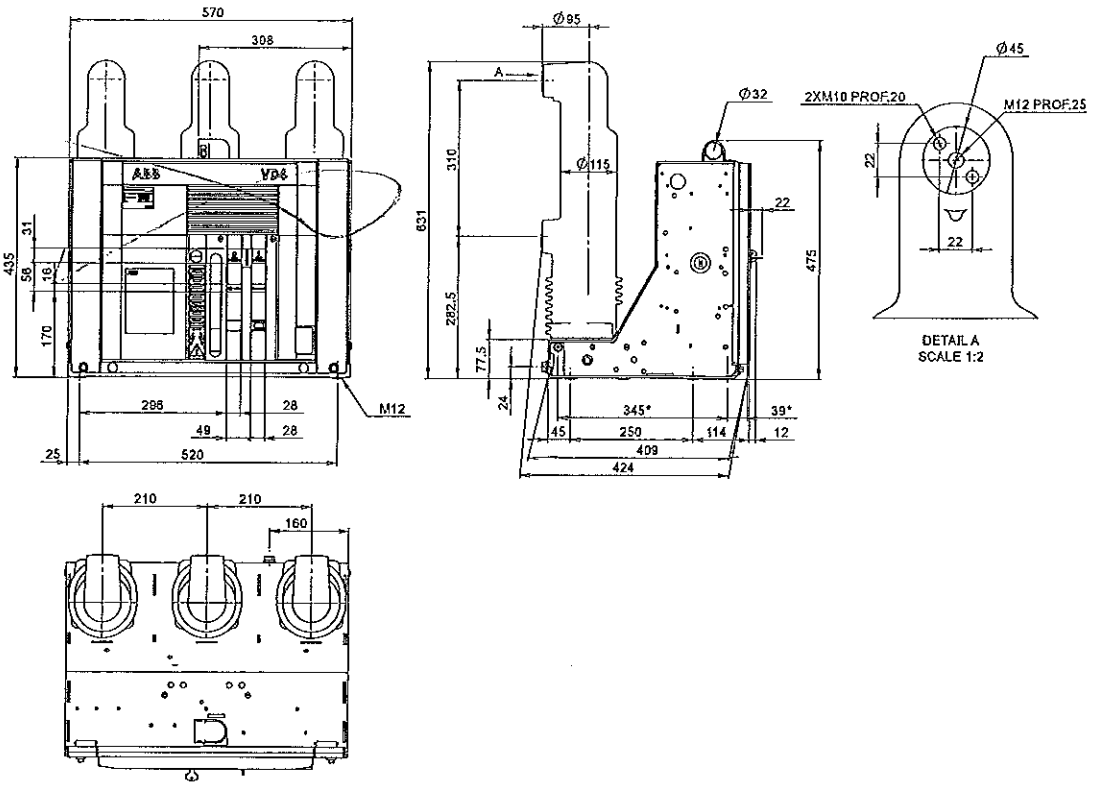


(*) 4000 A with forced ventilation.

ВЯРНО С ОРИГИНАЛА

Fixed circuit-breakers

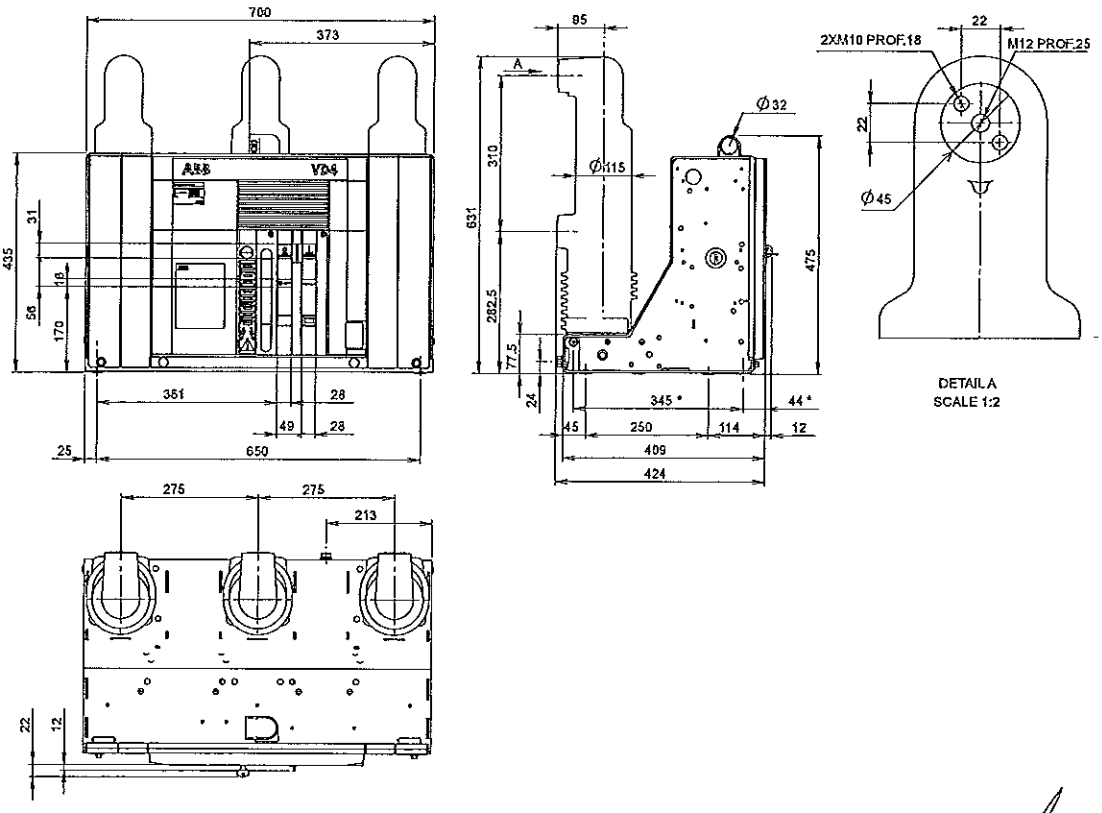
VD4		
TN	7409	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



(*) Fixing interchangeability with previous series (345 x 520).

Fixed circuit-breakers

VD4		
TN	7410	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA

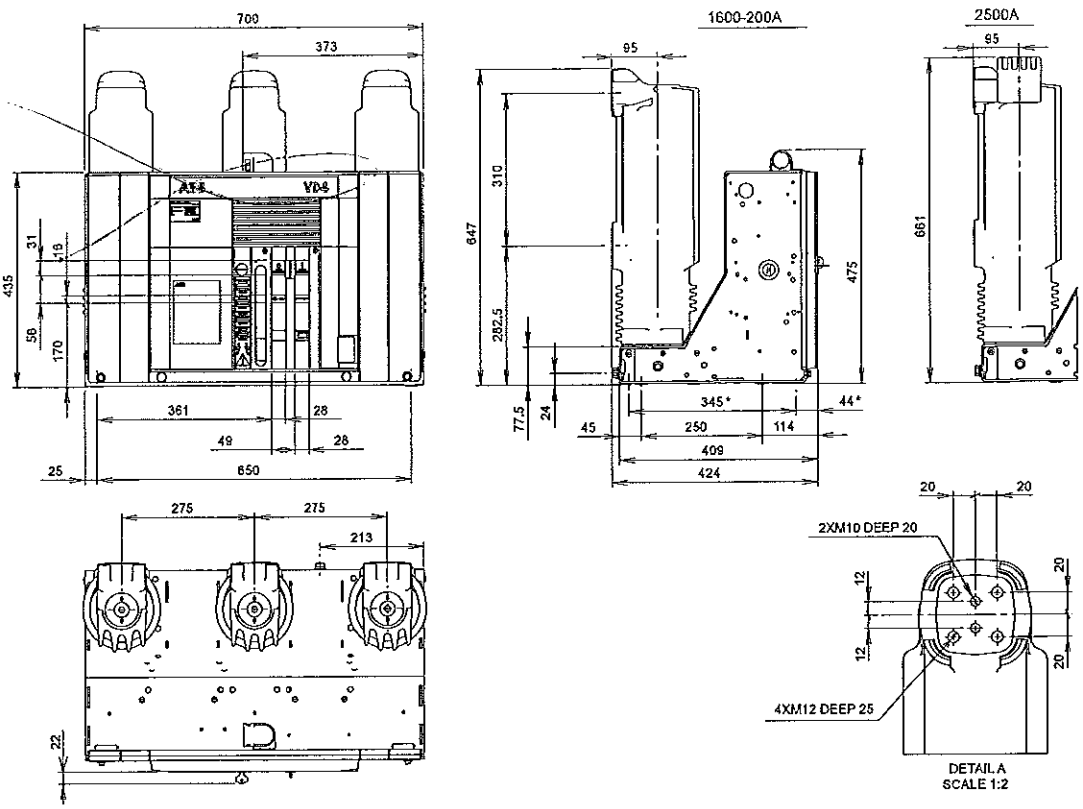


(*) Fixing interchangeability with previous series (345 x 650).

ВЯРНО С ОРИГИНАЛА

Fixed circuit-breakers

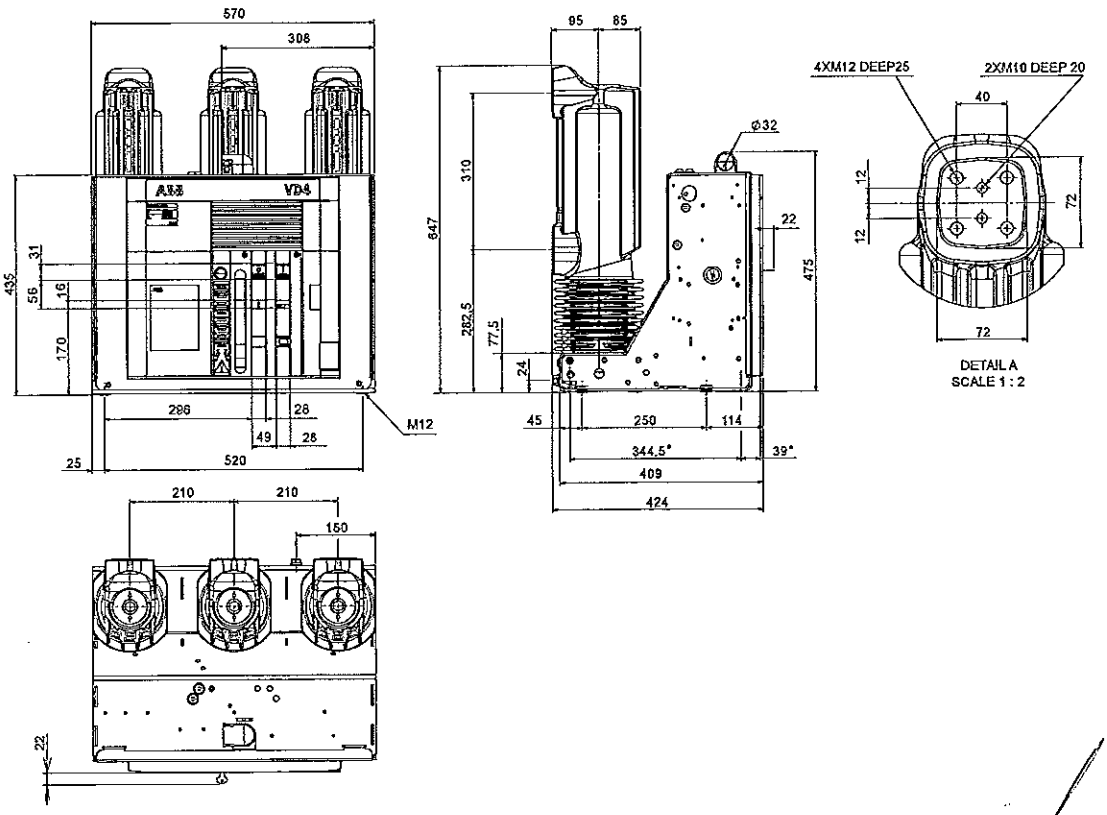
VD4		
TN	7411	
Ur	24	kV
Ir	1600	A
	2000	A
	2500	A
Isc	16	kA
	20	kA
	25	kA
	31,5	kA



(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit-breakers

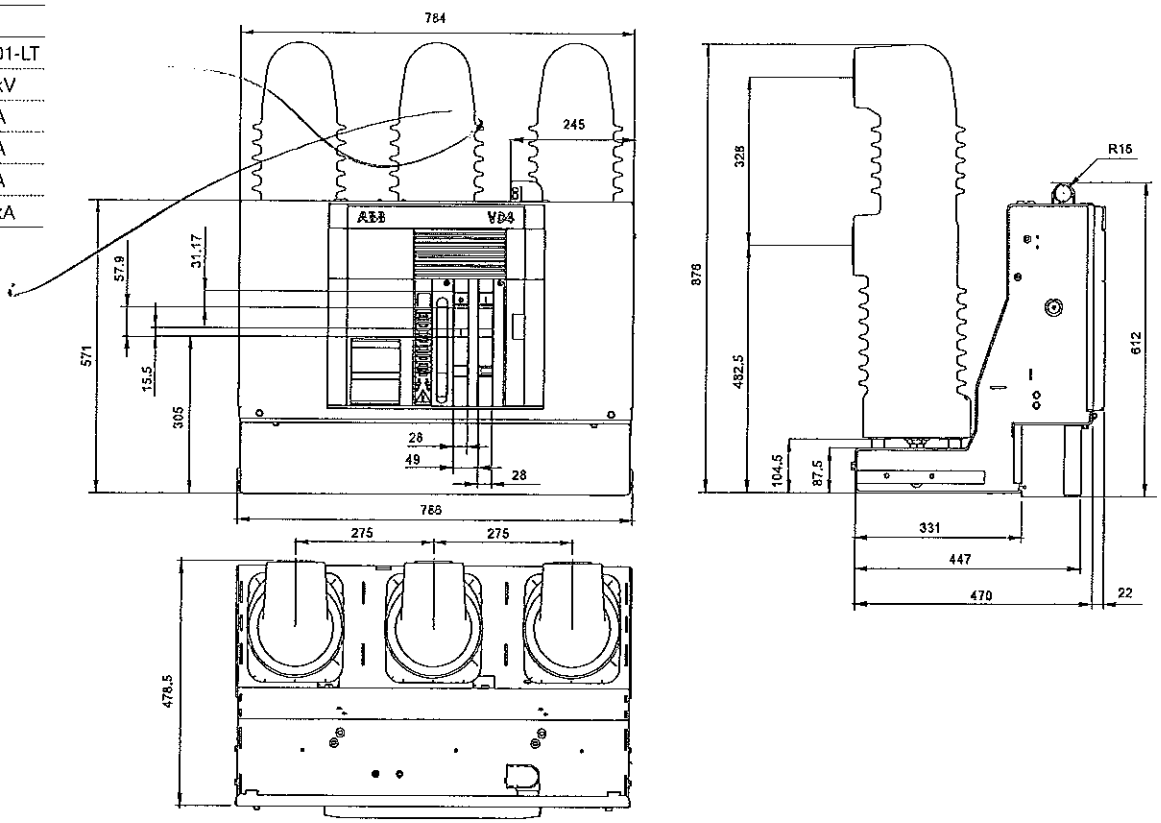
VD4		
TN	1VCD000172	
Ur	24	kV
Ir	1250	A
Isc	31.5	kA



ВАРИАНТ ОРИГИНАЛА

Fixed circuit-breakers

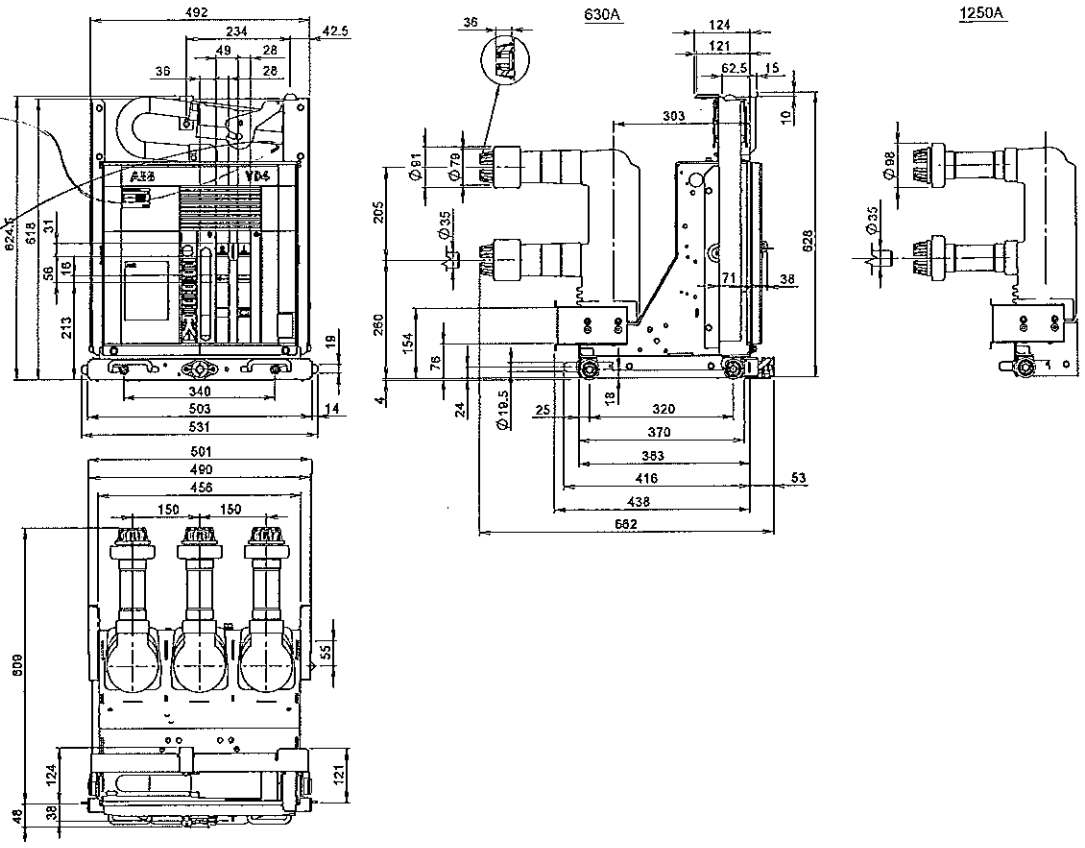
VD4		
TN	1VYN300901-LT	
Ur	36	kV
Ir	1250	A
	1600	A
	2000	A
Isc	31.5	kA



ВЯРНО С ОРИГИНАЛА

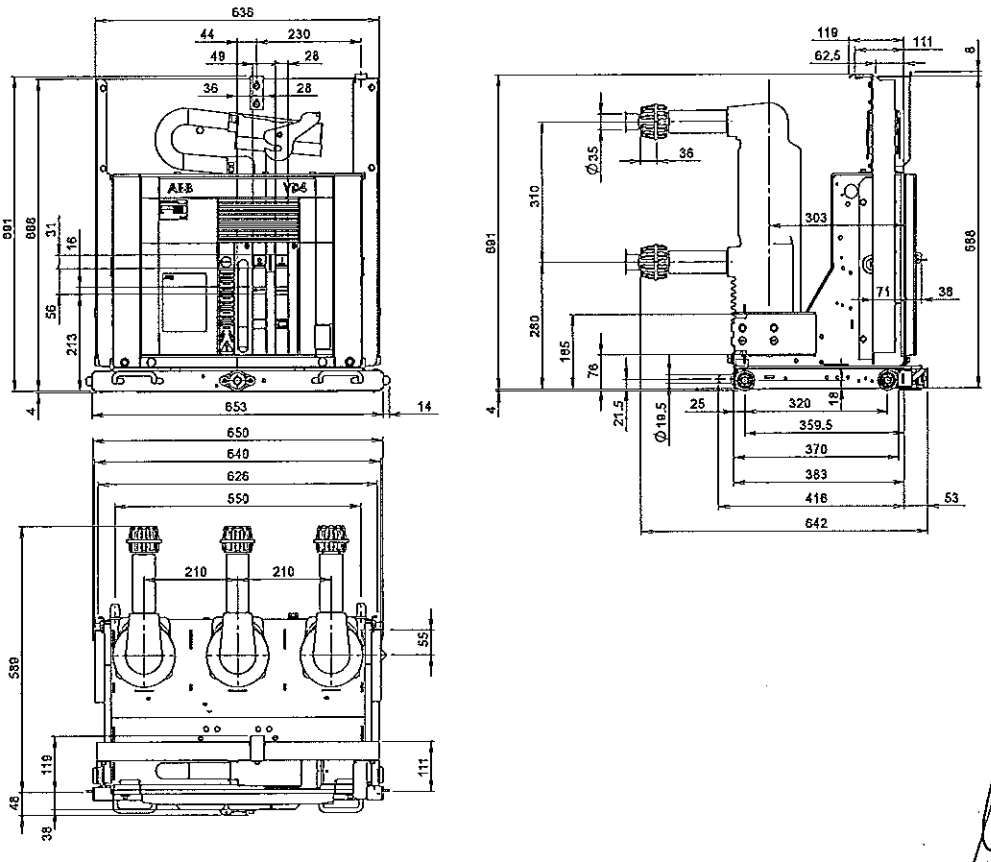
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

VD4/P		
TN	7412	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA



Withdrawable circuit-breakers for PowerCube modules

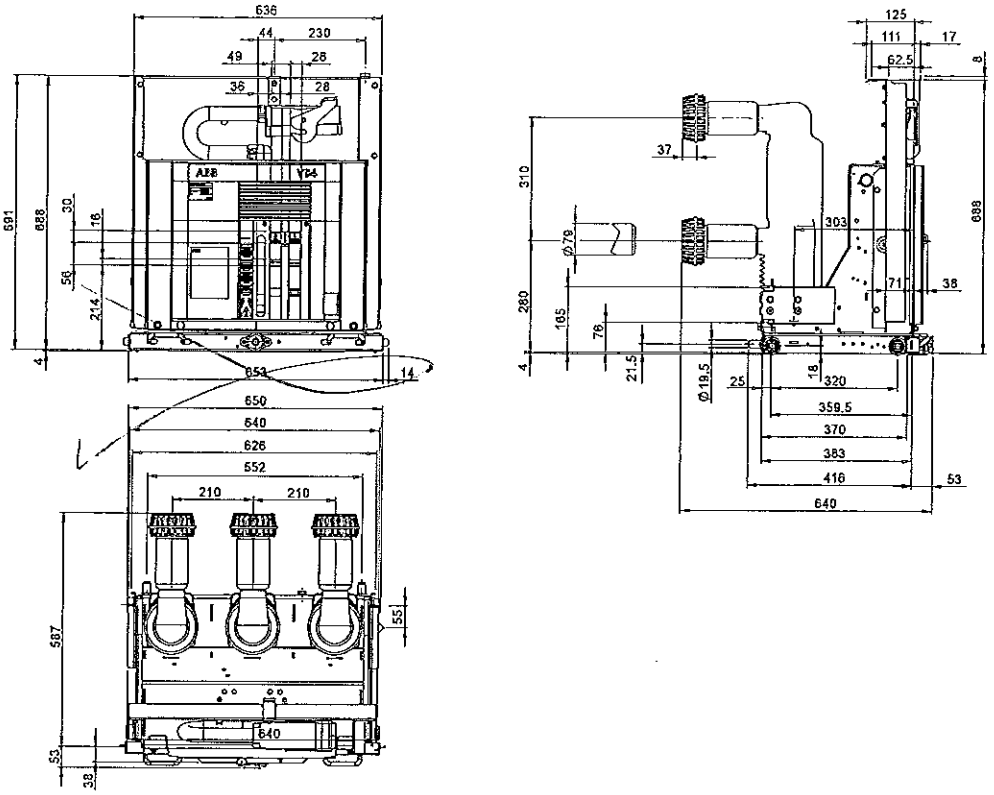
VD4/W		
TN	7420	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	16	kA
	25	kA
	31.5	kA



ВЯРНО С ОРИГИНАЛА

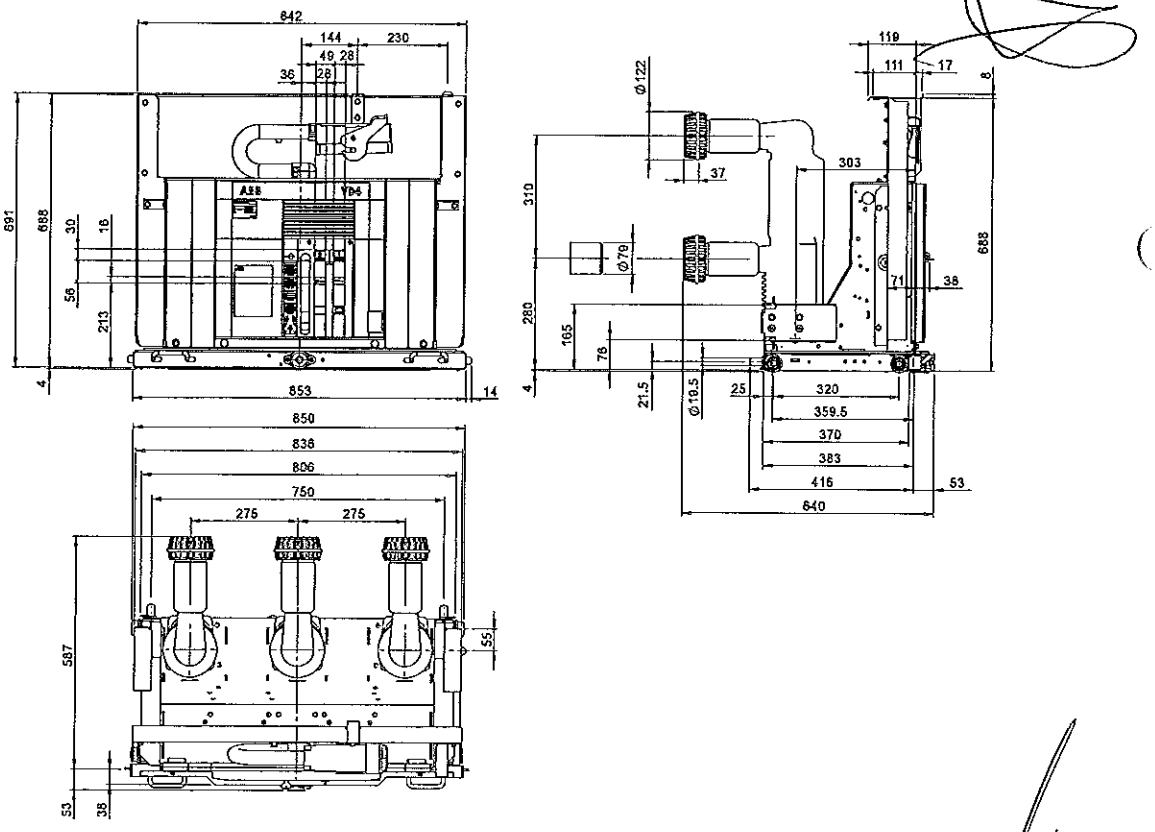
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

VD4/P		
TN	1VCD003284	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

VD4/P		
TN	1VCD003286	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
Isc	40	kA

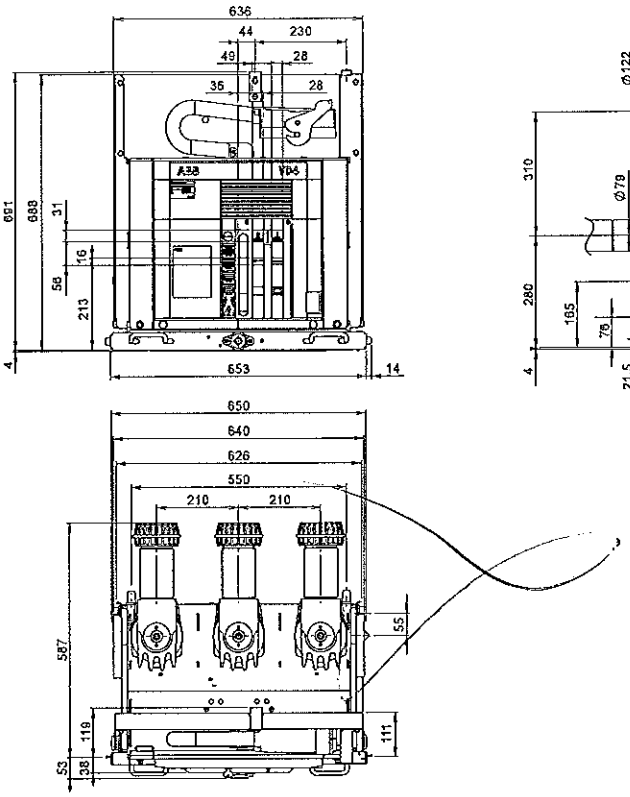


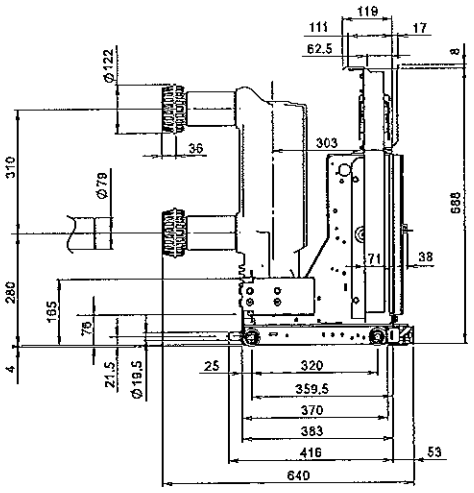
ВЯРНО С ОРИГИНАЛА

Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

VD4/P		
TN	7415	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
Isc	20	kA
	25	kA
	31.5	kA

VD4/P		
TN	7415	
Ur	12	kV
	17.5	kV
Ir	2000	A
Isc	40	kA

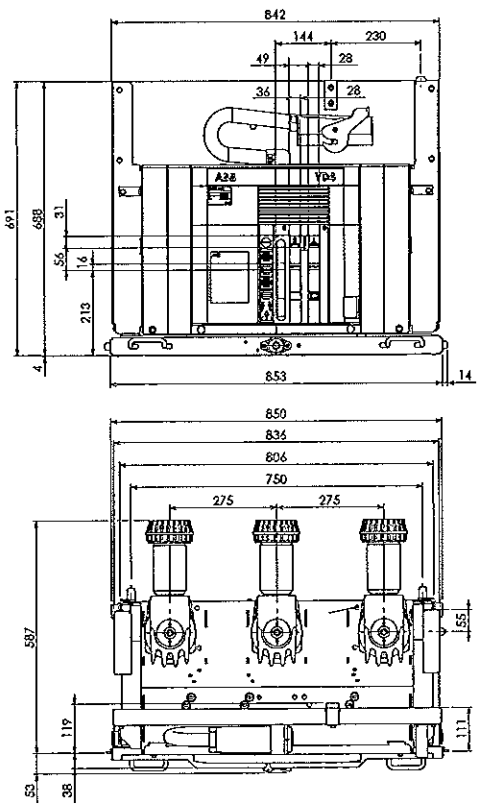


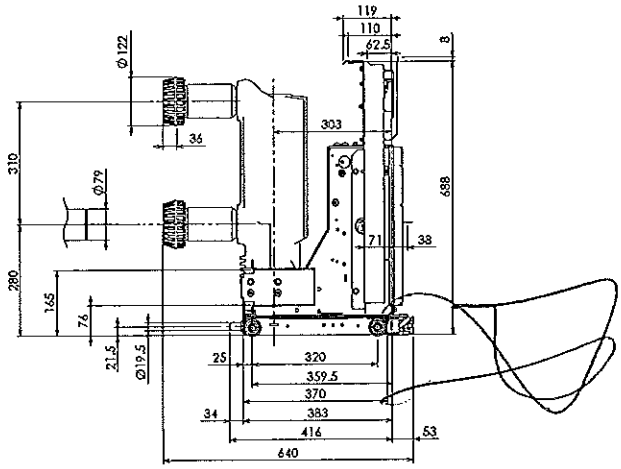


Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

VD4/P		
TN	7416	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
Isc	20	kA
	25	kA
	31.5	kA

VD4/P		
TN	7416	
Ur	12	kV
	17.5	kV
Ir	2000	A
Isc	40	kA

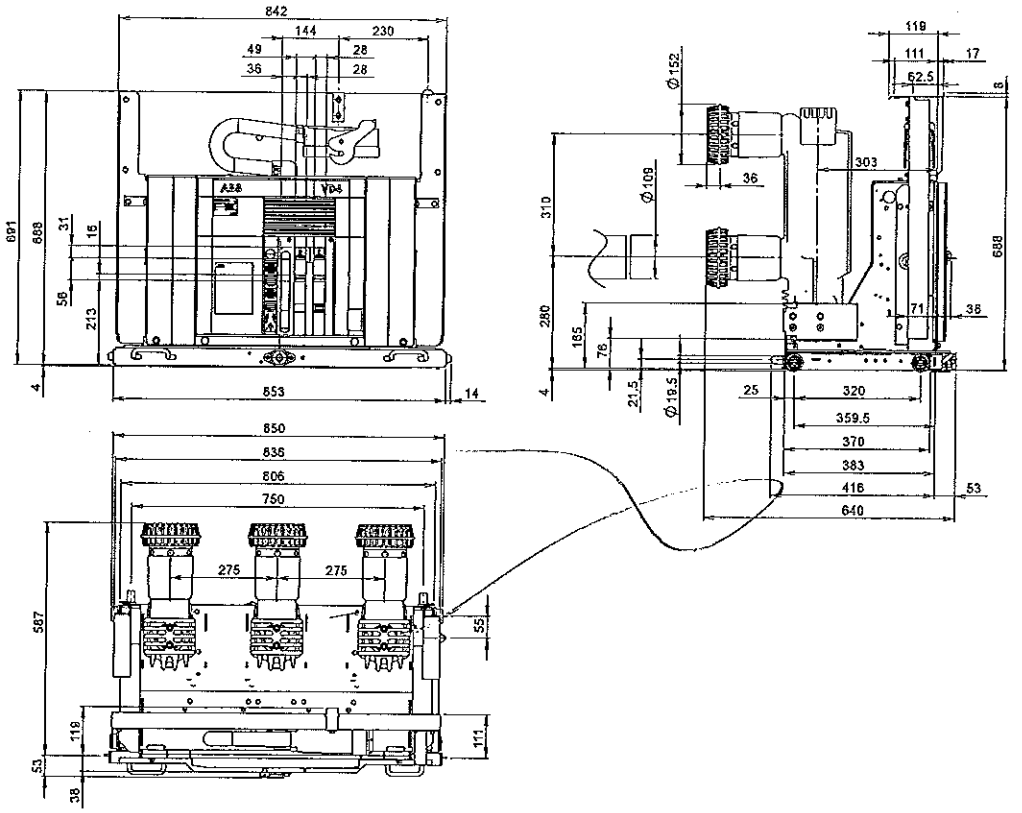




ВЯРНО С ОРИГИНАЛА

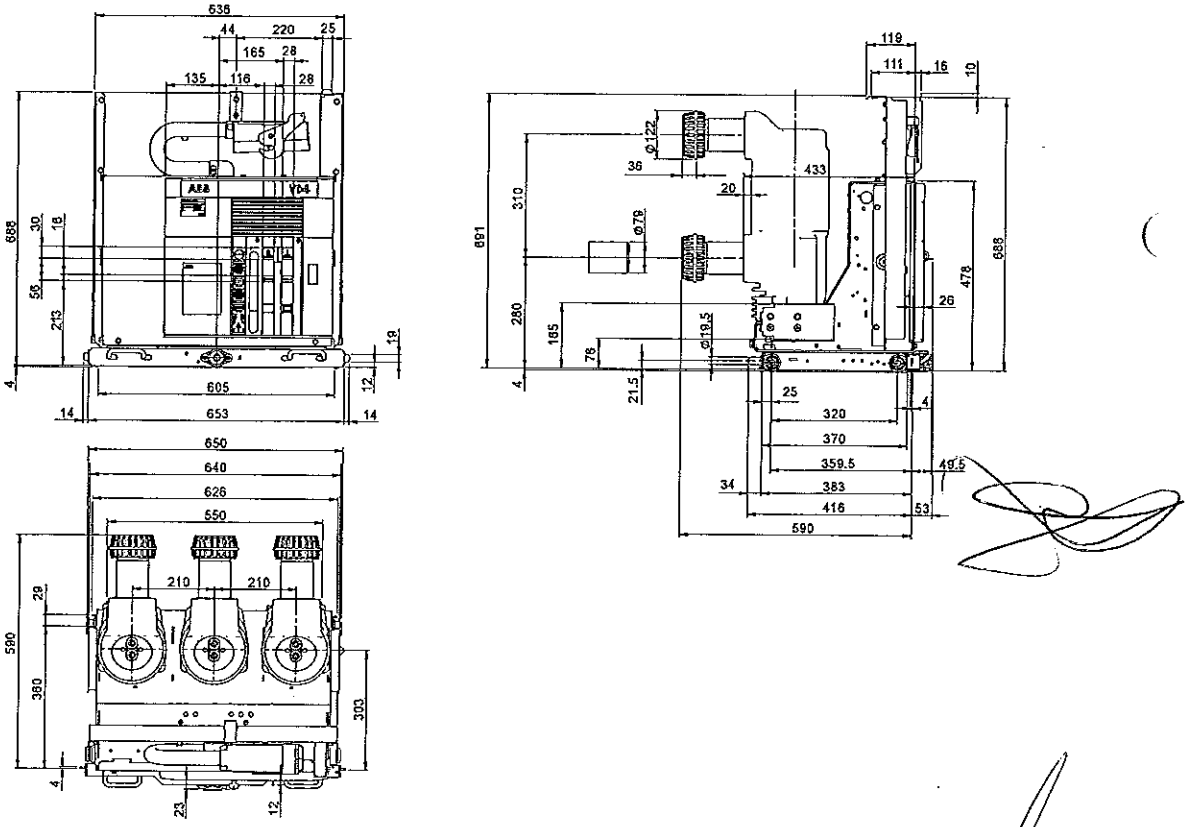
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

VD4/P		
TN	7417	
Ur	12	kV
	17.5	kV
Ir	2500	A
Isc	20	kA
	25	kA
	31.5	kA
	40	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

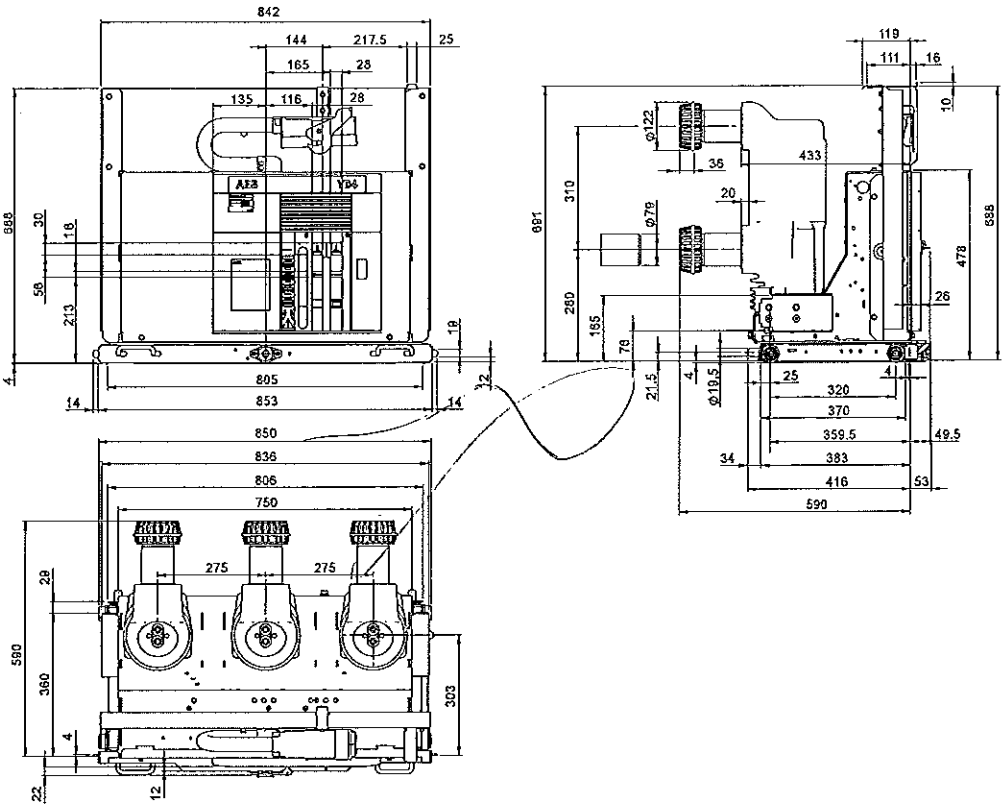
VD4/P		
TN	1VCD003444	
Ur	12	kV
	17.5	kV
Ir	1250	A
	1600	A
	2000	A
Isc	50	kA



ВЯРНО С ОРИГИНАЛА

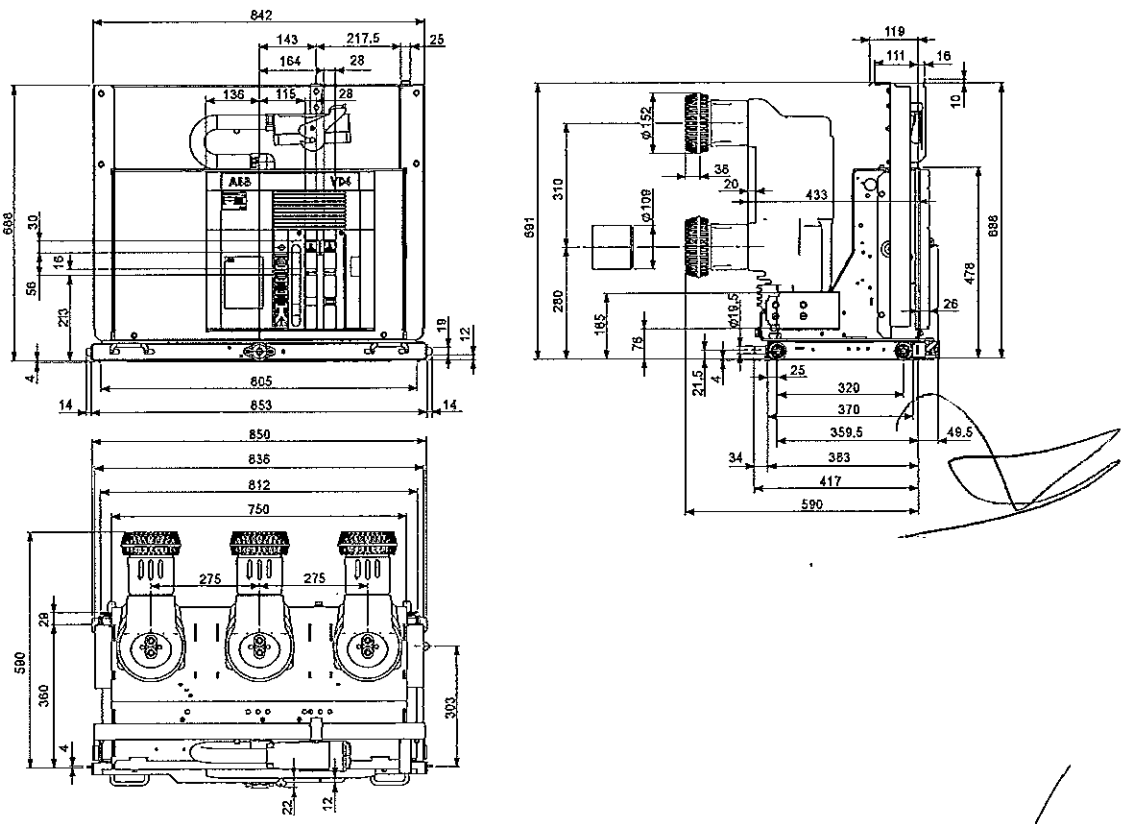
Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

VD4/P		
TN	1VCD003445	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
Isc	50	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

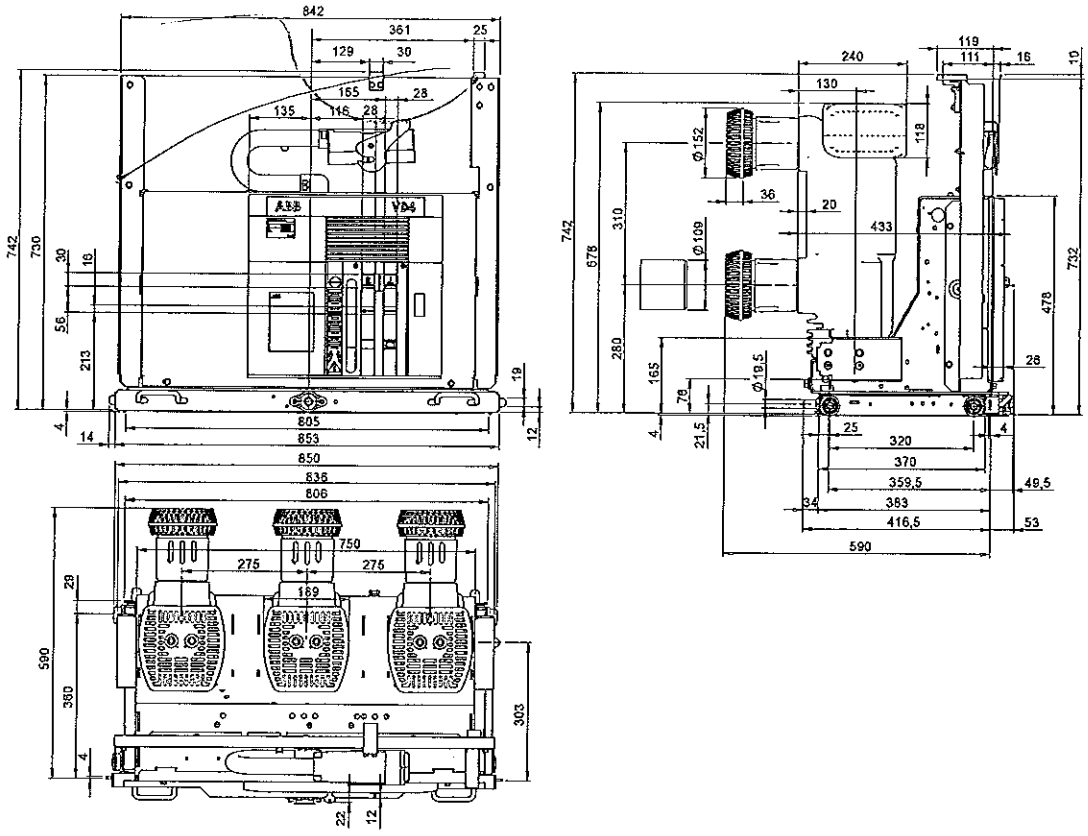
VD4/P		
TN	1VCD003446	
Ur	12	kV
	17.5	kV
Ir	2500	A
Isc	50	kA



ВЯРНО С ОРИГИНАЛА

Withdrawable circuit-breakers for PowerCube modules

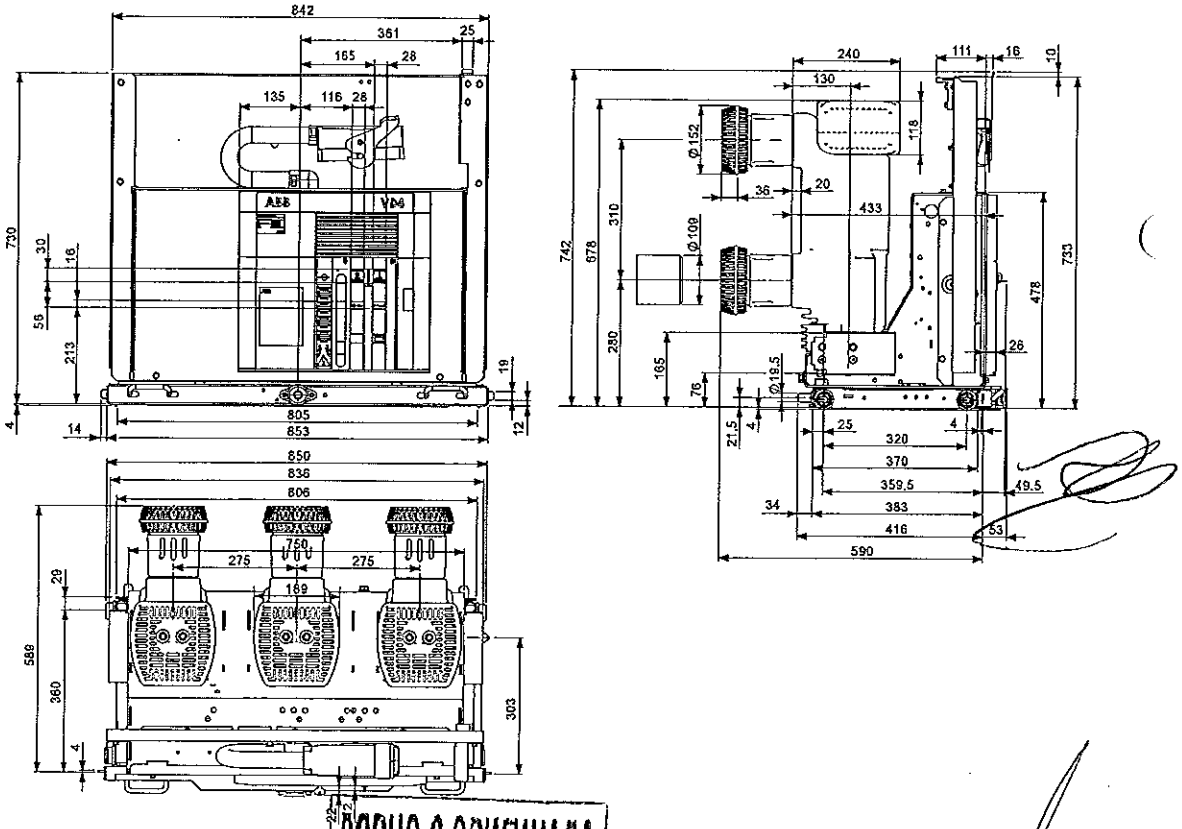
VD4/W		
TN	1VCD003596	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	50	kA



(*) 4000 A with forced ventilation.

Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	1VCD003447	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	50	kA

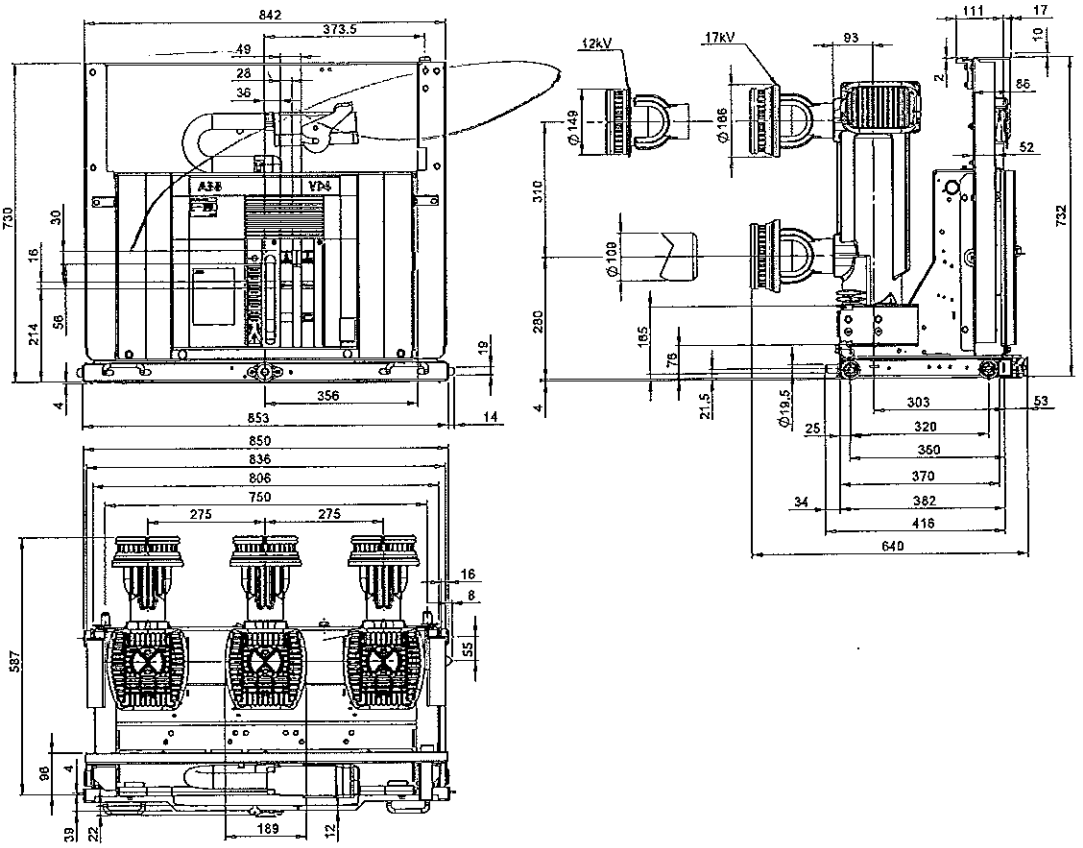


(*) 4000 A with forced ventilation.

ВЯРНО С ОРИГИНАЛА

Withdrawable circuit-breakers for UniGear ZS1 switchgear

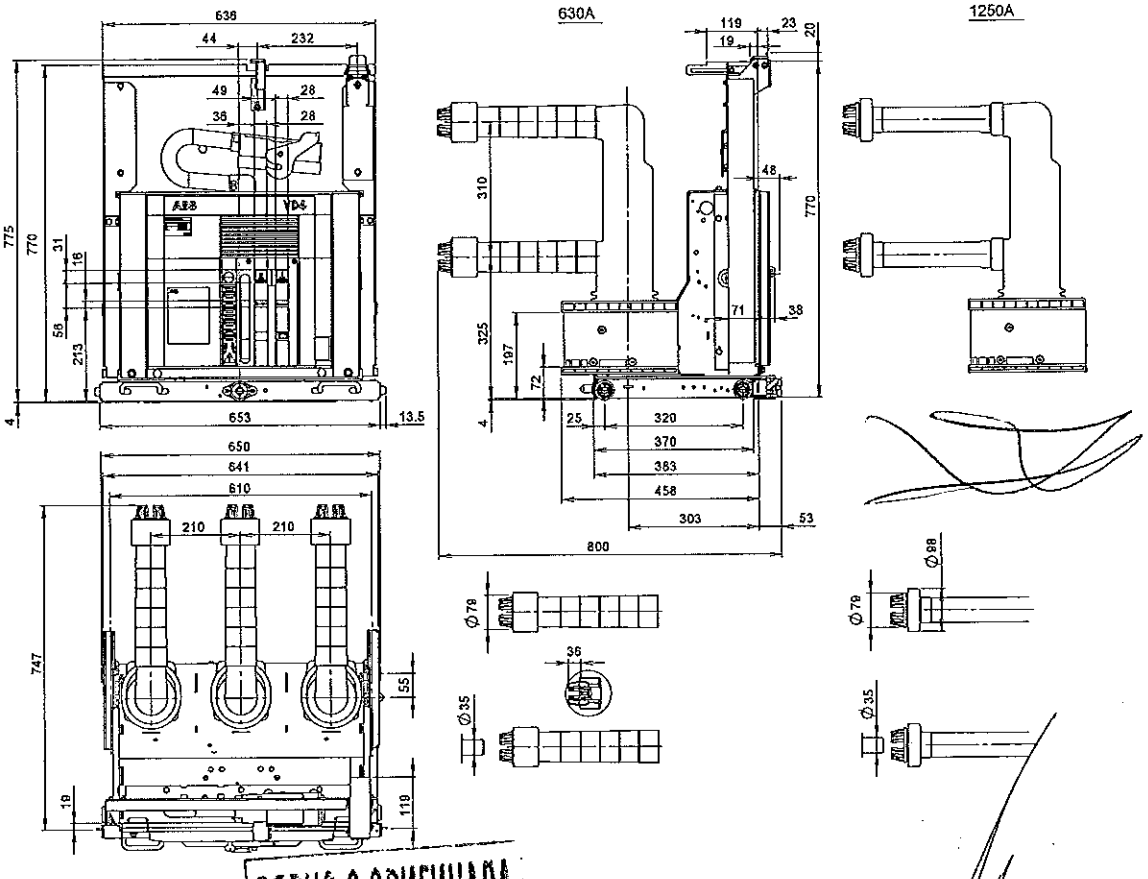
VD4/P		
TN	1VCD000153	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	20	kA
	25	kA
	31.5	kA
	40	kA



(*) 4000 A with forced ventilation.

Withdrawable circuit-breakers for UniGear ZS1 switchgear and PowerCube modules

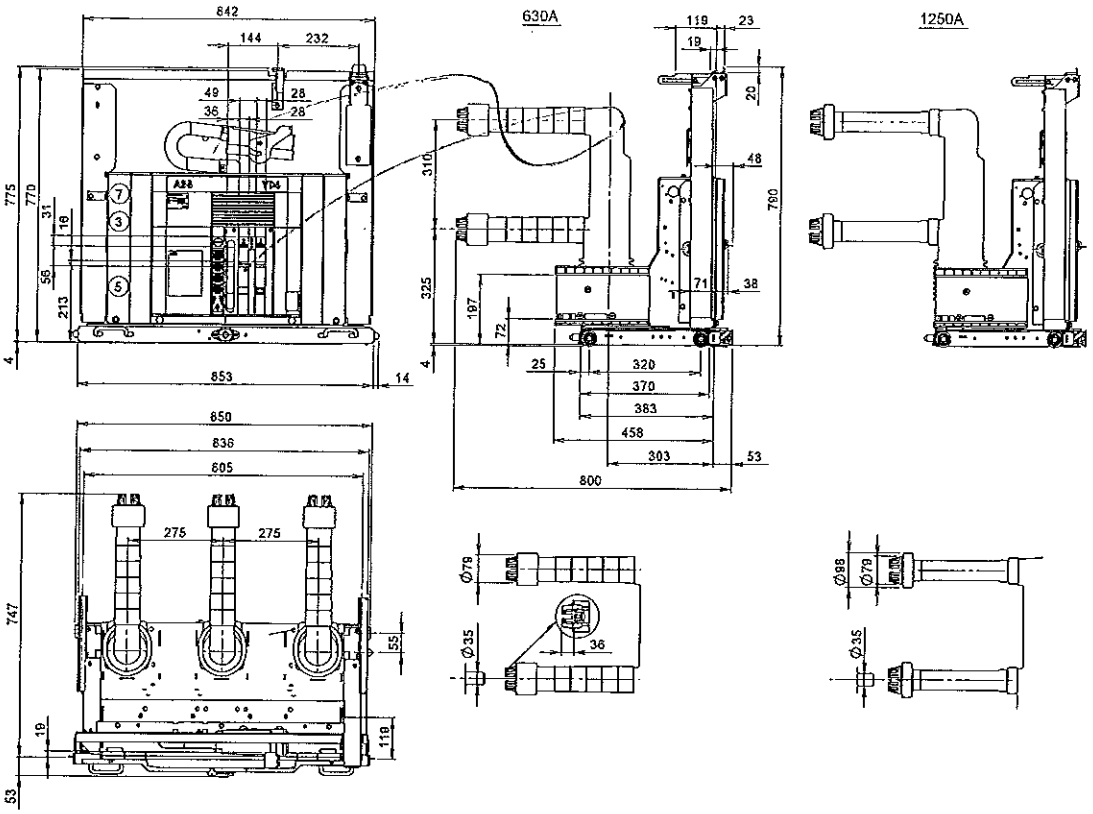
VD4/P		
TN	7413	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



ВЕРНО С ОРИГИНАЛА

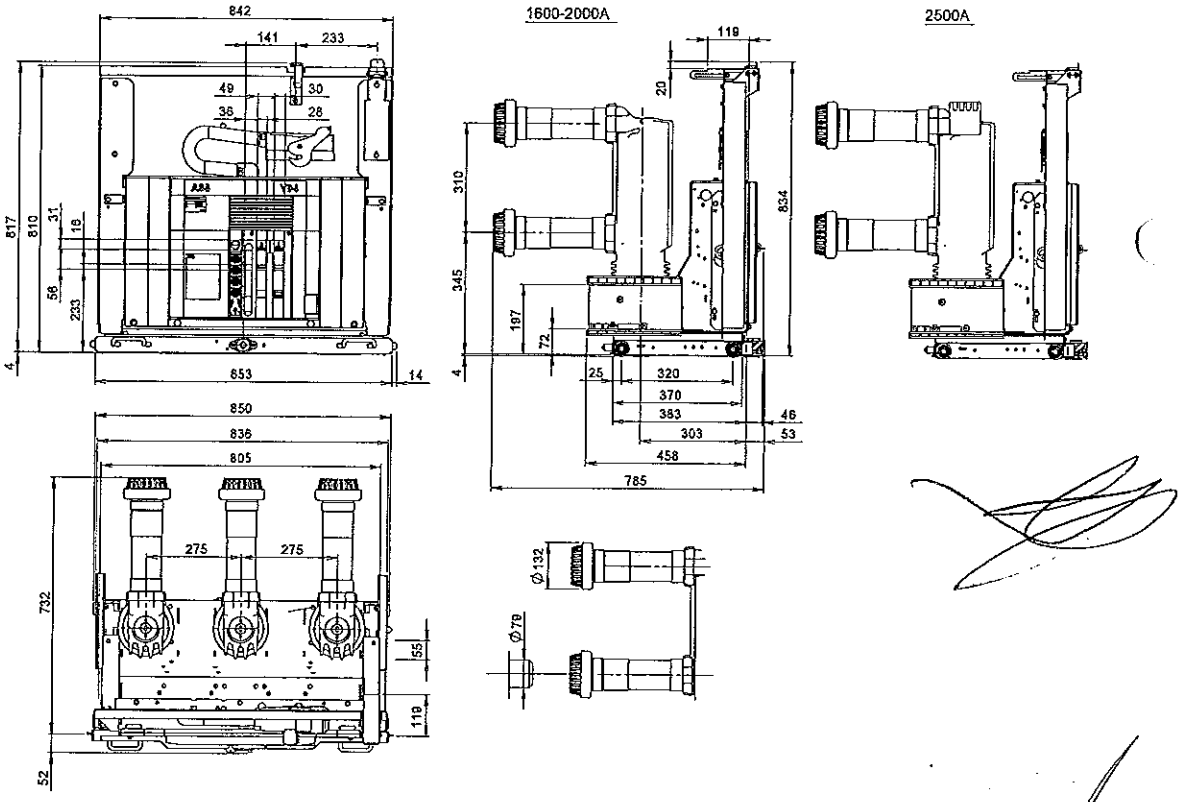
Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	7414	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	7418	
Ur	24	kV
Ir	1600	A
	2000	A
	2500	A (1)
Isc	16	kA
	20	kA
	25	kA
	31.5	kA

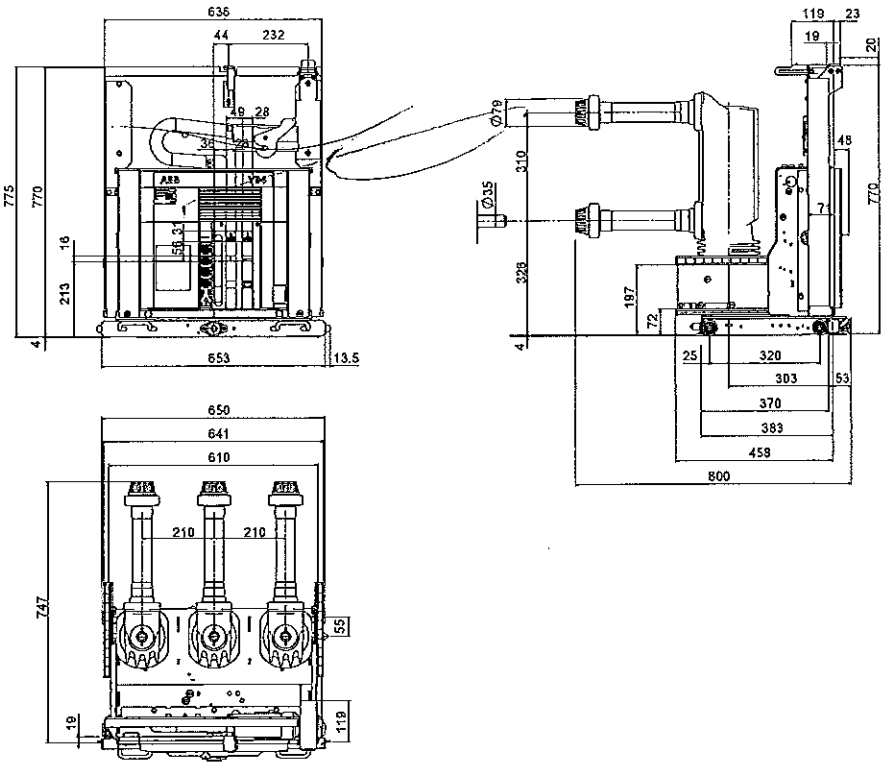


(1) The rated uninterrupted current of 2300 A is guaranteed with natural ventilation. The rated uninterrupted current of 2500 A is guaranteed with forced ventilation.

ВЯРНО С ОРИГИНАЛА

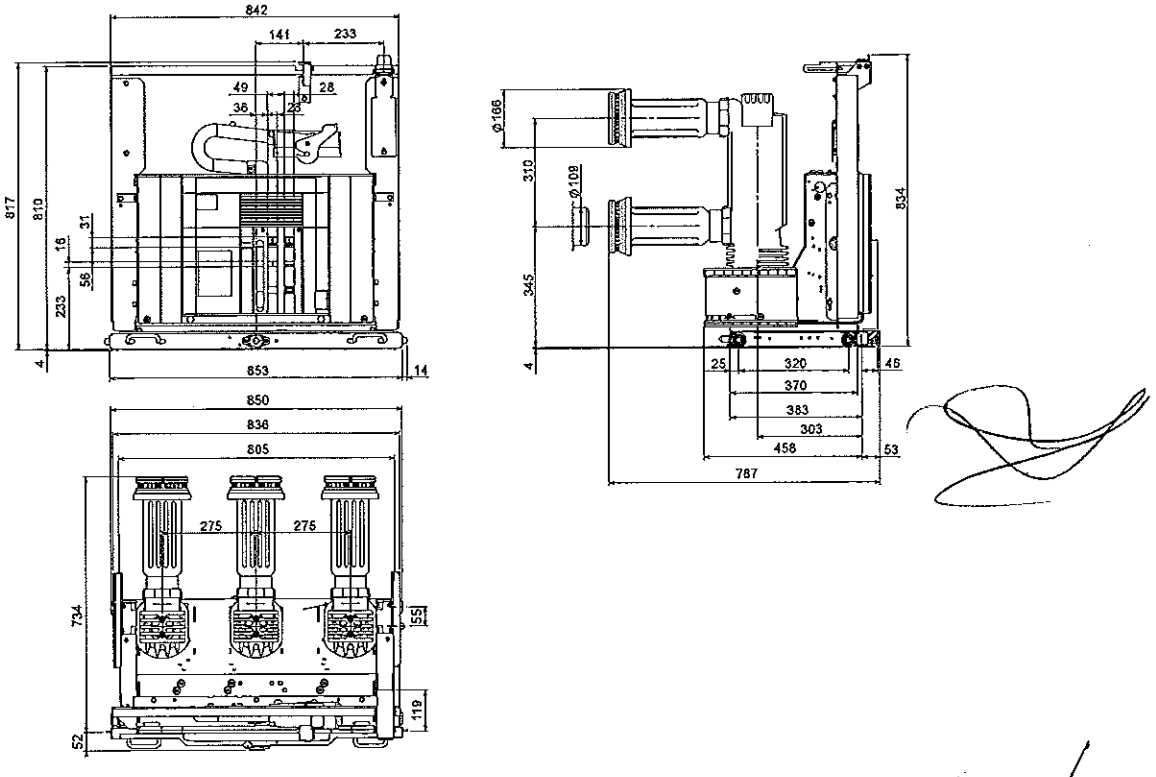
Withdrawable circuit-breakers for UniGear ZS1 switchgear

VD4/P		
TN	1VCD000173	
Ur	24	kV
Ir	1250	A
Isc	31.5	kA



Withdrawable circuit-breakers for UniGear ZS1 switchgear

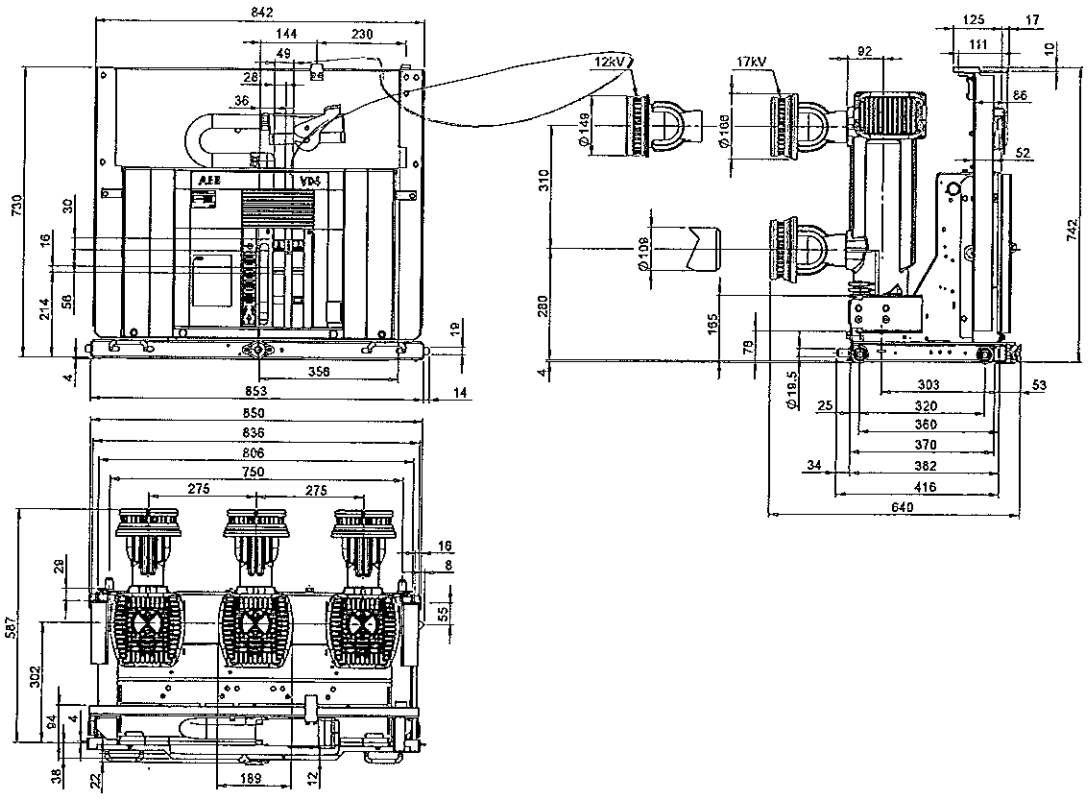
VD4/P		
TN	1VCD000177	
Ur	24	kV
Ir	2700	A
	3150	A
Isc	31.5	kA



ВЯРНО С ОРИГИНАЛА

Withdrawable circuit-breakers for PowerCube modules

VD4/W		
TN	1VCD000152	
Ur	12	kV
	17.5	kV
Ir	3150	A (*)
Isc	20	kA
	25	kA
	31.5	kA
	40	kA

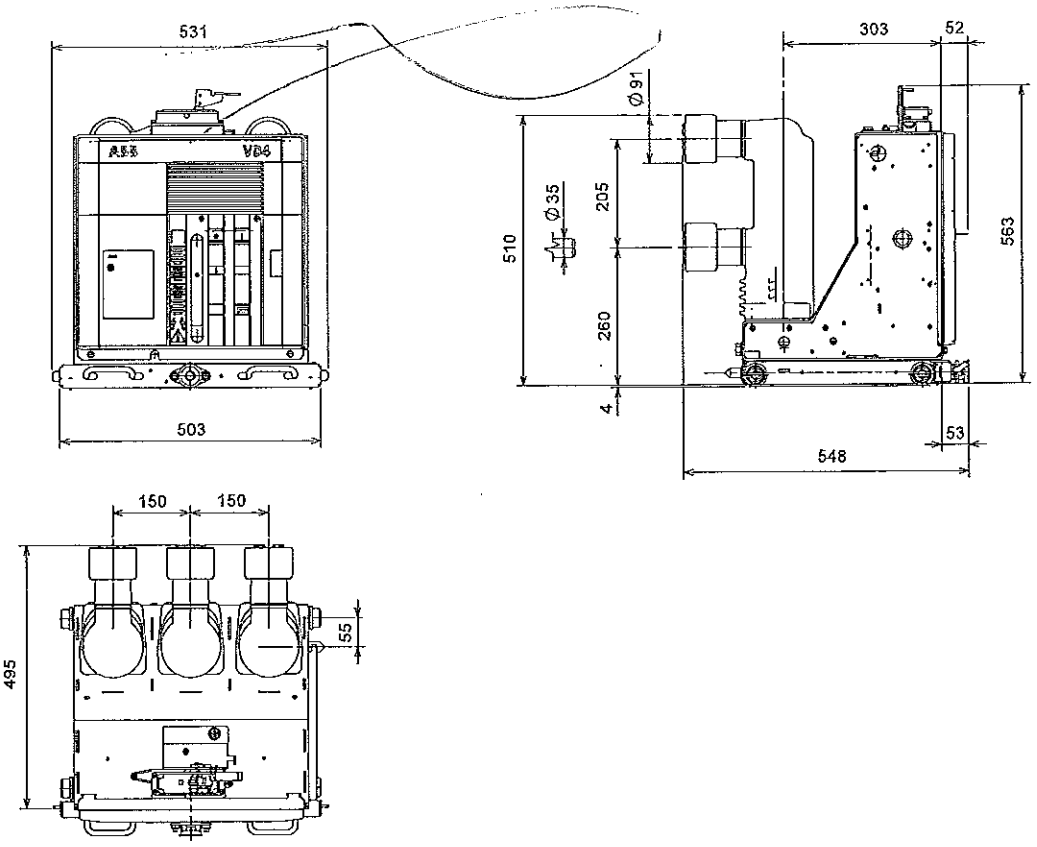


(*) 4000 A with forced ventilation.

ВЯРНО С ОРИГИНАЛА

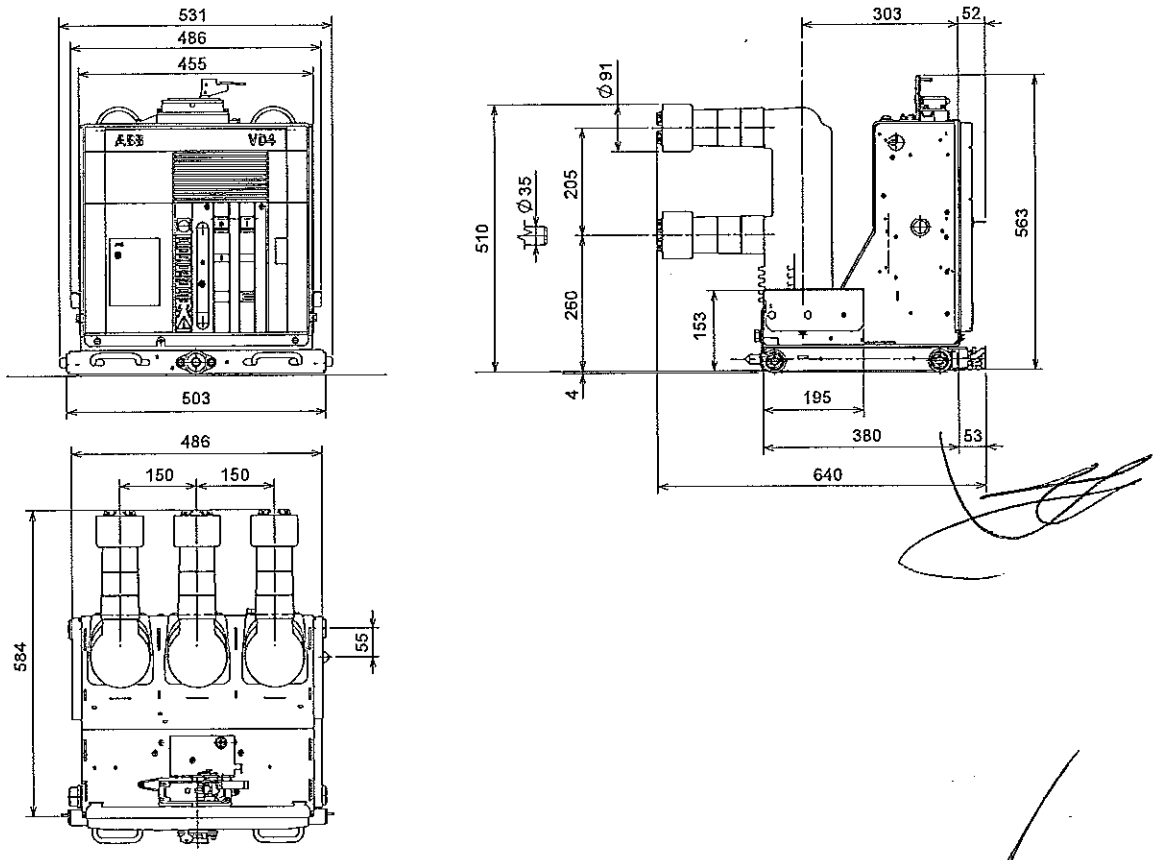
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/Z8		
TN	1VCD000092	
Ur	12	kV
Ir	630	A
Isc	20	kA
	25	kA



Withdrawable circuit-breakers for ZS8.4 switchgear

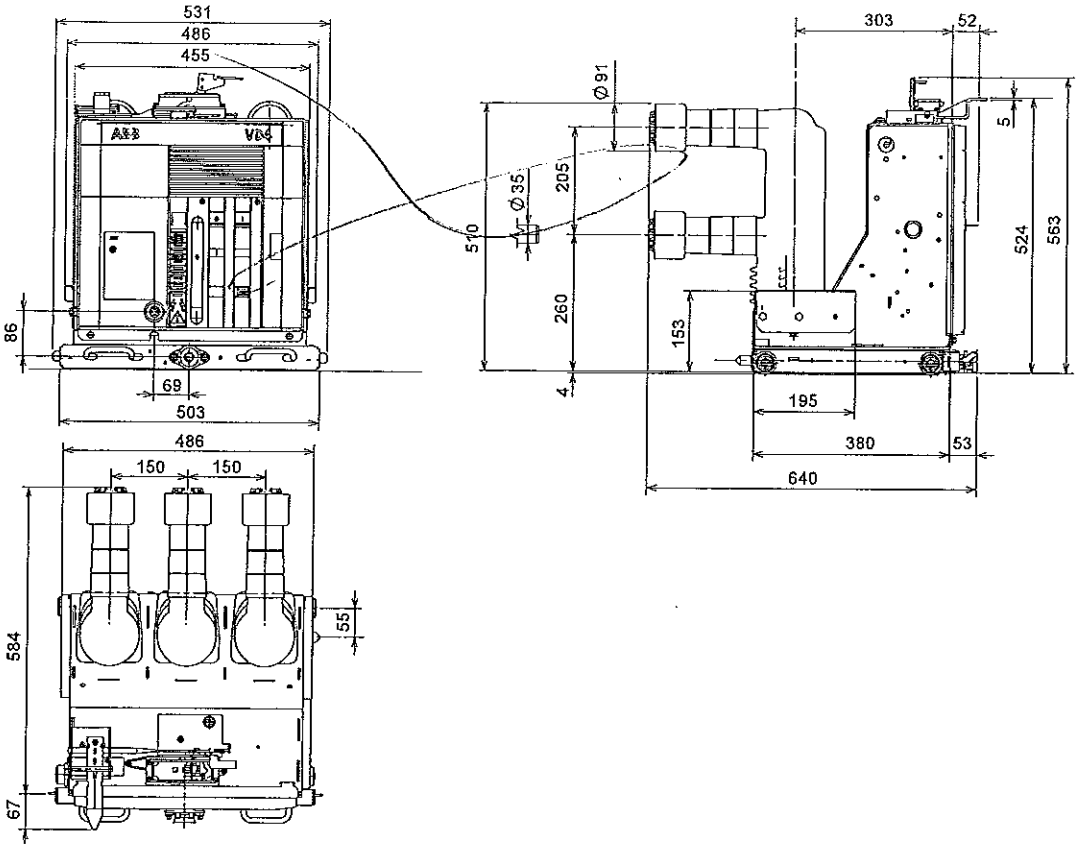
VD4/ZT8		
TN	1VCD000093	
Ur	12	kV
Ir	630	A
Isc	20	kA
	25	kA



ВЯРНО С ОРИГИНАЛА

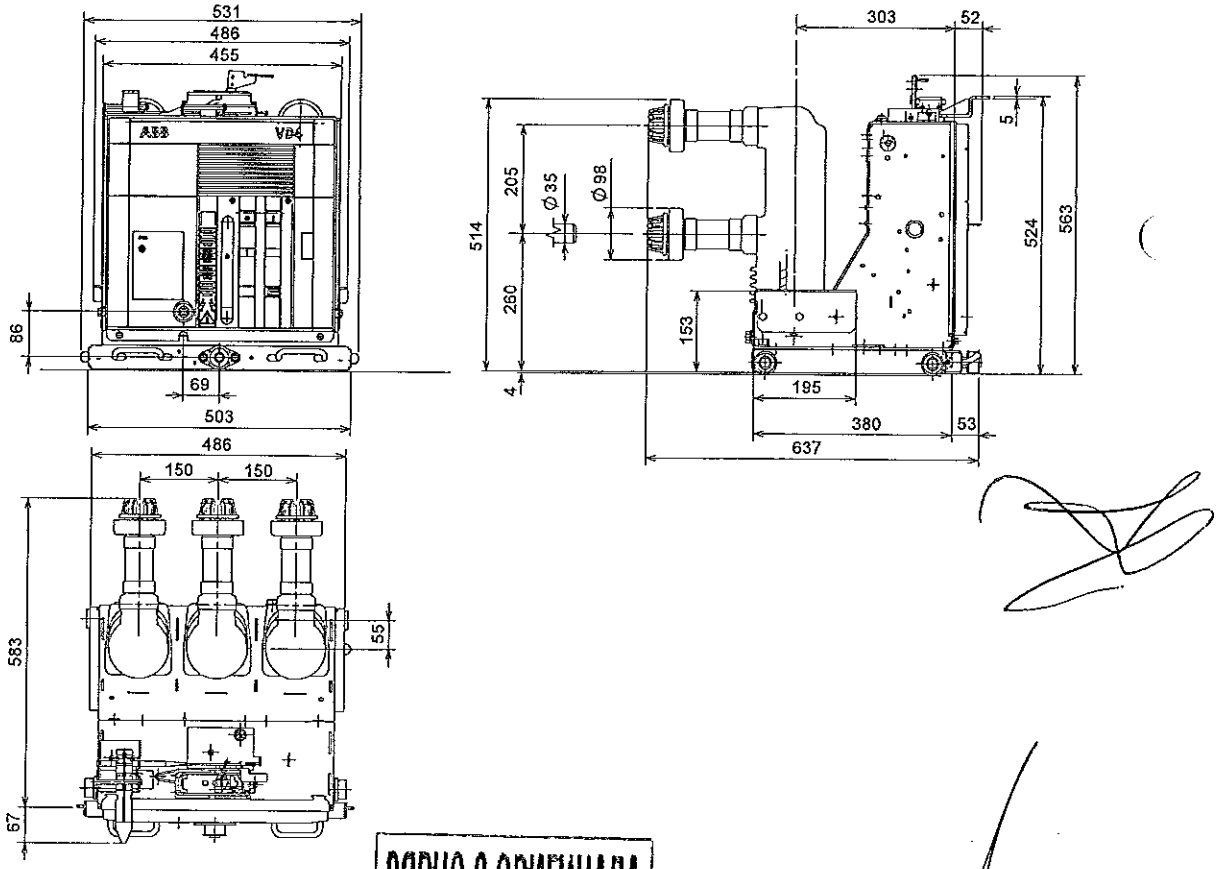
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZS8		
TN	1VCD000091	
Ur	12	kV
Ir	630	A
Isc	20	kA
	25	kA



Withdrawable circuit-breakers for ZS8.4 switchgear

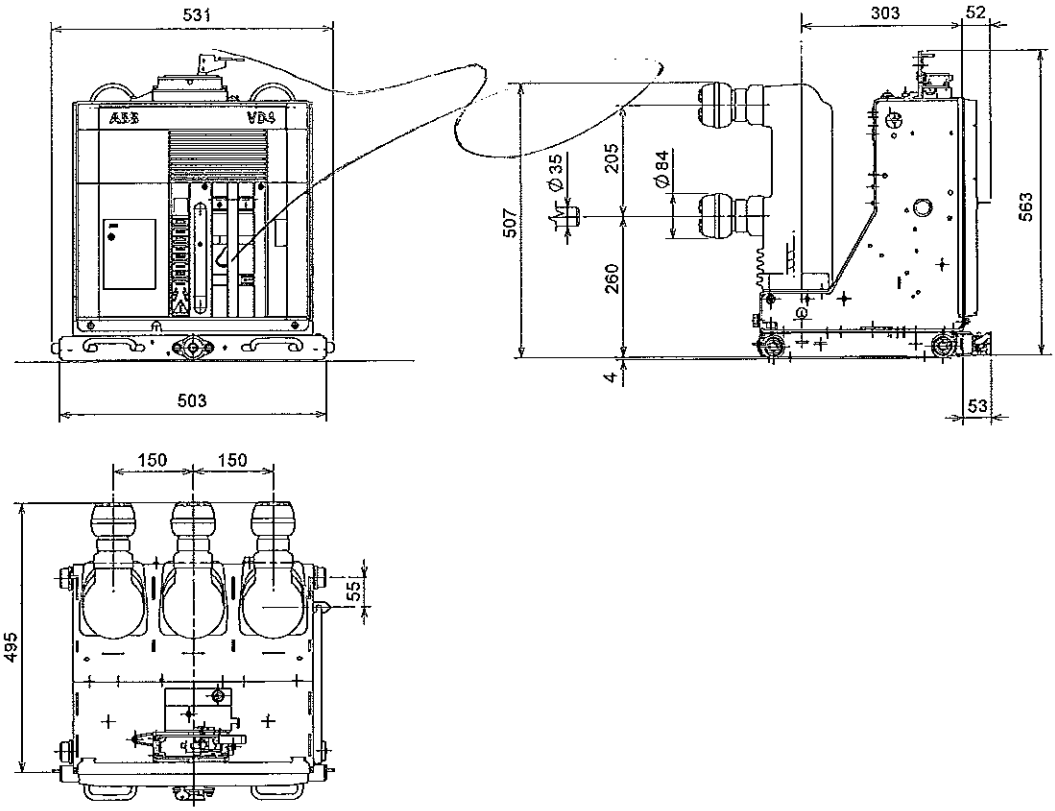
VD4/ZS8		
TN	1VCD000133	
Ur	12	kV
Ir	1250	A
Isc	20	kA
	25	kA



ВЯРНО С ОРИГИНАЛА

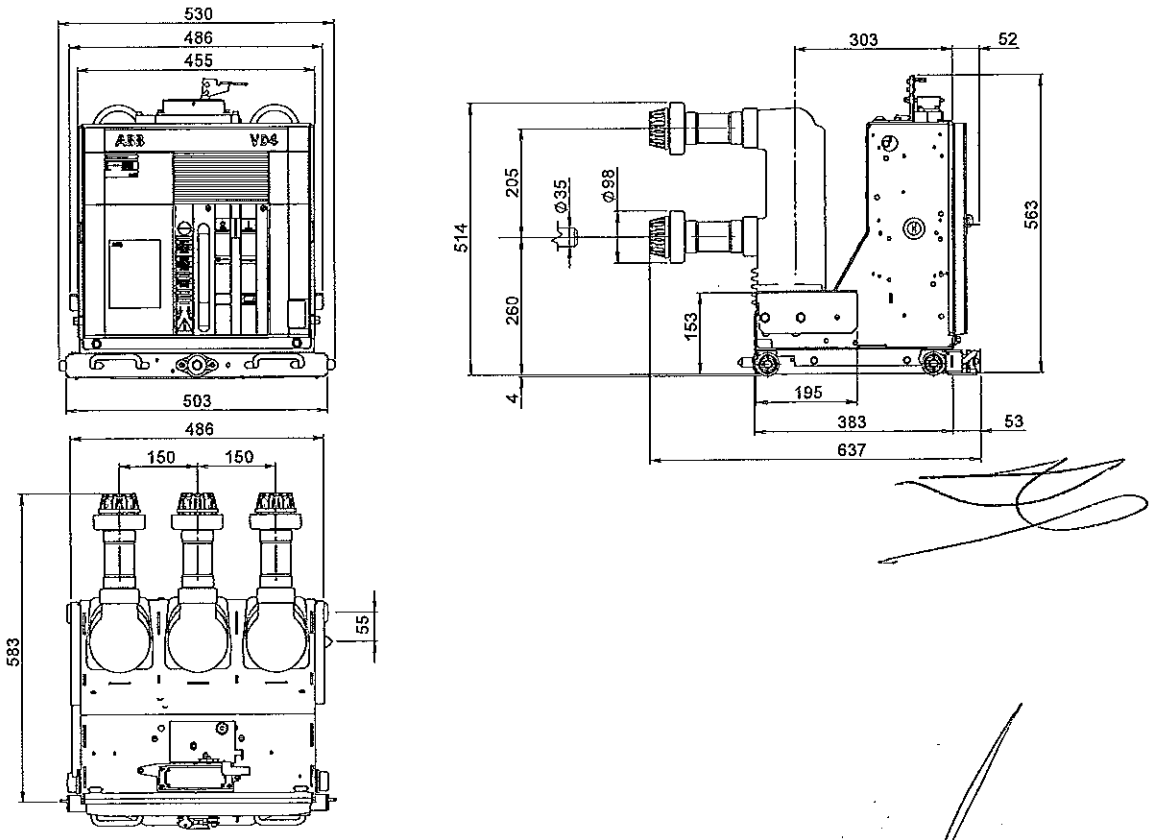
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/Z8		
TN	1VCD000137	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	20	kA
	25	kA



Withdrawable circuit-breakers for ZS8.4 switchgear

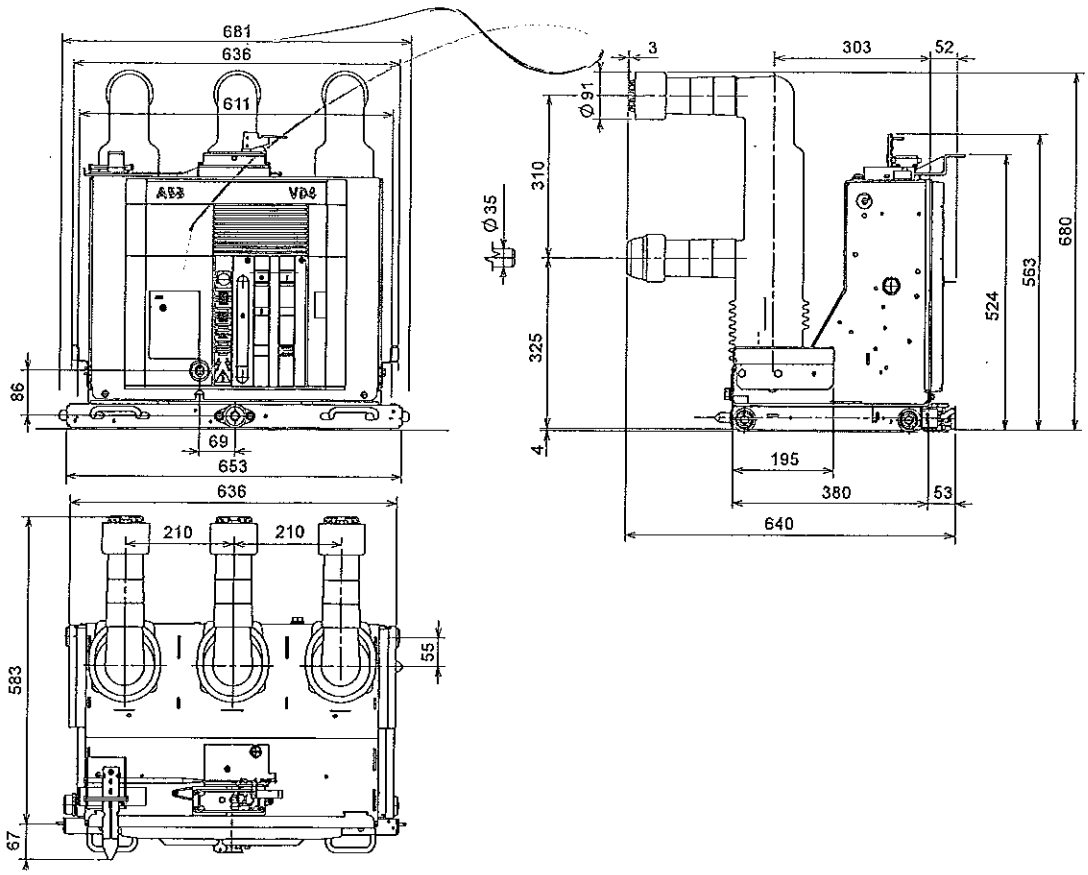
VD4/ZT8		
TN	1VCD000134	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
Isc	20	kA
	25	kA



ВЯРНО С ОРИГИНАЛА

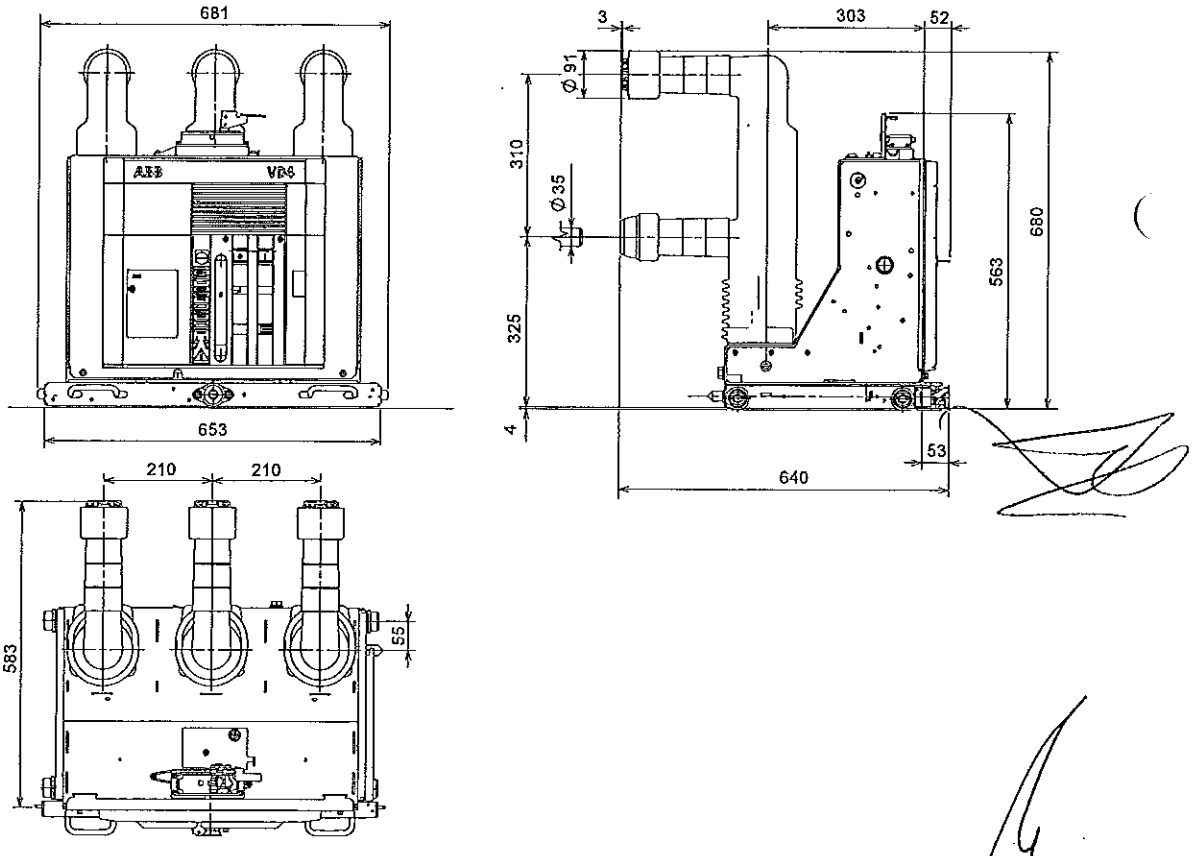
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZS8		
TN	1VCD000088	
Ur	24	kV
Ir	630	A
Isc	16	kA
	20	kA
	25	kA



Withdrawable circuit-breakers for ZS8.4 switchgear

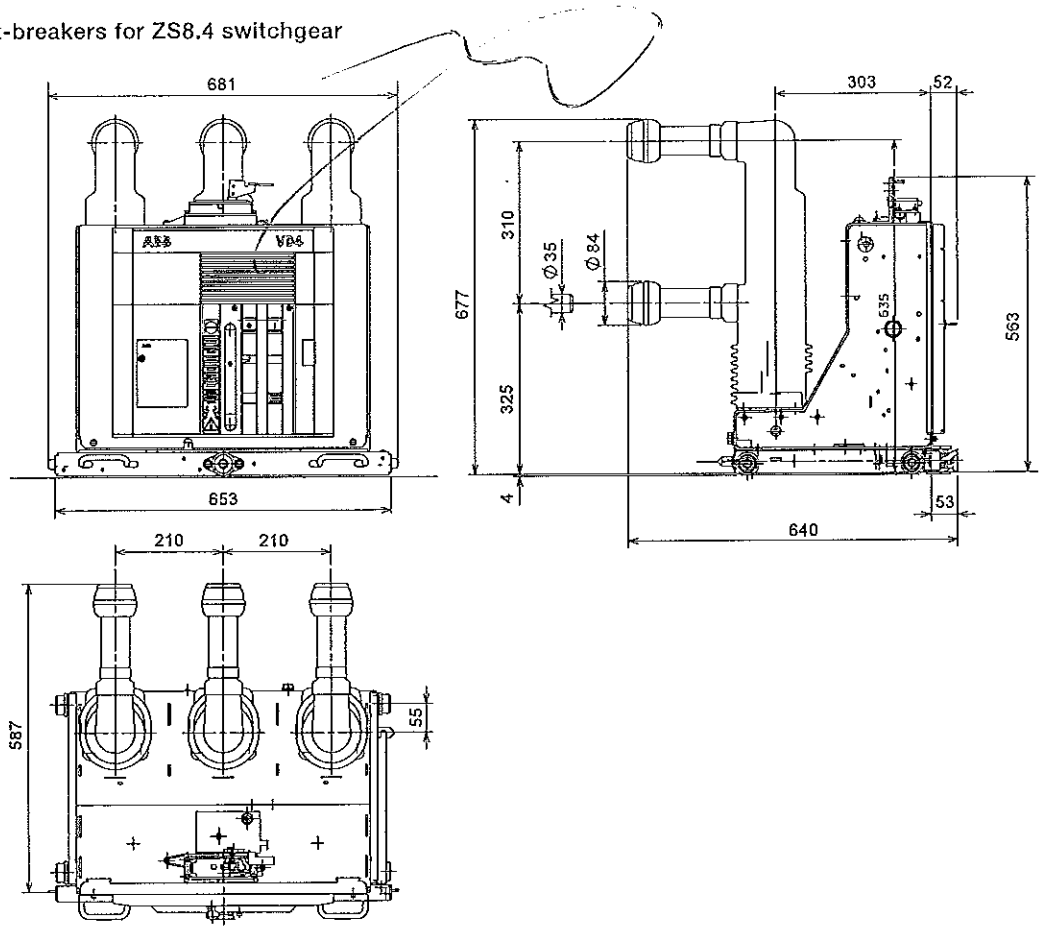
VD4/Z8		
TN	1VCD000089	
Ur	24	kV
Ir	630	A
Isc	16	kA
	20	kA
	25	kA



ВЯРНО С ОРИГИНАЛА

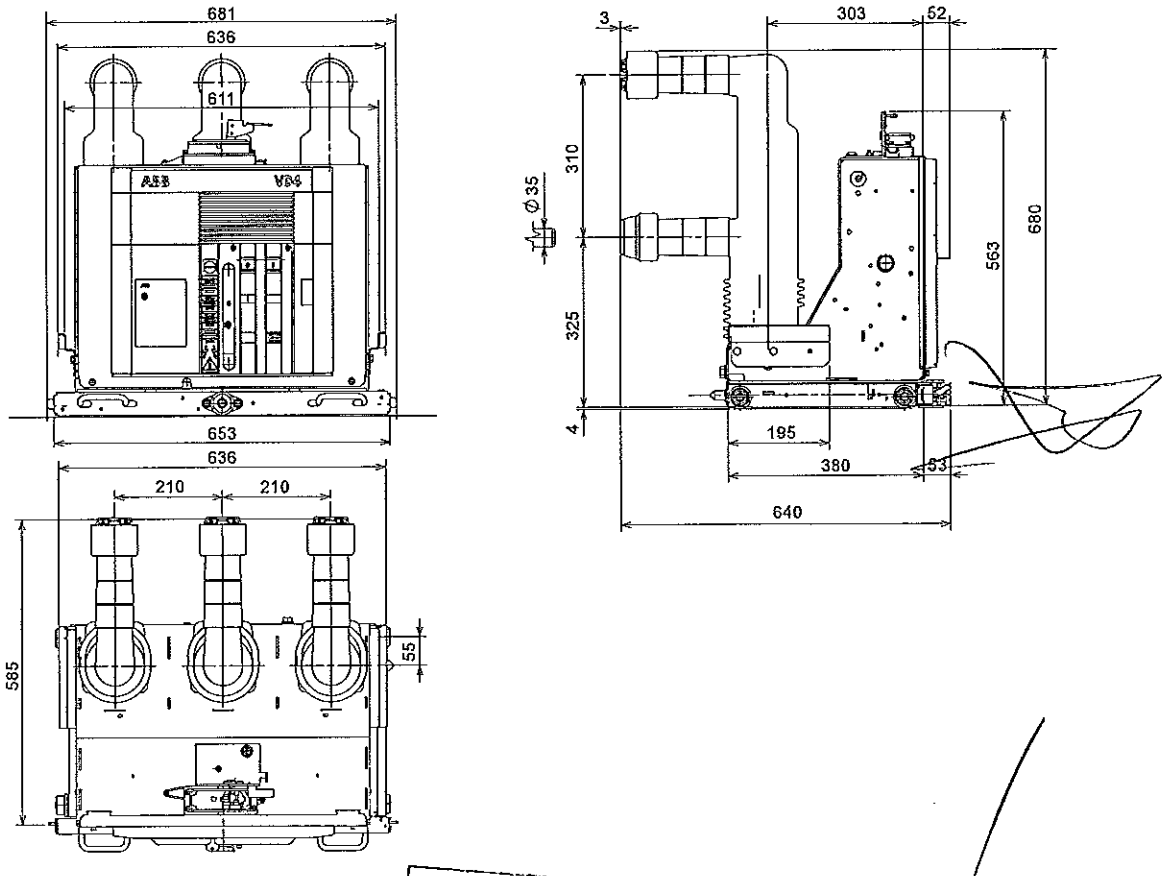
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/Z8		
TN	1VCD000138	
Ur	24	kV
Ir	1250	A
Isc	16	kA
	20	kA
	25	kA



Withdrawable circuit-breakers for ZS8.4 switchgear

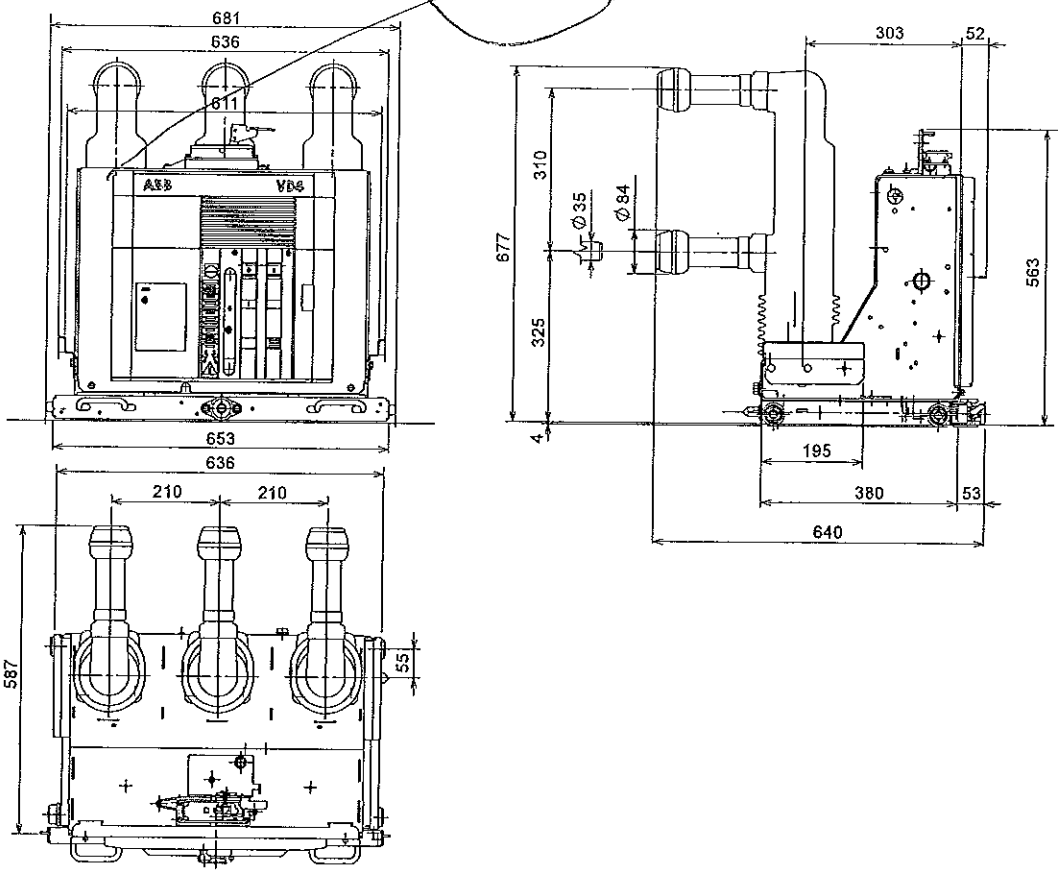
VD4/ZT8		
TN	1VCD000090	
Ur	24	kV
Ir	630	A
Isc	16	kA
	20	kA
	25	kA



ВЯРНО С ОРИГИНАЛА

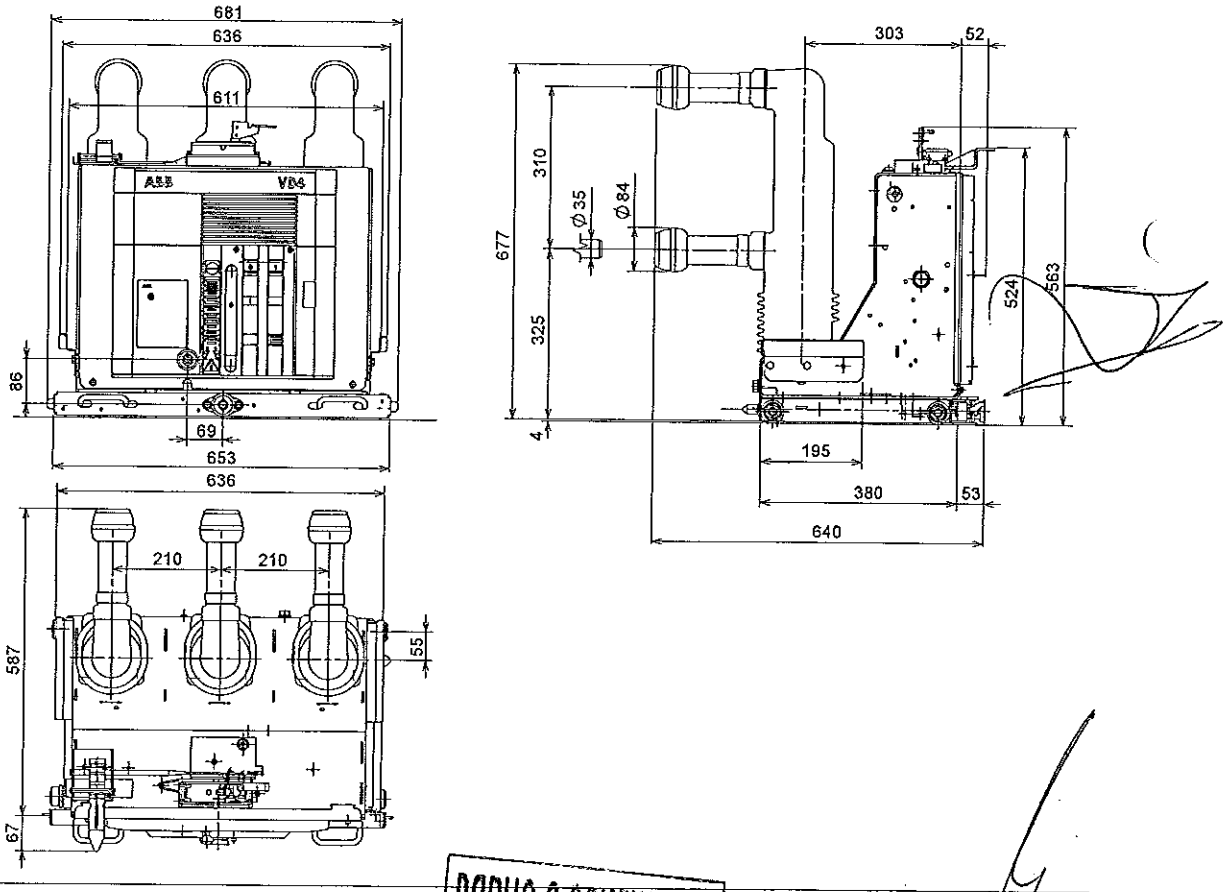
Withdrawable circuit-breakers for ZS8.4 switchgear

VD4/ZT8		
TN	1VCD000136	
Ur	24	kV
Ir	1250	A
Isc	16	kA
	20	kA
	25	kA



Withdrawable circuit-breakers for ZS8.4 switchgear

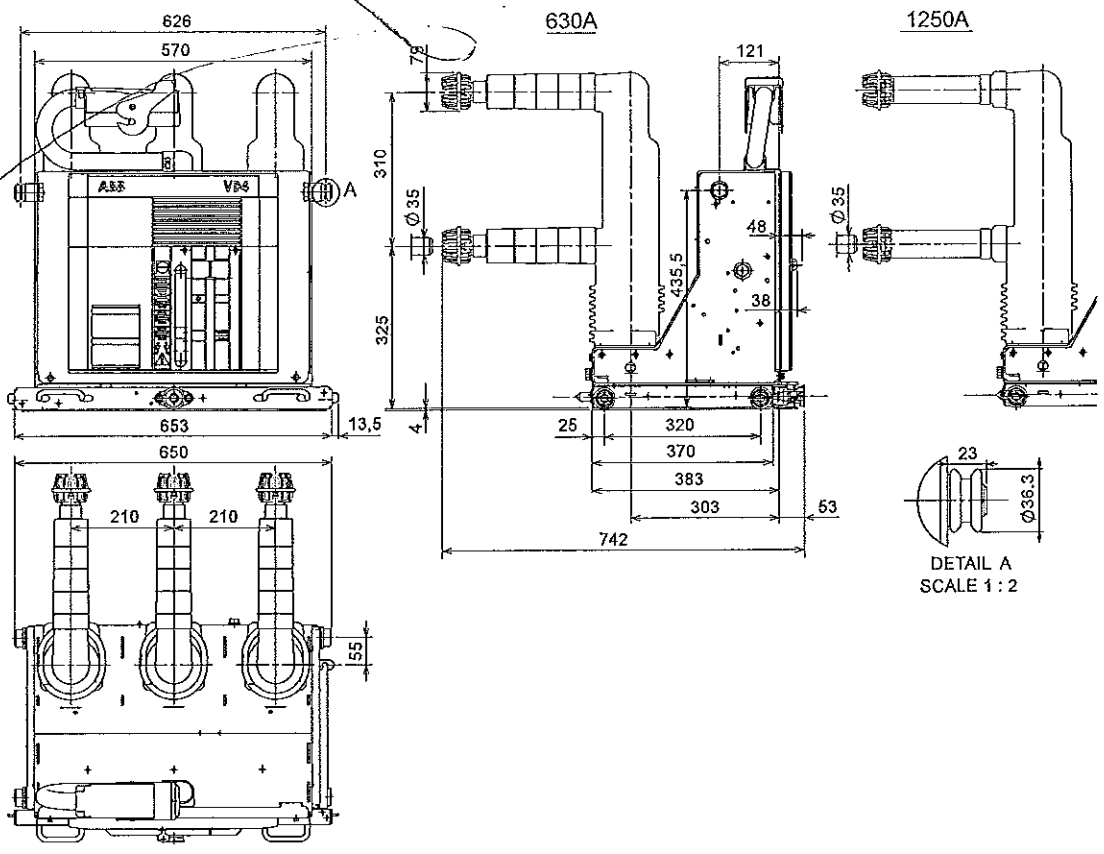
VD4/ZS8		
TN	1VCD000135	
Ur	24	kV
Ir	1250	A
Isc	16	kA
	20	kA
	25	kA



ВЯРНО С ОРИГИНАЛА

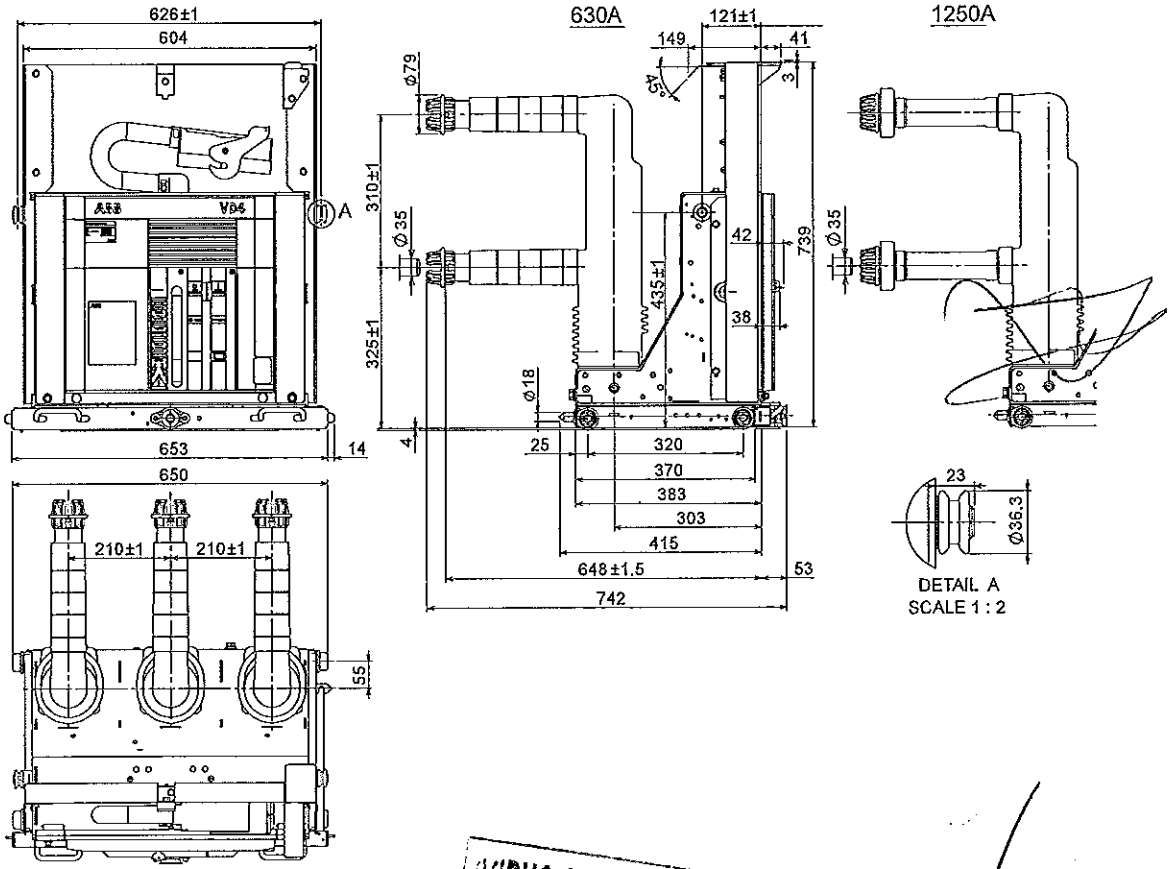
Withdrawable circuit-breakers for UniSwitch / UniMix switchgears

VD4/US		
TN	1VCD000047	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



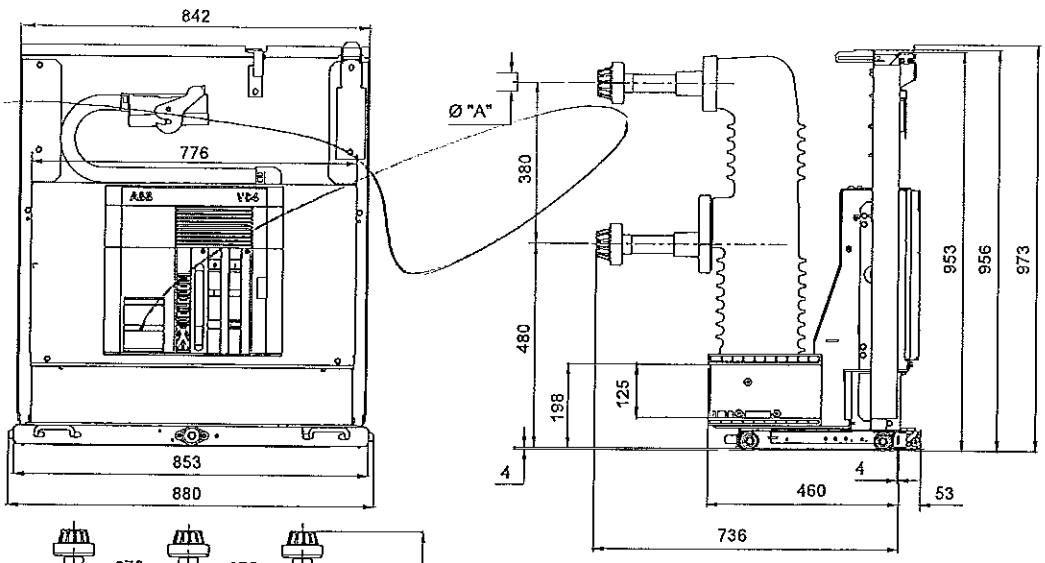
Withdrawable circuit-breakers for UniSec switchgears

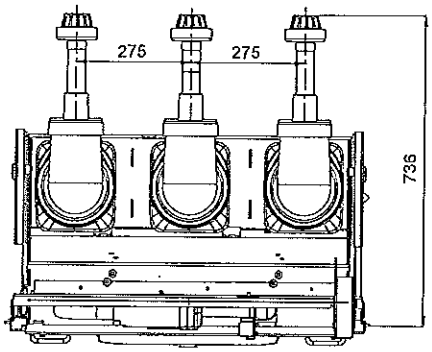
VD4/SEC		
TN	1VCD000190	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



ВЕРНО С ОРИГИНАЛА

VD4		
TN	1VYN300901-KG	
Ur	36	kV
Ir	1250	A
	1600	A
	2000	A
Isc	31.5	kA





Breaker type	Ø A mm
VD4 36.12.32	35
VD4 36.16.32 - VD4 36.20.32	79

ВЯРНО С ОРИГИНАЛА

14. Product quality and environmental protection

The apparatus are produced in compliance with the requirements of international standards for the quality management system and environmental management system. In these fields, the excellent level is proved by quality certificates according to ISO 9001 and by the EMS according to ISO 14 001.

End of life of product

The ABB company is committed to complying with the relevant legal and other requirements for environment protection according to the ISO 14 001 standard.
The duty of company is to facilitate subsequent recycling or disposal at the end of product life. During disposal of the product, it is always necessary to act in accordance with local legal requirements in force.

Methods of disposal

Disposal can either be carried out thermally in an incineration plant or by storing on a waste site.

RAW MATERIAL	RECOMMENDED METHOD OF DISPOSAL
Metal material (Fe, Cu, Al, Ag, Zn, W, others)	Separation and recycling
Thermoplasts	Recycling or disposal
Epoxy resin	Separation of metal material and the disposal of rest
Rubber	Disposal
Oil as dielectric (transformer oil)	Draining from equipment and further recycling or disposal
Packing material – wood	Recycling or disposal
Packing material – foil	Recycling or disposal

ВЕРНО С ОРИГИНАЛА

For more information please contact:

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Unità Operativa Sace-MV
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ABB AG
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Oberhausener Strasse 33
D-40472 Ratingen
Phone: +49(0)2102/12-1230, Fax: +49(0)2102/12-1916
E-mail: powertech@de.abb.com

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The data and illustrations are not binding. We reserve the right to make changes without notice in the course of technical development of the product.

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6476541011 - Rev. Y, en - Instruction Manual - 2014.03 (VD4 up to 36 kV; up to 50 kA) (gs)(b)

ВЯРНО С ОРИГИНАЛА

Power and productivity for a better world™

Прилжение 1.2 - типови_изпитания

ВЯРНО С ОРИГИНАЛА

АББ Трансмисионе & Дистрибузионе С.п.А.
Унита Оператива Сачe Т.М.С.

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ПРОТОКОЛ ЗА ТИПОВИ ИЗПИТАНИЯ No. 100081_C СТРАНЦИ 1/1

Apparatus: КРУ тип ZS1 изд. 1.2 с вакуумнен прекъсвач тип VD4/P 12.12.31 p=210

Идентификация: 1VCP0000138-Rev.-,en-Технчиески каталог-2003-04

Параметри:

Номинално напрежение:	12	kV
Ном. Издържано импулсно напрежение:	75	kV
Ном. Издържано напрежение с 50Hz:	28	kV
Номинална честота:	50-60	Hz
Номинален ток на шината:	1250	A
Номинален ток на ошиновката:	1250	A
Ном. Издържан ток, пикова стойност:	80	kA
Ном. Издържан кратковременен ток на к.с.:	31.5	kA
Ном. Продължителност на к.с.:	3	s

Test reports verifying rating assigned by the manufacturer:

Изпитания	Тест съгласно стандарт	Тестов протокол	
		No.	Издаден от
Диелектрични изпитания	IEC 60298 Subclausole 6.1	0003 Ra	ПЕХЛА Високо-мощностни лаборатории
Тест с повишаване на температурата	IEC 60298 Subclausole 6.3/6.4	0009 Ra	ПЕХЛА Високо-мощностни лаборатории
Тест за кратковременен т.к.с. и пиков т.к.с.	IEC 60298 Subclausole 6.5	HZ 144 F08	АББ Калор Емаг Лаборатории
Механична работа и тест за блокировки	IEC 60298 Subclausole 6.102	MZ ZS1 A03	АББ Калор Емаг Лаборатории
Тест за вътрешна дъга	IEC 60298 Annex AA	HZ 146 L02	АББ Калор Емаг Лаборатории
Тест за механична работа	IEC 62271-100 subclause 6.101.2	0316 Ra	ПЕХЛА Високо-мощностни лаборатории
Тест за способност за изкл. на т.к.с. и вкл. върху т.к.с.	IEC 62271-100 subclause 6.106	0231 Ra	ПЕХЛА Високо-мощностни лаборатории

Лабораторията на АВВ ТиД Унита Оператива САЧЕ Т.М.С. в гр. Далмине е акредитирана съгласно UNI CEI EN ISO/IEC 17025 от SINAL с регистрационен номер Reg. No. 0253

Лабораторията на АББ Калор Емаг в гр. Ратинген, Германия е акредитирана съгласно UNI CEI EN ISO/IEC 17025 от DATech под регистрационен номер No. DAT-P-032/93

Високо-мощностните лаборатории ПЕХЛА са акредитирани съгласно UNI CEI EN ISO/IEC 17025 от DATech с регистрационен номер No. DAT-P-032/93 и сертификат Д-ПЛ-12072-06-01

Дата на издаване:
03/09/23

Отдел за Развойна дейност
Г.М. Граванзола

PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the Short-Circuit-Testing Liaison (STL)

Test Report

Report No.: 0316 Ra **Copy No.:** 1 **Contents:** 24 Sheets

Equipment under test: Vacuum circuit-breaker type VD4 17.12.32

Manufacturer:

Circuit-breaker: ABB T&D S.p.A. - Unità operativa Sace TMS, Via Friuli, 4 – 24044 Dalmine (BG), Italy

Pole parts inclusive vacuum interrupter: ABB Calor Emag Mittelspannung GmbH, 40472 Ratingen, Germany

Client: ABB T&D S.p.A. - Unità operativa Sace TMS, Via Friuli, 4 – 24044 Dalmine (BG), Italy

Testing station: PEHLA - Testing Laboratory Ratingen

Date of test: 28th April 2003 –21st May 2003

Applied test specifications:

IEC 62271-100, 1st Ed, 2001-05, clause 6.101.1 and 6.101.2
IEC 60694, Ed.2.2, 2002-01

Tests performed:

In accordance with the requirements of class M2, 10 000 mechanical operating cycles without voltage on or current in the main circuit were carried out with the vacuum circuit-breaker of type VD4 17.12.32 to demonstrate the mechanical reliability.

Test results:

No changes impairing the function of the circuit-breaker were noted after the endurance test.
The vacuum circuit-breaker type VD4 17.12.32 passed the mechanical type test successfully.

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN

Technical Committee

Mannheim, 25th July 2003

i.V.

The test results relate only to the items tested.

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03PED001

Deutscher Akkreditierungs Rat DAR
DAT-P-032/93

ВЯРНО С ОРИГИНАЛА

Accreditation

The PEHLA-Testing Laboratory Ratingen has been approved by the DATech (German accreditation body for technology) according to DIN EN ISO/IEC 17025 for tests in the field of high-voltage switchgear and controlgear and power engineering equipment (Registration-No. DAT-P-032/93).

Under reference to DIN EN ISO/IEC 17025 PEHLA states the following:

- The accreditation of the PEHLA-Testing Laboratory or any of its test reports by themselves in no way constitute or imply product approval by DATech or any other body.
- If someone refers to a test in an accredited PEHLA-Testing Laboratory this reference shall include the accreditation body, i.e. DATech, the relevant scope of the accreditation and the appropriate registration number.

STL-Member

PEHLA is foundation-member of the Short-Circuit Testing Liaison (STL) which has been founded in March 1969. STL is a forum for the international co-operation of the testing organisations with the further full members ASTA (GB), CESI (I), ESEF (F), KEMA (NL), SATS (N, S, AIR) and STLNA (USA). In the Framework of EC, STL has been recognised in 1992 by EOTC as agreement group.

PEHLA-Documents

A Certificate

is issued for type tests which have successfully been carried out in full compliance with the relevant specifications or standards and STL Guides valid at the time of the test.
For these tests the equipment under test must be clearly identified by technical description, drawings and additional specifications.

A Test Document

is issued for parts of type tests which have successfully been carried out in full compliance with the relevant specifications or standards and STL Guides valid at the time of test.
For these tests the equipment under test must be clearly identified by technical description, drawings and additional specifications.

A Test Report

is issued for all other tests which have been carried out according to specifications, standards or "PEHLA-Richtlinien" (PEHLA Guides) and/or clients instructions.
Similarly, this test report contains all test results, details of the conditions under which the tests were carried out, also details relating to the behaviour of the equipment during test, and its condition after the tests.

Addresses:

Office: PEHLA-Geschäftsstelle
Hallenweg 40
68219 Mannheim; Germany

Testing Station: PEHLA-Testing Laboratory Ratingen
Oberhausener Str. 33
40472 Ratingen; Germany

Manufacturer: ABB T&D S.p.A - Unità Operativa Sace TMS
Via Friuli, 4
24044 Dalmine (BG), Italy

ABB Calor Emag Mittelspannung GmbH
Oberhausener Str. 33
40472 Ratingen, Germany

Client: ABB T&D S.p.A - Unità Operativa Sace TMS
Via Friuli, 4
24044 Dalmine (BG), Italy

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List of Test Participants

Representatives of the Test Committee:

Mr. G. Heit	PEHLA-Testing Laboratory Mannheim
Mr. K.-H. Koch	PEHLA-Testing Laboratory Mannheim
Mr. M. Schöttler	PEHLA-Testing Laboratory Ratingen
Mr. U. Köster	PEHLA-Testing Laboratory Ratingen

Test Operator:

Mr. M. Schöttler	PEHLA-Testing Laboratory Ratingen
Mr. H.-W. Ott	PEHLA-Testing Laboratory Ratingen
Mr. J. Mendorf	PEHLA-Testing Laboratory Ratingen
Mr. A. Piglas	PEHLA-Testing Laboratory Ratingen

Representatives of the Client:

Mr. S. Magoni	ABB T&D S.p.A. - Unità operativa Sace TMS, Italy
Mr. L. Cavenati	ABB T&D S.p.A. - Unità operativa Sace TMS, Italy

ВЯРНО С ОРИГИНАЛА

Technical Data of Test Object

Switching Device – Circuit-Breaker

Ratings assigned by the manufacturer

Test Object: Vacuum circuit-breaker
Type: VD4 17.12.32
Manufacturer:
Circuit-breaker: ABB T&D S.p.A. - Unità operativa Sace TMS, Via Friuli, 4 – 24044 Dalmine (BG), Italy
Pole parts including vacuum interrupters: ABB Calor Emag Mittelspannung GmbH, 40472 Ratingen, Germany
Serial-No.: AD00011927 **Year of manufacture:** 2003
Drawing No.: TN. 7405 (circuit-breaker)
Vacuum interrupter: Type VG4S, L1: No. 489814, L2: No. 488577, L3: No. 485245
Drawing No.: GCE7003979R0131 (pole part)

Rated voltage	17.5 kV
Rated lightning impulse withstand voltage	95 kV
Rated switching impulse withstand voltage	- kV
Rated power frequency withstand voltage	38 kV
Rated frequency	50 Hz
Rated normal current	1250 A
Rated peak withstand current	80 kA
Rated short-time withstand current	31.5 kA
Rated duration of short-circuit	3 s
Rated short-circuit breaking current at 17.5 kV	31.5 kA
D.C. component	30 %
Rated short-circuit making current at 17.5 kV	80 kA
Rated transient recovery voltage:	
Peak value	30 kV
Rate of rise	0.42 kV/µs
First-pole-to-clear-factor	1.5
Rated operating sequence	O-0.3s-CO-3min-CO
Arc extinguishing medium	vacuum
Number of poles	3
Number of units per pole	1
Rated opening time	≥ 45 ms
Rated closing time	approx. 60 ms
Rated voltage of trip coil	220 V-DC
Rated voltage of closing coil	220 V-DC
Rated supply voltage	220 V-DC
Rated frequency of supply voltage	- Hz

Essential characteristics and installed devices:

Motor Drive Type 701 921/804 (EL1)

Date of receipt of test object: 23rd April 2003

ВЯРНО С ОРИГИНАЛА

List of Drawings

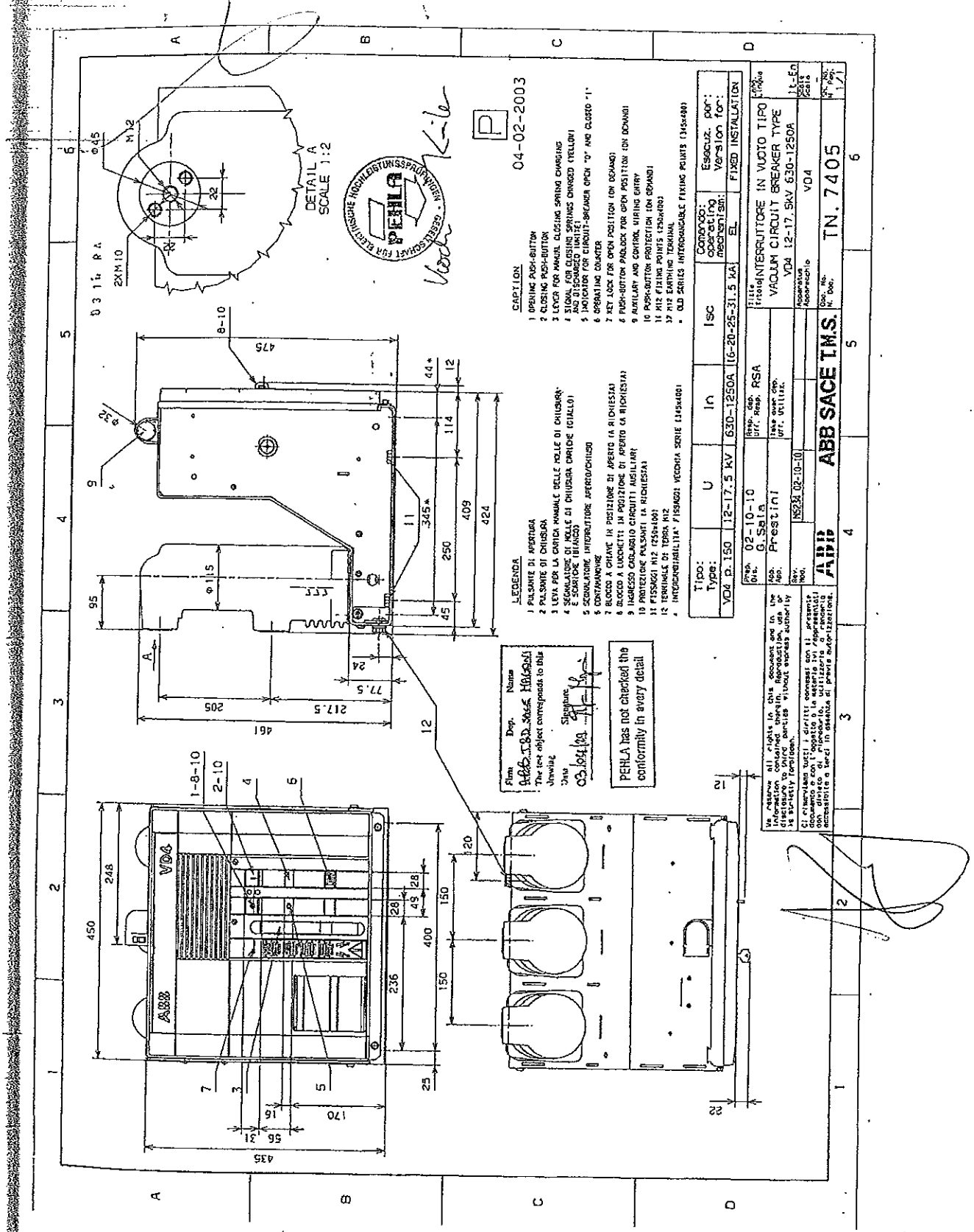
The manufacturer has guaranteed, that the equipment submitted for test has been manufactured in full accordance with the following drawings. PEHLA has verified that these drawings adequately represent the equipment tested. These drawings have been stamped and signed by PEHLA representatives and are kept

☒ with the test documents at the test laboratory.
☐ at the client.

The drawings contained in this document are identical with the checked, stamped and signed drawings.

Drawing-No.	Revision	Title	Additional remarks
TN. 7405	M5234	VACUUM CIRCUIT BREAKER TYPE VD4 12-17.5kV 630-1250A	Included in test report
510507	50538	OPERATING MECHANISM ASSEMBLY	Included in test report
GCE7003979R0131	00	pole complete VD4P 12kV 1250A 31,5kA	Included in test report
510564	50538	CLOSING SPRINGS ASSEMBLY	—
RA2129	L0488	COMPRESSION SPRING	—
GCE7005535R0101	03	Montagegruppe	—
Parts list			
510564		Ass. molle di ch. com. EL1	—
510507		Assieme comando EL1	—
GCE7003979R0131		Pol vst. 40,7 3150N H205 12/171231 VG4S	—

ВЯРНО С ОРИГИНАЛА



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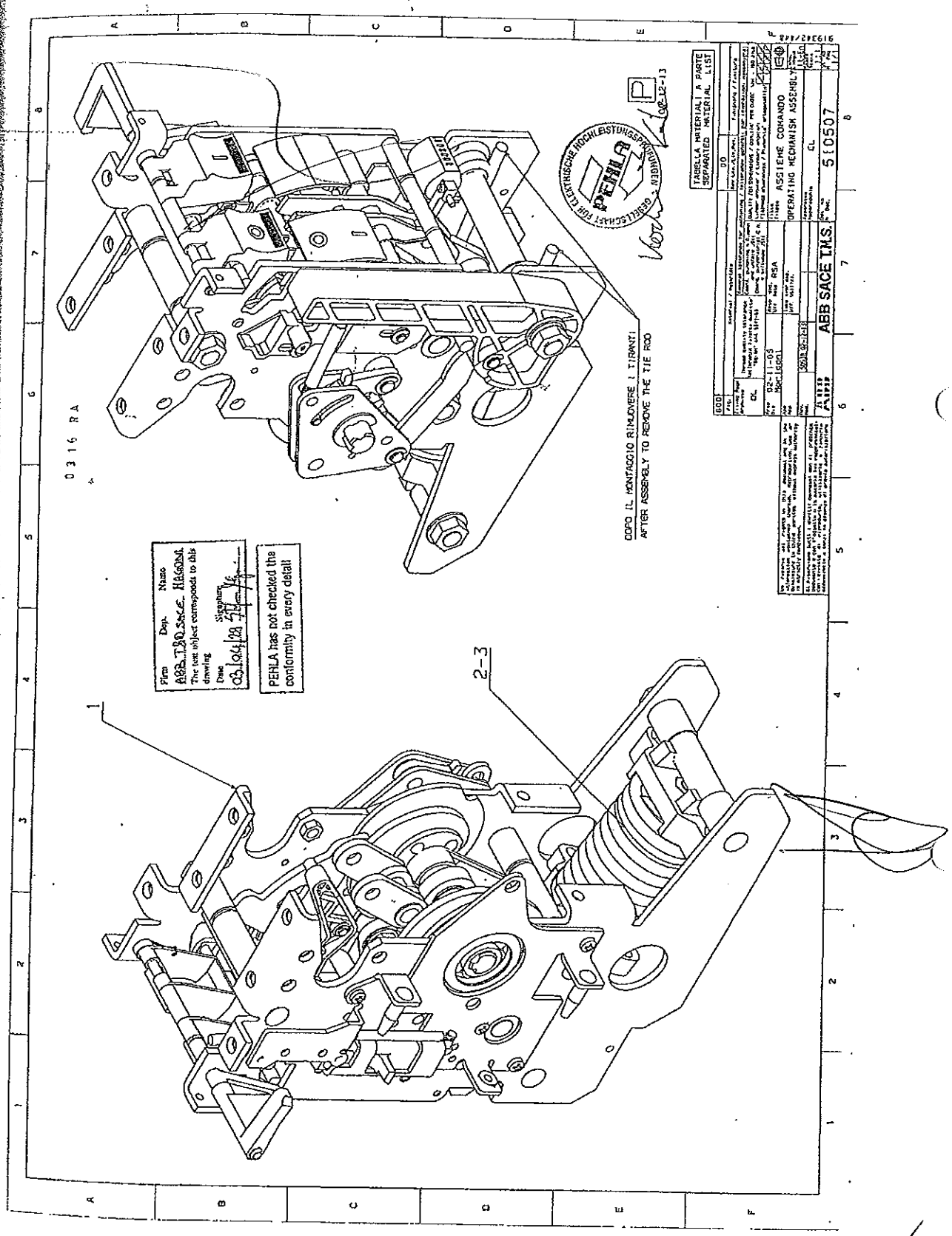

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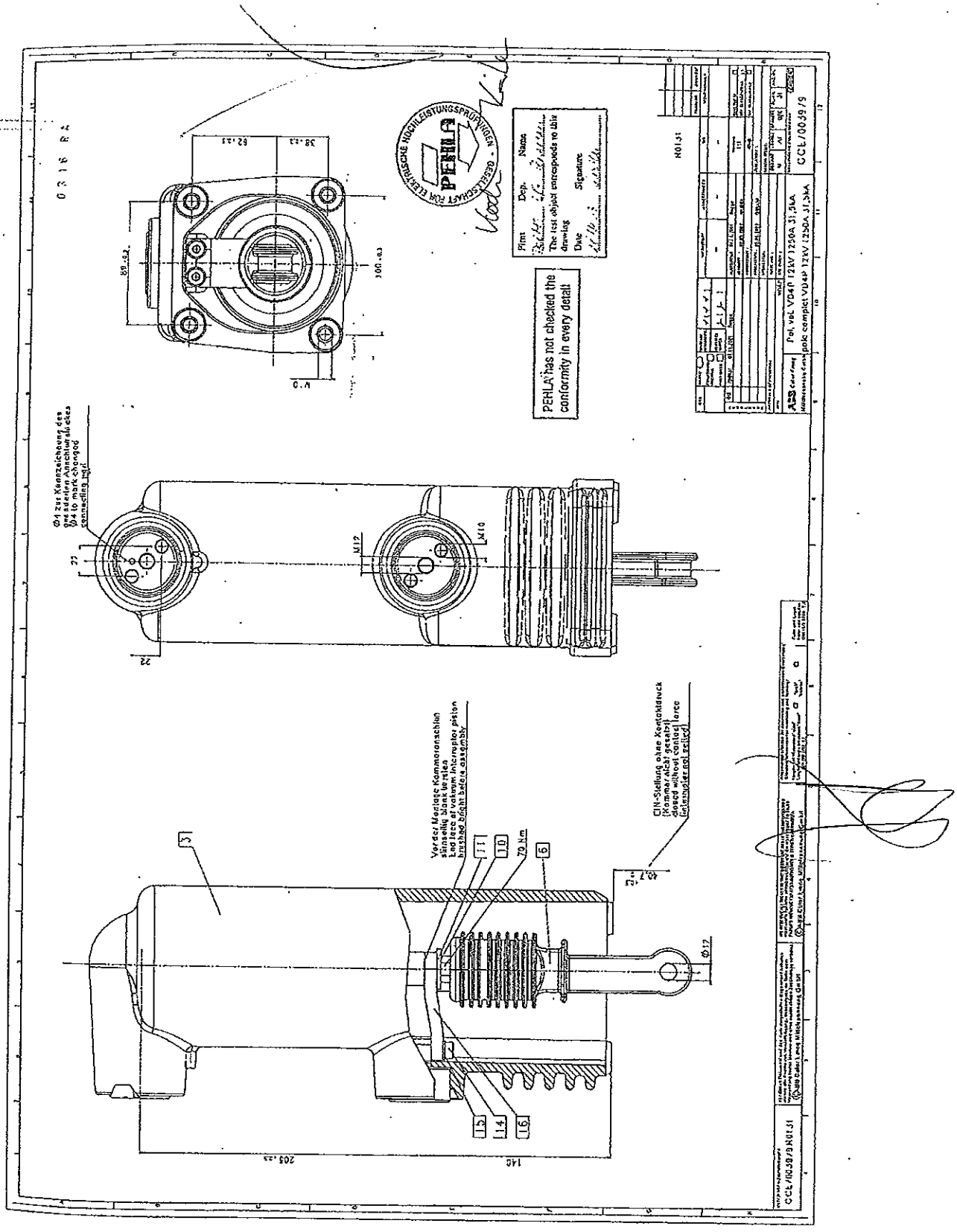


ВЯРНО С ОРИГИНАЛА

Details on Performance of the Test

Prior to the endurance test, the following electrical and mechanical data were determined by measurements on the circuit-breaker and its auxiliary systems:

a) closing time (5 times *)
b) opening time (5 times *)
c) time spread between units of one pole - not applicable
d) time spread between poles (5 times *)
e) charging time of the motorized operating mechanism (5 times *)
f) consumption of the motorized operating mechanism (5 times *)
g) consumption of the tripping devices (5 times *)
h) duration of opening and closing command impulse
i) tightness
j) gas densities or pressures - not applicable
k) resistance of the main circuit (5 times *)
l) time-travel chart (5 times *)
m) other important characteristics
- contact travel
- check of vacuum of interrupters
- verification of the rated operating sequence (refer to clause 6.101.2.5 a))
- ambient atmospheric conditions

*) 5 times at rated, minimum and maximum supply voltage.

The subsequent endurance test comprising 10 000 mechanical operating cycles was structured as follows and carried out five times:

500 operating cycles with operating sequence C - 30 s - O - 30 s at the minimum supply voltage of closing and opening devices and motorized operating mechanism and the minimum pressure for operation

500 operating cycles with operating sequence C - 30 s - O - 30 s at the rated supply voltage of closing and opening devices and motorized operating mechanism and the rated pressure for operation

500 operating cycles with operating sequence C - 30 s - O - 30 s at the maximum supply voltage of closing and opening devices and motorized operating mechanism and at the maximum pressure for operation

250 operating cycles with operating sequence C - 30 s - O - 300 ms - CO - 90 s at the rated supply voltage of closing and opening devices and motorized operating mechanism and at the rated pressure for operation

For faster operation, the recharging motor was cooled by air pressure.

After each series of 2 000 operating sequences the operating characteristics: a), b), d), e), and l) as listed above have been recorded.

Following the endurance test, the measurements carried out before the mechanical endurance test were measured again for comparison. Check, whether the travel characteristics fell within the envelope curves, taken before the endurance test.

ВЯРНО С ОРИГИНАЛА

Results of measurements before the mechanical endurance test

Number of operations: counter: 99893

a/b) Opening and closing time:

Ua = 220 V DC

Operating time [ms]

measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

	t_o (opening)			t_c (closing)		
U [V]	0.7 x Ua	1.0 x Ua	1.1 x Ua	0.85 x Ua	1.0 x Ua	1.1 x Ua
t [ms]	60.6	46.5	44.4	67.8	63.6	61.5
	61.5	46.8	44.4	67.8	63.6	61.2
	61.8	46.5	44.4	67.8	63.3	61.2
	61.5	46.5	44.4	68.1	63.6	61.5
	61.2	46.5	44.4	67.8	63.6	61.2

d) Time spread between the breaker poles:

The time spread between the breaker poles on closing and on opening of the circuit-breaker was measured to < 2 ms.

e/f) Charging time and power consumption of the motorized operating mechanism:

Rated voltage: Ua = 220 V DC

Measured values:

Measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

motor voltage	charging time after O-C operation [s]					current consumption [A]					power consumption [W]				
U = 0.85 x Ua = 187 V DC	3.67	3.74	3.67	3.66	3.71	0.96	0.96	0.94	0.94	0.95	180	180	176	176	178
U = 1.0 x Ua = 220 V DC	2.89	2.96	2.94	2.95	2.97	0.96	0.95	0.94	0.95	0.96	211	209	207	209	211
U = 1.1 x Ua = 242 V DC	2.63	2.59	2.74	2.74	2.74	0.98	0.97	0.97	0.96	0.97	237	235	235	232	235

ВЯРНО С ОРИГИНАЛА:

g) Consumption of the tripping devices:

Measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

	Shunt-release ON -MC					Shunt-release OFF -MO1				
Rated operating voltage U_a	220 V DC					220 V DC				
Current at minimum supply voltage [A]	0.68	0.68	0.68	0.68	0.68	0.50	0.52	0.52	0.52	0.52
Current at rated supply voltage [A]	0.84	0.84	0.84	0.84	0.84	0.68	0.64	0.64	0.64	0.68
Current at maximum supply voltage [A]	0.92	0.92	0.92	0.92	0.92	0.72	0.72	0.72	0.76	0.76

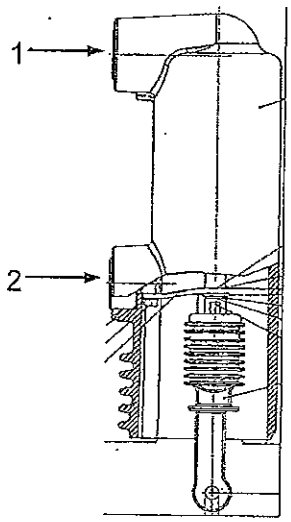
h) Duration of closing and opening command impulse:

Measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

	Shunt-release ON -MC					Shunt-release OFF -MO1				
Duration of command impulse at minimum supply voltage [ms]	72.0	71.7	70.2	72.3	72.0	65.1	67.2	67.5	65.7	64.2
Duration of command impulse at rated supply voltage [ms]	67.5	68.4	68.4	69.3	69.6	47.7	48.6	48.9	48.3	48.9
Duration of command impulse at maximum supply voltage [ms]	72.6	70.5	71.4	70.5	68.1	48.6	49.5	47.1	47.1	49.2

k) Resistance of the main conductors:

Measuring points:



ВЯРНО С ОРИГИНАЛА

Contact resistance measured during the 5 x CO operations at the minimum supply voltage of the coils:

Measuring points	L1 µΩ	L2 µΩ	L3 µΩ
1 - 2	15.1	15.2	15.4

Contact resistance measured during the 5 x CO operations at the rated supply voltage of the coils:

Measuring points	L1 µΩ	L2 µΩ	L3 µΩ
1 - 2	15.1	15.2	15.4

Contact resistance measured during the 5 x CO operations at the maximum supply voltage of the coils:

Measuring points	L1 µΩ	L2 µΩ	L3 µΩ
1 - 2	15.1	15.2	15.3

l) Time-travel chart with opening and closing speed: See diagram 1.1 and 1.2

Speed in [m/s]; Ua = 220 V DC
at U = 1.0 x Ua

	V_{O1}	V_{O2}	V_C
L2	1.24	1.45	0.91

The deviations from the measured mechanical time travel charts are in the allowable limits of the reference mechanical travel characteristics.

Vo1: opening speed considered 8.25 mm after the separation in the main contacts of phase L2.
Vo2: opening speed considered between 1.65 and 8.25 mm after the separation in the main contacts of phase L2.
Vc: closing speed considered 3.3 mm before the touching in the main contacts of phase L2.

m) Other important characteristics:

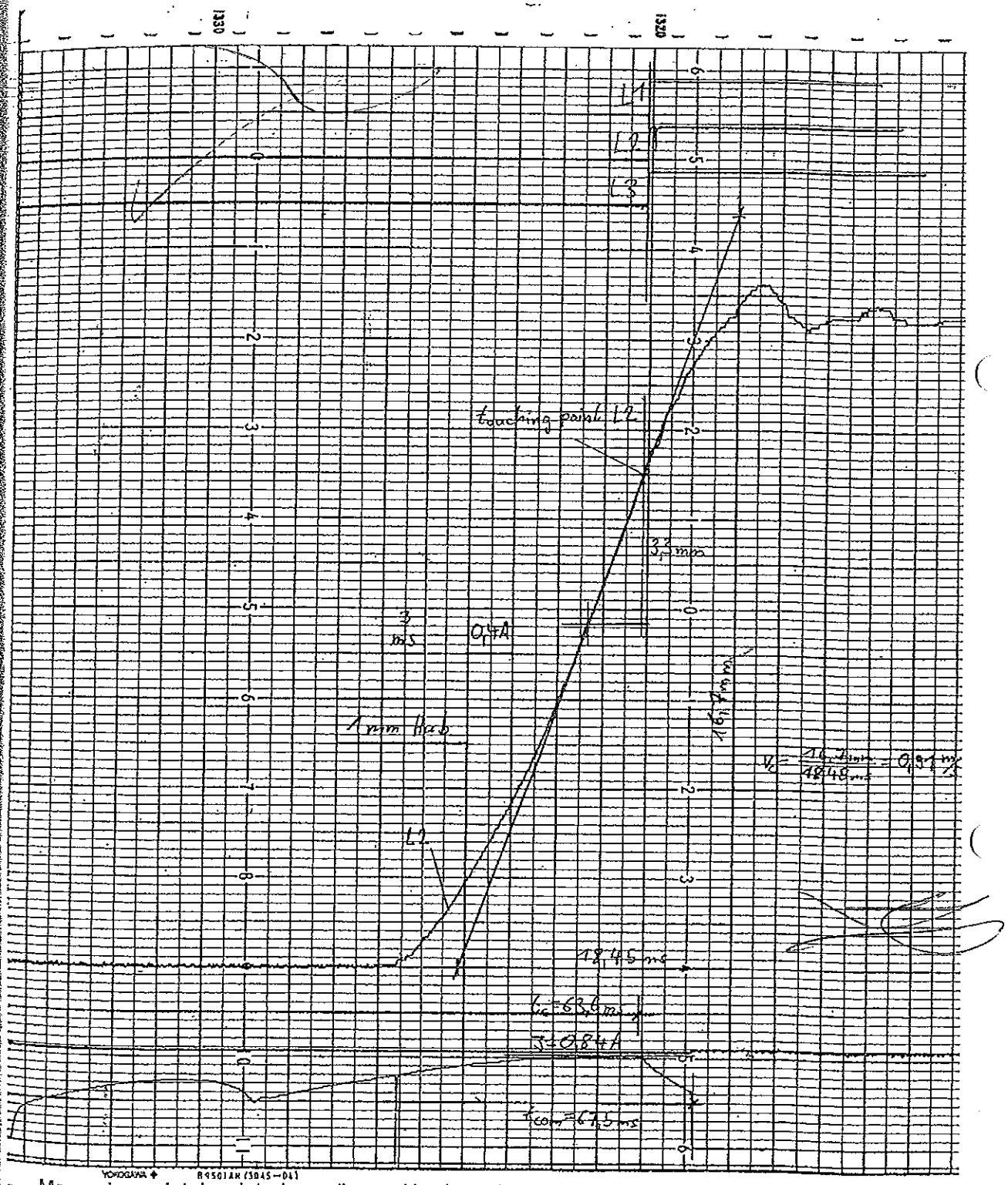
- **Contact travel:**

	L1	L2	L3
Total Travel [mm]	14.5	14.5	14.7
Cont.-travel [mm]	11.2	11.2	11.2
Contact-spring travel [mm]	3.3	3.3	3.5

- **Check of vacuum of interrupters:**
  60 kV DC ok
- **Verification of the rated operating sequence:**
  O-0.3s-CO-3min-CO at rated voltage ok
- **Ambient atmospheric conditions:**
  Date: 28th April 2003, ambient air temperature: approx. 23°C

ВЯРНО С ОРИГИНАЛА

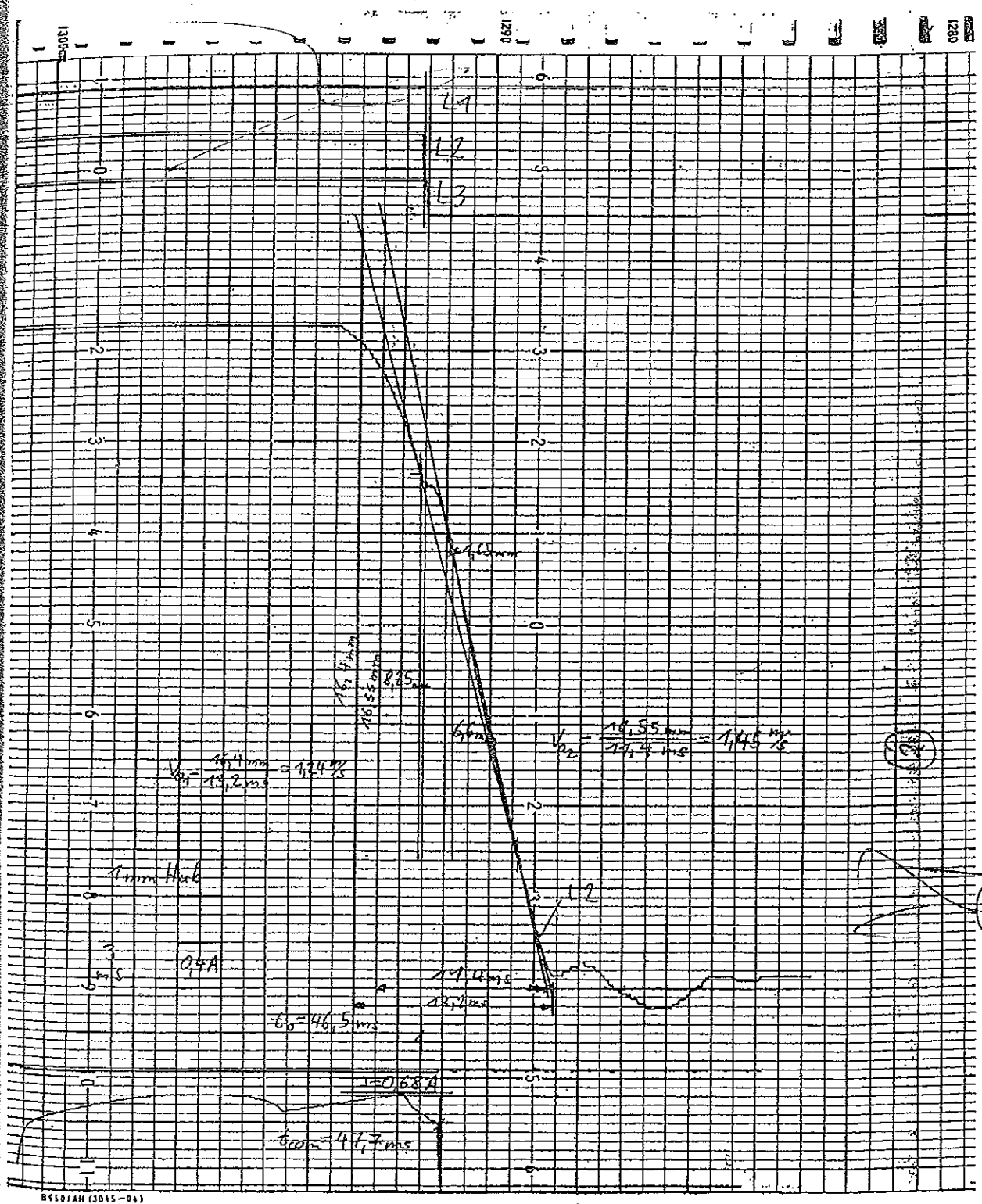
Diagram 1.1: Measurement of the operating speed before the mechanical endurance test



- Measuring point: Insulated coupling rod in phase L2
- Operating speed measured: V_c = 0.91 m/s at U = 1.0 x Ua
  For the speed calculation, an enlarged similar triangle was used in order to increase the accuracy of the travel and time measurement.

ВЯРНО С ОРИГИНАЛА

Diagram 1.2: Measurement of the operating speed before the mechanical endurance test



- Measuring point: Insulated coupling rod in phase L2
- Operating speed measured: V_{O2} = 1.24 m/s, V_{O2} = 1.45 m/s at U = 1.0 x Ua
  For the speed calculation, an enlarged similar triangle was used in order to increase the accuracy of the travel and time measurement.

ВЯРНО С ОРИГИНАЛА

Results of measurements during the mechanical endurance test

a/b) Opening and closing time:

Operating time [ms] Ua = 220 V DC	U [V]	t_{o1} (opening) 0.7 x Ua	1.0 x Ua	1.1 x Ua	t_c (closing) 0.85 x Ua	1.0 x Ua	1.1 x Ua
Number of operations: 2 000	t [ms]	62.1	47.1	44.7	68.4	64.5	62.4
Number of operations: 4 000	t [ms]	62.7	47.4	44.7	69.0	64.2	62.4
Number of operations: 6 000	t [ms]	63.0	47.7	45.0	69.6	65.1	62.7
Number of operations: 8 000	t [ms]	63.0	47.7	45.0	69.3	64.8	62.4

d) Time spread between the breaker poles:
The time spread between the breaker poles on closing and on opening of the circuit-breaker was measured to < 2 ms.

e) Charging time of the motorized operating mechanism:

	charging time after O-C operation [s]		
Motor voltage Ua = 220 V DC	U = 0.85 x Ua = 187 V DC	U = 1.0 x Ua = 220 V DC	U = 1.1 x Ua = 242 V DC
Number of operations: 2 000	4.01	3.10	2.97
Number of operations: 4 000	4.21	3.30	3.00
Number of operations: 6 000	5.73	3.89	3.21
Number of operations: 8 000	4.92	3.62	3.11

m) Other important characteristics - contact travel:

Contact travel in L2	Total Travel [mm]
Number of operations: 2 000	14.4
Number of operations: 4 000	14.3
Number of operations: 6 000	14.2
Number of operations: 8 000	14.2

l) Time-travel chart with opening and closing speed:

Speed in [m/s]; at Ua = 220 V DC L2	V_{O1} (8.25 mm)	V_{O2} (6.60 mm)	V_C (3.30 mm)
Number of operations: 2 000	1.19	1.49	0.88
Number of operations: 4 000	1.13	1.42	0.84
Number of operations: 6 000	1.12	1.38	0.85
Number of operations: 8 000	1.10	1.38	0.89

The deviations from the measured mechanical time travel charts are in the allowable limits of the reference mechanical travel characteristics.

ВЯРНО С ОРИГИНАЛА

Results of measurements after the mechanical endurance test

Number of operations: counter: 10024

a/b) Opening and closing time:

Ua = 220 V DC

Operating time [ms]

measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

	t_o (opening)			t_c (closing)		
U [V]	0.7 x Ua	1.0 x Ua	1.1 x Ua	0.85 x Ua	1.0 x Ua	1.1 x Ua
t [ms]	63.3	47.4	45.0	68.7	64.2	62.1
	63.3	47.4	45.3	69.0	64.5	62.7
	62.4	47.1	45.0	69.0	64.5	62.4
	63.0	47.4	45.0	68.4	64.5	62.7
	63.0	47.7	45.0	69.3	64.5	62.1

d) Time spread between the breaker poles:

The time spread between the breaker poles on closing and on opening of the circuit-breaker was measured to < 2 ms.

e/f) Charging time and power consumption of the motorized operating mechanism:

Rated voltage: Ua = 220 V DC

Measured values:

Measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

motor voltage	charging time after O-C operation [s]					current consumption [A]					power consumption [W]				
U = 0.85 x Ua = 187 V DC	3.96	4.39	4.60	4.55	4.58	0.98	1.04	1.05	1.06	1.10	183	194	196	198	206
U = 1.0 x Ua = 220 V DC	3.50	3.46	3.40	3.40	3.32	1.12	1.07	1.05	1.05	1.00	246	235	231	231	220
U = 1.1 x Ua = 242 V DC	2.91	2.88	2.86	2.87	2.90	1.04	1.05	1.05	1.05	1.04	252	254	254	254	252

ВЯРНО С ОРИГИНАЛА

g) Consumption of the tripping devices:

Measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

	Shunt-release ON -MC					Shunt-release OFF -MO1				
Rated operating voltage U_a	220 V DC					220 V DC				
Current at minimum supply voltage [A]	0.68	0.68	0.68	0.68	0.68	0.52	0.48	0.52	0.52	0.52
Current at rated supply voltage [A]	0.84	0.84	0.84	0.84	0.84	0.68	0.68	0.68	0.68	0.68
Current at maximum supply voltage [A]	0.96	0.92	0.92	0.92	0.92	0.76	0.76	0.76	0.76	0.76

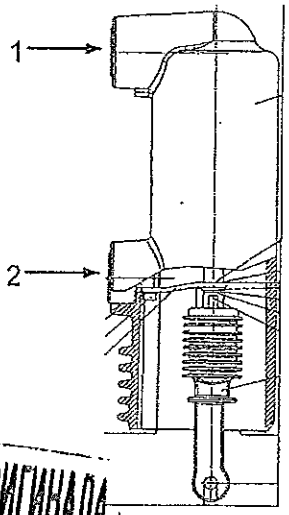
h) Duration of closing and opening command impulse:

Measured during the 5 x CO operations
- at the minimum supply voltage
- at the rated supply voltage
- at the maximum supply voltage

	Shunt-release ON -MC					Shunt-release OFF -MO1				
Duration of command impulse at minimum supply voltage [ms]	72.6	72.9	71.7	72.6	72.9	62.1	63.3	61.5	62.7	63.0
Duration of command impulse at rated supply voltage [ms]	69.6	69.9	69.9	69.9	69.9	50.1	50.1	50.7	50.1	50.7
Duration of command impulse at maximum supply voltage [ms]	65.7	69.3	69.0	69.3	69.0	51.0	51.0	50.7	51.0	51.0

k) Resistance of the main conductors:

Measuring points:



ВЯРНО С ОРИГИНАЛА

Contact resistance measured during the 5 x CO operations at the minimum supply voltage of the coils:

Measuring points	L1 µΩ	L2 µΩ	L3 µΩ
1 - 2	15.3	15.3	15.7

Contact resistance measured during the 5 x CO operations at the rated supply voltage of the coils:

Measuring points	L1 µΩ	L2 µΩ	L3 µΩ
1 - 2	15.3	15.3	15.6

Contact resistance measured during the 5 x CO operations at the maximum supply voltage of the coils:

Measuring points	L1 µΩ	L2 µΩ	L3 µΩ
1 - 2	15.3	15.3	15.7

l) Time-travel chart with opening and closing speed: See diagram 2.1 and 2.2

Speed in [m/s]; Ua = 220 V DC
at U = 1.0 x Ua

	V_{O1}	V_{O2}	V_C
L2	1.12	1.42	0.89

The deviations from the measured mechanical time travel charts are in the allowable limits of the reference mechanical travel characteristics.

Vo1: opening speed considered 8.25 mm after the separation in the main contacts of phase L2.
Vo2: opening speed considered between 1.65 and 8.25 mm after the separation in the main contacts of phase L2.
Vc: closing speed considered 3.3 mm before the touching in the main contacts of phase L2.

m) Other important characteristics:

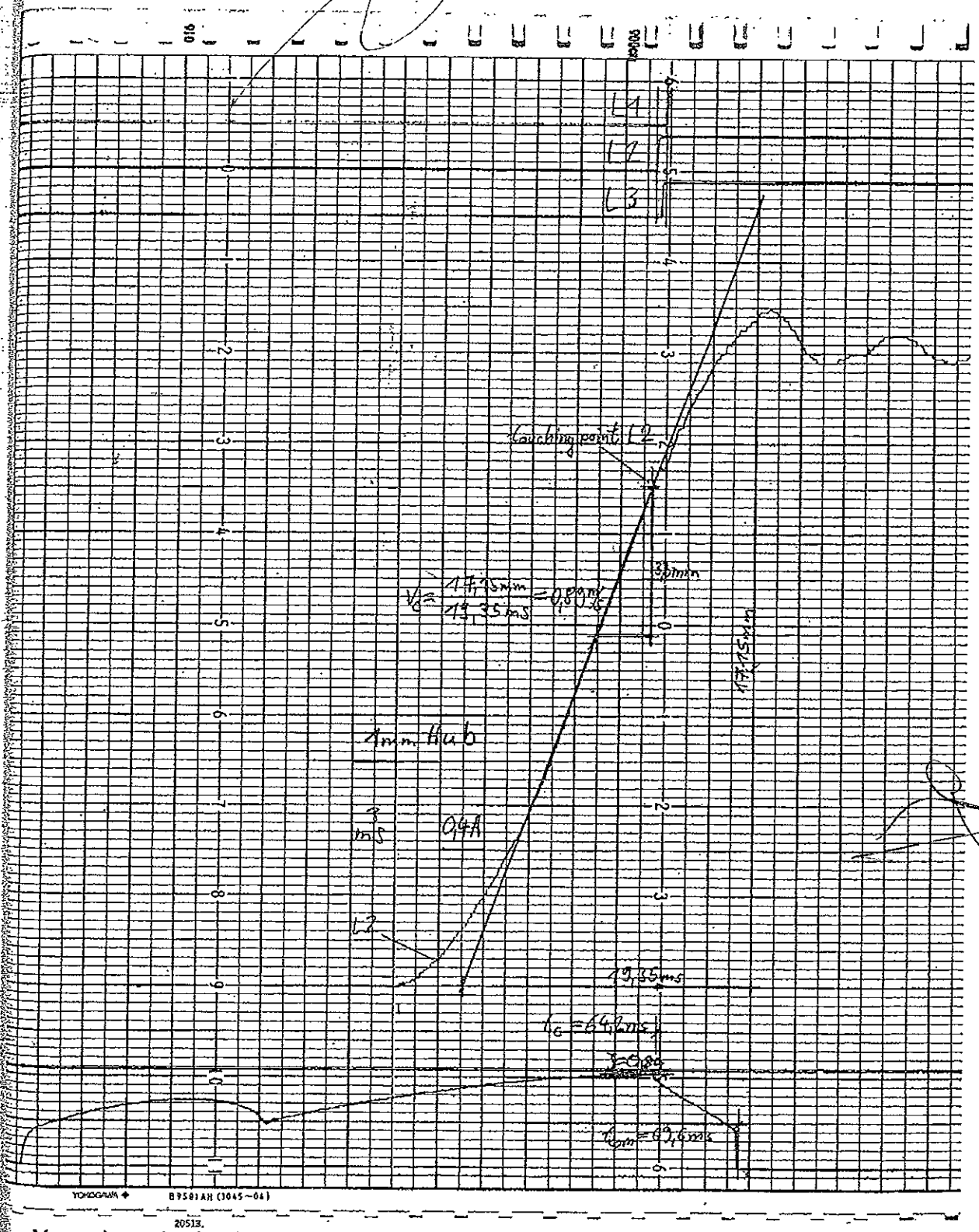
- **Contact travel:**

	L1	L2	L3
Total Travel [mm]	14.2	14.2	14.3
Cont.-travel [mm]	11.8	11.3	11.2
Contact-spring travel [mm]	2.4	2.9	3.1

- **Check of vacuum of interrupters:**
  60 kV DC ok
- **Verification of the rated operating sequence:**
  O-0.3s-CO-3min-CO at rated voltage ok
- **Ambient atmospheric conditions:**
  Date: 21st May 2003, ambient air temperature: approx. 22.5°C

ВЯРНО С ОРИГИНАЛА

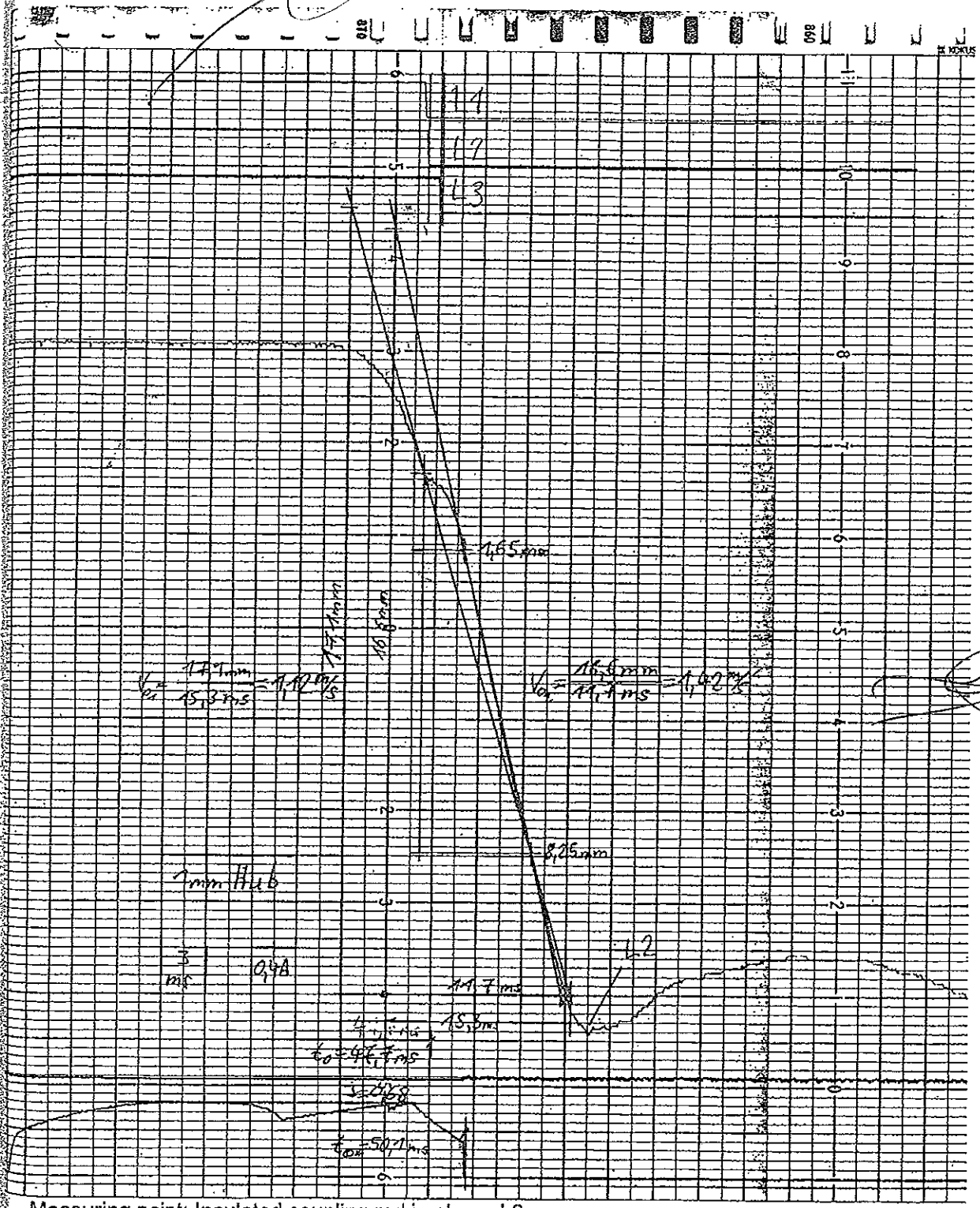
Diagram 2.1: Measurement of the operating speed after the mechanical endurance test



Measuring point: Insulated coupling rod in phase L2
Operating speed measured: V_C = 0.89 m/s at U = 1.0 x Ua
For the speed calculation, an enlarged similar triangle was used in order to increase the accuracy of the travel and time measurement.

ВЯРНО С ОРИГИНАЛА

Diagram 2.2: **Measurement of the operating speed after the mechanical endurance test**



Measuring point: Insulated coupling rod in phase L2

Operating speed measured: V_{O1} = 1.12 m/s, V_{O2} = 1.42 m/s at U = 1.0 x Ua

For the speed calculation, an enlarged similar triangle was used in order to increase the accuracy of the travel and time measurement.

ВЯРНО С ОРИГИНАЛА

Evaluation of the measurements before and after the test program

The reference mechanical travel characteristic was recorded at the rated supply voltage before the endurance test. All measured travel-curves fall within the limits of the two envelope curves which characterize the allowable deviations from the reference curve.

All characteristics measured before and after the test program do not show unacceptable variations.

The circuit-breaker operated only on command and did not operate without command.

Measuring Instrument Record

Test job no.: 940

Object tested: VD4 17.12.32

Date of test: 28th April – 21st May 2003

Test report: PEHLA 0316Ra

Test operator: Piglas/Schöttler

Instrument	Ident.-no.	Measuring	Remarks
Microohmmeter MO2A 50	ELK 001111	20µΩ / 200µΩ	Resistance measurement
resistive travel pick-up type lino pot Ts 50 502	ELK 001124	5 kΩ	Travel time measurement
DM 7100 Transient memory	ELK 000467	±2 V / full scale 50µs/word, channel 4 (12 bit)	
YEW-3063 Multi-pen	ELK 000462	0.25 V/cm-vernier 10 cm/min, channel 4	
Slide caliper rule	LAE 002162	0 - 300 mm	
Shunt 1A/150mV	ELK 000435	1A/150mV	Current measurement (MC/MO1)
DM 7100 Transient memory	ELK 000467	±20/0.2 V/full scale 50 µsec/word/10ms/word channel 1, 2, 3, 8 (8 bit)	Operating time measurement,
YEW-3063 Multi-pen	ELK 000462	Channel 1, 2, 3, 8, 0.25/1 V/cm-cal/vernier 10 cm/min	
Electronic time clock	ELK 001231	0-100s	Charging time measurement
Unigor 6E	ELK 000389	1 A	Motor current measurement
Vidar-Vacuum-Checker-Test device	DRU 000026	40/60kV DC	Vacuum-Checker-Test
BBC MA 5D	ELK 000362	300 V DC	Voltage measurement
Hygrometer Hygronom	FEU 000022	-30°C - +50°C	temperature measurement

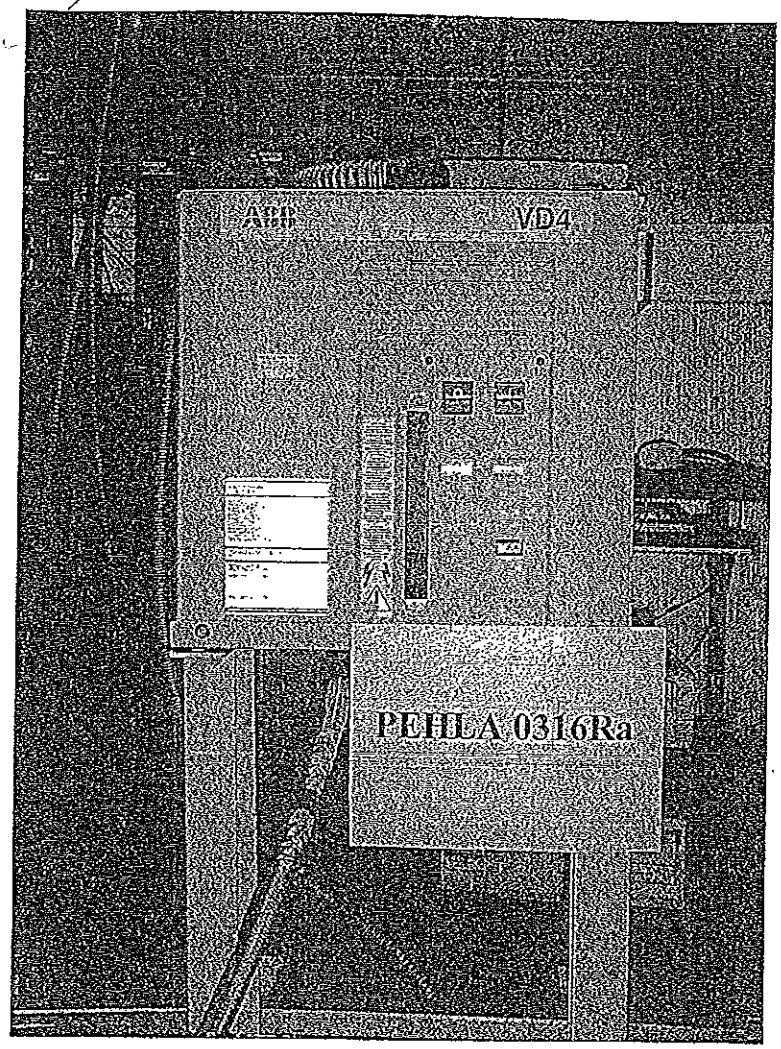


Figure 1: Test object

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PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the Short-Circuit-Testing Liaison (STL)

Test Report

Report No.: 0231Ra **Copy No.: 1** **Contents: 61 Sheets**

Equipment under test: Vacuum circuit-breaker type VD4.17.12.32 (17.5 kV, 1250 A, 31.5 kA) equipped with vacuum interrupters type VG4S.

Manufacturer:

Circuit-breaker: ABB T&D SpA, Divisione Sace T.M.S, Via Friuli, 4 – 24044 Dalmine (BG), Italy

Pole parts inclusive vacuum interrupters: ABB Calor Emag Mittelspannung GmbH, Oberhausener Str. 33, 40472 Ratingen, Germany

Client: ABB T&D SpA, Divisione Sace T.M.S, Via Friuli, 4 – 24044 Dalmine (BG), Italy

Testing station: PEHLA-Testing Laboratory Ratingen

Date of test: 19th December 2002

Applied test specifications:

The tests have been carried out in accordance with the client's instructions.
Test procedure and test parameters were based on:
IEC 62271-100/2001-05, Clauses 6.106.1, 6.106.2, 6.106.3, 6.106.4, 6.106.5, 6.108.3
STL-Guide to IEC 60056: 4th Edition: 1987, Amendment Slip No. 2

Tests performed:

Basic short-circuit test-duties T10 – T100 and double earth fault breaking test.
No-load operations and measurement of the resistance of the pole parts before and after the tests.
Power-frequency withstand voltage test with 38.0 kV – 1 min before and after the tests.
Measurement of the time-travel characteristic before and after the tests.
For further details see sheet no. 3.

Test results:

The vacuum circuit-breaker passed the mentioned tests successfully.

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN

Technical Committee

Mannheim, 27th March 2003

The test results relate only to the items tested.

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Deutscher Akkreditierungs Rat
DAR
DAT-P-032/93

Accreditation

The PEHLA-Testing Laboratory Ratingen has been approved by the DATech (German accreditation body for technology) according to DIN EN ISO/IEC 17025 for tests in the field of high-voltage switchgear and controlgear and power engineering equipment (Registration-No. DAT-P-032/93).

Under reference to DIN EN ISO/IEC 17025 PEHLA states the following:

- The accreditation of the PEHLA-Testing Laboratory or any of its test reports by themselves in no way constitute or imply product approval by DATech or any other body.
- If someone refers to a test in an accredited PEHLA-Testing Laboratory this reference shall include the accreditation body, i.e. DATech, the relevant scope of the accreditation and the appropriate registration number.

STL-Member

PEHLA is foundation-member of the Short-Circuit Testing Liaison (STL) which has been founded in March 1969. STL is a forum for the international co-operation of the testing organisations with the further full members ASTA (GB), CESI (I), ESEF (F), KEMA (NL), SATS (N, S, AIR) and STLNA (USA). In the Framework of EC, STL has been recognised in 1992 by EOTC as agreement group.

PEHLA-Documents

A Certificate

is issued for type tests which have successfully been carried out in full compliance with the relevant specifications or standards and STL Guides valid at the time of the test.
For these tests the equipment under test must be clearly identified by technical description, drawings and additional specifications.

A Test Document

is issued for parts of type tests which have successfully been carried out in full compliance with the relevant specifications or standards and STL Guides valid at the time of test.
For these tests the equipment under test must be clearly identified by technical description, drawings and additional specifications.

A Test Report

is issued for all other tests which have been carried out according to specifications, standards or "PEHLA-Richtlinien" (PEHLA Guides) and/or clients instructions.
Similarly, this test report contains all test results, details of the conditions under which the tests were carried out, also details relating to the behaviour of the equipment during test, and its condition after the tests.

Addresses:

Office: PEHLA-Geschäftsstelle
Hallenweg 40
68219 Mannheim, Germany

Testing Station: PEHLA-Testing Laboratory Ratingen
Oberhausener Str. 33
40472 Ratingen, Germany

Manufacturer: ABB T&D SpA, Divisione SACE T.M.S.
Via Friuli, 4
24044 Dalmine (BG), Italy

ABB Calor Emag Mittelspannung GmbH
Oberhausener Str. 33
40472 Ratingen, Germany

Client: ABB T&D SpA, Divisione SACE T.M.S.
Via Friuli, 4
24044 Dalmine (BG), Italy

ВЯРНО С ОРИГИНАЛА

Tests performed:
Basic short-circuit test-duties and double-earth fault breaking test.

Infeed by means of copper bars to the upper terminals of the circuit-breaker, lower terminals short-circuited and earthed.

T10: 3.39 kA at 18.7 kV / 3.46 kA at 17.5 kV / 3.41 kA at 18.7 kV / 3.43 kA at 17.8 kV
(10 % I_{sc} O-0.3s-CO-3min-CO-5min-CO).

T30: 9.69 kA at 18.8 kV / 9.81 kA at 18.7 kV / 9.93 kA at 19.1 kV
(30 % I_{sc} O-0.3s-CO-3min-CO).

T60: 19.1 kA at 18.0 kV / 18.7 kA at 17.7 kV / 18.7 kA at 18.0 kV / 19.2 kA at 18.2 kV
(60 % I_{sc} O-0.3s-CO-3min-CO-8min-CO).

T100s: 32.6 kA at 18.6 kV / 32.0 kA at 17.6 kV / 31.6 kA at 19.5 kV
(100% I_{sc} O-0.3 s-CO-3min-CO).

T100a: 33.3 kA (30.3%$_{DC\text{-}comp.}$) at 19.2 kV / 33.1 kA (27.9%$_{DC\text{-}comp.}$) at 19.4 kV /
33.0 kA (26.7%$_{DC\text{-}comp.}$) at 19.2 kV / 33.1 kA (28.8%$_{DC\text{-}comp.}$) at 18.7 kV
(100% I_{sc} O_{asym}/O_{asym}/O_{asym}/O_{asym}).

Double earth fault breaking test: 28.8 kA at 18.5 kV

No-load operations and measurement of the resistance of the pole parts before and after the tests.
Power-frequency withstand voltage test with 38.0 kV – 1 min before and after the tests.
Measurement of the time-travel characteristic before and after the tests.

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