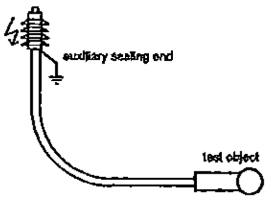
**Test results (continued)**

### 4.6.8 Partial discharge test at elevated and ambient temperatures (test 8)

| | | |
|---|---|---|
| Test frequency: | | 50 Hz |
| Test temperature: | Ambient temperature | 20 °C |
| | Conductor temperature | 20 °C and elevated, resp. 95..100 °C |
| Calibration of the test circuit by calibrator | Output | 10 pC |

**Measured PD values**

| Test arrangement   | | | Prestress voltage (1 min) | Measuring voltage (1 min) | Measured PD value |
|---|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | kV | pC |
| **Measured PD values at elevated temperature** | | | | | |
| 1 | Conductor | Screen | 29 | 25 | < 5 [1] |
| 2 | Conductor | Screen | | | |
| 3 | Conductor | Screen | 29 | 25 | < 2 [1] |
| 4 | Conductor | Screen | | | |
| **Measured PD values at ambient temperature** | | | | | |
| 1 | Conductor | Screen | 29 | 25 | < 1.0 [1] |
| 2 | Conductor | Screen | | | |
| 3 | Conductor | Screen | 29 | 25 | < 1.0 [1, 2, 3] |
| 4 | Conductor | Screen | 29 | 25 | < 1.0 [1, 2, 3] |

Notes:

1) Two of the respective test lines were connected to form one closed conductor loop for heating the latter. Thus, two test lines were simultaneously tested. Providing separate test results for each of the test lines is not possible.

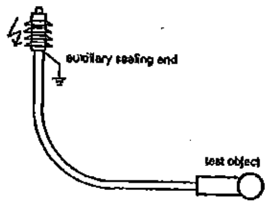
2) Basic disturbance level at same value

3) The test lines were separated for the PD measurement.

**Test results (continued)**

### 4.6.9 Impulse voltage test at ambient temperature (test 9)

| | | |
|---|---|---|
| Full wave: | Front time | $T_1$ = 1.27 μs |
| | Virtual time to half value | $T_2$ = 53.0 μs |
| Test temperature: | Ambient temperature | 20 °C |
| | Conductor temperature | 20 °C |

| Test arrangement  | | | Test voltage | Result |
|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | Number of impulses/disruptive discharges |
| 1 | Conductor | Screen | +125<br>-125 | 10/0<br>10/0 |
| 2 | Conductor | Screen | | |
| 3 | Conductor | Screen | | |
| 4 | Conductor | Screen | | |



**Notes:**

All test lines were tested simultaneously.

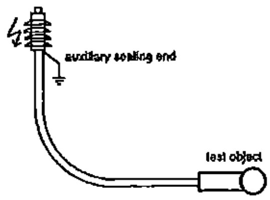
**Test results (continued)**

### 4.6.10 AC voltage test (test 10)

Duration of test after having reached full voltage: 15 min

Test frequency: 50 Hz

Test temperature: Ambient temperature 20 °C
Conductor temperature 20 °C

| Test arrangement   | | | Test voltage | Result |
|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | |
| 1 | Conductor | Screen | 32 | No disruptive discharge |
| 2 | Conductor | Screen | | |
| 3 | Conductor | Screen | | |
| 4 | Conductor | Screen | | |

**Notes:**

All test lines were tested simultaneously.

## 4.7 Assessment of the results of test sequence D1

• Test 1

In the DC voltage test at -76 kV/15 min, no disruptive discharge occurred on any of the four test objects.

• Test 2

In the 50-Hz AC voltage test at 57 kV/5 min, no disruptive discharge occurred on any of the four test objects.

• Test 3

In the partial discharge test at ambient temperature and at 50-Hz AC voltage of 25 kV, none of the four test objects exceeded the permissible maximum partial discharge value of 10 pC. The partial discharge value measured was not higher than 1.0 pC.

• Test 4

In the impulse voltage test at elevated temperature with 10 test impulses of 125-kV lightning impulse voltage 1.2/50 of each polarity, no disruptive discharge occurred on any of the four test objects.

• Test 5

All of the four test objects were subjected to 63 electrical heat cycles in air. In the simultaneous 50-Hz continuous AC voltage test at 32 kV, no disruptive discharge occurred on any of the four test objects.

• Test 6

All of the four test objects were subjected to 63 electrical heat cycles in water. No disruptive discharge occurred on any of the four test objects, when they were tested simultaneously in water and by 50-Hz continuous AC voltage of 32 kV.

• Test 7

After 5 complete operations of disconnection and connection, no visible damage was found on the contact

• Test 8

In the partial discharge test at elevated and ambient temperatures at 50-Hz AC voltage of 25 kV, none of the four test objects exceeded the permissible maximum partial discharge value of 10 pC. The partial discharge value measured was not higher than 5 pC.

**Assessment of the results of test sequence D1 (continued)**

- Test 9

In the impulse voltage test at ambient temperature with 10 test impulses of 125-kV lightning impulse voltage 1.2/50 of each polarity, no disruptive discharge occurred on any of the four test objects.

- Test 10

In the 50-Hz AC voltage test at 32 kV/15 min, no disruptive discharge occurred on any of the four test objects.

All of the four test objects meet the requirements specified by CENELEC Harmonization Document HD 629.1 S2 2006-2.

The tests of test sequence D1 have been PASSED.

## 5. Tests of test sequence D2

### 5.1 Test laboratory

High-voltage test laboratory, high-voltage hall 2 and
High-power test laboratory, high-current bay

### 5.2 Normative document

CENELEC Harmonization Document HD 629.1 S2: 2006-02
DIN VDE 0278-629.1 (VDE 0278 Teil 629-1): 2002-06
IEC 61442: 2005-04
DIN VDE 0278-442 (VDE 0278 Teil 442): 2006-01

### 5.3 Required test parameters

| Test No. | Type of test | Required test parameters | |
|---|---|---|---|
| 1 | DC voltage test | Test voltage 6 x $U_0$:<br>Duration of test:<br>Polarity: | 76 kV<br>15 min<br>Negative |
| 2 | AC voltage test | Test voltage 4.5 x $U_0$:<br>Test frequency:<br>Duration of test: | 57 kV<br>50 Hz<br>5 min |
| 3 | Thermal short-circuit test of the conductor | Short-circuit-conductor final temperature:<br>Number of short-circuits: | 250 °C<br>2 |
| 5 | Disconnection/connection | Number of complete operations: | 5 |
| 6 | Impulse voltage test at ambient temperature | Front time:<br>Virtual time to half value:<br>Test voltage:<br>Number of impulses:<br>Polarity:<br>Conductor temperature: | 1.2 µs<br>50 µs<br>125 kV<br>10 impulses<br>pos./neg.<br>$\vartheta_u$ |
| 7 | AC voltage test | Test voltage 2.5 x $U_0$:<br>Test frequency:<br>Duration of test: | 32 kV<br>50 Hz<br>15 min |

## 5.4 Test arrangement

Each of the three connectors under test was arranged on a test line by the client. The connectors were completed by bushings or terminations. The test objects were mounted on cable lines of approx. 3-m length and of N2XS(F)2Y-1x50 RM/16 mm²-12/20 kV type. To apply the test voltage, each of the test lines had additionally been equipped with one auxiliary sealing end of EPKT type (made by Tyco Electronics Raychem).
All test voltages were applied to the core against the cable screen, which was connected to the test earth. The tests did not start earlier than 24 hours after the installation of the accessories on the cable lines.

### 5.4.1 DC voltage test (test 1)

Test arrangement to IEC 61442: 2005-04, Clause 5

### 5.4.2 AC voltage test (test 2)

Test arrangement to IEC 61442: 2005-04, Clause 4

### 5.4.3 Thermal short-circuit test of the conductor (test 3)

Test arrangement to IEC 61442: 2005-04, Clause 11

The three test objects were arranged on an assembly plate on equal level with phase centres distances of 110 mm. Additionally the cables were fixed by cable clamps at a distance of 350 mm from the axis of the cable connector centre. For the test, a short-circuit bridge of 30 mm x 10 mm was connected at the three bushings, and the auxiliary sealing end sides of the three test lines were connected three-pole to the short-circuit current source.

### 5.4.4 Disconnection/connection (test 5)

None

### 5.4.5 Impulse voltage test at ambient temperature (test 6)

Test arrangement to IEC 61442: 2005-04, Clause 6

### 5.4.6 AC voltage test (test 7)

See Sub-clause 5.4.2

## 5.5 Test and measuring circuits

### 5.5.1 DC voltage test (test 1)
See Sub-clause 4.5.1

### 5.5.2 AC voltage test (test 2)
See Sub-clause 4.5.2

### 5.5.3 Thermal short-circuit test of the conductor (test 3)
See following sheet.

### 5.5.4 Disconnection/connection (test 5)
None

### 5.5.5 Impulse voltage test at ambient temperature (test 6)
See Sub-clause 4.5.4

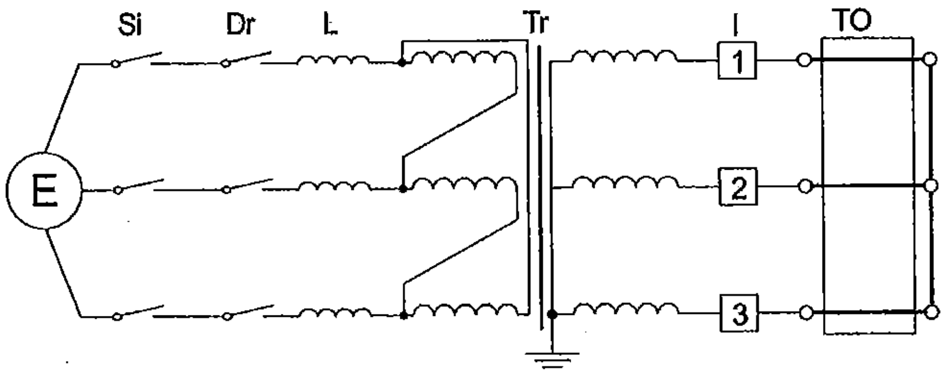
### 5.5.6 AC voltage test (test 7)
See Sub-clause 4.5.2

**Test and measuring circuits (continued)**

**Thermal short-circuit test (test 3)**

Technical data of test circuits

| Test requirement | | Short-circuit tests |
|---|---|---|
| Test No. | | 207 2835 and 207 2837 |
| Number of phases (Test circuit) | | 3 |
| Number of poles/phases (Test object) | | 3 |
| Power frequency Hz | | 50 |
| Power factor cos φ | | 0.015 |
| Earthing conditions | Generator / grid | Not earthed |
| | Short-circuit transformer | Earthed |
| | Short-circuit point | Not earthed |




| | | | |
|---|---|---|---|
| E | Power supply (grid) | TO | Test object |
| Si | Master breaker | I | Current measurement |
| Dr | Making switch | U | Voltage measurement |
| L | Current-limiting reactor | 1 - 3 | Measuring points |
| Tr | Short-circuit transformer | | |

Figure 7: Test and measuring circuit for the thermal short-circuit test of the conductor

Technical data of measuring circuits

| Measuring point | Symbol | Measured quantity | Measuring sensor/device |
|---|---|---|---|
| 1 | i L1 | Current of conductor L1 | Rogowski measuring device |
| 2 | i L2 | Current of conductor L2 | Rogowski measuring device |
| 3 | i L3 | Current of conductor L3 | Rogowski measuring device |
| Recording instrument: BE 256 transient recorder system | | | |

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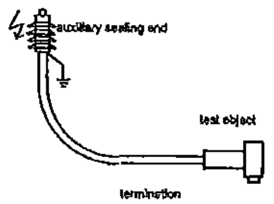
## 5.6 Test results

### 5.6.1 DC voltage test (test 1)

Polarity: Negative

Duration of test after having reached full voltage: 15 min

Test temperature: Ambient temperature 20 °C
Conductor temperature 20 °C

| Test arrangement   | | | Test voltage | Result |
|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | |
| 5 | Conductor | Screen | -76 | No disruptive discharge |
| 6 | Conductor | Screen | -76 | No disruptive discharge |
| 7 | Conductor | Screen | -76 | No disruptive discharge |

Notes: -

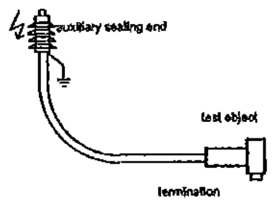
**Test results (continued)**

### 5.6.2 AC voltage test (test 2)

Duration of test after having reached full voltage: 5 min

Test frequency: 50 Hz

Test temperature: Ambient temperature 20 °C
Conductor temperature 20 °C

| Test arrangement   | | | Test voltage | Result |
|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | |
| 5 | Conductor | Screen | 57 | No disruptive discharge |
| 6 | Conductor | Screen | 57 | No disruptive discharge |
| 7 | Conductor | Screen | 57 | No disruptive discharge |

Notes: -

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**Test results (continued)**

### 5.6.3 Thermal short-circuit test of the conductor (test 3)

| | |
|---|---|
| Condition of test object before test: | Prestressed by previous tests |
| Connection of the test object: | By 50-mm² cable |
| Short-circuit point: | At the bushings |
| Ambient temperature: | 16 °C |

**Test parameters:**

| Test No. | | | 207 2835 | 207 2837 |
|---|---|---|---|---|
| Test voltage | V | | 455 | 455 |
| Peak short-circuit current | kA | L1 | 12.8 | 13.4 |
| | | L2 | 13.5 | 14.0 |
| | | L3 | 14.8 | 15.6 |
| Symmetrical short-circuit current | kA | L1 | 8.93 | 9.02 |
| | | L2 | 8.86 | 8.91 |
| | | L3 | 9.32 | 9.09 |
| | Average | | 9.04 | 9.01 |
| Duration of short-circuit | ms | | 1011 | 1011 |
| Joule integral $10^6$ | $A^2s$ | L1 | 80.8 | 82.3 |
| | | L2 | 79.9 | 80.3 |
| | | L3 | 88.2 | 84.0 |
| Symmetrical short-circuit current 1 s | kA | | 9.09 | 9.06 |
| Notes | | | - | 2., Kt |
| Evaluation | | | OK | OK |

**Notes:**

OK: The test object is able to carry the short-circuit current

**Condition of test object after test:**

The test objects did not show any externally visible changes or damage.

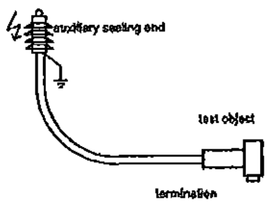
**Test results (continued)**

### 5.6.4 Disconnection/connection (test 5)

Each of the three test objects was disconnected and connected altogether five times as specified by the manufacturer's assembly instructions. No visible damage was found on the contact.

### 5.6.5 Impulse voltage test at ambient temperature (test 6)

| | | |
|---|---|---|
| Full wave: | Front time | $T_1$ = 1.27 µs |
| | Virtual time to half value | $T_2$ = 53 µs |
| Test temperature: | Ambient temperature | 20 °C |
| | Conductor temperature | 20 °C |

| Test arrangement   | | | Test voltage | Result |
|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | Numbers of impulses/disruptive discharges |
| 5 | Conductor | Screen | +125<br>-125 | 10/0<br>10/0 |
| 6 | Conductor | Screen | | |
| 7 | Conductor | Screen | | |

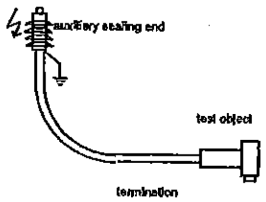
**Notes:**

All test lines were tested simultaneously.

**Test results (continued)**

### 5.6.6 AC voltage test (test 7)

| | | |
|---|---|---|
| Duration of test after having reached full voltage: | | 15 min |
| Test frequency: | | 50 Hz |
| Test temperature: | Ambient temperature | 20 °C |
| | Conductor temperature | 20 °C |

| Test arrangement   | | | Test voltage | Result |
|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | |
| 5 | Conductor | Screen | | |
| 6 | Conductor | Screen | 32 | No disruptive discharge |
| 7 | Conductor | Screen | | |

**Notes:**

All test lines were tested simultaneously.

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## 5.7 Assessment of the tests of test sequence D2

- Test 1

In the DC voltage test at -76 kV/15 min, no disruptive discharge occurred on any of the three test objects.

- Test 2

In the 50-Hz AC voltage test at 57 kV/5 min, no disruptive discharge occurred on any of the three test objects.

- Test 3

In the thermal short-circuit test of the conductor with a thermally equivalent current of 9.1 kA/1 s, no visible damage was detected on any of the three test objects.

- Test 5

After 5 complete operations of disconnection and connection, no visible damage was found on the contact.

- Test 6

In the impulse voltage test at ambient temperature with 10 test impulses of 125-kV lightning impulse voltage 1.2/50 of each polarity, no disruptive discharge occurred on any of the three test objects.

- Test 7

In the 50-Hz AC voltage test at 32 kV/15 min, no disruptive discharge occurred on any of the three test objects.

All of the three test objects meet the requirements specified by CENELEC Harmonization Document HD 629.1 S2 2006-2.

The tests of test sequence D2 have been PASSED

## 6. Tests of test sequence D3

### 6.1 Test laboratory

High-voltage test laboratory, high-voltage hall 2

### 6.2 Normative document

CENELEC Harmonization Document HD 629.1 S2: 2006-02
DIN VDE 0278-629.1 (VDE 0278 Teil 629-1): 2002-06
IEC 61442: 2005-04
DIN VDE 0278-442 (VDE 0278 Teil 442): 2006-01

### 6.3 Required test parameters

| Test No. | Type of test | Required test parameters | |
|---|---|---|---|
| 14 | Operating eye test | Axial force 1300 N, 1 min<br>Torque 14 Nm<br>Duration of test: | <br><br>1 min |
| 15 | Partial discharge test at ambient temperature | Prestress voltage 2.25 x $U_0$:<br>Measuring voltage 2.00[1] x $U_0$:<br>Prestress duration:<br>Measuring time: | 29 kV<br>25 kV<br>1 min<br>1 min |

Notes to the table of required test parameters:

1) CENELEC Harmonization Document HD 629.1 S2: 2006-2, Table 7, requires the partial discharge to be measured at a measuring voltage of 1.73 x $U_0$, or 2.00 x $U_0$ respectively. The measurement was done at 2 x $U_0$, because the standard of the cable used for the test requires a test voltage > 1.73 x $U_0$.

## 6.4 Test arrangement

The client arranged each of the cable connectors under test (test object) on a test line. The test objects were mounted on cable lines of approx. 1 m length and of N2XS(F)2Y-1x50 RM/16 mm²-12/20 kV type. To apply the test voltage, each of the test line had additionally been equipped with one auxiliary sealing end of EPKT type (manufacturer Tyco Electronics Raychem). All test voltages were applied to the core against the cable screen, which was connected to the test earth.
The tests did not start earlier than 24 hours after the installation of the accessories on the cable lines.

### 6.4.1 Operating eye test

Test arrangement to IEC 61442: 2005-04, Clause 19

### 6.4.2 Partial discharge test at ambient temperature

Test arrangement to IEC 61442: 2005-4, Clause 7, with the following simplifications:

Due to the short cable lengths, neither double impulse diagram nor terminating impedance or reflexion suppressor were used. The PD calibrator was connected in parallel to the test object only at the detector-remote end.

## 6.5 Test and measuring circuits

### 6.5.1 Operating eye test

None

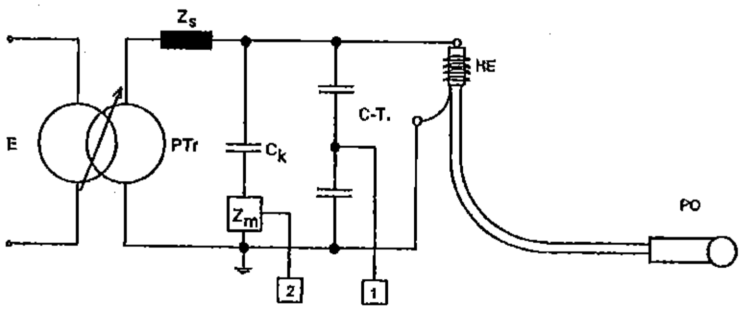
### 6.5.2 Partial discharge test at ambient temperature

Technical data of test circuit

| | | | |
|---|---|---|---|
| Test transfomer: | Rated voltage | 125 | kV |
| | Rated power | 100 | kVA |
| | Rated frequency | 50 | Hz |
| | Damping resistance | 0.67 | kOhm |

Technical data of measuring circuit

| Measuring point | Measured quantity | Measuring sensor/device | Technical parameters |
|---|---|---|---|
| 1 | Test voltage | - Capacitive divider with MU11 peak voltmeter (TuRD) | Ratio 864 |
| 2 | Partial discharges | - Coupling capacitor of WMCF type (TuRD)<br>- Coupling four pole of COPL542A type<br>- PD measuring station of MPD540 type<br>- USB interface 502<br>- PD calibrator of CAL542 type (mtronix) | $C_k$ = 1 nF<br><br>Band width = 300 MHz<br>Center frequency 400 kHz<br>Output 10 pC |




E Supply
PTr Test transformer with variable transformer connected in series
$Z_s$ Blocking impedance
$C_k$ Coupling capacitor
$Z_m$ Coupling four pole (measuring impedance)
C-T. Capacitive divider
HE Auxiliary sealing end
1, 2 Measuring points
PO Test object

Figure 8: Test and measuring circuit for the partial discharge test

## 6.6 Test results

### 6.6.1 Operating eye test

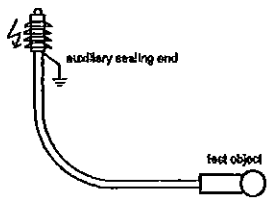
The connector releases at an axial force of 23 N, but is capable of tightening again.

### 6.6.2 Partial discharge test at ambient temperature

| | | |
|---|---|---|
| Test frequency: | | 50 Hz |
| Test temperature: | Ambient temperature | 20 °C |
| | Conductor temperature | 20 °C |

Calibration of the test circuit by calibrator output 10 pC

**Measured PD values**

| Test arrangement   | | | Prestress voltage (1 min) | Measuring voltage (1 min) | Measured PD value |
|---|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | kV | pC |
| 1 | Conductor | Screen | 29 | 25 | <1 [1)] |

**Notes:**

1) Basic disturbance level at same value

## 6.7 Assessment of the results of test sequence D3

- Test 1

No visible damage was found after the operating eye test.

- Test 2

In the partial discharge test at ambient temperature and at 50-Hz AC voltage of 25 kV, none of the test object exceeded the permissible maximum partial discharge value of 10 pC. The partial discharge value measured was not higher than 1.0 pC.

All of the test object meet the requirements specified by CENELEC Harmonization Document HD 629.1 S2 2006-2.

The tests of the test sequence D3 have been PASSED

## 7. Special tests (tests Nos. 17 to 21)

### 7.1 Test laboratory

Low-voltage test laboratory, test room 7 (test No. 17)
High-voltage test laboratory, high-voltage hall 2 (tests Nos. 18, 20 and 21))
High-power test laboratory, test bay 3 (test No. 19)

### 7.2 Normative documents

CENELEC Harmonization Document HD 629.1 S2: 2006-02
DIN VDE 0278-629.1 (VDE 0278 Teil 629-1): 2002-06
IEC 61442: 2005-04
DIN VDE 0278-442 (VDE 0278 Teil 442): 2006-01

### 7.3 Required test parameters

| Test No. | Type of test | Required test parameters | |
|---|---|---|---|
| 17 | Screen resistance measurement | Temperature during exposure to heat:<br>Duration of thermal ageing: | (120±2) °C<br>168 h |
| 18 | Leakage current measurement | Test voltage $U_m$: | 24 kV |
| 19 | Screen fault current initiation test | • Solidly earthed system<br>Test voltage:<br>Test current:<br>Duration of current flow:<br>Number of tests:<br>• Unearthed or Impedance-earthed system<br>Test voltage:<br>Test current:<br>Test procedure: | <br>12.7 kV[1)]<br>10 kA<br>0.2 s<br>2<br><br>12.7 kV[1)]<br>Minimum 10 A<br>Start<br>C-1 s<br>O-2 min<br>C-2 min<br>O-2 min<br>C 1 min<br>O end |
| 20 | Operating force test | F < 900 N | |
| 21 | Capacitive test point performance | - | - |

Note:

1) Test parameter complies with normative document. If lower values are applied the test will become more severe.

## 7.4 Test arrangement

### 7.4.1 Screen resistance measurement (test No. 17)

Test arrangement to IEC 61442: 2005-04, Clause 15

Only one single connector body was used for the measurement. For the definite and reproducible measurement of the resistance on the screen two rings made of bare copper wire and of approx. 1-mm width were fixed to the screen. They served as fixed electrodes for the resistance measurement.

### 7.4.2 Leakage current measurement (test No. 18)

Test arrangement to IEC 61442: 2005-04, Clause 16

The client installed one test object on a short length of cable, which was equipped with an auxiliary sealing end on its other end, and completed it with a bushing. Subsequently, a square metal foil of 25 cm² was fitted to the outer conductive layer of the test object in the region of the bushing. When the AC test voltage was applied to the test object, the leakage current from metal foil to earth was measured.

### 7.4.3 Screen fault current initiation test (test No. 19)

Test arrangement to IEC 61442: 2005-04, Clause 17

A bushing was centrally arranged in a metal plate of 600 x 600 x 5, which was vertically fixed to a test rack. Each of the test objects, installed on a short length of cable by the client, was fixed to the bushing and the screen was earthed in accordance with the manufacturer's instructions. The other end of each length of cable was equipped with an auxiliary sealing end. For the test with solidly earthed system, a threaded rod of 10 mm Ø was arranged in the region of the transition from the conductor to the cable lug in the body of the connector under test so that a connection was established from the cable lug through a drilled hole to the inner and outer conducting layers of the connector body. For the test with unearthed or impedance earthed systems, a drilled hole was used instead of the rod. It had a copper wire of 0.2 mm Ø for bridging the insulation between the inner and outer screens and for initiating the arc. In both cases, neither the rod nor the wire protruded beyond the outer conducting layer of the connector body.

### 7.4.4 Operating force test of the cable connector (test No. 20)

Test arrangement to IEC 61442: 2005-04, Clause 18

One connector was assembled according to the client's instructions and was mounted on a bushing using a gliding agent provided by the client.

### 7.4.5 Capacitive test point performance (test No. 21)

Test arrangement to IEC 61442: 2005-04, Clause 20

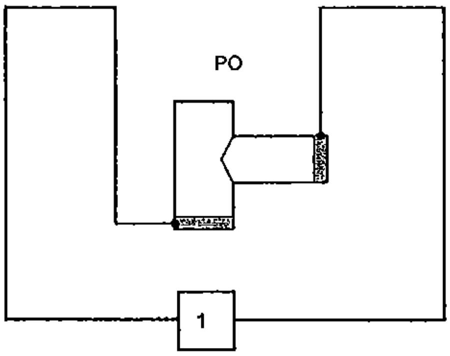
One connector was installed on a short length of cable by the client and the screen was earthed in accordance with the manufacturer's instructions. The test object was equipped with a mating bushing.

## 7.5 Test and measuring circuits

### 7.5.1 Screen resistance measurement (test No. 17)

Technical data of measuring circuit

| Measuring point | Measured quantity | Measuring sensor/device | Technical parameters |
|---|---|---|---|
| 1 | Resistance | Digital hand multimeter of 137 type (KEITHLEY) | Measuring range R - 2 kΩ |




1 Measuring point
PO Test object

Figure 9: Measuring circuit for resistance measurement on the screen

**Test and measuring circuits (continued)**

### 7.5.2 Leakage current measurement (test No. 18)

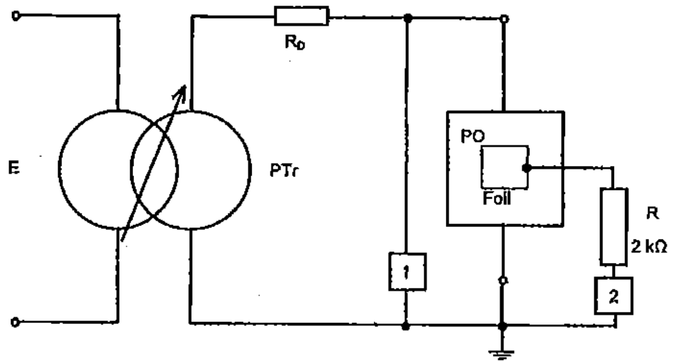
Technical data of test circuit

Single-phase AC voltage source

| | | | |
|---|---|---|---|
| Test transformer: | Rated voltage | 125 | kV |
| | Rated power | 100 | kVA |
| | Rated frequency | 50 | Hz |
| | Damping resistance | 0.67 | kΩ |

Technical data of measuring circuit

| Measuring point | Measured quantity | Measuring sensor/device | Technical parameters |
|---|---|---|---|
| 1 | Test voltage | Capacitive divider with MU11 (TuRD) peak voltmeter | Ratio 864 |
| 2 | Test current | Digital hand multimeter of 137 type (KEITHLEY) | MB 0.2 mA AC |




E Supply
PTr Test transformer with variable transformer connected in series
$R_D$ Damping resistance
R Resistance
1, 2 Measuring points
PO Test object

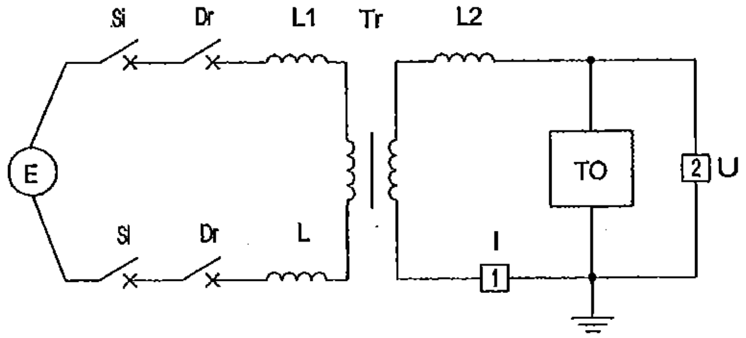
Figure 10: Test and measuring circuit for the leakage current measurement

Test and measuring circuits (continued)

### 7.5.3 Screen fault current initiation test (test No. 19)

Technical data of test circuit

| | | |
|---|---|---|
| Test requirement | | Screen fault current test |
| Test No. | | 107 4008 and 107 6207 |
| Number of phases | (Test circuit) | 2 |
| Number of poles/phases | (Test object) | 1 |
| Power frequency | Hz | 50 |
| Power factor cos φ | | < 0.15 |
| Connection of short-circuit transformers | | I/I |
| Short-circuit power | | 120 MVA |
| Earthing conditions | Grid | Not earthed |
| | Short-circuit transformer | Earthed |




| | | | |
|---|---|---|---|
| E | Power supply (grid) | 1, 2 | Measuring points |
| Si | Master breaker | I | Current measurement |
| Dr | Making switch | U | Voltage measurement |
| L1, L2 | Current limiting reactors | TO | Test object |
| Tr | Short-circuit transformer | | |

Figure 11: Test and measuring circuit for the screen fault current initiation test

Technical data of measuring circuits

| Test No. | Measuring point | Symbol | Measured quantity | Measuring sensor/device |
|---|---|---|---|---|
| 107 4008 and 107 6207 | 1 | i | Short-circuit current | Current transformer |
| | 2 | u | Test voltage | RC divider |
| Recording instrument: BE 256 transient recorder | | | | |

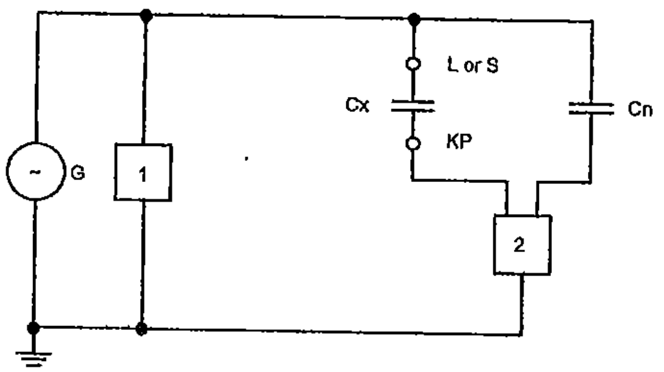
### 7.5.4 Capacitive test point performance (test No. 21)

Capacitance measurement by differential bridge

The capacitance Cx to be measured was connected to a capacitance measuring bridge together with the well-known capacitance Cn.

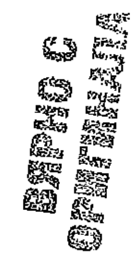
Technical data of measuring circuit

| Measuring point | Measured quantity | Measuring sensor/device | Technical parameters |
|---|---|---|---|
| 1 | Capacitance | C-tan δ measuring bridge of VFM type (made by MWB) | Measuring range x 100 pF |
| 2 | Test voltage | Capacitive divider with MU11 (made by TuRD) peak voltmeter | |




G Sine-wave generator
Cx Capacitance to be determined
L, S Cable conductor or cable screen
KP Capacitive test point
Cn Comparison capacitance
1, 2 Measuring points

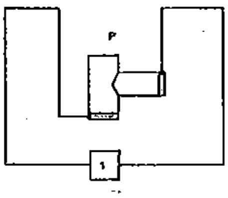
Figure 12: Test and measuring circuit for determining the capacitive test point performance



## 7.6 Test results

### 7.6.1 Screen resistance measurement (test No. 17)

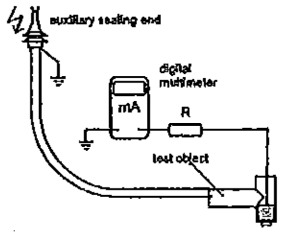
| | | |
|---|---|---|
| Test temperature: | Ambient temperature | 20 °C |
| Temperature during exposure to heat: | | 120 °C |
| Time of exposure to heat: | | 168 h |

| Test arrangement  | | Resistance | Result |
|---|---|---|---|
| No. of test object | Condition of test object | Ω | |
| 8 | Before exposure to heat | 216 | OK |
| 8 | After exposure to heat | 300 | OK |

OK: The resistance measured before and after the exposure to heat was significantly below the maximum permissible value of 5000 Ω.

### 7.6.2 Leakage current measurement (test No. 18)

| | | |
|---|---|---|
| Test temperature: | Ambient temperature | 20 °C |

| Test arrangement  | | | Test voltage | Leakage current | Result |
|---|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | kV | µA | |
| 9 | Conductor | Screen | 24 | < 5 | OK |



OK: The leakage current was below the maximum permissible value of 0.5 mA.

**Test results (continued)**

### 7.6.3 Screen fault current initiation test (test No. 19)

| | |
|---|---|
| Test requirement: | Screen fault current test for impedance-earthed systems |
| Type of test object: | RSES-5225-R 250 A |
| Ambient temperature: | 19 °C |

| Test No. | 107 ... | 4007 | 4008 | | |
|---|---|---|---|---|---|
| Test object | No. | - | 11 | | |
| Cycle | | - | $C_{1s} - O_{2min} - C_{2min} - O_{2min} - C_{1min} - O$ | | |
| Test voltage | kV | 12.8 | 12.8 | 12.8 | 12.8 |
| Test current | A | 15.5 | 15.5 | 15.5 | 15.5 |
| Time of test | s | 0.2 | 1 | 120 | 60 |
| Notes | | 1) | 2) | 2) | 2) |
| Evaluation | | - | OK | OK | OK |

Notes:

1) Current setting

2) The test object is capable of properly carrying the fault current.

OK: During the making cycle the arc was ignited or re-ignited, respectively.
During the making time, the current flow was present.
A fault in the insulation is reliably detectable.

| | |
|---|---|
| Test requirement: | Screen fault current test for solidly earthed systems |
| Type of test object | RSES-5225-R 250 A |
| Ambient temperature: | 19 °C |

| Test No. | 107 | 6207 |
|---|---|---|
| Test object | No. | 9 |
| Test voltage | kV | 12.8 |
| Test current | kA | 10.9 |
| Time of test | s | 200 |
| Notes | | 1) |
| Evaluation | | n. OK |

Notes:

1) The connector got loosened from bushing and cable. The bushing got broken.

n. OK: For the case of a disruptive discharge the screen of the connector is able to carry a fault current which is sufficient to trip the protection device, but another operation is no more possible.

ВЯРНО С ОРИГИНАЛА

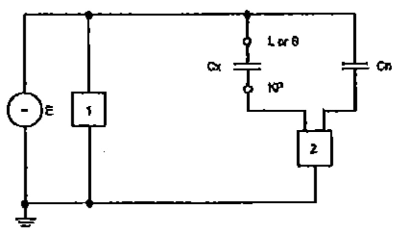
**Test results (continued)**

### 7.6.4 Operating force test (test No. 20)

Cold conditioning for 12 h at −20 °C, withdrawal force = 524 N

### 7.6.5 Capacitive test point performance (test No. 21)

Test temperature: Ambient temperature 23 °C

| Test arrangement  | | | Capacitance of test point KP | | Notes |
|---|---|---|---|---|---|
| No. of test object | Voltage applied to | Earthed | Towards cable screen $C_{te}$ | Towards cable conductor $C_{tc}$ | |
| | | | pF | pF | |
| 12 | L (conductor) | Screen connection of the connector body | - | 9.5 | OK |
| 12 | S (screen) | Conductor | 11.8 | - | OK |



**Notes:**

OK: The ratio of $C_{te}$ to $C_{tc}$ was 11.8 pF:9.5 pF ≈ 1.24, and thus ≤ 12 as specified by the normative document

## 7.7 Assessment of special tests

- Test 17

The resistance measured before and after the exposure to heat at 120 °C/168 h was 300 and 216 Ω, resp. This was significantly below the maximum permissible value of 5000 Ω.

- Test 18

The leakage current measured at an applied AC test voltage of 24 kV fell below the maximum permissible value of 0.5 mA with a measured value of 5 μA.

- Test 19

- Solidly earthed systems
For the case of a disruptive discharge the screen of the connector is able to carry a fault current which is sufficient to trip the protection device. The fault was reliably initiated within 3 s. The screen is able to discharge an arc to earth. The current is sufficient to operate the circuit protection, but the cable terminal gets completely destroyed so that another making of the short-circuit was no more possible.

- Unearthed or impedance-earthed systems
During the making cycle the arc was ignited or re-ignited, respectively. During the making time, the current flow was present. A fault in the insulation is reliably detectable. During the making cycle, the arc was ignited resp. re-ignited at 12.1 kV. During the making time, the current flow was present at 12.1 kV. A fault in the insulation is reliably detectable.

- Test 20

The withdrawal force was determined to be 524 N. Thus it is below the maximum permissible value of 900 N.

- Test 21

The ratio of $C_{te}$ to $C_{tc}$ was determined to be 1.24, which is ≤ 12 as specified by the normative document

The test objects meet the requirements specified by CENELEC Harmonization Document HD 629.1 S2: 2006-2, except Test No. 19.

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## 8. Photos

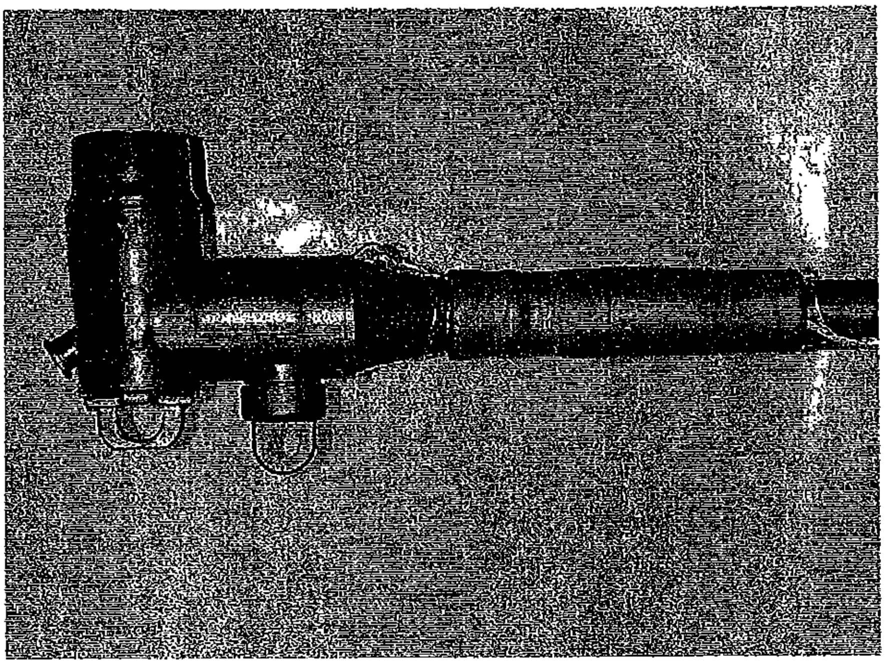


Figure 13: View of one test object

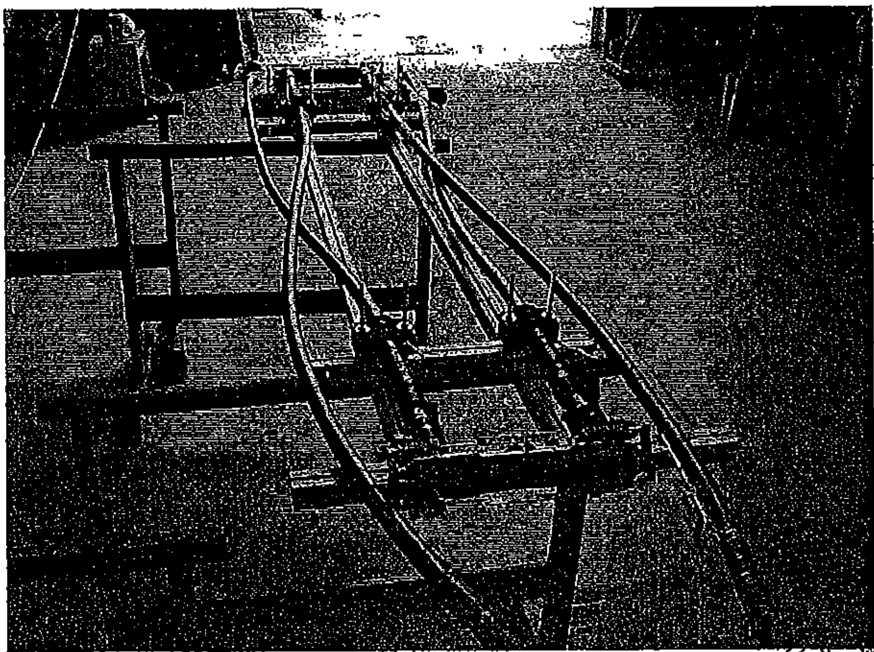


Figure 14: Arrangement for the electrical heat cycling test in air for test sequence D

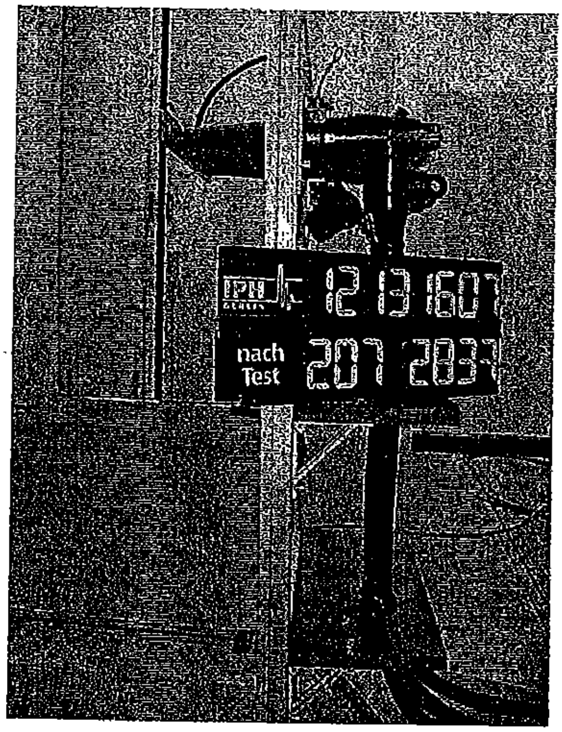



Figure 15: View of the test objects for the test sequence D2 (mounted on bushings)

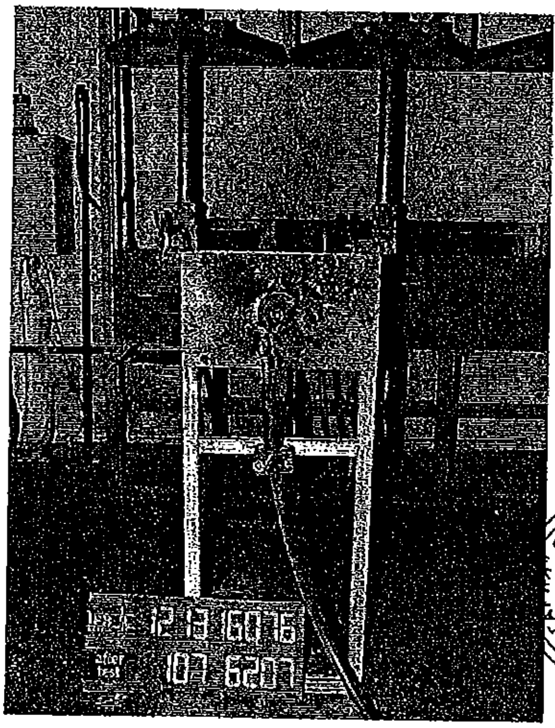


Figure 16: Test object after the screen fault current initiation test (solidly earthed systems)

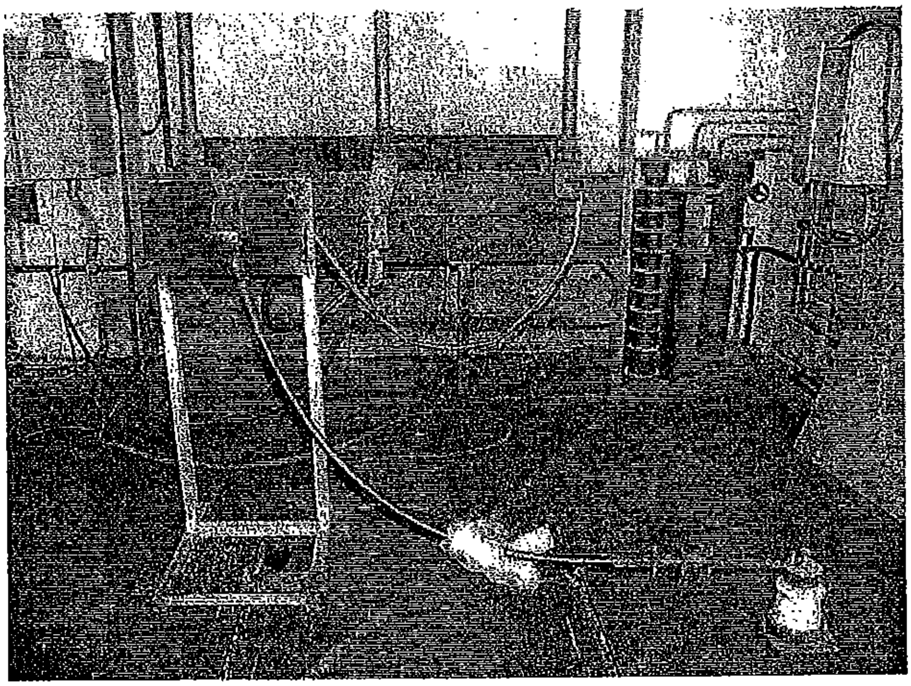
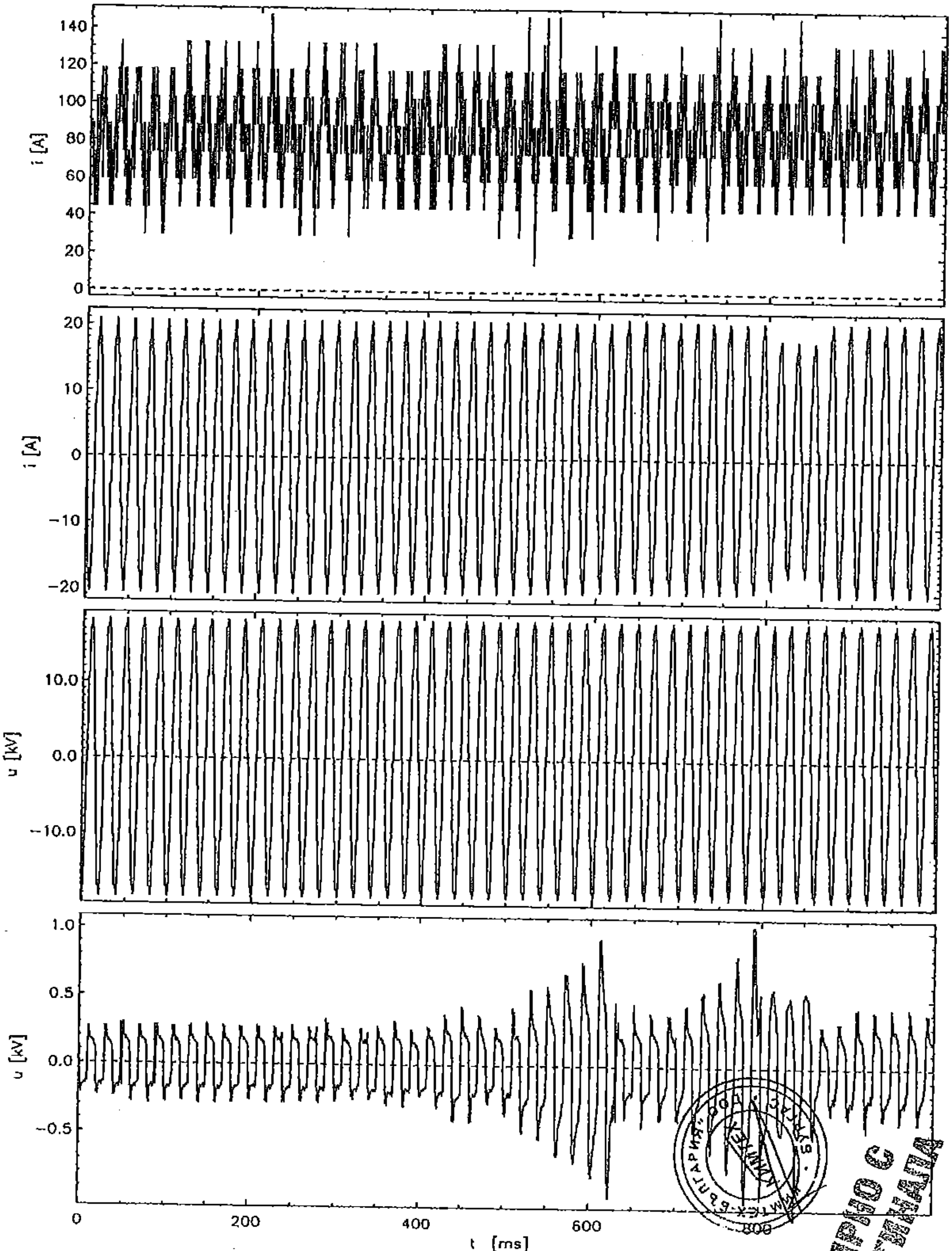


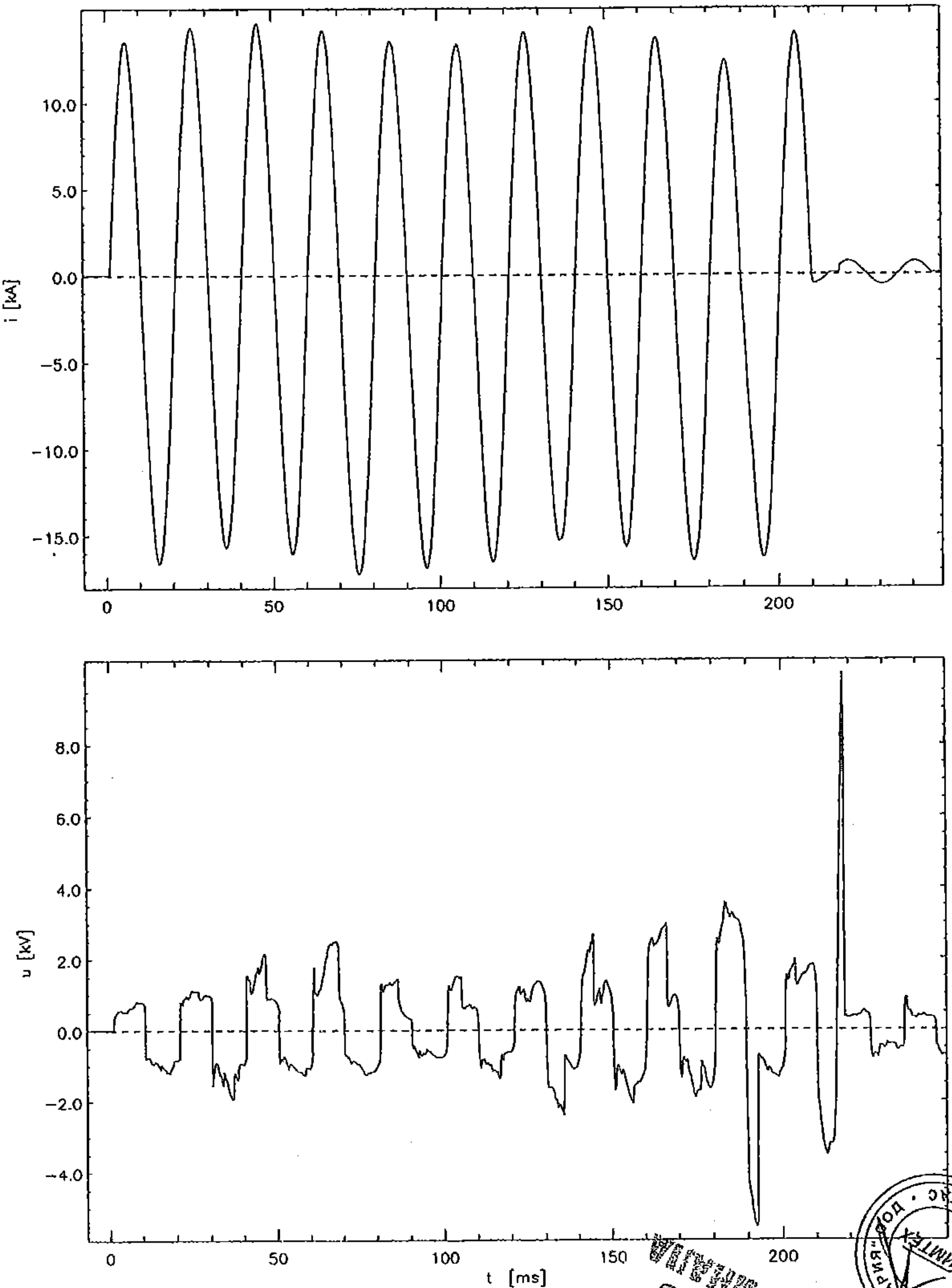
Figure 17: Test object No. 11 after the screen fault current initiation test (unearthed or impedance-earthed systems)

## 9. Oscillograms

Test–No. 1074008



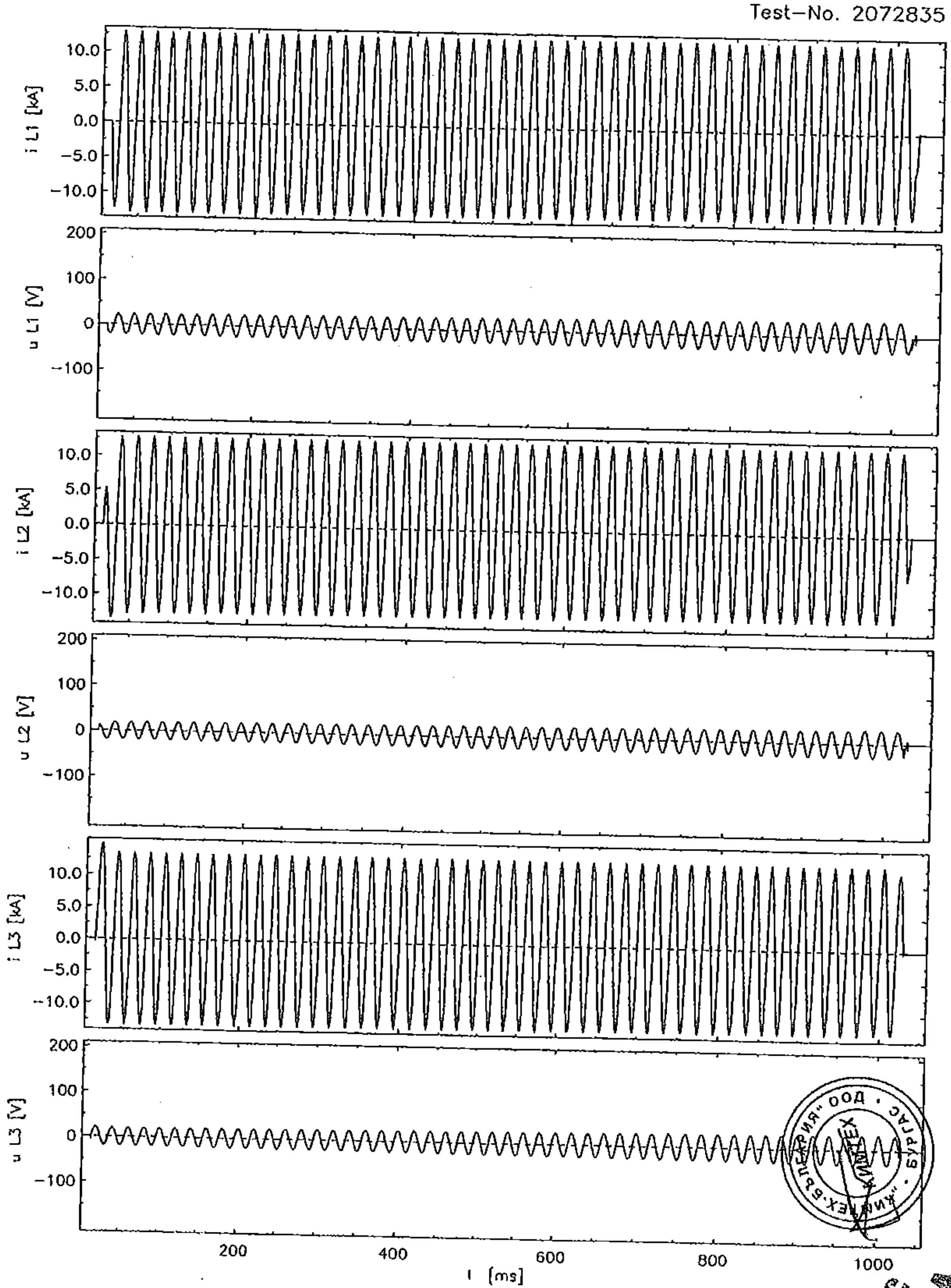
Test-No. 1076207



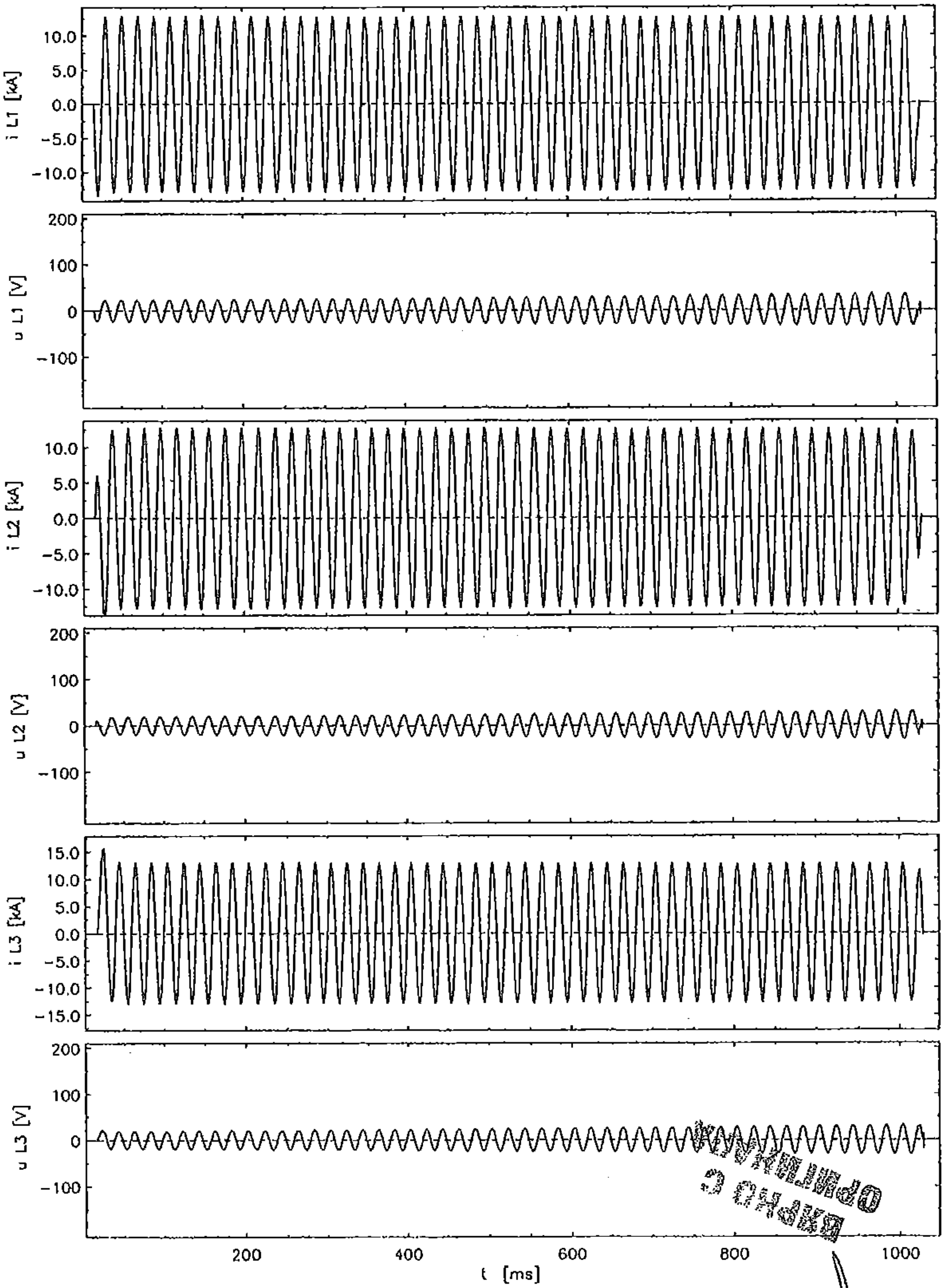
TEST REPORT NO. 1213.1607.6.950

SHEET 58

Test–No. 2072835



Test–No. 2072837




ВЯРНО С ОРИГИНАЛА

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e-mail: office@kimtech.bg

ISO9001
ISO14001
OHSAS18001

**Списък на проведените изпитвания на щепселна кабелна глава, Г-образна/адаптор/ тип RSES**

1. Изпитване издръжливост с постоянно напрежение;
2. Изпитване издръжливост с променливо напрежение;
3. Изпитване частичен разряд при околна температура;
4. Изпитване импулсно напрежение при околна температура;
5. Изпитване циклично електрическо нагряване във въздух;
6. Изпитване циклично електрическо нагряване във вода;
7. Изпитване комутация/включване/изключване;
8. Изпитване частичен разряд при околна температура;

13.01.2016г.

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Немска Служба по Акредитация
Предоставено съгласно

с подписано многостранно споразумение на ЕА, ILAC и IAF за взаимно одобрение

АКРЕДИТАЦИЯ

С настоящото Немска служба за акредитация потвърждава, че лабораторията за изпитване

FGH Инженеринг и Изпитвания
Халенвег 40, 68219 Манхайм

притежава правомощия съгласно ISO/IEC 17025:2005 да провежда изпитвания в областта на

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силови кабели и комплекти за силови кабели

Свидетелството за акредитация важи във връзка с решение от 11.01.2012 с акредитационен № D-PL-12110-01 и е валидно до 10.01.2017г. Състои се от този лист, обратната страна на този лист и приложения общо 22 страници.

Регистрационен номер на свидетелството: D-PL-12110-01

Франкфурт на Майн, 11.01.2012 дипл. инж. Ралф Егнер

DAkkS Deutsche Akkreditierungsstelle

# Deutsche Akkreditierungsstelle GmbH
# German Accreditation Body

**Entrusted according to Section 8 subsection1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV**
Signatory to the Multilateral Agreements of
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# Accreditation

The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

**FGH Engineeering & Test GmbH**
**Hallenweg 40, 68219 Mannheim**

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

**High voltage devices and systems and their components**
**Power cable and power cable sets**

The accreditation certificate shall only apply in connection with the notice of accreditation of 11.01.2012 with the accreditation number D-PL-12110-01 and is valid until 10.01.2017. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 22 pages.

Registration number of the certificate: D-PL-12110-01

ВЯРНО С ОРИГИНАЛА

Frankfurt am Main, 11.01.2012

On behalf of Dipl.-Ing. (FH) Ralf Egner
Head of Division 2

„КИМТЕХ-БЪЛГАРИЯ" ООД • БУРГАС

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

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Предоставено съгласно

с подписано многостранно споразумение на ЕА, ILAC и IAF за взаимно одобрение

АКРЕДИТАЦИЯ

С настоящото Немска служба за акредитация потвърждава, че лабораторията за изпитване

Институт „Изпитвания на електрическа високо технологична техника"
Ландсбергер Алее 378А, 12681 Берлин

притежава правомощия съгласно ISO/IEC 17025:2005 да провежда изпитвания в областта на

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Unterzeichnerin der Multilateralen Abkommen
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# Akkreditierung

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**Institut "Prüffeld für elektrische Hochleistungstechnik" GmbH**
**Landsberger Allee 378A, 12681 Berlin**

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

**Hochspannungsgeräte, -anlagen und deren Komponenten**
**Kabel und Leitungen**
**Industrielle Niederspannungsgeräte**

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Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Leiter Abteilung 2

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# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният Иван Вълков Костов, в качеството си на управител на Кимтех България ООД, гр. Бургас, жк. Братя Миладинови, бл. 57, вх. 4А официален дистрибутор на изделията на Tyco Electronics Raychem декларирам, на собствена отговорност, че продуктите:

1/ Щепселна кабелна глава права 20кV, 250А, 50мм2 тип RSSS 5225-P

2/ Щепселна кабелна глава права, 20кV, 250А, 95мм2 тип RSSS 5229-P

произведени в Отобрун, Германия, за които се отнася тази декларация, са произведени в условията на въведената и поддържаната от производителя система за производствен контрол и в сътветствие със следните стандарти CENELEC HD 629 (VDE 0278-629), и съотвествието е оценено съгласно Наредбата за съществените изисквания и оценяване на съответствието на строителните продукти. Декларацията се издава въз основа на протоколи от проведени изпитания № PPR 2528, издаден от Лаборатория за изпитвания Берлин.

13.01.2016г.
гр. Бургас

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/И. Костов-управител/

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кабели, трансформатори,
електрооборудване

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факс: 02 9733370
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e-mail: office@kimtech.bg

# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният Иван Вълков Костов, в качеството си на управител на Кимтех България ООД, гр. Бургас, жк. Братя Миладинови, бл. 57, вх. 4А официален дистрибутор на изделията на Tyco Electronics Raychem декларирам, на собствена отговорност, че продуктите:

1/ Щепселна кабелна глава Г-образна, 20кV, 250А, 50мм2 тип RSES 5225-P

2/ Щепселна кабелна глава Г-образна, 20кV, 250А, 95мм2 тип RSES 5229-P

произведени в Отобрун, Германия, за които се отнася тази декларация, са произведени в условията на въведената и поддържаната от производителя система за производствен контрол и в сътветствие със следните стандарти CENELEC HD 629 (VDE 0278-629), к съотвесввието е оценено съгласно Наредбата за съществените изисквания и оценяване на съответствието на строителните продукти. Декларацията се издава въз основа на протоколи от проведени изпитания № PPR 2527, издаден от Лаборатория за изпитвания Берлин.

13.01.2016г.
гр. Бургас

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/И. Костов-управител/

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Kimtech

Кимтех България ООД
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официален дистрибутор на
tyco Electronics
кабели, трансформатори,
електрооборудване

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# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният Иван Вълков Костов, в качеството си на управител на Кимтех България ООД, гр. Бургас, жк. Братя Миладинови, бл. 57, вх. 4А официален дистрибутор на изделията на Tyco Electronics Raychem декларирам, на собствена отговорност, че продуктите:

1/ Щепселна кабелна глава за проходни изводи тип „С" 20kV, 95-185мм2 тип RICS 5133

1/ Щепселна кабелна глава за проходни изводи тип „С" 20kV, 95-185мм2 тип RICS 5137

произведени в Отобрун, Германия, за които се отнася тази декларация, са произведени в условията на въведената и поддържаната от производителя система за производствен контрол и в съответствие със следните стандарти CENELEC HD 629.1 S21 (2006-02), (VDE 0278-629), и съотвестввието е оценено съгласно Наредбата за съществените изисквания и оценяване на съответствието на строителните продукти. Декларацията се издава въз основа на сертификат от типово одобрение № Е-13892 издаден от Дет Норске Веритас съгласно одобрени протоколи от проведени типови изпитания № PPR 866, PPR 1106 издадени от Лаборатория за изпитвания Тайко Електроникс Райхем и Лаборатория за изпитвания Мюнхен.

13.01.2016г.
гр. Бургас

Подпис и печат:
/И. Костов/

КИМТЕХ БЪЛГАРИЯ ООД • БУРГАС

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# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният Иван Вълков Костов, в качеството си на управител на Кимтех България ООД, гр. Бургас, жк. Братя Миладинови, бл. 57, вх. 4А официален дистрибутор на изделията на Tyco Electronics Raychem декларирам, на собствена отговорност, че продуктите:

1/ Кабелна глава, 20 kV, закрит монтаж, термосвиваема 70-240mm2 тип POLT 24D/1XI

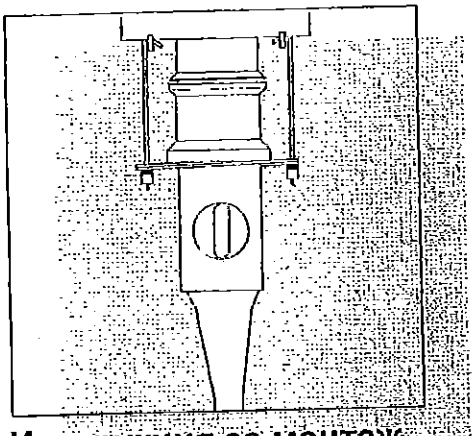
произведени в Отобрун, Германия, за които се отнася тази декларация, са произведени в условията на въведената и поддържаната от производителя система за производствен контрол и в сътветствие със следните стандарти CENELEC HD 629 (VDE 0278-629), IEC 60502-4 и съотвествието е оценено съгласно Наредбата за съществените изисквания и оценяване на съответствието на строителните продукти. Декларацията се издава въз основа на протокол от проведени изпитания № PPR 1410, издаден от Лаборатория за изпитвания Манхайм.

13.01.2016г.
гр. Бургас

Подпис и печат:
/И. Костов, управител/

КИМТЕХ БЪЛГАРИЯ ООД БУРГАС

E L E C T R I C A L
PRODUCTS·DIVISION



# Инструкция за монтаж
# EPP 0580 9/95

## Екраниран прав адаптор 250А, за едножилни пластмасови кабели 12 до 24 kV без броня (с тръба за маркиране на фазите)

## Тип RSSS

Raychem

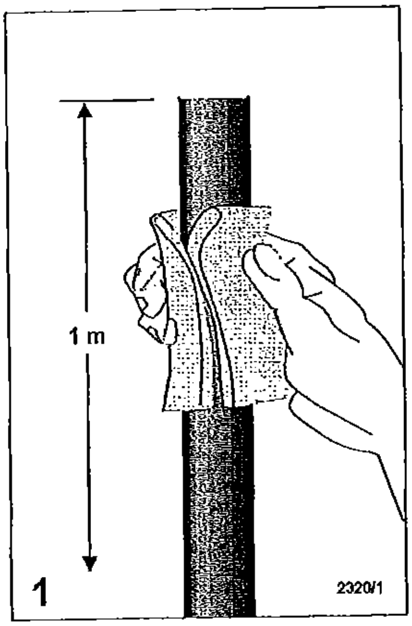
## Препоръки за безопасност

Важно е да се спазват съответните правила за безопасност
При работа с оборудване високо напрежение.За точна информация относно безопасността моля свържете се с официалният представител.

## Преди монтажа

Проверете, че комплекта е предназначен за кабела.Проверете етикета на комплекта и заглавието на Инструкцията за монтаж. Възможно е, компонентите или стъпки на работа да са променени, в сравнение с тези от предходния път, в който сте монтирали този продукт.Внимателно прочетете и следвайте стъпките в Инструкцията за монтаж.

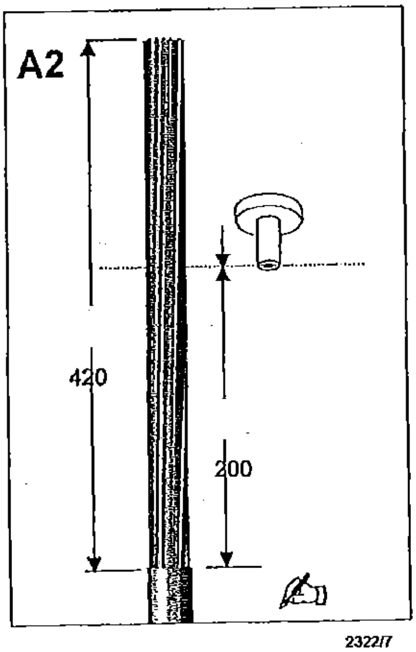
Информацията, съдържаща се в тези инструкции за монтаж е предназначена да опише правилния метод на монтаж на този продукт.Въпреки това,Raychem няма контрол върху полевите условия, които влияят върху монтажа на продукта.Това е отговорност на потребителя,да се определи пригодността на метода на монтаж в полеви условия на потребителя. Задълженията на Raychem са само тези, които са посочени в стандартните условия за продажба на Raychem за този продукт и вникакъв случай Raychem няма да е отговорен за каквито и да било други случайни,непреки или последващи вреди, произтичащи от употребата или злоупотребата с продуктите.



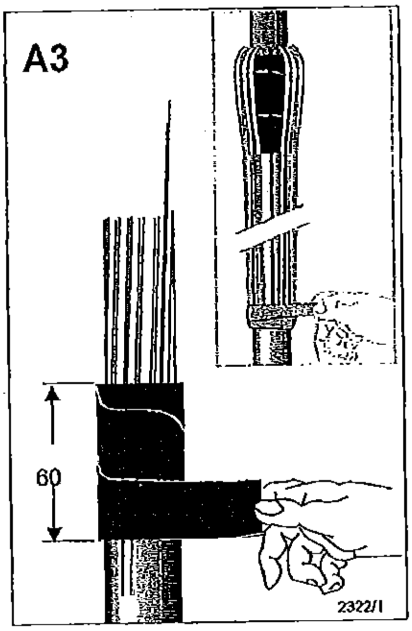

**Подготовка на кабела**
Почистете и обезмаслете края на външната обвивка на дължина от 1 метър с разтворител.

### А. Кабел с екран от телове

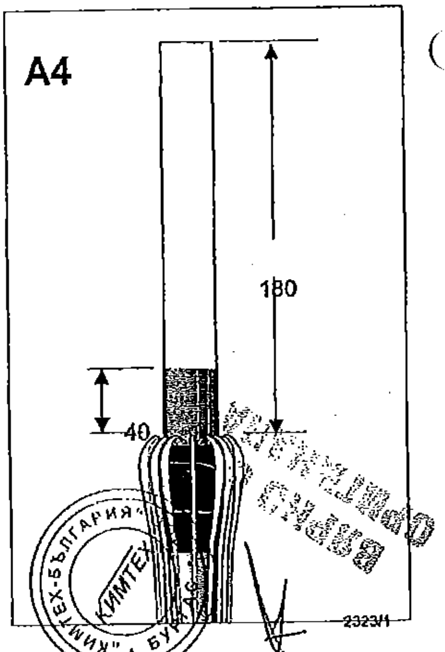
Позициониране на кабела. Маркирайте външната обвивка на 200 mm под края на втулката. Отрежете кабела 420 mm над маркировката и премахнете външната обвивка до този размер

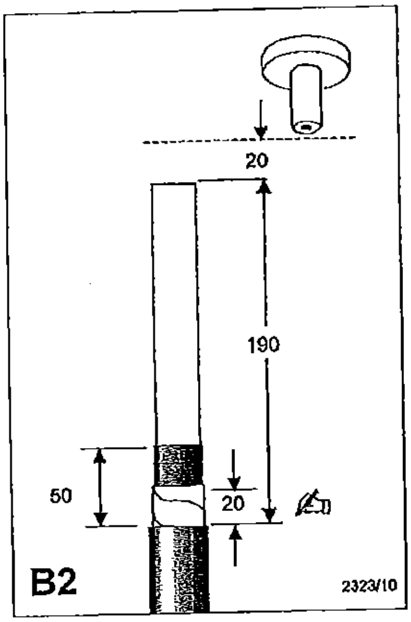


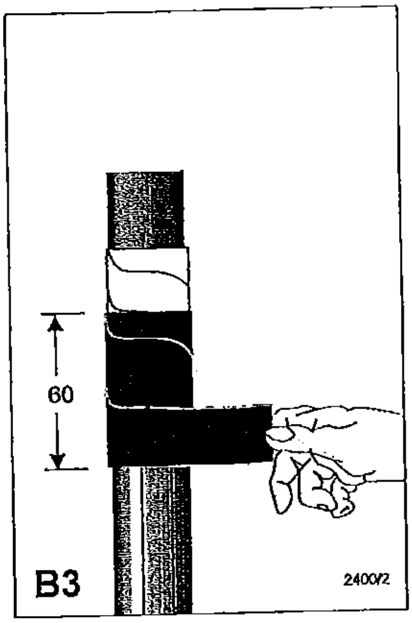

Увийте един слой уплътнителна лента (червена) с малко припокриване и леко разтягане около края на външната обвивка 60 mm.Огънете екрана от телове обратно върху външната обвивка. Избягвайте пресичане на отделните телове. Фиксирайте теловете с лента.

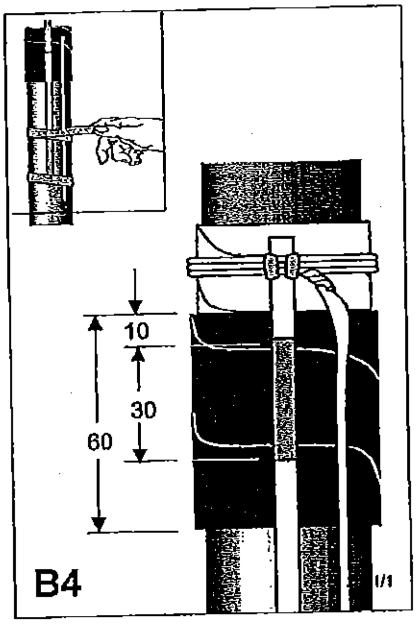



Отрежете жилото в съответсвие с чертежа. Премахнете екрана съгласно чертежа. Повърхността на изолацията не трябва да има следи от полупроводим материал. Забележка: не наранявайте изолацията, почистете от неравности






**B. Кабел с екран от ленти**
)т‚ ете жилото съгласно чертежа. Iремахнете външната обвивка на азстояние от 190 mm. Премахнете екрана т метални ленти до 20 mm от отреза на ъншната обвивка. Премахнете олупроводимиятекрана на жилото до 50 mm т отреза на външната обвивка. Iовърхността на изолацията не трябва да ма следи от полупроводим материал. Iабележка: не наранявайте золацията, почистете от неравности

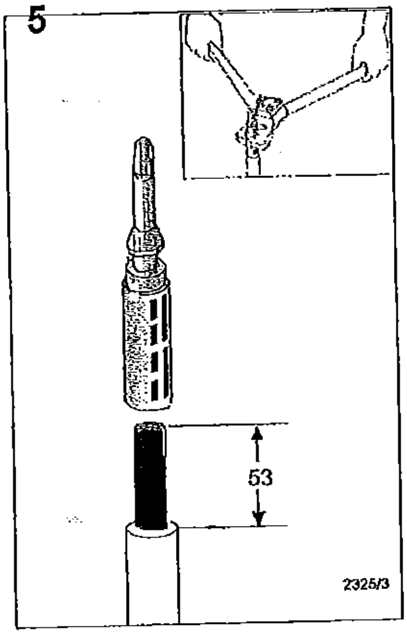
Увийте един слой уплътнителна лента (червена) с малко припокриване и леко разтягане около края на външната обвивка 60 mm.

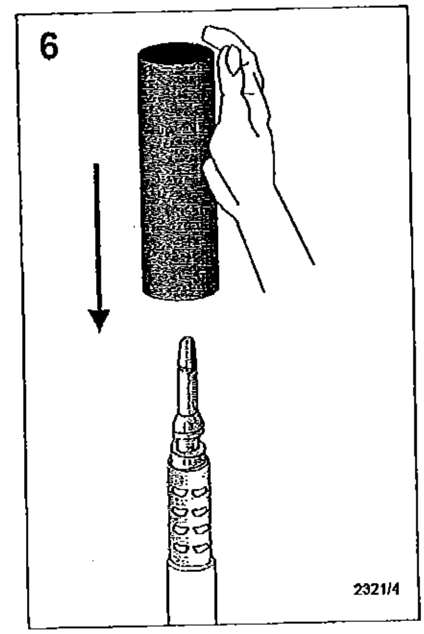
Фиксирайте заземителното въже към металния екран, така че приблизително 300 mm да остане свободният край. Оформете 30 mm преграда срещу влага като започнете 10 mm под мастик лентата.Фиксирайте заземителното въже с лента.

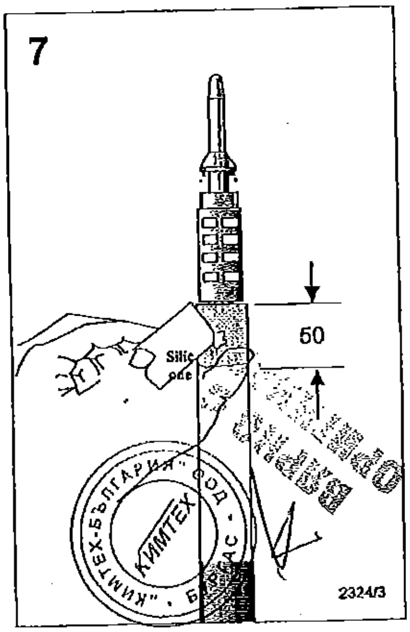
**Изпълнение на адаптора**
Отрежете изолацията както е показано на чертежа.Монтирайте конектора с инструмент за кербоване за алуминий в съответствие с размера показан на съединителя. Почистете и обезмасл. изол. на жилото и съединителя. Забележка: Използвайте само кербовъчни накрайници с мин. ширина на раб. повърхност7 mm .

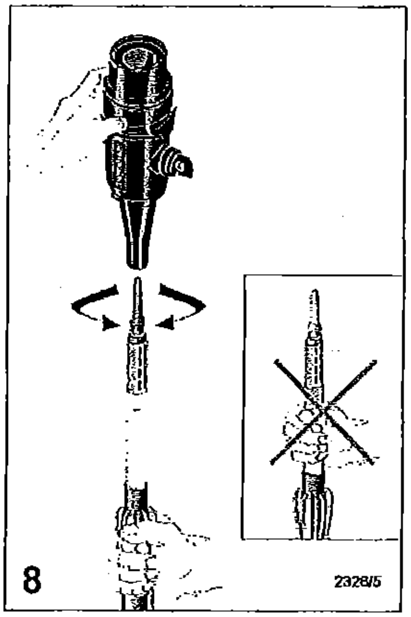
Проверете позицията на фазите и поставете съответно маркираната тръба върху кабела.

Нанесете силиконова смазка до края на изолацията на разстояние от около 50mm.

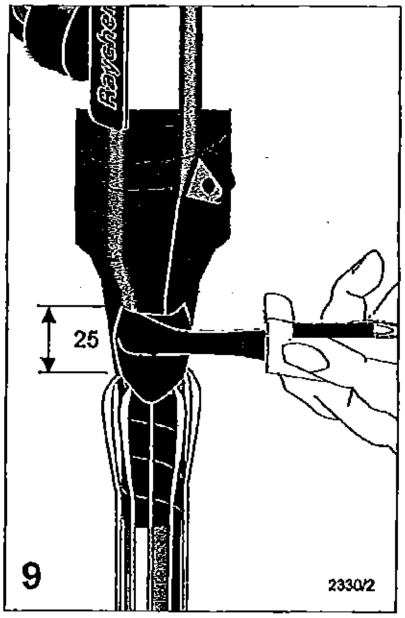


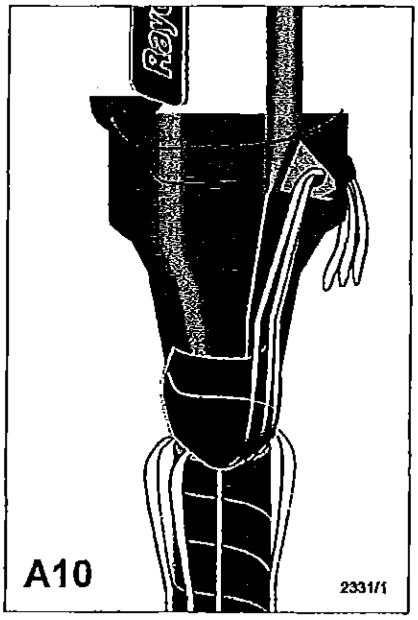






Напъхайте тялото на адаптора върху подготвеният кабел.Уверете се, че щифта е захванал тялото.Не трябва да е възможно да се измъкне обратно ако това е направено правилно.Точката за изпитване на адаптора трябва да е достъпна за измерване.
Note: Не пипайте изолацията.

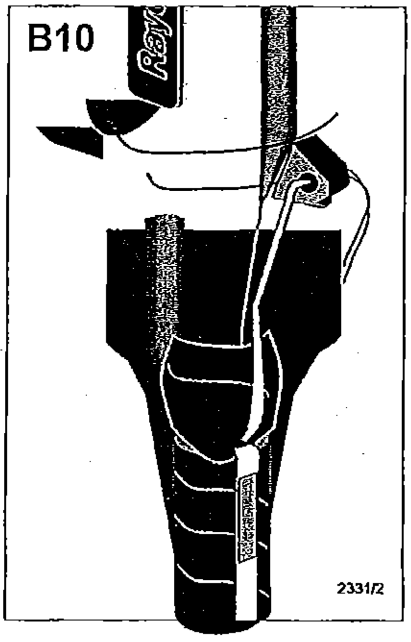



Увийте уплътнителна лента /червена/ между края на външната изолация и адаптора с дължина 25мм.
Сложете достатъчно уплътнителна лента, за да се постигне плавен преход от външната обвивка към адаптора.

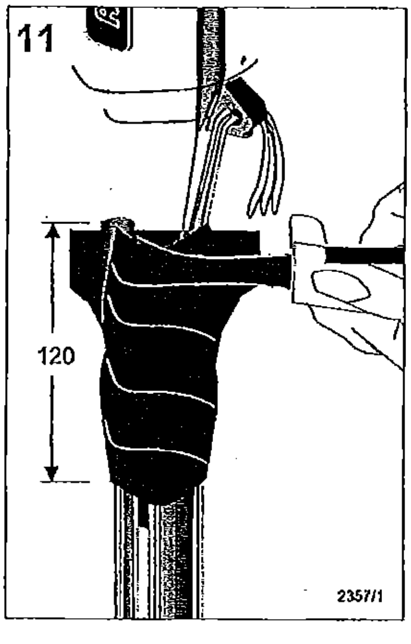



**А. Екран от телове**
Поставете 3 екраниращи телове и ги промушете през отвора на адаптора. Още не ги увивайте заедно.

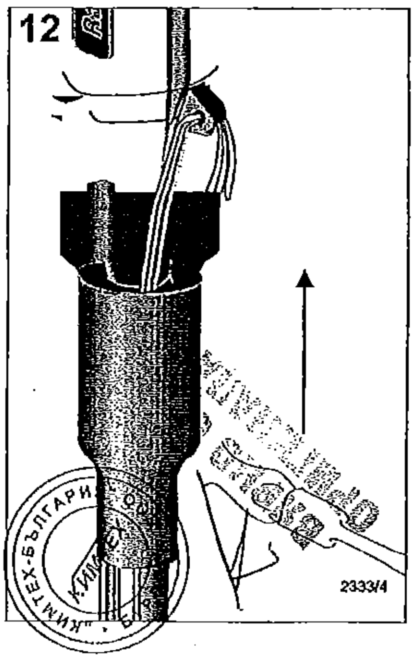
**В. Екран от ленти**
Вземете края на телта и я промушете през отвора адаптора. Още не я увивайте.

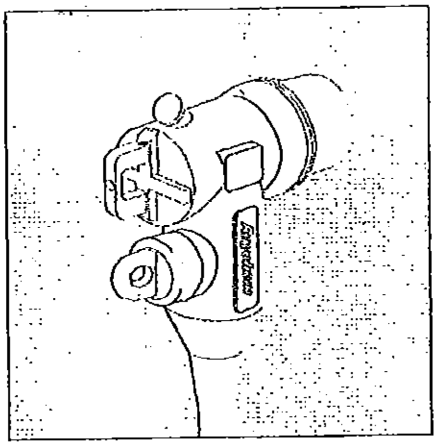



Започнете от долния край на предно положената лента и увивайте на горе уплътнителна лента /червена/ около кабела и адаптора на разстояние 120 mm.




Позиционирайте тръбата така, че частта увита с лента да е напълно покрита и свийте с горелка като започнете от долу нагоре по посока на адаптора.





# Инструкция за монтаж EPP-0470-2/00

## Екраниран адаптор 250А за едножилен пластмасов кабел 12 до 24 kV без броня (с тръба за маркиране на фазите)

Тип RSES

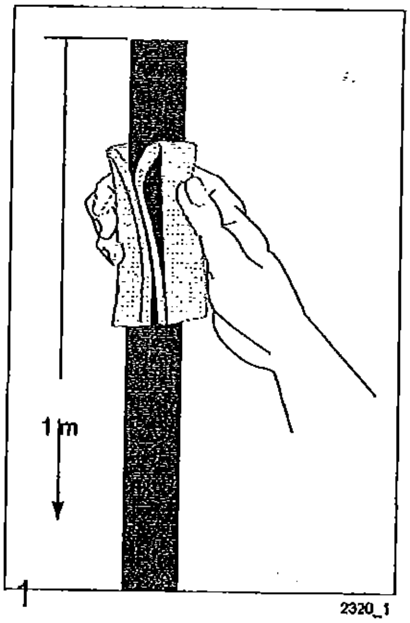

Tyco Electronics Raychem GmbH
Energy Division
Finsinger Feld 1
85521 Ottobrunn
Munich, Germany
Tel. ++49-89-6089-0
Fax ++49-89-6096345

**Препоръки за безопасност**

Важно е да се спазват съответните правила за безопасност при работа с оборудване високо напрежение. За точна информация относно безопасността моля свържете се с официалния представител.

## Преди монтажа

Проверете, че комплекта е предназначен за кабела. Проверете етикета на комплекта и заглавието на Инструкцията за монтаж. Възможно е компонентите или стъпките на работа да са променени, в сравнение с тези от предходния път, в който сте монтирали този продукт. Внимателно прочетете и следвайте стъпките в Инструкцията за монтаж.




## Подготовка на кабела

Почистете и обезмаслете края на външната обвивка на дължина от 1 метър с разтворител.

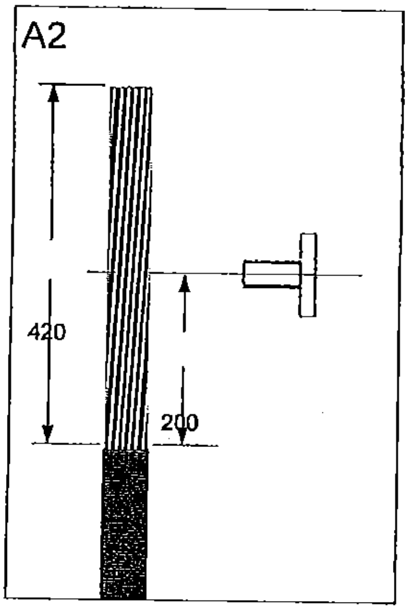
## А. Кабел с екран от телове

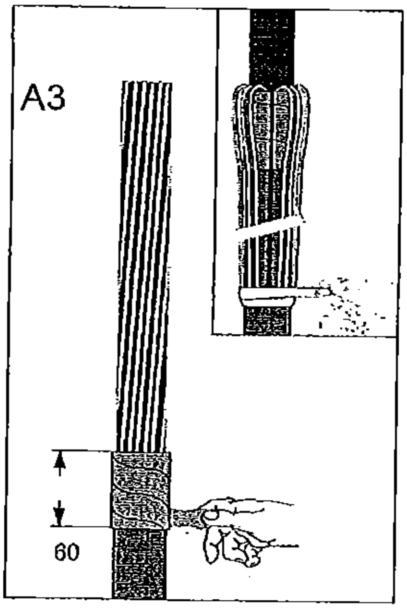
Позициониране на кабела. Маркирайте външната обвивка на 200мм под края на втулката. отрежете кабелна на 420мм над маркировката и премахнете външната обвивка до този размер.

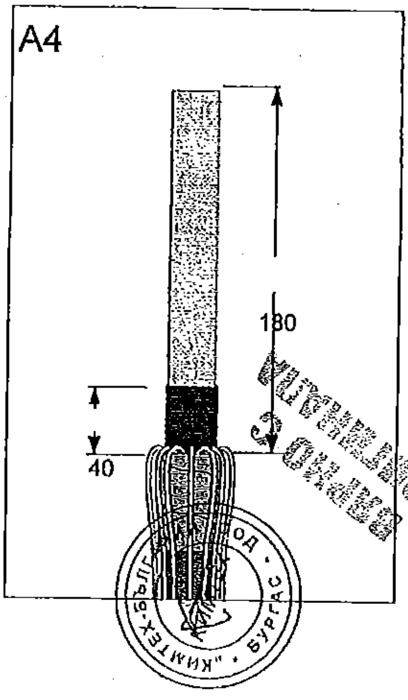
Увийте един слой уплътнителна лента (червена) с малко припокриване и леко разтягане около края на външната обвивка 60 мм. Огънете екрана от телове обратно върху външната обвивка. Избягвайте пресичане на отделните телове. Фиксирайте теловете с лента.

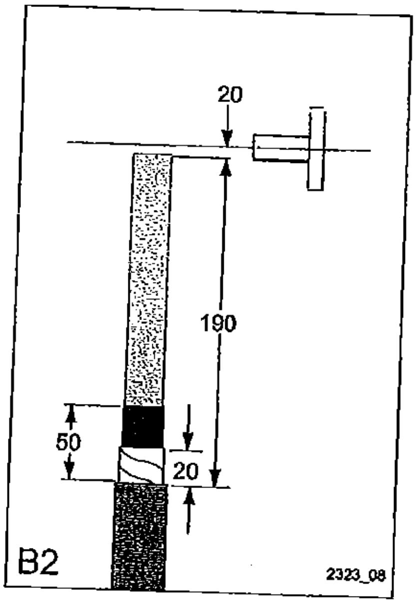
Отрежете жилото в съответствие с чертежа. Премахнете екрана съгласно чертежа. Повърхността на изолацията не трябва да има следи от полупроводим материал.

Забележка: не наранявайте изолацията почистете от неравности.

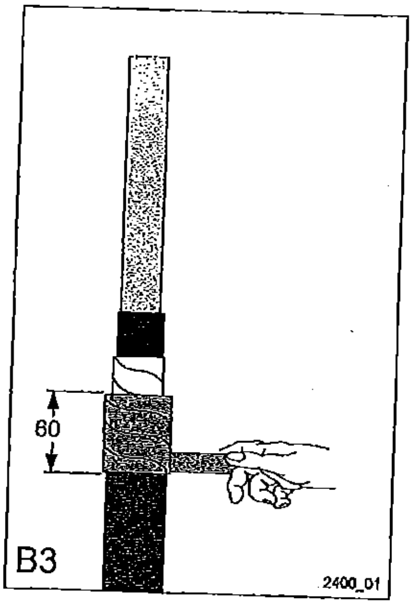


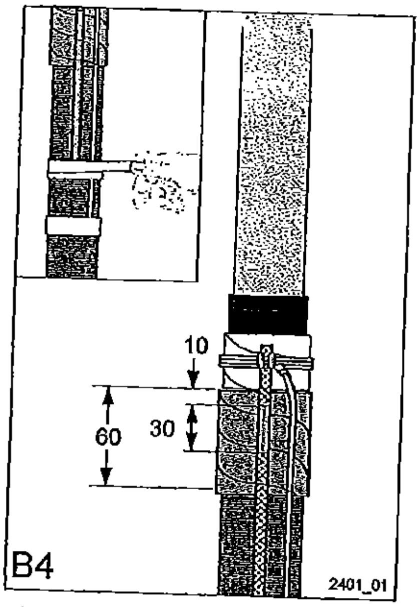






В. Кабел с екран от ленти
Отрежете жилото съгласно чертежа. Премахнете външната обвивка на Разстояние от 190 mm. Премахнете полупроводимия екран на жилото до 50 mm от отреза на външната обвивка. Повърхността на изолацията не трябва да има следи от полупроводим материал.
Забележка: не наранявайте изолацията, почистете от неравности.




Увийте един слой уплътнителна лента /червена/ с малко припокриване и лека разтягане околокрая на на външната обвивка 60мм.

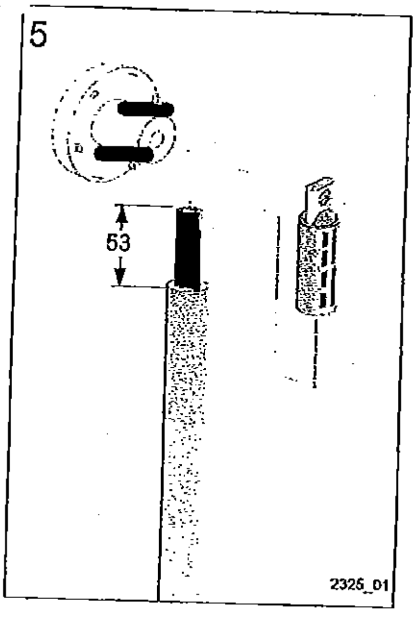


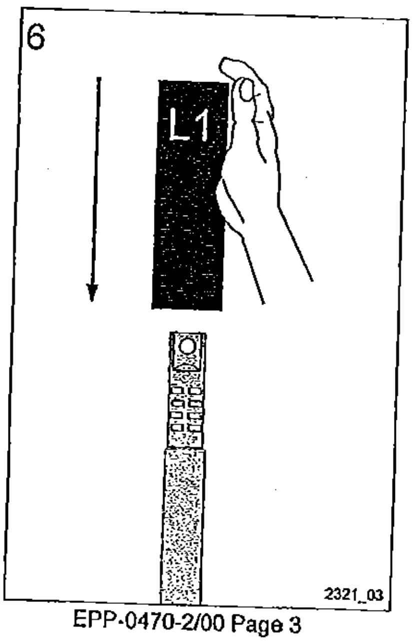

Фиксирайте заземителното въже, така, че приблизително 300мм да остане свободния край. Оформете 30mm преграда срещу влага като започнете 10мм по д мастик лентата. Фиксирайте заземителното въже с лента.

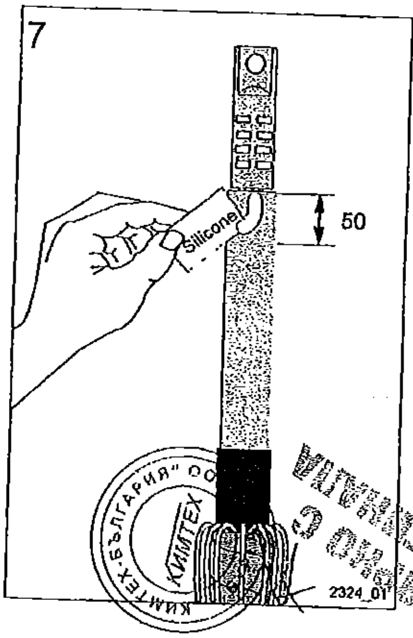
Отрежете изолацията както е показано на чертежа. Монтирайте кабелна обувка на проводника, така че отвора на кабелната обувка и втулката да са на една линия. Монтирайте кабелната обувка с инструмент за кербоване за алуминий в съответствие с размера показан на обувката.
Забележка: използвайте само кербовъчни накрайници с дължина на на раб. повърхност 7 мм.

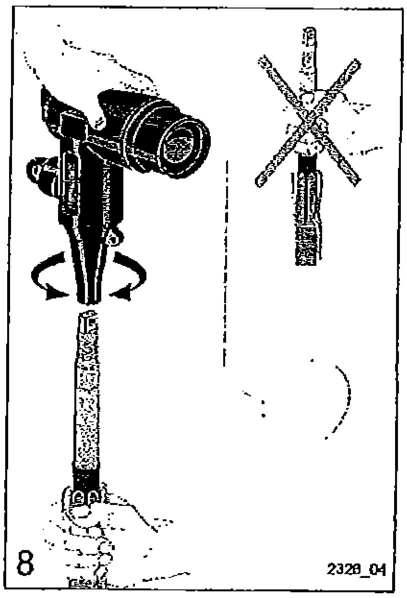
Почистете и обезмаслете изолацията на жилата и обувката. Проверете позицията на фазите и поставете съответно маркираната тръба върху фазите.

Нанесете силиконова смазка до края на изолацията на разстояние от около 50мм.

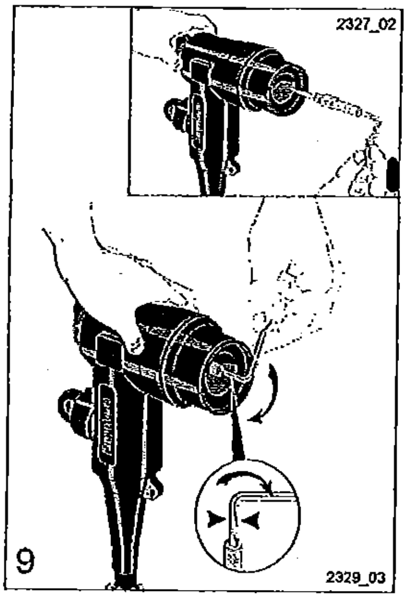


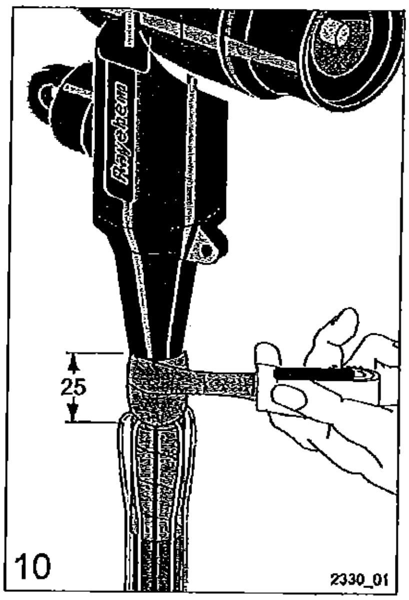






Напъхайте тялото на адаптора върху подготвения кабел. Предният край на адаптора трябва да сочи към втулката. Отвора на кабелната обувка и и втулката трябва да са на една линия.
Забележка: не пипайте изолацията .

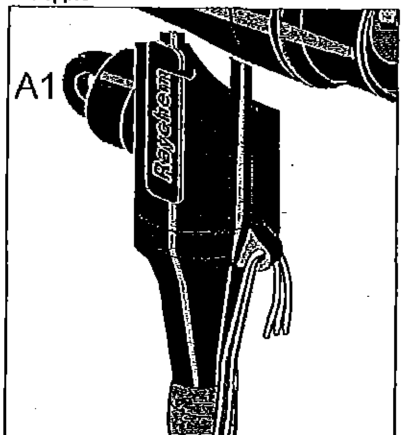



Вкрайте свърващия щифт в адаптора и я закрепете с шестограмен ключ.
Завъртете докато ключът се деформира.



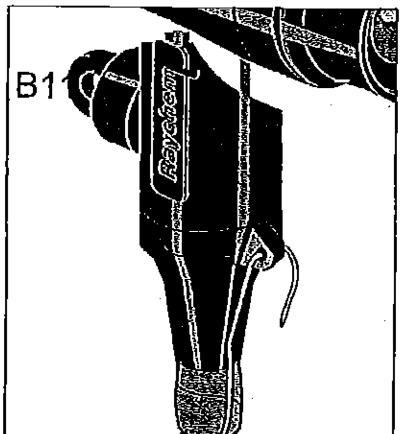

Увийте уплътнителна лента /червена/ между края на външната изолация и адаптора с дължина 25мм.
Сложете достатъчно уплътнителна лента, за да се постигне плавен преход от външната обвивка към адаптора.

A.Екран от телове
Поставете 3 екраниращи телове и ги промушете през отвора на адаптора. Още не ги увивайте заедно



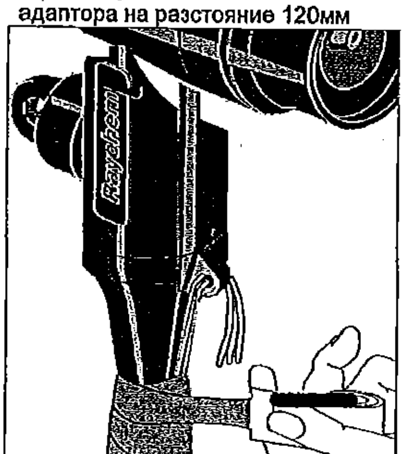

2332_01

B. Екран от ленти
Вземете края на лента и я промушете през отвора на адаптора. Още не я увивайте.

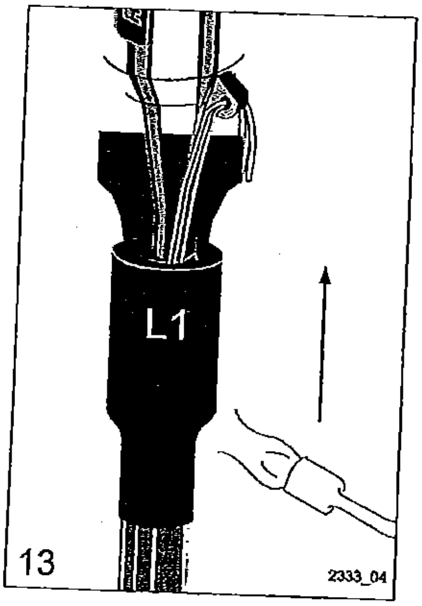


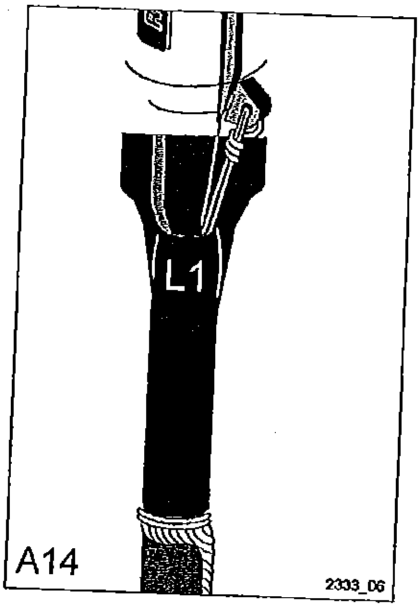

2332_02

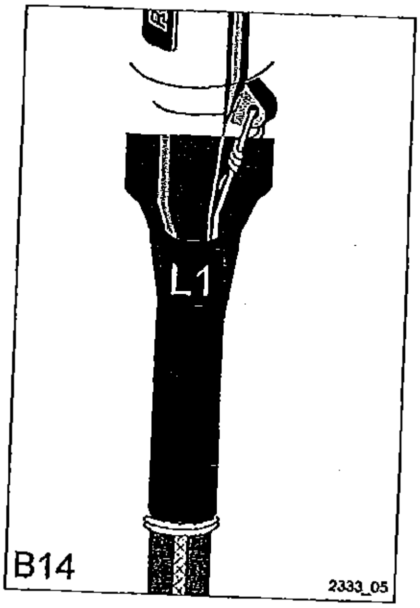
Започнете от долния край на предходно сложената лента и увивайте нагоре уплътнителна лента /червена/ около кабела и адаптора на разстояние 120мм



2357_01




Позиционирайте така тръбата, че частта увита с лента да е напълно покрита и свийте с горелка като започнете от долу на горе по посока на адатора.

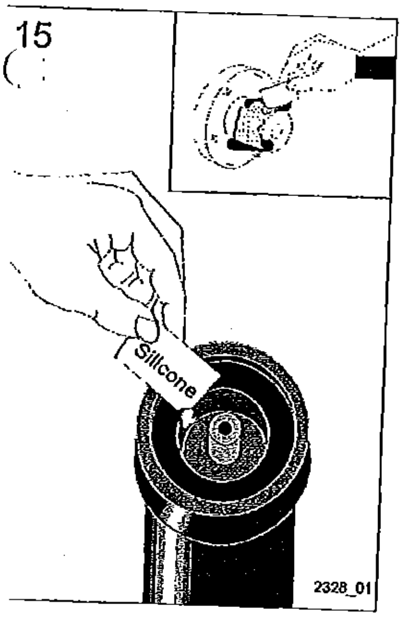
А. Екран от телове
Увийте теловете заедно около дупката на адаптора. Подсигурете теловете с плетенка към изолацията. Увийте екраниращите телове във формата на заземително въже.

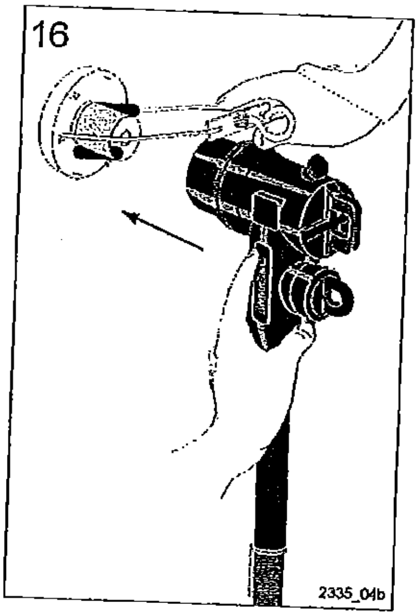
В. Екран от ленти
Увийте теловете заедно около дупката на адаптора. Подсигурете заземителното въже към изолацията с плетенка.

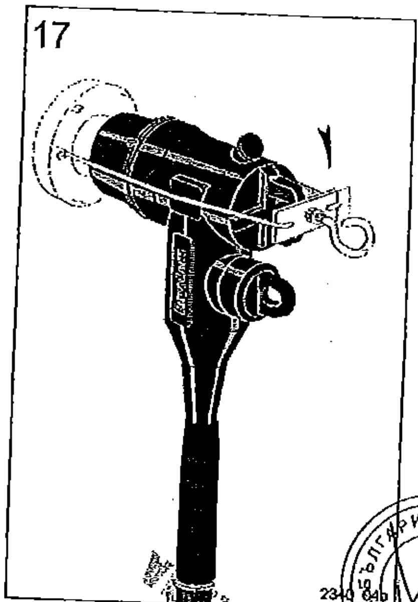
Нанесете силиконова смазка във прохода и във вътрешната повърхност на свързаният адаптор.

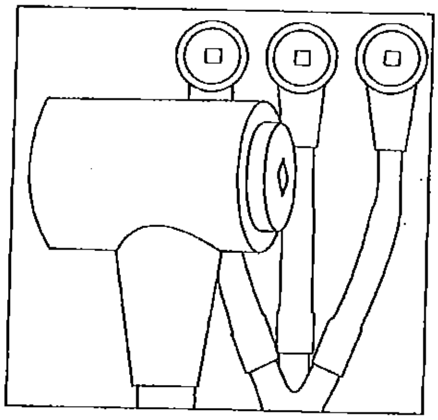
Закачете скобите в прохода.
Пъхнете адаптора в прохода.

Центрирайте скобата към адаптора и я закрепете.
Монтажът е готов.





Инструкция за монтаж
**EPP-0271-BG-12/94**

Изолирани
Т-адаптори за
напрежение до 24 kV
и 630 A за втулки с
резба по DIN 47636

Тип: RICS

Raychem

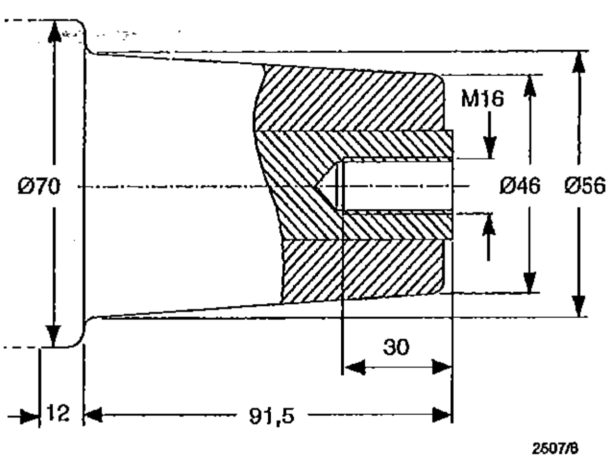
Информацията, съдържаща се в настоящата инструкция е предназначена да опише точния метод за инсталиране на този продукт. Поради това, че Raychem няма възможност да контролира полевите или други условия на монтаж , монтьорът трябва да прилага собствения си опит, когато инсталира този продукт.
Raychem не поема отговорност в случаи на повреди, възникнали в следствие на неправилно използване на продукта.

**Внимание!** Адапторът и главата не са екранирани!
При подадено напрежение повърхността на изолацията ще бъде също под напрежение, затова не трябва да се докосва!
Спазвайте правилата за работа с високоволтови съоръжения.

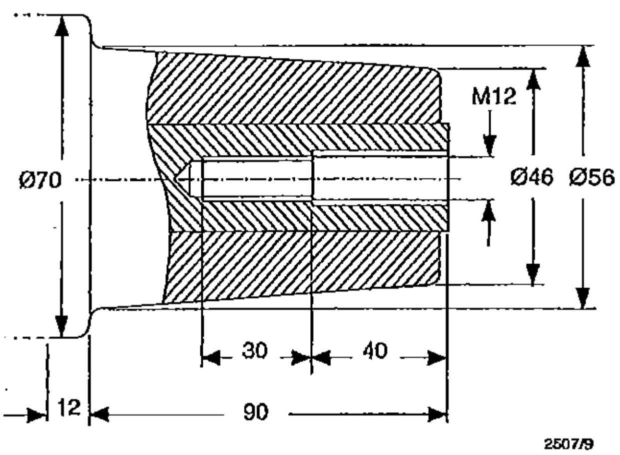
Забележка:
Минимално разстояние между адапторите: 25 mm
между адаптор и земя: 25 mm

**Профил на втулката:** Описаните адаптори да се използват само при размери на втулките отговарящи на тези от схеми **A1** или **A2**.

**A1**

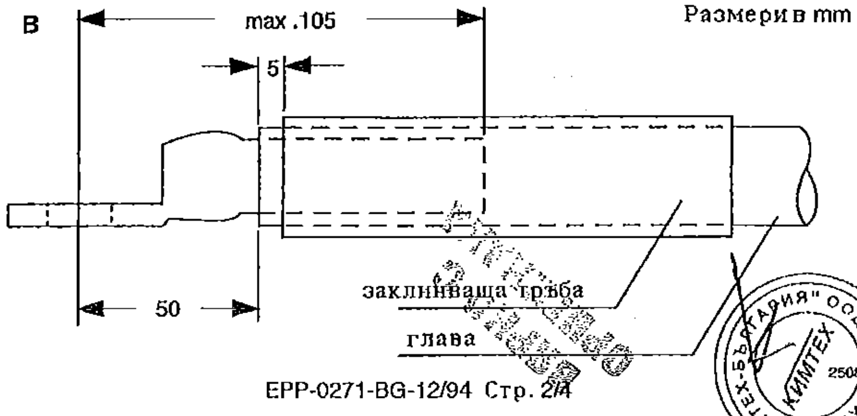



**A2**

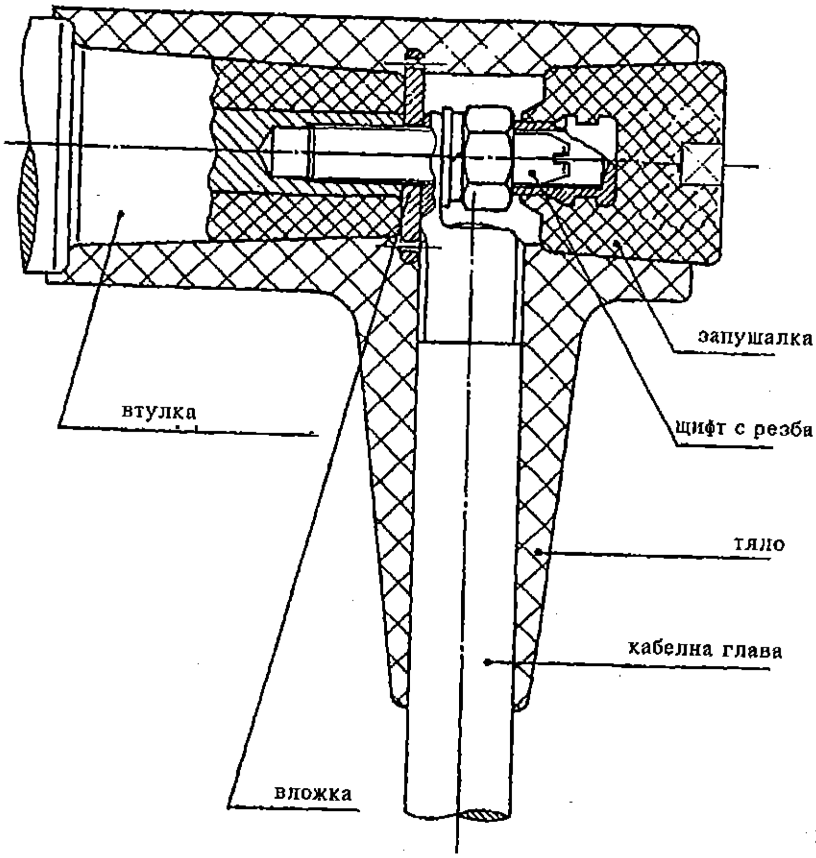



**Общи инструкции** Използвайте кабелни обувки с подходящ отвор.
Отстранете окиса от плоската част на обувката.
След пресоване отстранете острите ръбчета.
Използвайте обувки с подходящ химичен състав, ако е нужно - калайдисани или биметални.
Оставете главата да изстине преди да монтирате адаптора.

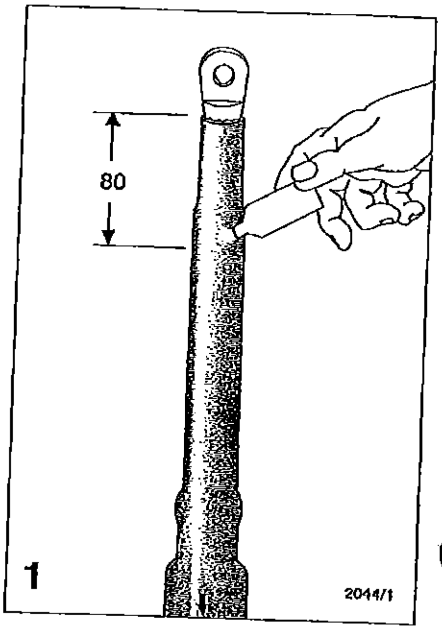
**Монтаж на главата** Монтирайте главата според приложената от Raychem инструкция.
Стрехичките, доставени с главата не са нужни при адаптора RICS.
Главата съдържа херметизиращ лепилен слой върху обувката, който трябва да е на разстояние най-малко 50 mm от центъра на отвора на обувката.
Ако в комплекта на адаптора има заклинваща тръба, свийте я върху главата по размерите от схема **B**.



## С Разположение на детайлите в готов Т-адаптор

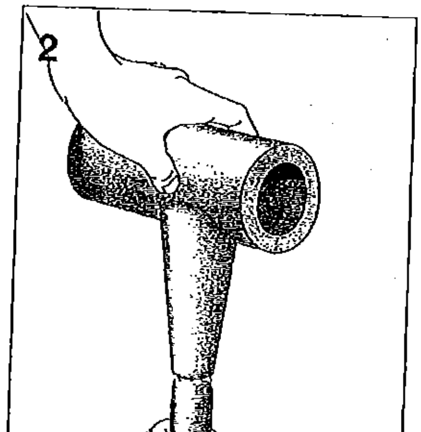



## Монтаж на Т-адаптора

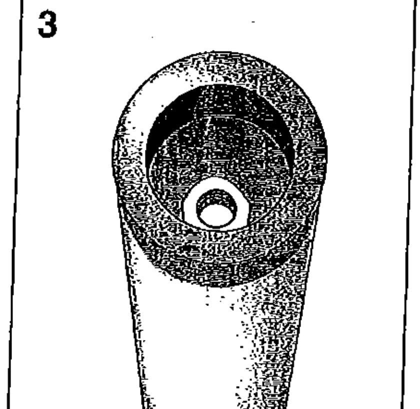



Намажете обилно със силиконова паста края на главата на около 80 mm. Намажете с проводимата паста повърхността на вложката, късия край на адаптора и плоската част на обувката.

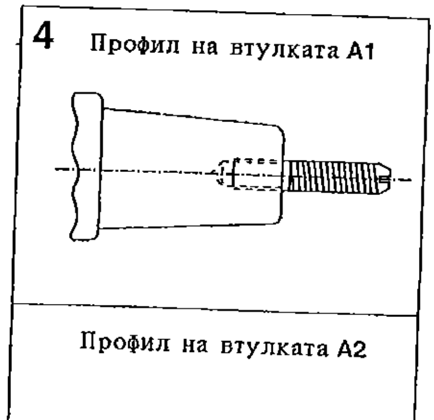
Пъхнете главата в тялото на адаптора. Дългият край на адаптора да сочи втулката.

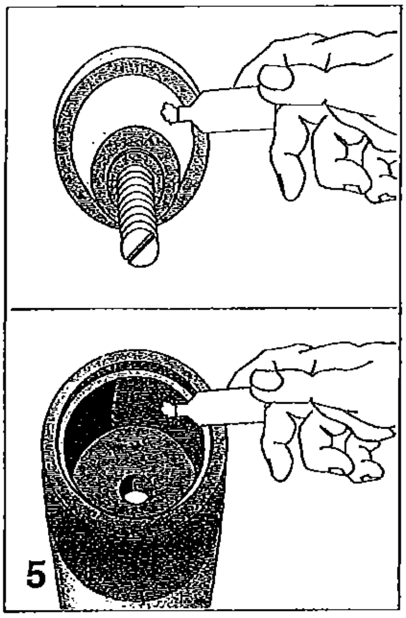



Отворът на кабелната обувка да е на една линия с този на металната вложка на адаптора.

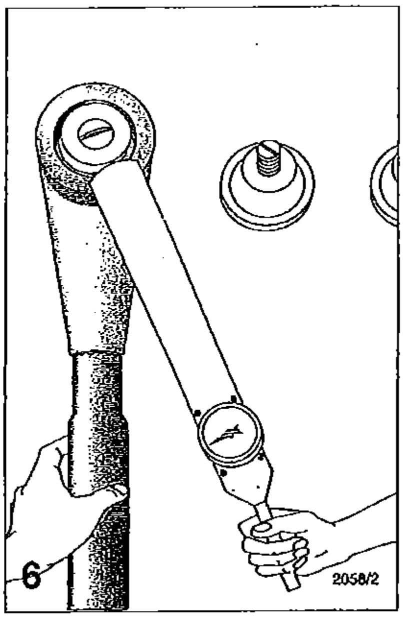



Отстранете щифта, останал във втулката. Завийте щифта на адаптора във втулката и го затегнете добре.



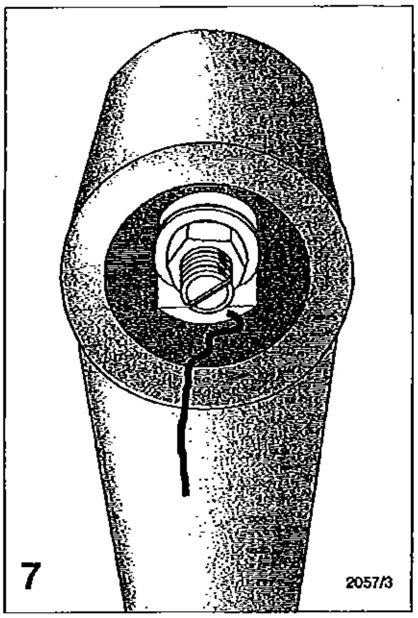



Намажете със силикон втулката и вътрешната повърхност на адаптора.



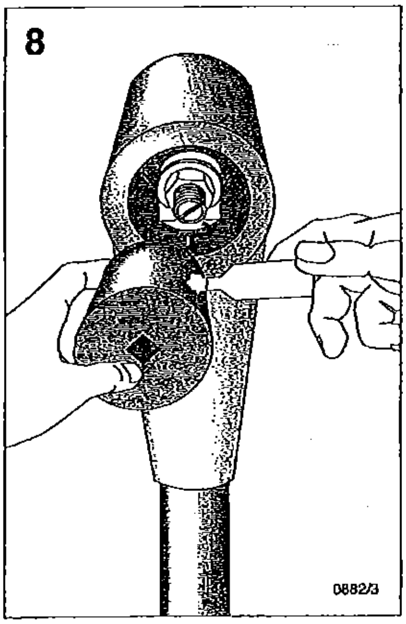

Напъхайте адаптора върху втулката. Вкарайте шайбата и гайката. Затегнете голямата гайка с усилие, показано долу.

| Втулка | Резба | Сила Nm | |
|---|---|---|---|
| | | min | max |
| A1 | M16 | 50 | 70 |
| A1 | M16/M12 | 35 | 40 |
| A2 | M12 | 35 | 40 |

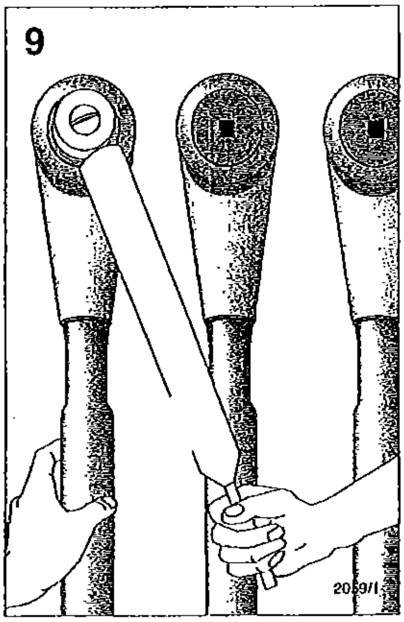



Поставете връвчицата в отвора на адаптора, както е показано на схемата.

Намажете обилно със силикон коничната повърхност на запушалката на адаптора и вътрешната му повърхност.

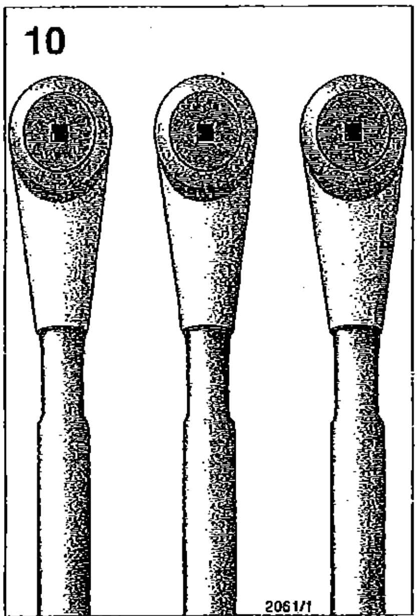



Завийте запушалката в адаптора. Завиването става с голямо усилие. Монтажът е завършен при усещане на голямо съпротивление. Не пренатягайте! Издърпайте връвчицата, за да освободите въздушното налягане в адаптора.




Схемата показва завършения адаптор.

Отстранете всички отпадъци в съответствие със санитарните норми.










Raychem България
ЕРЗЕТ ИИНЖЕНЕРИНГ
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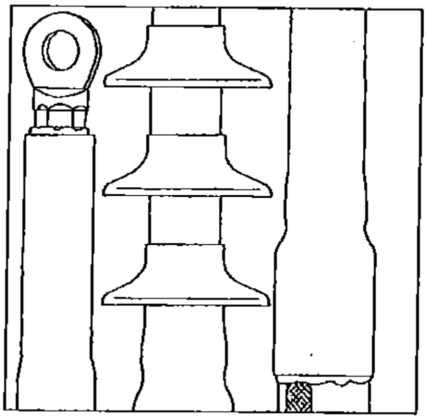
жк Братя Миладинови
бл.57 вх.4А ап.3
тел.факс 0035 956 37102
тел. 0035 956 34198

**Raychem**



Инструкция за монтаж
**ESD-3824-BG-4/05**

## Кабелни глави за кабели с пластмасова изолация без броня, за напрежение до 42 kV

**Тип: POLT**

Raychem – България
Бургас 8000
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Tyco Electronics Raychem GmbH
Energietechnik
Finsinger Feld 1
85521 Ottobrunn
Telefon: ++49-89-6089-0
Telefax: ++49-89-6096345

**Преди работа**

Убедете се, че комплекта, който използвате съответства на кабела.
Сверете етикета на комплекта със заглавието на инструкцията.
Внимателно прочетете инструкцията и следвайте стриктно стъпките на монтажа, защото е възможно да е настъпила промяна в компонентите или последователността на опереците след последния монтаж, който сте извършвали.

**Общи положения**

Препоръчва се използването на пропан-бутан.

Регулирайти горелката така, че да преобладава мекият, жълт пламък.

Избягвайте островърхия, син пламък.

Дръжте горелката наклонена в посоката на свиване така, че да подгрява студените части на тръбата.

Движете пламъка непрекъснато, за да избятвате прегаряне и нагърчване на тръбата.

Почистете с разтворител всички части, които ще контактуват с термотопимото лепило.

Спазвайте инструкциите за работа със съответния разтворител.

При рязане на тръбите използвайте остър нож и избягвайте образуването на ръбчета и неравности.

Свиването на всяка тръба извършвайте, както е посочено в инструкцията.

Убедете се , че тръбата се е свила добре по окръжността на кабела, преди да продължите свиването надлъжно.

Тръбата трябва да се свие гладко, без нагърчвания и профилът на вътрешните елементи да личи добре.

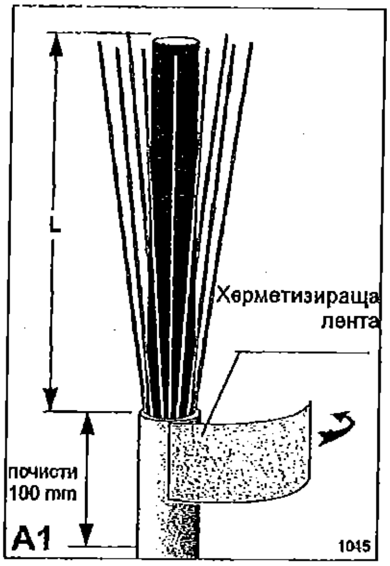
Информацията, съдържаща се в тази инструкция е предназначена да опише точния метод на монтаж на това изделие. Поради това, че Tyco Electronics няма възможност да контролира полевите или други условия на монтаж, монтьорът трябва да прилага собствения си опит, когато инсталира този продукт. Tyco Electronics не носи отговорност в случаи на повреда, възникнала в следствие на неправилен монтаж
Raychem е запазена марка на Tyco Electronics.

## Подготовка на кабела

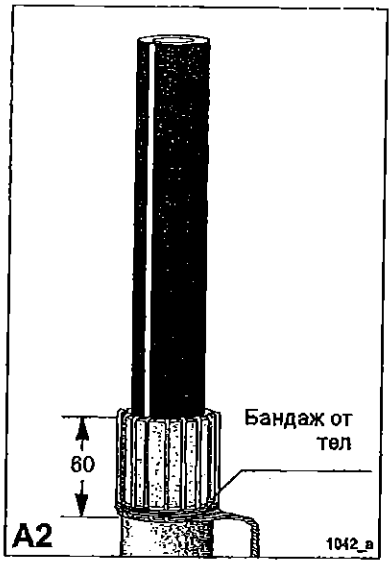
### A. Кабел с екран от телове

Таблица 1

| Тип POLT- | L закрито [mm] | L открито [mm] |
|---|---|---|
| 12 | 240 | 240 |
| 17.5 | 240 | 260 |
| 24 | 260 | 380 |
| 36 | 380 | 440 |
| 42 | 440 | 500 |




Отстранете обвивката по размера **L** (Таблица 1).
Почистете края на обвивката на 100 mm.
Навийте червената херметизираща лента върху края на обвивката.

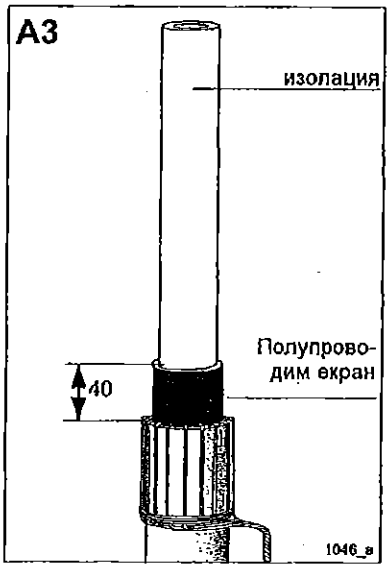


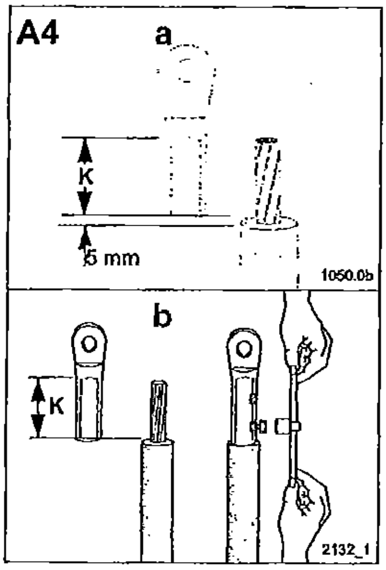

Огънете теловете към обвивката и ги положете без кръстосване върху червената лента.
Превържете ги с бандаж от тел на 60 mm от края на обвивката.
Оплетете теловете в заземително жило.

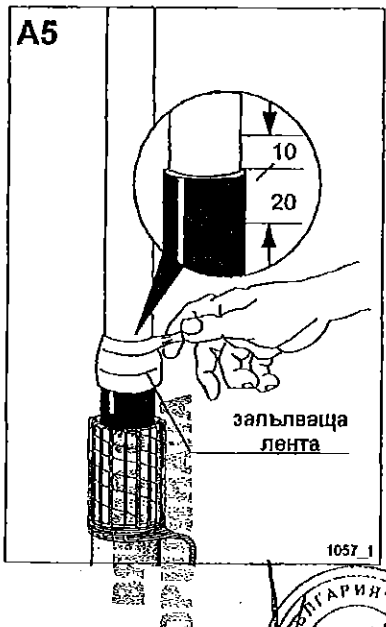
Отстранете полупроводимия екран до 40 mm от обвивката.
Повърхността на изолацията да е абсолютно чиста от проводими частици. Загладете неравностите.
**Забележка:** Не наранявайте изолацията!

Отрежете изолацията по размера **K** от схемата.
a. **Пресови обувки**
Размерът K да не надвишава 110 mm.
Монтирайте обувката.
b. **Винтови обувки**
Монтирайте обувката. Натягайте двата болта равномерно до откъсване на главите им.

Около края на полупроводимия екран навийте лента така, че да покриете 20 mm от екрана и 10 mm от изолацията.
Разпъвайте лентата до около половината от първоначалната и ширина, като се стремите да получите тънък и фин ръб върху изолацията.



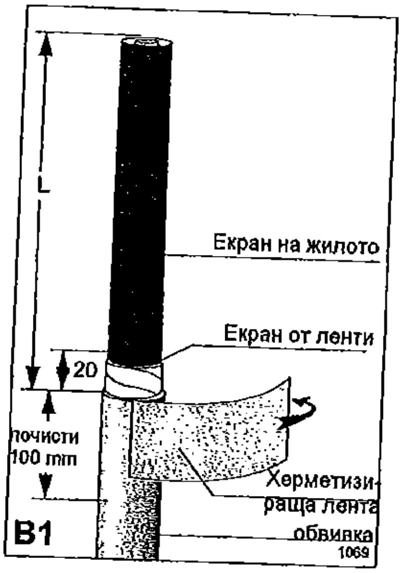



## Подготовка на кабела

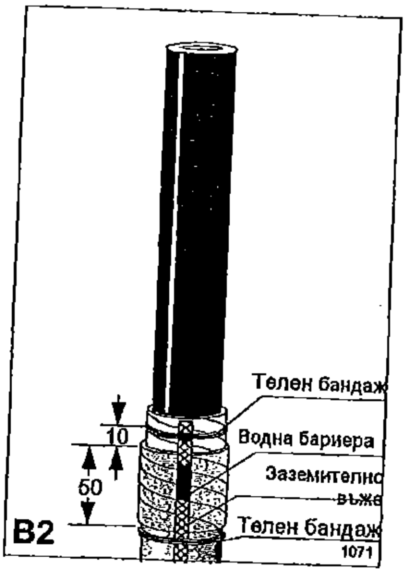
### B. Кабел с екран от ленти

**Таблица 2**

| Тип POLT- | L закрито [mm] | L открито [mm] |
|---|---|---|
| 12 | 250 | 250 |
| 17.5 | 250 | 290 |
| 24 | 290 | 390 |
| 36 | 390 | 450 |
| 42 | 450 | 510 |




Отстранете обвивката по размера L (Таблица 2).
Отстранете металния екран до 20 mm обвивката.
Почистете обвивката на 100 mm.
Навийте червената херметизираща лента върху края на обвивката.

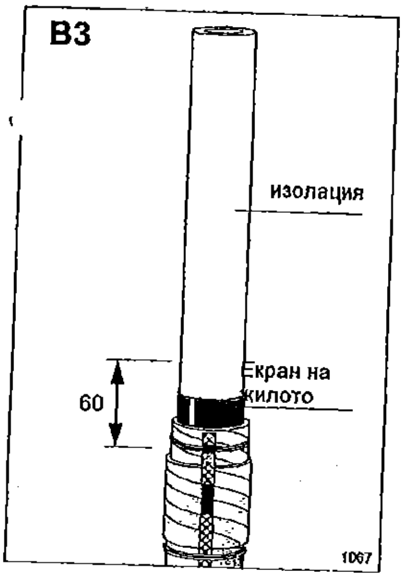


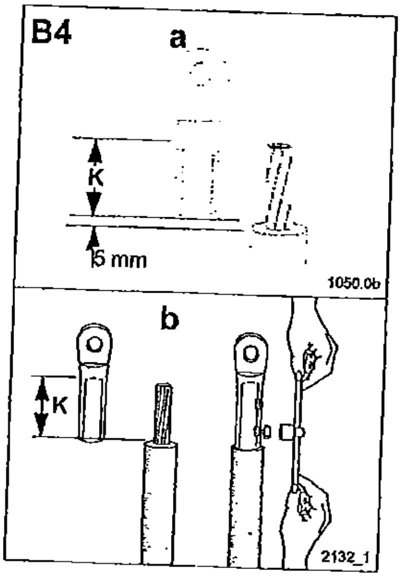

Фиксирайте заземителното вълже към металния екран чрез запояване или друг приет метод.
Водната бариера да легне върху червената лента.
С тел фиксирайте заземителното жило към обвивката непосредствено под червената лента.

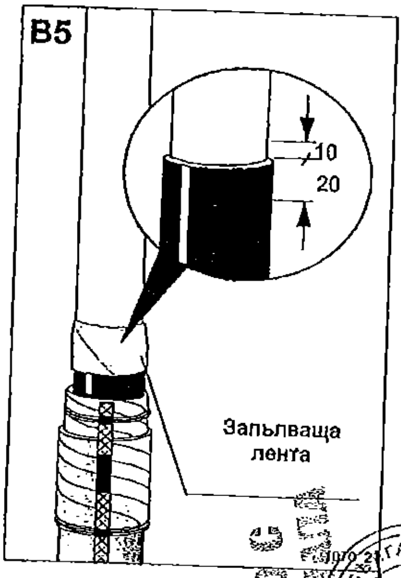
Отстранете полупроводимия екран до 60 mm от обвивката.
Повърхността на изолацията да е абсолютно чиста от проводими частици. Загладете неравностите.
**Забележка:** Не наранявайте изолацията!

Отрежете изолацията по размера K от схемата.
**a. Пресови обувки**
Размерът K да не надвишава 110 mm.
Монтирайте обувката.
**b. Винтови обувки**
Монтирайте обувката. Натягайте двата болта равномерно до откъсване на главите им.

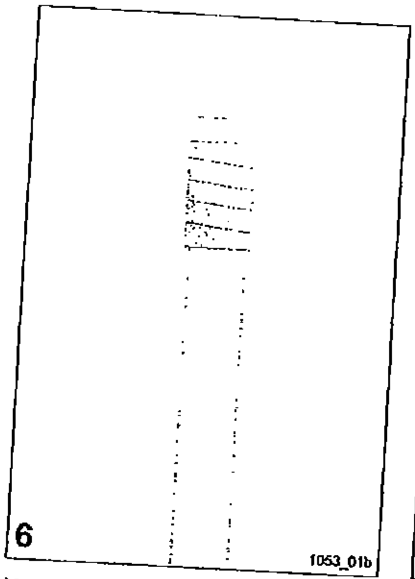
Около края на полупроводимия екран навийте лента така, че да покриете 20 mm от екрана и 10 mm от изолацията.
Разпъвайте лентата до около половината от първоначалната и ширина, като се стремите да получите тънък и фин ръб върху изолацията.



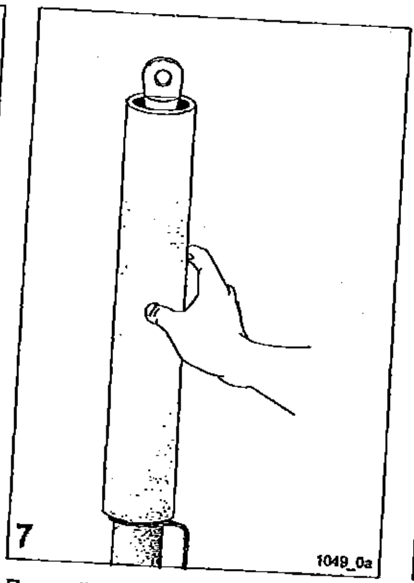



## Изработване на главата

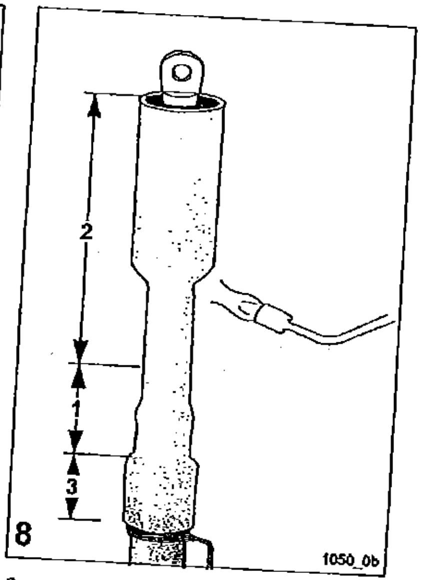



**Уплътняване на кабелната обувка:**
Използвайте червена лента и херметизирайте допълнително кабелната обувка при следните напрежение/сечение.

| | |
|---|---|
| **12kV:** | 10 - 25mm² |
| **17,5kV:** | 16 - 25mm² |
| **24 kV:** | 25 mm² |
| **36kV:** | 35 - 50 mm² |
| **42kV:** | 35 - 50 mm² |




Подгрейте кабелната обувка и налъхайте тръбата до бандажа от тел.



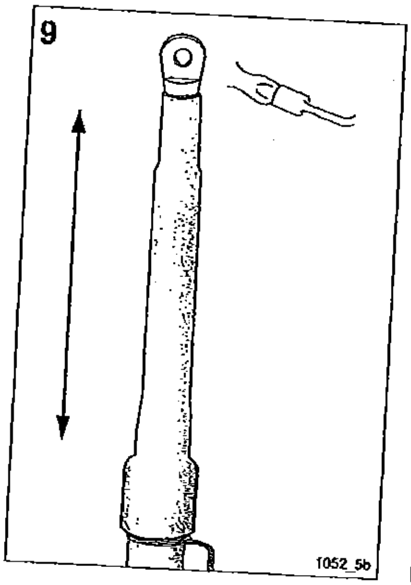

Започнете свиването на тръбата върху края на полупроводимия екран. Продължете свиването към кабелната обувка и накрая - към кабела.
Цифрите на схемата показват последователността на свиване.

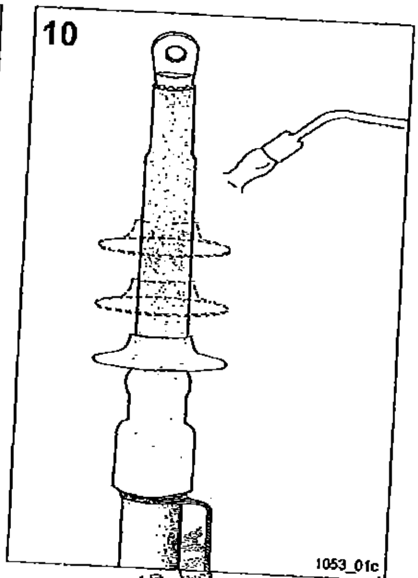
**Кабелната глава за монтаж на закрито е готова**

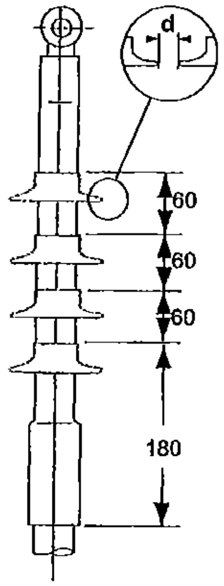
**Забележка:** След монтаж на главата върху шината е желателно главата да се нагрее допълнително до изтичането на зелена маса от вътрешността.
Оставете я да изстине, преди да я подложите на механически стрес.

**За монтаж на открито:**

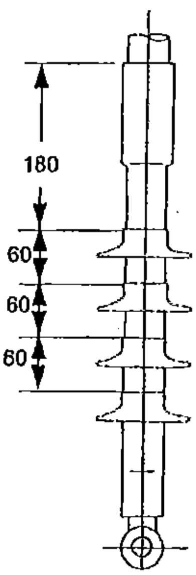
Свийте стрехичките по размерите от таблицата на Стр.6.
Започнете свиването от най-долната стрехичка.



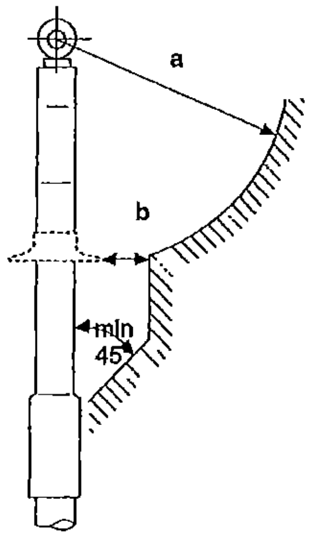



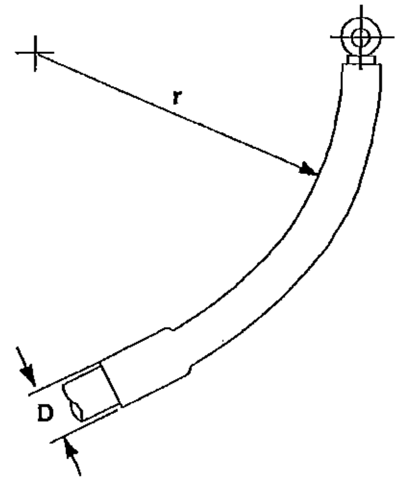



| Брой стрехички на жило | | |
|---|---|---|
| kV | закрито | открито |
| 12 | 0 | 1 |
| 17.5 | 0 | 3 |
| 24 | 0 | 3 |
| 36 | 0 | 4 |
| 42 | 0 | 4 |



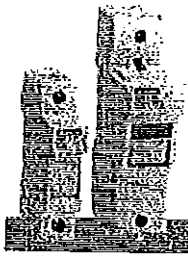

**Минимален радиус на огъване и отстояния**




| Min. отстояния | Max. Напрежение в kV | | | | |
|---|---|---|---|---|---|
| | 12 | 17,5 | 24 | 36 | 42 |
| a Въздушни | По местните спесификации | | | | |
| b Ф/Ф и Ф/земя в mm | 15 | 20 | 25 | 35 | 45 |
| d Между стрехичките в mm | 10 | 15 | 20 | 25 | 35 |
| r (min. Радиус на огъване) = 15 x D | | | | | |

**Молим, отстранете всички отпадъци в съответствие с екологичните и санитарни норми**

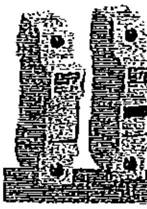


Page 12-2

**AC FUSE HOLDERS**
- Version without indicator: 1P, 1P+N, 2P, 3P, 3P+N
- Version with indicator: 1P
- For fuses 10x38, 14x51 and 22x58mm IEC class gG or aM.
- Rated current: 32A, 50A, 125A
- Rated voltage: 690VAC.

Page 12-2

**AC FUSE HOLDERS CLASS CC FOR NORTH AMERICAN MARKET**
- Version without indicator: 1P, 2P, 3P
- Version with indicator: 1P
- For 10x38mm UL/CSA class CC fuses
- Rated current: 30A
- Rated voltage: 600VAC.



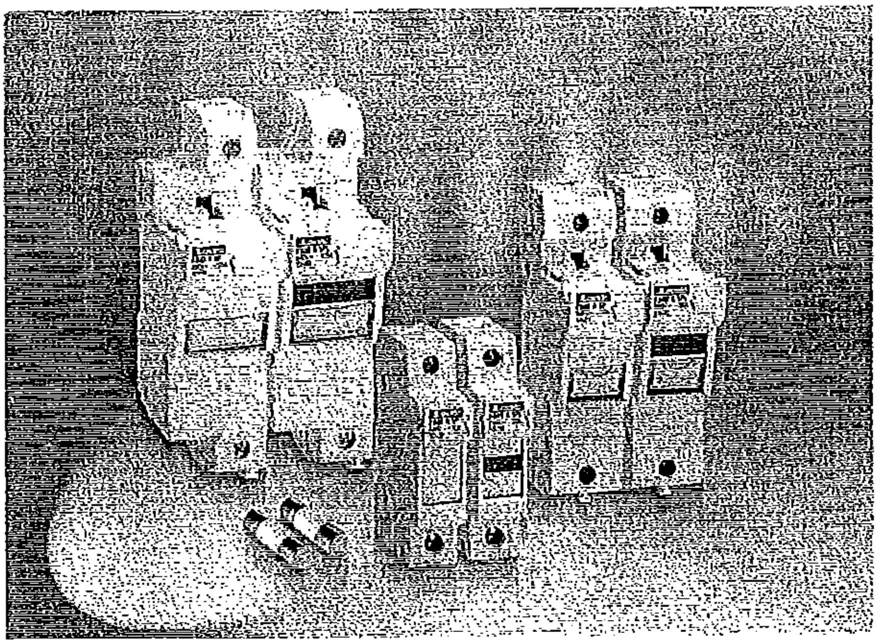
Page 12-3

**DC FUSE HOLDERS FOR PHOTOVOLTAIC APPLICATIONS**
- Version without indicator: 1P, 2P
- Version with indicator: 1P, 2P
- For 10x38mm IEC class gPV fuses
- Rated current: 32A
- Rated voltage: 1000VDC
- IEC utilisation category: DC20B.

Page 12-3

**DC FUSES FOR PHOTOVOLTAIC APPLICATIONS**
- 10x38mm, IEC class gPV
- Rated current: 20A
- Rated voltage: 1000VDC.

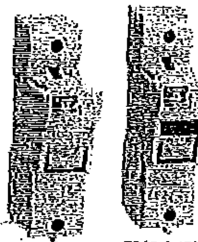
# FUSE HOLDERS



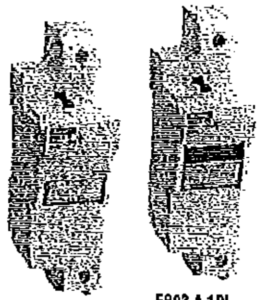
- Modular size for 10x38, 14x51 and 22x58mm fuses
- Finger safe - IP20 IEC degree of protection against accidental contact with live parts and with sealable cover for operators' safety
- Version with status indicator to quickly determine if the fuse is still operative or needs to be replaced
- UL and CSA certified versions.

## Fuse holders UL Recognized and CSA certified

FB01 A... FB01 A 1PL



FB02 A... FB02 A 1PL



FB03 A... FB03 A 1PL

new

| Order code | Pole arrangement | Status indicator | DIN size | Qty per pkg | Wt |
|---|---|---|---|---|---|
| | | | n° | n° | [kg] |
| For 10x38mm fuses. 32A rated current at 690VAC. | | | | | |
| FB01 A 1P | 1P | — | 1 | 12 | 0.066 |
| FB01 A 1PL | 1P | YES | 1 | 12 | 0.065 |
| FB01 A 1M⊘ | 1P+N | — | 1 | 12 | 0.062 |
| FB01 A 1N | 1P+N | — | 2 | 6 | 0.134 |
| FB01 A 2P | 2P | — | 2 | 6 | 0.132 |
| FB01 A 3P | 3P | — | 3 | 4 | 0.188 |
| FB01 A 3N | 3P+N | — | 4 | 3 | 0.260 |
| For 14x51mm fuses. 50A rated current at 690VAC. | | | | | |
| FB02 A 1P | 1P | — | 1 | 12 | 0.113 |
| FB02 A 1PL | 1P | YES | 1 | 12 | 0.114 |
| FB02 A 1N | 1P+N | — | 2 | 6 | 0.237 |
| FB02 A 2P | 2P | — | 2 | 6 | 0.224 |
| FB02 A 3P | 3P | — | 3 | 4 | 0.335 |
| FB02 A 3N | 3P+N | — | 4 | 3 | 0.460 |
| For 22x58mm fuses. 125A rated current at 690VAC. | | | | | |
| FB03 A 1P | 1P | — | 1 | 12 | 0.167 |
| FB03 A 1PL | 1P | YES | 1 | 12 | 0.167 |
| FB03 A 1N | 1P+N | — | 2 | 6 | 0.354 |
| FB03 A 2P | 2P | — | 2 | 6 | 0.334 |
| FB03 A 3P | 3P | — | 3 | 4 | 0.500 |
| FB03 A 3N | 3P+N | — | 4 | 3 | 0.720 |

⊘ Not certified.

**Operational characteristics**
- IEC rated voltage Ue:
  - 690VAC (FB01 A 1M excluded)
  - 400VAC (FB01 A 1M only)
- IEC rated current Ie:
  - FB01 A: 32A
  - FB02 A: 50A
  - FB03 A: 125A
- IEC utilisation category:
  - FB01 A: AC22B 500V, AC21B 690V (except FB01 A 1M: AC22B 400V)
  - FB02 A: AC22B 500V, AC21B 690V
  - FB03 A: AC21B 690V
- Suitable for IEC fuse class: gG and aM
- IEC degree of protection: IP20.

**Certifications and compliance**

Certifications obtained:

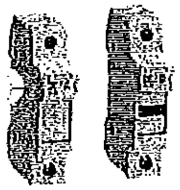
| Type | UL Recognized for USA (File E343395) | CSA certified (File 252040 class 6225) | UL Recognized for USA and Canada (File E343395) |
|---|---|---|---|
| FB01 A 1P, FB01 A 1PL, FB01 A 1N | ● | ● | |
| FB02 A... | | | ● |
| FB03 A... | | | ● |

● Certification obtained.

"UL Recognized": Products having this type of marking are intended for use as components of complete workshop-assembled equipment.

Compliant with standards: IEC/EN 60269-1, IEC/EN 60269-2, IEC/EN 60947-1, IEC/EN 60947-3, UL 4248-1, UL 4248-4, CSA C22.2 n°4248.1, CSA C22.2 n°4248.4.

## Fuse holders



FB01 B... FB01 B 1PL

new

| Order code | Pole arrangement | Status indicator | DIN size | Qty per pkg | Wt |
|---|---|---|---|---|---|
| | | | n° | n° | [kg] |
| For 10x38mm fuses. 32A rated current at 690VAC. | | | | | |
| FB01 B 1P | 1P | — | 1 | 12 | 0.062 |
| FB01 B 1PL | 1P | YES | 1 | 12 | 0.064 |
| FB01 B 1N | 1P+N | — | 2 | 6 | 0.127 |
| FB01 B 2P | 2P | — | 2 | 6 | 0.128 |
| FB01 B 3P | 3P | — | 3 | 4 | 0.185 |
| FB01 B 3N | 3P+N | — | 4 | 3 | 0.247 |

**Operational characteristics**
- IEC rated voltage Ue: 690VAC
- IEC rated current Ie: 32A
- IEC utilisation category: AC22B 500V, AC21B 690V
- Suitable for IEC fuse class: gG and aM
- IEC degree of protection IP20.

**Reference standards**

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-3, IEC/EN 60269-1, IEC/EN 60269-2.

## Fuse holders UL Listed and CSA certified for class CC fuses for North American market

FB01 C... FB01 C 1PL

new

| Order code | Pole arrangement | Status indicator | DIN size | Qty per pkg | Wt |
|---|---|---|---|---|---|
| | | | n° | n° | [kg] |
| For 10x38mm fuses. 30A rated current at 600VAC. | | | | | |
| FB01 C 1P | 1P | — | 1 | 12 | 0.070 |
| FB01 C 1PL | 1P | YES | 1 | 12 | 0.072 |
| FB01 C 2P | 2P | — | 2 | 6 | 0.140 |
| FB01 C 3P | 3P | — | 3 | 4 | 0.210 |

NOTE: UL Listed and CSA certified as "Fuseholders, Cartridge Fuse" for use with Class CC fuses. Interrupting rating 200,000 Amps rms symmetrical. Voltage rating 600V. Current rating 30A.

**Operational characteristics**
- IEC rated voltage Ue: 600VAC
- IEC rated current Ie: 30A
- IEC utilisation category: AC22B 600V, AC21B 600V
- Suitable for UL/CSA fuse class: CC
- IEC degree of protection IP20.

**Certifications and compliance**

Certifications obtained: UL Listed (File E343395) and CSA certified (File 252040 class 6225).

Compliant with standards: IEC/EN 60269-1, IEC/EN 60269-2, IEC/EN 60947-1, IEC/EN 60947-3, UL 4248-1, UL 4248-4, CSA C22.2 n°4248.1, CSA C22.2 n°4248.4.

КИМТЕХ ООД БУРГАС

# Fuse holders
**DC fuse holders for photovoltaic applications.**
**Accessories**

## Fuse holders for photovolatic applications

FB01 D 1PL

FB01 D...

| Order code | Pole arrange-ment | Status indicator | DIN size | Qty per pkg | Wt |
|---|---|---|---|---|---|
| | | | n° | n° | [kg] |
| For 10x38mm fuses. 32A rated current at 1000VDC. | | | | | |
| FB01 D 1P | 1P | — | 1 | 12 | 0.064 |
| FB01 D 1PL | 1P | YES | 1 | 12 | 0.065 |
| FB01 D 2P | 2P | — | 2 | 6 | 0.127 |
| FB01 D 2PL | 2P | YES | 2 | 6 | 0.130 |

**Operational characteristics**
- IEC rated voltage Ue: 1000VDC
- IEC rated current Ie: 32A
- IEC utilisation category: DC20B 1000VDC
- Suitable for IEC fuse class: gPV
- IEC degree of protection: IP20.

**Reference standards**
Compliant with standards: IEC/EN 60269-1, IEC/EN 60269-2, IEC/EN 60947-1, IEC/EN 60947-3.

## Fuses for photovoltaic applications

FE01 D...

| Order code | Rated current In | Qty per pkg | Wt |
|---|---|---|---|
| | [A] | n° | [kg] |
| For 10x38mm fuses. 30kA breaking capacity at 1000VDC. | | | |
| FE01 D 00200 | 2 | 10 | 0.008 |
| FE01 D 00400 | 4 | 10 | 0.008 |
| FE01 D 00600 | 6 | 10 | 0.008 |
| FE01 D 00800 | 8 | 10 | 0.008 |
| FE01 D 01000 | 10 | 10 | 0.008 |
| FE01 D 01200 | 12 | 10 | 0.008 |
| FE01 D 01600 | 16 | 10 | 0.008 |
| FE01 D 02000 | 20 | 10 | 0.008 |

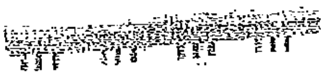
**Operational characteristics**
- IEC rated voltage Ue: 1000VDC
- IEC rated current Ie: 2-20A
- IEC fuse class: gPV

**Reference standards**
Compliant with standards: IEC/EN 60269-6

## Accessories

FBX 00

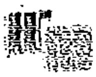
FBX 01
FBX 02



FBX 05

FBX 07

FBX 08



FBX 11

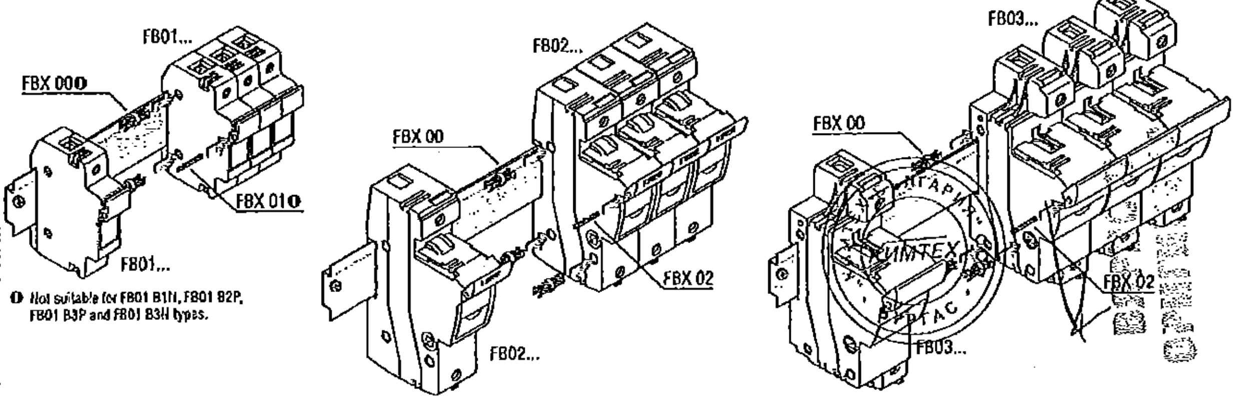
| Order code | Description | Qty per pkg | Wt |
|---|---|---|---|
| | [A] | n° | [kg] |
| FBX 00❶ | Coupling clip for 10x38, 14x51 and 22x58mm sizes❶ | 100 | 0.003 |
| FBX 01❶ | Coupling pin for 10x38mm size❶ | 100 | 0.005 |
| FBX 02 | Coupling pin for 14x51 and 22x58mm sizes | 100 | 0.008 |
| For FB01 A... and FB01 B... types. | | | |
| FBX 05 | Three-phase connection busbar, for 57 modules in total, 1m/3.3ft long | 10 | 0.465 |
| FBX 07 | One-pole terminal for 25mm² max conductor | 25 | 0.010 |
| FBX 08 | One-pole terminal for 50mm² max conductor | 25 | 0.020 |
| FBX 11 | End cap for FBX05 busbar | 50 | 0.001 |

❶ Not suitable for FB01 B1N, FB01 B2P, FB01 B3P and FB01 B3H types.

**General and operational characteristics**
THREE-PHASE BUSBAR
- Central point of power supply: 130A max
- Side point of power supply: 80A max
- Pitch: 18mm/0.7in
- Busbar section: 10mm²
- Number of modules/poles: 57
- For paralleling connection
- Length (standard supplied): 1m/3.3ft which can be cut in shorter sections

12

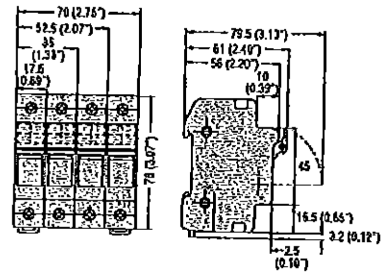
Fuse holder assembly in multiple pole configuration



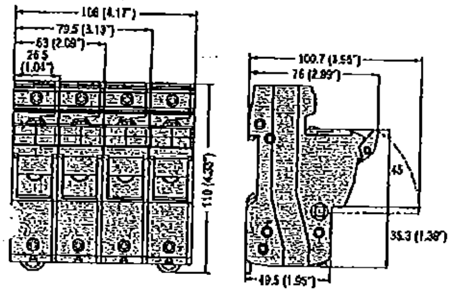

❶ Not suitable for FB01 B1N, FB01 B2P, FB01 B3P and FB01 B3H types.

FUSE HOLDERS

FB01 A... FB01 B... FB01 C... FB01 D...

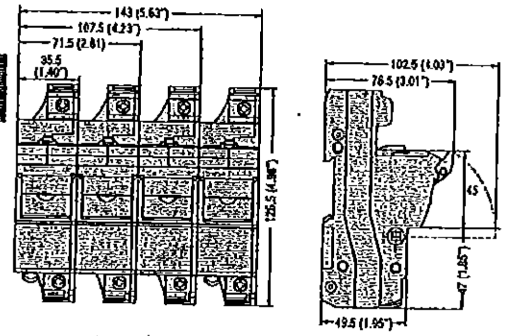


FB02 A...



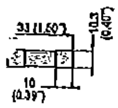


FB03 A...

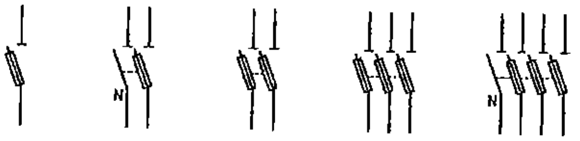


FUSES

FE01 D 0...



## Wiring diagrams



1P 1P+N 2P 3P 3P+N

| TYPE | | FB01 A... | FB01 B... | FB02 A... | FB03 A... | FB01 C... | FB01 D... |
|---|---|---|---|---|---|---|---|
| Range | | AC | | | | Class CC (AC) | DC |
| IEC maximum rated current In | | 32A | | 50A | 125A | 30A | 32A |
| IEC maximum rated voltage In | | 690VAC; 400VAC ❶ | 690VAC | | | 600VAC | 1000VDC |
| IEC utilisation category | | AC22B 500V; AC21B 690V; AC22B 400V ❶ | | | AC21B 690V | AC22B 500V; AC21B 690V | DC20B 1000VDC |
| Maximum power dissipation | | 3W | | 5W | 9.5W | 3W | 4W |
| Derating factor of current In for different ambient temperatures | 20°C | 1 | | | | | |
| | 30°C | 0.95 | | | | | |
| | 40°C | 0.9 | | | | | |
| | 50°C | 0.8 | | | | | |
| | 60°C | 0.7 | | | | | |
| | 70°C | 0.6 | | | | | |
| Derating factor of current In for side-by-side fuse holders - n° poles | 1-4 | 1 | | | | | |
| | 5-6 | 0.8 | | | | | |
| | 7-9 | 0.7 | | | | | |
| | ≥10 | 0.6 | | | | | |
| Voltage for status indicator | | 120...690VAC | | 230...690VAC | | 120...600VAC | 350...1000VDC |
| CONNECTIONS | | | | | | | |
| Maximum tightening torque | | 2.5Nm; 2Nm ❶ / 22lbin | | 3Nm / 26lbin | 4Nm / 35lbin | 2.5Nm / 22lbin | |
| Maximum conductor cross section | flexible/stranded | 1x16mm²; 1-16mm² ❶ / 6AWG | | 1x25mm² / 6AWG | 1x35mm² / 2AWG | 1x16mm² / 6AWG | 1x16mm² / 6AWG |
| | rigid/solid | 1x25mm²; 1-10mm² ❶ / 8AWG | | 1x35mm² / 8AWG | 1x50mm² / 1AWG | 1x25mm² / 10AWG | 1x25mm² / 4AWG |
| AMBIENT CONDITIONS | | | | | | | |
| Operating temperature | | -20...+70°C | | | | | |
| Storage temperature | | -40...+80°C | | | | | |
| Maximum altitude | | 3,000m | | | | | |
| Operation position | | Any | | | | | |
| Fixing | | On 35mm DIN rail (IEC/EN 60715) | | | | | |

❶ Values valid only for FB01 A 1M type.

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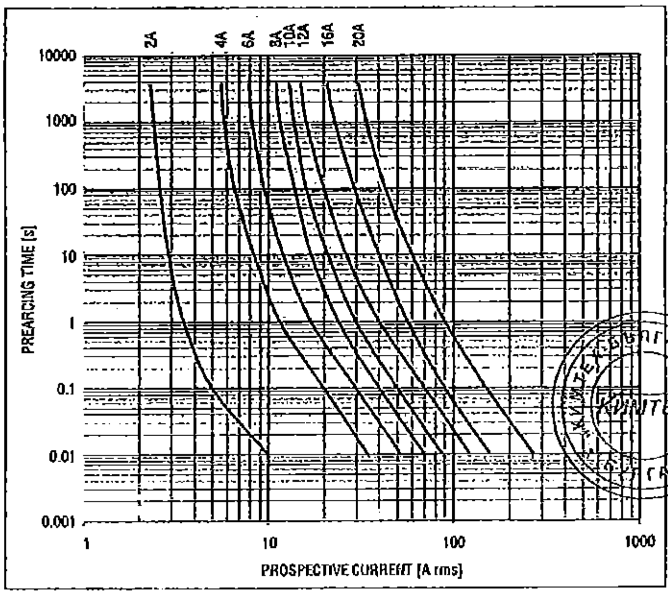
TECHNICAL CHARACTERISTICS FOR FE01 D... FUSES

| TYPE | Rated current [A] | Power consumption at 0.7 In [W] | Power consumption at In [W] | Prearcing I²t [A²s] | Total I²t at 1000VDC [A²s] |
|---|---|---|---|---|---|
| FE01 D 00200 | 2 | 0.62 | 1.54 | 1.78 | 6.5 |
| FE01 D 00400 | 4 | 0.73 | 1.84 | 3 | 11 |
| FE01 D 00600 | 6 | 0.96 | 2.4 | 8.5 | 32 |
| FE01 D 00800 | 8 | 1.02 | 2.55 | 25 | 93 |
| FE01 D 01000 | 10 | 1.03 | 2.58 | 11 | 52 |
| FE01 D 01200 | 12 | 1.04 | 2.6 | 25 | 116 |
| FE01 D 01600 | 16 | 1.08 | 2.7 | 33 | 152 |
| FE01 D 02000 | 20 | 1.16 | 2.9 | 85 | 390 |

TIME-CURRENT CHARACTERISTICS FOR FE01 D... FUSES



Kimtech
Кимтех България ООД
1113 гр. София
ул. Акад. Георги Бончев № 20

официален дистрибутор на
tyco Electronics
кабели, трансформатори,
електрооборудване

тел: 02 9733373
факс: 02 9733370
web:www.kimtech.bg
e-mail: office@kimtech.bg

## Описание на типа

за клемен блок с 3 еднополюсни предпазител разединители с цилиндрични стопяеми предпазители

Наименованието на клемния блок е ИК7ТК3Р

Клемния блок е съставен от 7бр. разединяеми клеми тип URTK/S и комплектован с допълнителни аксесоари към тях, 3 броя еднополюсни предпазител разединители тип FB01B и 3 броя цилиндрични стопяеми предпазители 10x38 4A, съгласно изискванията на ЧЕЗ България.

Разединяемите клеми URTK/S и техните аксесоари са произведени от Phoenix Contact GmbH и са със страна на произход Германия.

Предпазител разединителите са произведени от Lovato Electric и са със страна на произход Италия

Клемите, аксеоарите им, предпазител разединителите и стопяемите предпазители се произвеждат в клемен блок съгласно изискванията на ЧЕЗ България.

Подпис и печат:

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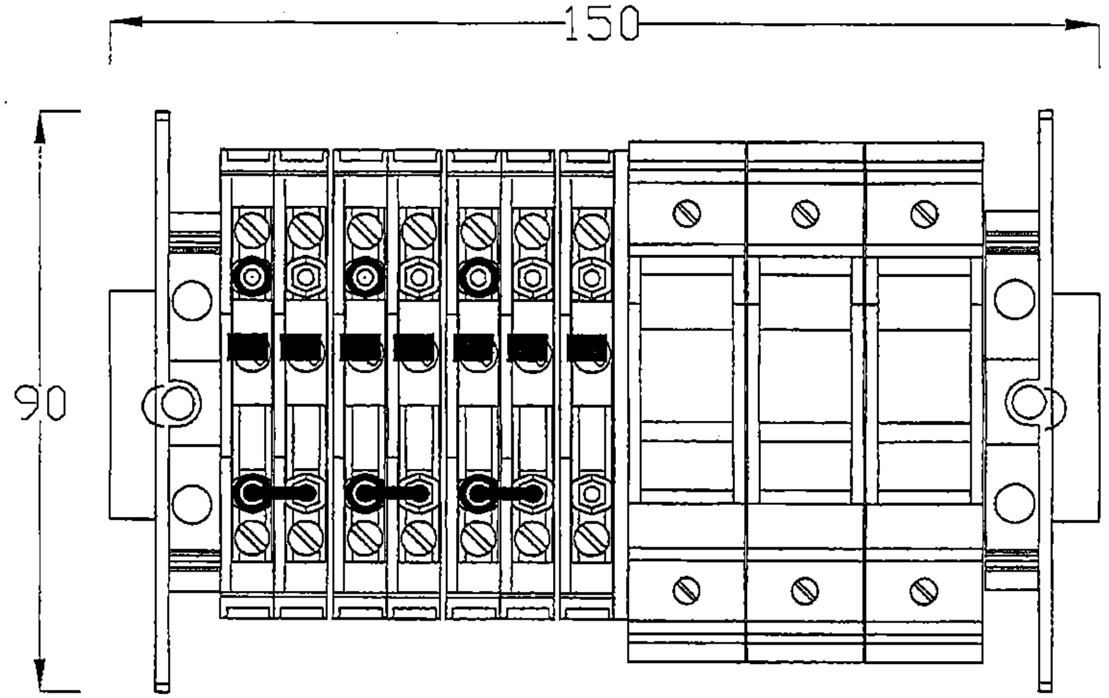


ВиВ Изоматик ООД

1680 София, ул. "Пирин" No40A

тел. 02 958 63 40, 958 63 44, 958 31 11, факс 958 22 70

| | | |
|---|---|---|
| ОБЕКТ: Измервателен клеморед ЧЕЗ | | СЪГЛАСУВАЛИ: |
| част: | лист No: 1/ 1 | |
| фаза: РП | мащаб: – | ВЪЗЛОЖИТЕЛ: |
| | | Чертал: |
| | | Р-л фирма: инж. Вл. Лазаров |

# DICHIARAZIONE DI CONFORMITA'
## DECLARATION OF CONFORMITY

Lovato electric

LOVATO ELECTRIC S.P.A.
Via Don E. Mazza, 12
24020 Gorle (BG) Italy
Tel: +39 035 4282111
Fax (National) +39 0354282200
Fax (International) +39 0354282400
E-mail: info@LovatoElectric.com
VAT ID No. IT 01921300164 77

Noi (denominazione del fornitore) **LOVATO ELECTRIC S.p.A.**
*We (supplier's name)*

(indirizzo) Via Don E. Mazza, 12 - 24020 Gorle - Bergamo - ITALY
*(address)*

dichiariamo sotto la nostra esclusiva responsabilità che i prodotti
*declare under our sole responsibility that the products*

Portafusibili **FB..**

*Fuseholders*

(nome, tipo o modello, lotto o numero di serie, possibilmente l'origine e la quantità)
*(name, type or model, batch or serial number, possibility sources and number of items*

sono conformi alle seguenti direttive
*are in conformity with the following directives*

**Direttiva Bassa Tensione nr.2006/95/CE**
*Low Voltage Directive no.2006/95/EC*

**Direttiva Compatibilità Elettromagnetica nr.2004/108/CE**
*Electromagnetic Compatibility Directive no.2004/108/EC*

Questo è documentato dalla conformità alle norme
*This is documented by the conformity with the following standards*

**EN 60269-1**

(Titolo e/o numero e data di pubblicazione della norma o di altri documenti normativi)
*(Title and /or number and date of issue of the standard or other normative documents)*

Questa dichiarazione è conforme alla Norma Europea EN45014 "Criteri generali del fornitore". Le basi per tali criteri sono documenti internazionali ed in particolare la Guida ISO/IEC 22 "Information on manufacture's declaration of conformity with standards or other technical specifications"

*This declaration of conformity is in compliance with the European Standard EN 45014 "General criteria for supplier's declaration of conformity". The basis for the criteria has been found in international documentation, particularly in: ISO/IEC Guide 22 "Information on manufacture's declaration of conformity with standards or other technical specifications"*

*Revisione:*
*Revision*

Perani

Ing. D. Perani Product Manager

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КИМТЕХ
БУРГАС

Gorle, 04/03/2011
(luogo e data)
(place and data of issue)

(Nome e firma della persona autorizzata)
*(Name and signature of authorized person)*

LOVATO ELECTRIC S.p.A .

DEVICE UNDER TEST...................... **Fuse holder *FB01B types***

MANUFACTURER............................ Lovato Electric S.p.A.

TYPE OF TEST................................ **Temperature rise test on FB01B fuse holders**

DATE OF DEVICE RECEIPT............ 27/04/2011

START / END TESTING .................... 29/04/2011 – 13/05/2011

SAMPLES STORING......................... ☒ Eliminated / returned to customer ☐ Storage :

INDEX ...............................................



ISSUE .............................................. 16/05/2011

COMPILED ........................................ STAFF LPR

APPROVED ....................................... RESP. LPR

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## 1. PURPOPSE OF TESTING

Requested test (according to the customer specification):
Temperature rise at 690V – 32A on FB01B fuse holders

Test purpose:
"Verify the good function of FB01B fuse holders ."

Test target:
Pass the test.

## 2. TEST SAMPLES

N. 1 FB01B1P fuse holder - 32A (10 x 38 mm), batch production number ...[1]
N. 1 FB01B2P fuse holder - 32A (10 x 38 mm), batch production number ...[1]
N. 1 FB01B3P fuse holder - 32A (10 X 38 mm), batch production number ...[1]

## 3. TEST METHOD

IEC 60947-3 (2008-08) Ed. 3.0 + IEC 60947-1 Ed. 5.1 (2011-03)
Temperature rise (§ 8.3.3.1)

## 4. TEST PROCEDURES

Temperature rise........................................................ Test instruction LPR 051-1, rev. 4, dated 11/10/2010.

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[1] not available
[1] not available
[1] not available

## 5. TEST RESULTS

### 5.1 TEMPERATURE RISE

#### 5.1.1 WITH LEGRAND FUSE 32 A gG 400 V

Sample under test.....................................N. 1 FB01B1P - 32A
N. 1 FB01B2P - 32A
N. 1 FB01B3P - 32A

**Test conditions**

Ambient temperature.................................21 °C
Relative humidity.......................................46 %
Installation.................................................In vertical way, on DIN RAIL 35mm

Data sheet fusible used:
- Supplier ...............................................Legrand
- Code ....................................................cod. 133 32

**Test parameters**

Wiring of the main circuit
- cables section / length...........................$6{,}0\ mm^2$ / 1,0 m
- screws tightening nominal torque .........2,0 ÷ 2,5 N.m
- screws applied tightening torque ..........2,0 N·m

Supply of the main circuit
- rated current.........................................Ith = 25 - 32 A
- test current...........................................I = 32 A
- supply frequency.................................50 Hz

**Test results**

See next page.

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The test results are related only to the exemplary tested and listed under the "test samples".

Temperature rise main circuit

| | [K] | | | Standard limit EN60947-1 tab. 2 |
|---|---|---|---|---|
| | One pole fuse holder FB01B1P | 2 pole fuse holder FB01B2P | 3 pole fuse holder FB01B3P | |
| Terminal L1 | 43 | 54 | 57 | 65 |
| Terminal T1 | 39 | 51 | 52 | 65 |
| Terminal L2 | - | 55 | 61 | 65 |
| Terminal T2 | - | 49 | 58 | 65 |
| Terminal L3 | - | - | 57 | 65 |
| Terminal T3 | - | - | 50 | 65 |
| Note | Silver plated-brass terminal | | | |

Temperature rise for accessibile parts

| | [K] | | | Standard limit EN60947-1 tab. 3 |
|---|---|---|---|---|
| | One pole fuse holder FB01B1P | 2 pole fuse holder FB01B2P | 3 pole fuse holder FB01B3P | |
| Line side | 14 | 24 | 29 | 40 |
| Load side | 10 | 19 | 21 | 40 |
| Left side | 24 | 30 | 32 | 40 |
| Right side | 22 | 30 | 31 | 40 |
| On front | 18 | 24 | 29 | 40 |
| Lever | 9 | 16 | 17 | 40 |

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## 6. TEST EQUIPMENT AND INSTRUMENTS

### 6.1. TEST EQUIPMENT

| Description | Used for | Full scale | Code |
|---|---|---|---|
| Current supply station | Power supply main circuit | 20V – 50A | LPRA 065 |

### 6.2. MEASURING INSTRUMENTS

| Description | Used to measure | Full scale | Code | Calibration expiration date |
|---|---|---|---|---|
| Thermohygrometer | Ambient temperature | -5 ÷ 50 °C | LPR 1 65 | 27/10/2011 |
| Thermohygrometer | Relative humidity | 10 ÷ 90% | LPR 165 | 27/10/2011 |
| Termometric Instrument | Temperature rise | -30 ÷ +200 °C | LPR 201 | 10/01/2012 |
| Termocouple T type | Temperature rise | -30 ÷ +200 °C | LPR 201 | 10/01/2012 |
| Termocouple T type | Temperature rise | -30 ÷ +200 °C | LPR 201.13 | 10/01/2012 |
| Current transformer | Main circuit current | 1.004/50 A | LPR 155 | 11/05/2014 |
| Digital multimeter | Main circuit current | 10 A | LPR 55 | 11/05/2012 |
| Digital multimeter | Drop voltage | mV - Autom. | LPR 125 | 11/05/2012 |
| Dynamometric screw driver | Main terminal screw tightening | 6,0 Nm | LPR 231 | 07/01/2012 |

## 7. REMARKS & ANALYS

Temperature rise test 690V – 32A: test passed

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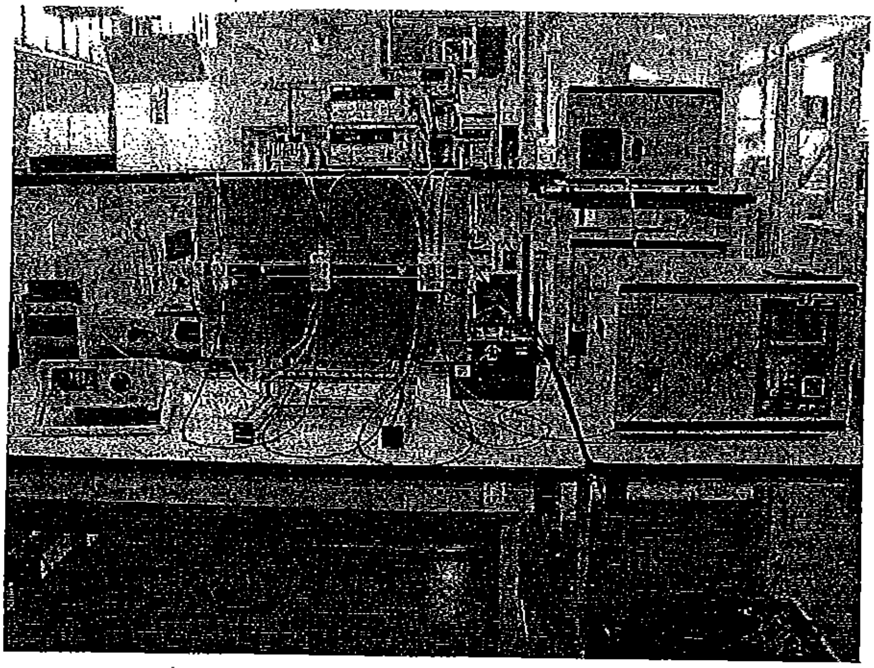
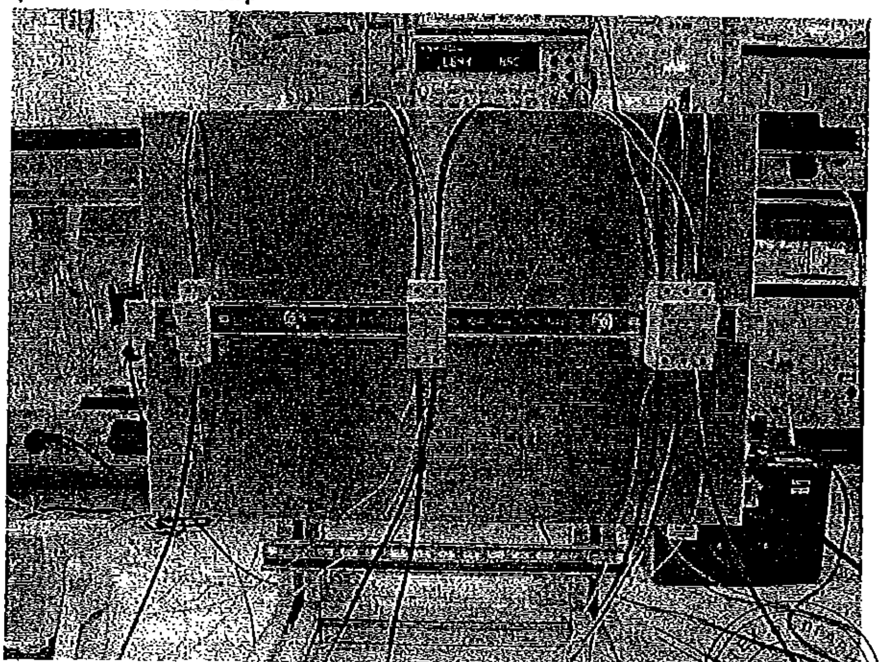
The test results are related only to the exemplary tested and listed under the "test samples".

## 8. ANNEX

Picture 1: Temperature rise – test setup



Picture 1a: Temperature rise – test setup



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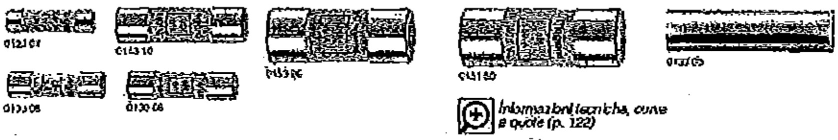
ВЯРНО С ОРИГИНАЛА

The test results are related only to the exemplary tested and listed under the "test samples".

Picture 2: Catalogue Legrand fuses

**legrand**

## fusibili cilindrici



Informazioni tecniche, curve e quote (p. 122)

### Tipo "gG"

B.C.R. (Bassa Capacità di Rottura) Rispondenti alle norme CEI 32-5 - CEI 32-5 EN 60 269-1 EN 60 269-3

| Conf. | Art. | Art. | In (A) | Tensione (V~) | Potere di interruzione (kA) |
|---|---|---|---|---|---|
| | | | **8,5 x 23 mm** | | |
| 10 | 013 02 | 014 02 | 2 | 250 | 6 |
| 10 | 013 04 | 014 04 | 4 | | |
| 10 | 013 06 | 014 06 | 6 | | |
| 100 | 013 10 | 014 10 | 10 | | |
| | | | **8,5 x 31,5 mm** | | |
| 10 | 0123 01 | | 1 | 400 | 20 |
| 10 | 0123 02 | 0124 02 | 2 | | |
| 10 | 0123 04 | 0124 04 | 4 | | |
| 10 | 0123 06 | 0124 06 | 6 | | |
| 10 | 0123 08 | | 8 | | |
| 10 | 0123 10 | 0124 10 | 10 | | |
| 10 | 0123 12 | | 12 | | |
| 100 | 0123 16 | 0124 16 | 16 | | |
| 100 | 0123 20 | 0124 20 | 20 | | |
| | | | **10,3 x 38 mm** | 400 | |

A.C.R. (Alta Capacità di Rottura) Conformi alle norme CEI 32-1 e 32-4 - IEC 60 269.1,2 e 2,1 - EN 60 269,1 Approvazioni Bureau Veritas

| Conf. | Art. | Art. | In (A) | Tensione (V~) | Potere di interruzione (kA) |
|---|---|---|---|---|---|
| | | | **10,3 x 38 mm** | | |
| 10 | 0133 91 | | 0,5 | 500 | 100 |
| 10 | 0133 01 | | 1 | | |
| 10 | 0133 02 | 0134 02 | 2 | | |
| 10 | 0133 04 | 0134 04 | 4 | | |
| 10 | 0133 06 | 0134 06 | 6 | | |
| 10 | 0133 08 | 0134 08 | 8 | | |
| 10 | 0133 10 | 0134 10 | 10 | | |
| 10 | 0133 12 | 0134 12 | 12 | | |
| 10 | 0133 16 | 0134 16 | 16 | | |
| 10 | 0133 20 | 0134 20 | 20 | | |
| 10 | 0133 25 | 0134 25 | 25 | | |
| | | | **14 x 51 mm** | | |
| 10 | 0143 02 | | 2 | 500 | 100 |
| 10 | 0143 04 | 0145 04 | 4 | | |
| 10 | 0143 06 | 0145 06 | 6 | | |
| 10 | 0143 10 | 0145 10 | 10 | | |
| 10 | 0143 16 | 0145 16 | 16 | | |
| 10 | 0143 20 | 0145 20 | 20 | | |
| 10 | 0143 25 | 0145 25 | 25 | | |
| 10 | 0143 32 | 0145 32 | 32 | | |
| 10 | 0143 40 | 0145 40 | 40 | | |
| 10 | 0143 50 | 0145 50 | 50 | 400 | |
| | | | **22 x 58 mm** | | |
| 10 | 0153 10 | 0155 10 | 10 | 500 | 100 |
| 10 | 0153 16 | 0155 16 | 16 | | |
| 10 | 0153 20 | 0155 20 | 20 | | |
| 10 | 0153 25 | 0155 25 | 25 | | |
| 10 | 0153 32 | 0155 32 | 32 | | |
| 10 | 0153 40 | 0155 40 | 40 | | |
| 10 | 0153 50 | 0155 50 | 50 | | |
| 10 | 0153 63 | 0155 63 | 63 | | |
| 10 | 0153 80 | 0155 80 | 80 | | |
| 10 | 0153 95 | 0155 95 | 100 | | |
| 10 | 0153 97 | 0155 97 | 125 | 400 | |

(1) Tipo g

### Tipo "aM"

Rispondenti alle norme IEC EN 60269-1
Approvazione Bureau Veritas

| Conf. | Art. | Art. | In (A) | Tensione (V~) | Potere di interruzione (kA) |
|---|---|---|---|---|---|
| | | | **8,5 x 31,5 mm** | | |
| 10 | 0120 01 | | 1 | 400 | 20 |
| 10 | 0120 02 | | 2 | | |
| 10 | 0120 04 | | 4 | | |
| 10 | 0120 06 | | 6 | | |
| 10 | 0120 08 | | 8 | | |
| 10 | 0120 10 | | 10 | | |

A.C.R. (Alta Capacità di Rottura) Conformi alle norme IEC 60269-1,2 e 2-1; EN 60269-1; CEI 32.1 e 32.4 Approvazioni Bureau Veritas

| Conf. | Art. | Art. | In (A) | Tensione (V~) | Potere di interruzione (kA) |
|---|---|---|---|---|---|
| | | | **10,3 x 38 mm** | | |
| 10 | 0130 22 | | 0,25 | 500 | 100 |
| 10 | 0130 95 | | 0,50 | | |
| 10 | 0130 01 | | 1 | | |
| 10 | 0130 02 | | 2 | | |
| 10 | 0130 04 | | 4 | | |
| 10 | 0130 06 | | 6 | | |
| 10 | 0130 08 | | 8 | | |
| 10 | 0130 10 | | 10 | | |
| 10 | 0130 12 | | 12 | | |
| 10 | 0130 16 | | 16 | | |
| 10 | 0130 20 | | 20 | 400 | |
| 10 | 0130 25 | | 25 | 400 | |
| | | | **14 x 51 mm** | | |
| 10 | 0140 02 | 0141 02 | 2 | 500 | 100 |
| 10 | 0140 04 | 0141 04 | 4 | | |
| 10 | 0140 06 | 0141 06 | 6 | | |
| 10 | 0140 08 | 0141 08 | 8 | | |
| 10 | 0140 10 | 0141 10 | 10 | | |
| 10 | 0140 12 | 0141 12 | 12 | | |
| 10 | 0140 16 | 0141 16 | 16 | | |
| 10 | 0140 20 | 0141 20 | 20 | | |
| 10 | 0140 25 | 0141 25 | 25 | | |
| 10 | 0140 32 | 0141 32 | 32 | | |
| 10 | 0140 40 | 0141 40 | 40 | | |
| 10 | 0140 45 | 0141 45 | 45 | | |
| 10 | 0140 50 | | 50 | 400 | |
| | | | **22 x 58 mm** | | |
| 10 | 0150 16 | 0151 16 | 16 | 500 | 100 |
| 10 | 0150 20 | 0151 20 | 20 | | |
| 10 | 0150 25 | 0151 25 | 25 | | |
| 10 | 0150 32 | 0151 32 | 32 | | |
| 10 | 0150 40 | 0151 40 | 40 | | |
| 10 | 0150 50 | 0151 50 | 50 | | |
| 10 | 0150 63 | 0151 63 | 63 | | |
| 10 | 0150 80 | 0151 80 | 80 | | |
| 10 | 0150 95 | 0151 95 | 100 | | |
| 10 | 0150 97 | 0151 97 | 125 | 400 | |

### Neutri

| Conf. | Art. | Dimensioni |
|---|---|---|
| 10 | 0123 00 | 8,5 x 31,5 |
| 10 | 0133 00 | 10,3 x 38 |
| 10 | 0143 00 | 14 x 51 |
| 10 | 0153 00 | 22 x 58 |

(1) [illegible]

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The test results are related only to the exemplary tested and listed under the "test samples".

KEMA
REGISTERED QUALITY

KEMA KEUR

# CERTIFICATE

KEMA No. 1974117.13

Issued to:
Applicant:
Phoenix Contact GmbH & Co
Flachsmarktstrasse 8-28
BLOMBERG, Germany

Manufacturer/Licensee:
Phoenix Contact GmbH & Co
Flachsmarktstrasse 8-28
BLOMBERG, Germany

Product : Terminal blocks

Trade name : PHOENIX CONTACT
Types/models : URTK/S-BEN BU, URTK/S-BEN, URTK/S, URTK/SP, USLKG 10, USLKG 6N

The product and any acceptable variation thereto is specified in the Annex to this certificate and the documents therein referred to.

KEMA hereby declares that the above mentioned product has been certified on the basis of:
- a type test according to the standard EN 60947-7-1:1991, EN 60947-7-2:1995
- an inspection of the production location according to CCA Group Operational Document CCA 204
- a certification agreement with the number 900469

KEMA hereby grants the right to use the KEMA certification mark

KEMA KEUR

The KEMA-KEUR certification mark may be applied to the product as specified in this certificate for the duration of the KEMA-KEUR certification agreement and under the conditions of the KEMA-KEUR certification agreement.

This certificate is issued on: August 6, 1999

C.M. Boschloo
Certification Manager

Integral publication of this certificate is allowed

N.V. KEMA
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 9035, 6800 ET Arnhem, The Netherlands
Telephone +31 26 3 56 28 50, Telefax +31 26 3 61 49 22

ACCREDITED BY
THE DUTCH COUNCIL
FOR ACCREDITATION

КИМТЕХ

## SPECIFICATION OF THE CERTIFIED PRODUCT

**Product data**

| | | |
|---|---|---|
| product | : | terminal blocks |
| trade name | : | PHOENIX CONTACT |
| types | : | URTK/S-BEN BU, URTK/S-BEN, URTK/S, URTK/SP, USLKG 10, USLKG 6N |
| material | : | thermoplastic material |
| mounting | : | top hat rail 35 mm (EN 50022) and G-profile rail 32 mm (EN 50035) |

**Additional Information**

Markings

Trademark, type designation, rated connection capacity and rated insulation voltage are indented in the insulation material.

**Product data – type USLKG 6N**

| | | |
|---|---|---|
| rated connection capacity | : | 6 mm² |
| connectable conductors | : | one conductor<br>0,2 - 10 mm² solid<br>0,2 - 6 mm² flexible without ferrule<br>0,25 - 6 mm² flexible with ferrule<br>two conductors<br>0,2 - 2,5 mm² solid<br>0,2 - 2,5 mm² flexible without ferrule<br>0,25 - 1,5 mm² flexible with ferrule |
| description | : | protective conductor terminal block with 2 screw-type clamping units, 1-pole |

**Product data – type URTK/S**

| | | |
|---|---|---|
| rated voltage | : | 400 V |
| rated connection capacity | : | 6 mm² |
| connectable conductors | : | one conductor<br>0,5 - 10 mm² solid<br>0,5 - 6 mm² flexible without ferrule<br>0,5 - 10 mm² flexible with ferrule<br>two conductors<br>0,5 - 2,5 mm² solid<br>0,5 - 6 mm² flexible without ferrule<br>0,5 - 4 mm² flexible with ferrule |
| rated impulse withstand voltage | : | 6 kV |
| description | : | disconnect terminal block with 2 screw-type clamping units, 1-pole |

N.V. KEMA
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 9035, 6800 ET ARNHEM, The Netherlands
Telephone +31 26 3562850, Telefax +31 26 3514922

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**Product data – type USLKG 10**

| | | |
|---|---|---|
| rated connection capacity | : | 6 $mm^2$ |
| connectable conductors | : | one conductor<br>0,5 - 10 $mm^2$ solid<br>0,5 - 6 $mm^2$ flexible without ferrule<br>0,5 - 6 $mm^2$ flexible with ferrule<br>two conductors<br>0,5 - 2,5 $mm^2$ solid<br>0,5 - 2,5 $mm^2$ flexible without ferrule<br>0,5 - 2,5 $mm^2$ flexible with ferrule |
| description | : | protective conductor terminal block with 2 screw-type clamping units, 1-pole |

**Product data – type URTK/S-BEN**

| | | |
|---|---|---|
| rated voltage | : | 500 V |
| rated connection capacity | : | 6 $mm^2$ |
| connectable conductors | : | one conductor<br>0,5 - 10 $mm^2$ solid<br>0,5 - 6 $mm^2$ flexible without ferrule<br>0,5 - 10 $mm^2$ flexible with ferrule<br>two conductors<br>0,5 - 2,5 $mm^2$ solid<br>0,5 - 6 $mm^2$ flexible without ferrule<br>0,5 - 4 $mm^2$ flexible with ferrule |
| rated impulse withstand voltage | : | 6 kV |
| description | : | disconnect terminal block with 2 screw-type clamping units, 1-pole |

**Product data – type URTK/S-BEN BU**

| | | |
|---|---|---|
| rated voltage | : | 500 V |
| rated connection capacity | : | 6 $mm^2$ |
| connectable conductors | : | one conductor<br>0,5 - 10 $mm^2$ solid<br>0,5 - 6 $mm^2$ flexible without ferrule<br>0,5 - 10 $mm^2$ flexible with ferrule<br>two conductors<br>0,5 - 2,5 $mm^2$ solid<br>0,5 - 6 $mm^2$ flexible without ferrule<br>0,5 - 4 $mm^2$ flexible with ferrule |
| rated impulse withstand voltage | : | 6 kV |
| description | : | disconnect terminal block with 2 screw-type clamping units, 1-pole |

**Product data – type URTK/SP**

| | | |
|---|---|---|
| rated voltage | : | 500 V |
| rated connection capacity | : | 6 mm² |
| connectable conductors | : | one conductor<br>0,5 - 10 mm² solid<br>0,5 - 6 mm² flexible without ferrule<br>0,5 - 6 mm² flexible with ferrule<br>two conductors<br>0,5 - 2,5 mm² solid<br>0,5 - 4 mm² flexible without ferrule<br>0,5 - 2,5 mm² flexible with ferrule |
| rated impulse withstand voltage | : | 6 kV |
| description | : | disconnect terminal block with 2 screw-type clamping units, 1-pole |

**TESTS**

**Test requirements**

EN 60947-7-1:1991 + C:1997-06 + A11:1997
EN 60947-7-2:1995 + C:1996-01

**Test results**
The test results are laid down in KEMA test file 97.4117.13.

**Conclusion**
The examination proved that all test requirements were met.

Tested by : H.L. Schendstok

Checked by : L.J.W. van Megen b.a.

**FACTORY-LOCATION(S)**

Phoenix Contact GmbH & Co.
Flachsmarktstrasse 8-28, BLOMBERG, Germany



КИМТЕХ-БЪЛГАРИЯ ООД БУРГАС КИМТЕХ

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**Списък на проведените изпитвания на клемен блок с клеми за медни проводници от проходен тип 1P, 3P и 3P+N**

1. Изпитване покачване на температура.

13.01.2016г.

Подпис и печат

„КИМТЕХ БЪЛГАРИЯ" ООД КИМТЕХ БУРГАС

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

of **KEMA Nederland B.V.**
**Calibration & Metering**
**Arnhem**

This annex is valid from: **30-03-2010** to **01-03-2014** Replaces annex dated: **30-06-2009**

Premises: **n.a.**

| HCS code | Measured quantity, Range | Frequency | Best measurement capabilities ($k$=2) | Remarks |
|---|---|---|---|---|
| LF 0 0 | DC/LF Quantities | | | |
| LF 1 0 | DC Voltage | | | |
| | Standard cells | | 3 µV | |
| | Up to 1 mV | | 0,4 µV | |
| | 1 mV to 10 mV | | $3{\cdot}10^{-4}{\cdot}U$ | |
| | 10 mV to 100 mV | | $3{\cdot}10^{-5}{\cdot}U$ | |
| | 100 mV to 10 V | | $5{\cdot}10^{-6}{\cdot}U$ | |
| | 10 V to 100 V | | $1{\cdot}10^{-5}{\cdot}U$ | |
| | 100 V to 1100 V | | $2{\cdot}10^{-5}{\cdot}U$ | |
| | Zener Reference Standards | | | |
| | 1 V and 1,018 V | | 3 µV | |
| | 10 V | | 20 µV | |
| | High Voltage | | | Measuring |
| | 1 kV to 6 kV | | $2{\cdot}10^{-3}{\cdot}U$ | |
| LF 2 0 | DC Current | | | |
| | 10 µA to 3 A | | $2{\cdot}10^{-5}{\cdot}I$ | |
| | 3 A to 10 A | | $2{,}5{\cdot}10^{-5}{\cdot}I$ | |
| | 10 A to 20 A | | $6{\cdot}10^{-5}{\cdot}I$ | |

This annex has been approved by:

Ir. J.C. van der Poel
Chief Executive

| HCS code | Measured quantity, Range | Frequency | Best measurement capabilities ($k$=2) | Remarks |
|---|---|---|---|---|
| | 20 A to 100 A | | $1{\cdot}10^{-4}{\cdot}I$ | |
| LF 3 1 | AC Voltage | | | |
| | 60 mV to 1000 V | 40 Hz to 20 kHz | $2{\cdot}10^{-4}{\cdot}U$ | |
| | 60 mV to 1000 V | 20 kHz to 50 kHz | $3{\cdot}10^{-4}{\cdot}U$ | |
| | 60 mV to 220 V | 20 kHz to 50 kHz<br>50 kHz to 100 kHz | $4{\cdot}10^{-4}{\cdot}U$ | |
| | 220 V to 1000 V | 50 kHz to 100 kHz | $4{\cdot}10^{-4}{\cdot}U$ | |
| | 220 V to 1000 V | 50 kHz to 100 kHz | $2{\cdot}10^{-3}{\cdot}U$ | |
| | High Voltage<br>1 kV tot 6 kV | 50 Hz | $2{\cdot}10^{-3}{\cdot}U$ | Measuring |
| LF 3 2 | AC Voltage Ratio<br>(instrument transformers)<br>Primary: (10-600)V<br>Secondary: (0,1-240)V | 50 Hz and 60 Hz | $3{\cdot}10^{-5}{\cdot}U_{uit}/U_{in}$ and 90 µrad | |
| LF 3 3 | AC Current | | | |
| | 0,1 mA to 300 mA | 40 Hz to 5 kHz | $3{\cdot}10^{-4}{\cdot}I$ | |
| | 300 mA to 20 A | 40 Hz to 1 kHz | $3{\cdot}10^{-4}{\cdot}I$ | |
| | 20 A to 50 A | 40 Hz to 1 kHz | $6{\cdot}10^{-4}{\cdot}I$ | |
| LF 4 2 | AC Current Ratio | | | ambient temp. (23 ± 2) °C |
| | (instrument transformers) | 50 Hz and 60 Hz | $3{\cdot}10^{-5}{\cdot}I_{uit}/I_{in}$ and 90 µrad | Measuring |

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| HCS code | Measured quantity, Range | Frequency | Best measurement capabilities ($k$=2) | Remarks |
|---|---|---|---|---|
| | Primary: 5 A to 6000 A<br>Secondary: 1A or 5A | | | |
| LF 4 3 | High Current<br>10 A to 6000 A | 50 Hz, 60 Hz | $3{\cdot}10^{-4}{\cdot}I$ | |
| LF 5 0 | Power and Energy | | | 10 mV to 1100 V, |
| | Power<br>0,1 µW to 1 µW<br>1 µW to 1 kW | | <br>$1{\cdot}10^{-4}{\cdot}P$<br>$5{\cdot}10^{-5}{\cdot}P$ | 10 µA to 100 A |
| | 1 kW tot 10 kW<br>10 kW tot 110 kW<br>3 W to 57,6 kW<br><br>3 W to 2,9 MW | <br><br>50 Hz and 60 Hz<br><br>50 Hz and 60 Hz | $1{\cdot}10^{-4}{\cdot}P$<br>$2{\cdot}10^{-4}{\cdot}P$<br>$\frac{3\cdot10^{-4}}{\cos\varphi}\cdot P$<br><br>$\frac{2\cdot10^{-4}}{\cos\varphi}\cdot P$ | <br><br>on site to be performed at ambient temperature; voltage and current as mentioned above<br><br>measuring<br>20 V to 1100 V<br>100 mA to 6000A<br>cos φ = 0 to 1 |
| | Reactive Power ($P_r$)<br>6 var to 1,8 Mvar | 50 Hz and 60 Hz | $\frac{5\cdot10^{-4}}{\sin\varphi}\cdot P_r$ | 60 V to 300 V<br>100 mA to 6000 A |
| | Electrical<br>(reactive-) energy | | | see (reactive-) power and time |
| LF 5 1 | Power Factor<br>cos φ : 0 to 1 | 40 Hz to 100 Hz | $\frac{2\cdot10^{-3}}{\cos\varphi}\cdot \mathrm{PF}$ | |

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ВЯРНО С ОРИГИНАЛА

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| HCS code | Measured quantity, Range | Frequency | Best measurement capabilities (*k*=2) | Remarks |
|---|---|---|---|---|
| LF 6 | Impedance (DC/LF) | | | |
| LF 6 2 | DC Resistance | | | Non-decadic values |
| | 20 µΩ to 50 µΩ | | $3\cdot10^{-4}.R$ | |
| | 50 µΩ to 100 µΩ | | $1\cdot10^{-4}.R$ | |
| | 100 µΩ to 20 kΩ | | $1,2\cdot10^{-5}.R$ | |
| | 1 mΩ to 10 mΩ | | $6,5\cdot10^{-6}\cdot R$ | |
| | 10 mΩ to 1000 mΩ | | $7.10^{-6}.R$ | |
| | 1 Ω to 10 kΩ | | $5\cdot10^{-6}.R$ | |
| | 10 kΩ to 1 MΩ | | $1\cdot10^{-5}\cdot R$ | |
| | 1 MΩ to 10 MΩ | | $1,2\cdot10^{-5}\cdot R$ | |
| | 10 MΩ to 100 MΩ | | $3.10^{-5}.R$ | |
| | 100 µΩ to 10 kΩ | | $6.10^{-6}.R$ | Decadic Values |
| LF 6 4 | Capacitance | | | |
| | LF Capacitance | | | accuracy depends on dissipation factor at 1 kHz |
| | 10 pF to 100 pF | 100 Hz, 1 kHz, 10 kHz | $1\cdot10^{-3}\cdot C$ | |
| | 1 µF | 50 Hz, 200 Hz, 1 kHz | $1\cdot10^{-3}\cdot C$ | |
| LF 6 7 | Inductance | | | |
| | 1 mH to 10 mH | 1 kHz, (400-1692)Hz | $1\cdot10^{-3}\cdot L$ | |
| | 100 mH | 100 Hz, 1 kHz 1,592 kHz | $1\cdot10^{-3}\cdot L$ | |
| | 1 H | 100 Hz, 200 Hz, 400 Hz and 1 kHz | $1\cdot10^{-3}\cdot L$ | |
| | | | | |
| RF 0 0 | RF Quantities | | | |
| RF 3 0 | RF Power | | | |
| | - 9 dBm to +30 dBm | 0,1 MHz to 4200 MHz | 0,5 dB | Measuring |
| | +30 dBm to +57 dBm | 0,1 MHz to 500 MHz | 0,6 dB | 50 ohm coaxial VSWR |
| | -60 dBm to –10 dBm | 10 MHz to 10000 MHz | 0,5 dB | |

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| HCS code | Measured quantity, Range | Frequency | Best measurement capabilities ($k$=2) | Remarks |
|---|---|---|---|---|
| | -80 dBm to –10 dBm | 0,1 MHz to 2700 MHz | 1,1 dB | source < 2<br>Generating:<br>(0,09 - 3200) MHz |
| RF 5 0 | Rise time (10% to 90%)<br>1 ns to 1 ms | | $2{\cdot}10^{-2}\cdot\tau$ +200 ps | 10 mV/div to 1 kV/div |
| TF 0 0 | TIME and FREQUENCY | | | |
| TF2 1 | Frequency | 1 Hz to 1,2 GHz | $5{\cdot}10^{-10}{\cdot}f$ | |
| TF 2 2 | Time interval | 1 µs to ∞ | $5{\cdot}10^{-10}{\cdot}t$ + 100 ns | |
| TF 3 2 | Harmonic Distortion | | | (1) |
| | < 0,1 % | 20 Hz to 2,5 kHz | $3{\cdot}10^{-4}$ | |
| | 0,1 % to 1 % | 20 Hz to 2,5 kHz | $1{\cdot}10^{-3}$ | |
| | 1 % to 10 % | 20 Hz to 2,5 kHz | $3{\cdot}10^{-3}$ | |
| | 10 % to 30 % | 20 Hz to 2,5 kHz | $1{\cdot}10^{-2}$ | |
| | 30 % to 100 % | 20 Hz to 2,5 kHz | $3{\cdot}10^{-2}$ | |

Part II, Mechanical quantities and Temperature

| | Measured quantity, Instrument, Gauge | Range | Best measurement capabilities ($k$=2) | Remarks |
|---|---|---|---|---|
| PV 1 0 | Pressure | | | (2) |
| | Relative Pressure | (-10 to 10) kPa | $3{\cdot}10^{-4}{\cdot}p_e$ + 4 Pa | medium: air |
| | | (-98 to 100) kPa | $3{\cdot}10^{-4}{\cdot}p_e$ + 5 Pa | medium: nitrogen |
| | | 100 kPa to 10 MPa | $3{\cdot}10^{-4}{\cdot}p_e$ | medium: nitrogen |
| | | (10 to 70) MPa | $3{\cdot}10^{-4}{\cdot}p_e$ | medium: oil |

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| HCS code | Measured quantity, Range | Frequency | Best measurement capabilities ($k$=2) | Remarks |
|---|---|---|---|---|
| | Absolute Pressure | (80 to 110) kPa | $3{\cdot}10^{-4}{\cdot}p$ | medium: air |
| | | (2 to 200) kPa | $3{\cdot}10^{-4}{\cdot}p$ + 5 Pa | medium: nitrogen |
| | | 200 kPa to 10 MPa | $3{\cdot}10^{-4}{\cdot}p$ | medium: nitrogen |
| | | (10 to 70) MPa | $3{\cdot}10^{-4}{\cdot}p$ | medium: oil |
| TE 0 0 | TEMPERATURE, HUMIDITY AND THERMOPHYSICAL PROPERTIES | | | |
| TE 1 0 | Resistance thermometers | -50 °C to 20 °C | 0,02 K | |
| | | 20 °C to 50 °C | 0,05 K | |
| | | 50 °C to 300 °C | 0,05 K | |
| | | 300 °C to 550 °C | 0,16 K | |
| | | 550 °C to 650 °C | 0,50 K | |
| TE 3 0 | Thermocouples | -50 °C to 20 °C | 0,16 K | Including C.J. references |
| | | 20 °C to 50 °C | 0,16 K | |
| | | 50 °C to 300 °C | 0,16 K | |
| | | 300 °C to 550 °C | 0,21 K | |
| | | 550 °C to 650 °C | 0,6 K | |
| | | 650 °C to 1000 °C | 1,6 K | |
| TE 4 0 | Liquid-in-glass thermometers | -50 °C to 50 °C | 0,02 K | |
| | | 20 °C to 50 °C | 0,04 K | |
| | | 50 °C to 300 °C | 0,02 K | |
| | Differential Temperature | -50 °C to 200 °C | 0,05 K | $t_{min}$ = -50 °C<br>$t_{max}$ = 200 °C |
| TE 4 1 | Self indicating thermometers | | | |

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| HCS code | Measured quantity, Range | Frequency | Best measurement capabilities ($k$=2) | Remarks |
|---|---|---|---|---|
| | Dry Block Calibrators | -20 °C to 650 °C | $(8\cdot10^{-4}\cdot t_{90} + 0{,}06)$ K | |
| | Writing thermometers | 15 °C to 50 °C | 0,5 K | |
| | Digital thermometers | -50 °C to 20 °C | 0,02 K | including C.J. references |
| | | 20 °C to 50 °C | 0,05 K | |
| | | 50 °C to 300 °C | 0,05 K | resolution 1 digit |
| | | 300 °C to 550 °C | 0,16 K | |
| | | 550 °C to 630 °C | 0,50 K | |
| | | 630 °C to 1000 °C | 1,5 K | |

Remarks:

The ambient temperature during calibration is, unless specified otherwise, for:
LF measurements @ (23 ± 1)°C
TF measurements @ (23 ± 1)°C
Pressure measurements @ (23 ± 2)°C
Temperature measurements @ (23 ± 2)°C

(1) The stated best measurement capabilities are based on the fundamental frequency of the input signal. If desired the distortion can be specified as a rang number of the harmonics.

(2) $p_e = p - p_{amb}$; $p_e$ is the relative pressure, $p_{amb}$ is the local air pressure, p is the absolute pressure.

The best measurement capability is the highest achievable accuracy for a given measuring value or measuring range, expressed as the total positive and negative measurement uncertainty.

The uncertainty is calculated according to EA-4/02 "Expression of the Uncertainty of Measurement in Calibration".

Calibrations are performed inside the laboratory, unless specified otherwise.

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# C



## Low voltage cylindrical fuses

ETI Power needs control

# Cylindrical fuse-links

## Cylindrical fuse-link CH

| Rated current | Fusing characteristics |
|---|---|
| 1-100 A | gG, aM |

**Application:** Cylindrical fuse-links are used as the most secure protection of electrical installations, control, and signal circuits against overloads and short circuit currents. Their dimensions comply with IEC 60269-1 and IEC 60269-2-1. They are used mainly in industrial areas, since their dimensions allow voltages of up to 690 V. The most common sizes are the following four: 8x32, 10x38, 14x51 and 22x58.

| CH8 rated current/rated voltage | code No. gG | code No. aM | weight (g) | packaging (pcs) |
|---|---|---|---|---|
| 1A, 400V | 002610000 | 002611000 | 4 | 10/740 |
| 2A, 400V | 002610001 | 002611001 | | |
| 4A, 400V | 002610003 | 002611003 | | |
| 6A, 400V | 002610005 | 002611005 | | |
| 8A, 400V | 002610006 | 002611006 | | |
| 10A, 400V | 002610007 | 002611007 | | |
| 12A, 400V | 002610008 | 002611008 | | |
| 16A, 400V | 002610009 | 002611009 | | |
| 20A, 400V | 002610011 | 002611011 | | |
| 25A, 400V | 002610013 | 002611013 | | |

| CH10 rated current/rated voltage | code No. gG | code No. aM | weight (g) | packaging (pcs) |
|---|---|---|---|---|
| 0,5A, 500V | 002620017 | 002621017 | 7,5 | 10/500 |
| 1A, 500V | 002620000 | 002621000 | | |
| 2A, 500V | 002620001 | 002621001 | | |
| 4A, 500V | 002620003 | 002621003 | | |
| 6A, 500V | 002620005 | 002621005 | | |
| 8A, 500V | 002620006 | 002621006 | | |
| 10A, 500V | 002620007 | 002621007 | | |
| 12A, 500V | 002620008 | 002621008 | | |
| 16A, 500V | 002620009 | 002621009 | | |
| 20A, 500V(400V aM) | 002620011 | 002621011 | | |
| 25A, 500V(400V aM) | 002620013 | 002621013 | | |
| 32A, 400V | 002620015 | 002621015 | | |

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technical data on page 400

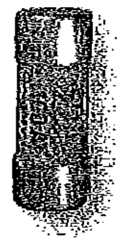
NEW! NEW!

| CH14 rated current/rated voltage | code No. gG | code No. gG with striker pin | code No. aM | code No. aM with striker pin | weight [g] | packaging [pcs] |
|---|---|---|---|---|---|---|
| 2A, 690V | 002630001 | 006711015* | 002631001 | 006711029* | | |
| 4A, 690V | 002630003 | 006711005* | 002631003 | 006711030* | | |
| 6A, 690V | 002630005 | 006711016* | 002631005 | 006711031* | | |
| 8A, 690V | 002630006 | 006711017* | 002631006 | 006711032* | | |
| 10A, 690V | 002630007 | 006711018* | 002631007 | 006711033* | | |
| 12A, 690V | 002630008 | 006711006* | 002631008 | 006711034* | | |
| 16A, 690V | 002630009 | 006711001* | 002631009 | 006711035* | 18,6 | 10/200 |
| 20A, 690V | 002630011 | 006711002* | 002631011 | 006711036* | | |
| 25A, 690V | 002630013 | 006711003* | 002631013 | 006711037* | | |
| 32A, 690V | 002630015 | 006711019* | 002631015* | 006711038* | | |
| 40A, 500V | 002630017 | 006711004 | 002631017 | 006711039 | | |
| 50A, 500V | 002630019 | 006711020** | 002631019** | 006711040** | | |

* 500V
**400V

NEW! NEW!

| CH22 rated current/rated voltage | code No. gG | code No. gG with striker pin | code No. aM | code No. aM with striker pin | weight [g] | packaging [pcs] |
|---|---|---|---|---|---|---|
| 4A, 690V | | 006711008 | | | | |
| 6A, 690V | | 006711009 | | 006711041 | | |
| 8A, 690V | | 006711021 | | 006711042 | | |
| 10A, 690V | | 006711010 | | 006711043 | | |
| 12A, 690V | | 006711022 | | 006711044 | | |
| 16A, 690V | 002640009 | 006711023 | 002641009 | 006711045 | | |
| 20A, 690V | 002640011 | 006711024 | 002641011 | 006711046 | | |
| 25A, 690V | 002640013 | 006711025 | 002641013 | 006711047 | 51 | 10/480 |
| 32A, 690V | 002640015 | 006711011 | 002641015 | 006711048 | | |
| 40A, 690V | 002640017 | 006711026 | 002641017 | 006711049 | | |
| 50A, 690V | 002640019 | 006711027 | 002641019 | 006711050 | | |
| 63A, 690V | 002640021 | 006711012 | 002641021 | 006711051 | | |
| 80A, 500V | 002640023 | 006711013 | 002641023 | 006711052 | | |
| 100A, 500V | 002640025 | 006711014 | 002641025 | 006711053 | | |

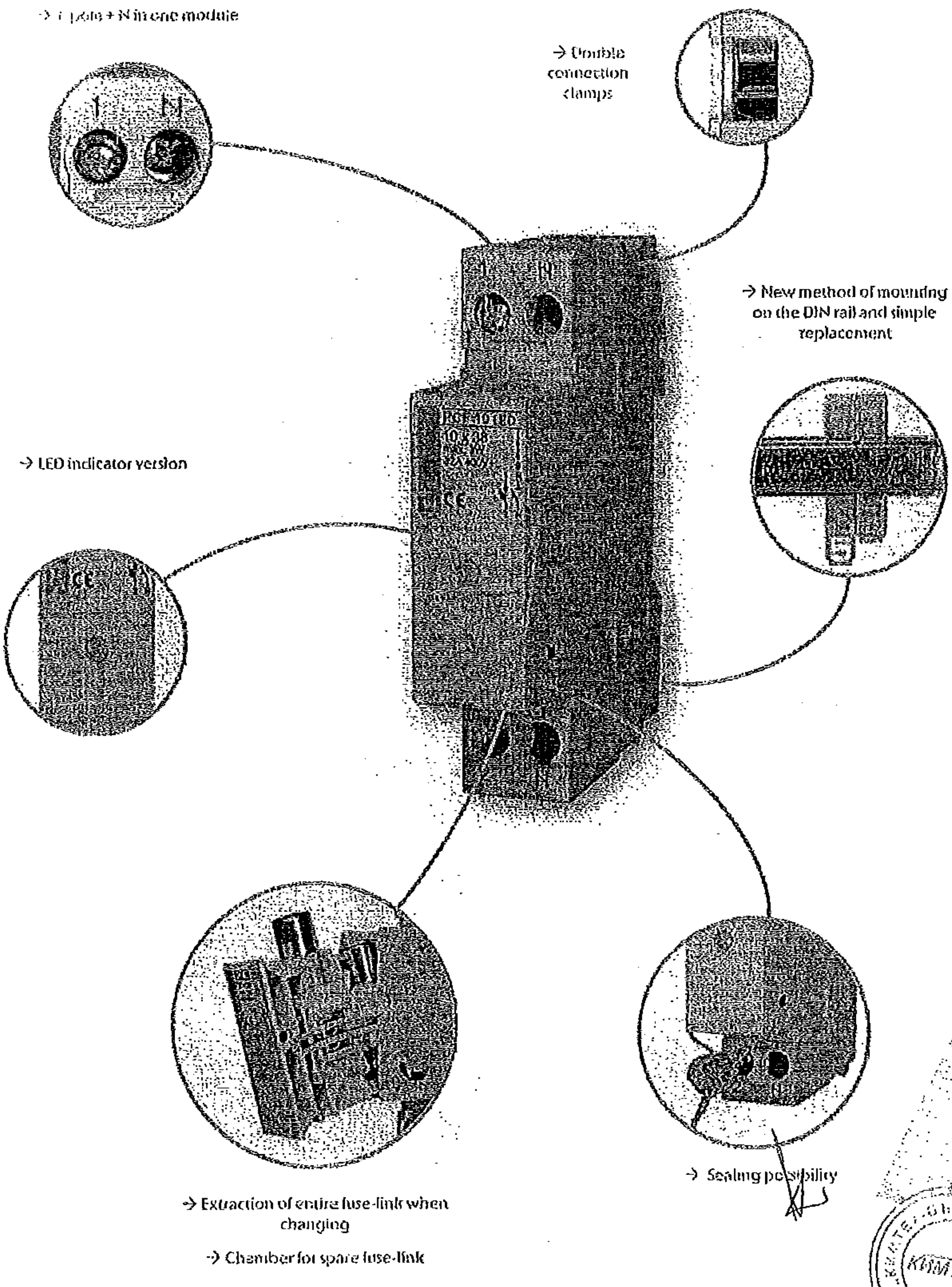


КИМТЕХ-БЪЛГАРИЯ ООД КИМТЕХ БУРГАС

technical data on page 400

# Fuse disconnectors for cylindrical fuse-links

## Advantages of fuse disconnector PCF



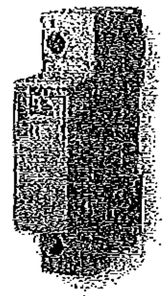
# Fuse disconnector PCF 8

| Rated current | Rated operational voltage | Utilization category |
|---|---|---|
| max. 20 A | 400 V | AC22B |

### 1-pole

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002530001 | - | 58 | 12/108 |
| | | 002530011 | LED | | |
| | | *002531001 | - | 58 | 12/108 NEW! |
| | | *002531011 | LED | | |

* Connection clamp on the right side "French version"



### 1-pole + N

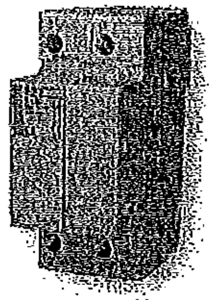
| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002530002 | - | 70 | 12/108 |
| | | 002530012 | LED | | |
| | | *002531002 | - | 70 | 12/108 NEW! |
| | | *002531012 | LED | | |

* Connection clamp on the right side, N pole on the left "French version"

### 2-pole

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002530003 | - | 120 | 6/54 |
| | | 002530013 | LED | | |
| | | *002531003 | - | 120 | 6/54 NEW! |
| | | *002531013 | LED | | |

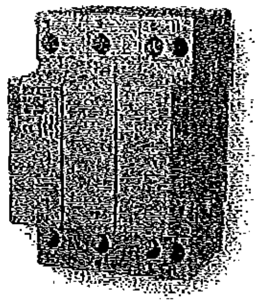
* Connection clamp on the right side "French version"



### 3-pole

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002530004 | - | 180 | 4/36 |
| | | 002530014 | LED | | |
| | | *002531004 | - | 180 | 4/36 NEW! |
| | | *002531014 | LED | | |

* Connection clamp on the right side "French version"



### 3-pole + N

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002530005 | - | 195 | 4/36 |
| | | 002530015 | LED | | |
| | | *002531005 | - | 195 | 4/36 NEW! |
| | | *002531015 | LED | | |

* Connection clamp on the right side, N pole on the left "French version"

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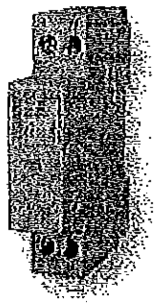
ETI



# Fuse disconnector PCF 10

| Rated current | Rated operational voltage | Utilization category |
|---|---|---|
| max. 32 A | 690 V a.c. | AC22B |



**1-pole**

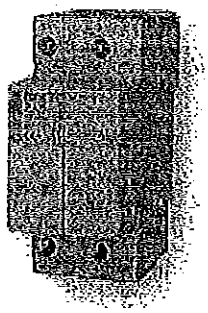
| $U_n/U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 32 | 002550001 | - | 58 | 12/108 |
| | | 002550011 | LED | | |
| | | *002551001 | - | 58 | 12/108 NEW! |
| | | *002551011 | LED | | |

*Connection clamp on the right side "French version"

**1-pole+N**

| $U_n/U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400/690 | 32 | 002550002 | - | 70 | 12/108 |
| | | 002550012 | LED | | |
| | | *002551002 | - | 70 | 12/108 NEW! |
| | | *002551012 | LED | | |

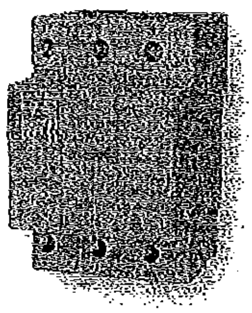
*Connection clamp on the right side, N pole on the left "French version"



**2-pole**

| $U_n/U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 32 | 002550003 | - | 120 | 6/54 |
| | | 002550013 | LED | | |
| | | *002551003 | - | 120 | 6/54 NEW! |
| | | *002551013 | LED | | |

*Connection clamp on the right side "French version"



**3-pole**

| $U_n/U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 32 | 002550004 | - | 180 | 4/36 |
| | | 002550014 | LED | | |
| | | *002551004 | - | 180 | 4/36 NEW! |
| | | *002551014 | LED | | |

*Connection clamp on the right side "French version"

**3-pole+N**

| $U_n/U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 32 | 002550005 | - | 195 | 4/36 |
| | | 002550015 | LED | | |
| | | *002551005 | - | 195 | 4/36 NEW! |
| | | *002551015 | LED | | |

*Connection clamp on the right side, N pole on the left "French version"

КИМТЕХ-БЪЛГАРИЯ ООД
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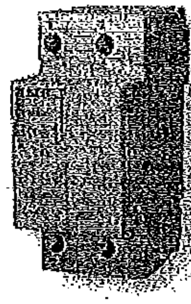
# Fuse disconnector PCF CC

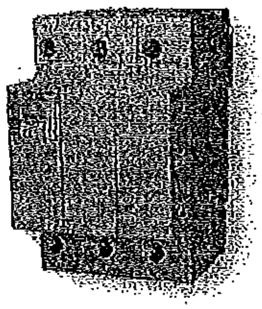
| Rated current | Rated operational voltage | Utilization category |
|---|---|---|
| max. 30 A | 600 V | AC22B |

| 1-pole | | | | | |
|---|---|---|---|---|---|
| Un (V) | In (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 600 | 30 | 002550101 | - | 58 | 12/108 |
| | | 002550111 | LED | | |

| 2-pole | | | | | |
|---|---|---|---|---|---|
| Un (V) | In (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 600 | 30 | 002550103 | - | 120 | 6/54 |
| | | 002550113 | LED | | |



| 3-pole | | | | | |
|---|---|---|---|---|---|
| Un (V) | In (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 600 | 30 | 002550104 | - | 180 | 4/36 |
| | | 002550114 | LED | | |



## Accessories

| Fuse disconnector PS PCF | | | | | | |
|---|---|---|---|---|---|---|
| Un (V) | In (A) | code No. PCF8 | code No. PCF10 | weight (g) | packaging (pcs) | contact |
| 230 | 6 | 002559001 | 002559001 | 35 | 1/10 | 1 x b<br>1 x a/b |



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## General information about fuse disconnector VLC

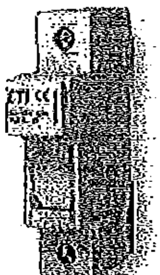
The main characteristics of ETI fuse disconnectors are:

- Compliance with IEC 60947-1, IEC 60947-3, UL 512 and UL 486 E.
- Plastic parts are made of material resistant to high temperatures.
- All contact surfaces are silver plated.
- Mounting on standard DIN 35 mm rail (DIN EN60715). The sizes 14x51 and 22x58 can be also fixed with screws on a flat base.
- For all sizes a version with electronic indicator is available. There are two technical types of indicator:
  - a) L (LED) with built-in LED diode which blinks after the fuse-link operates. The internal circuit resistance is 2 MΩ, thus the total dissipation is minimal. The indicator is capable of operating in conditions of open circuit with minimum capacitance between connection cables. Operating voltage range spans from 50 V to 690 V a.c. and d.c.
  - b) I (NEON) with neon lamp which is constantly lit after the fuse-link operates. The internal circuit resistance is 570 kΩ, thus it is necessary for the circuit to be closed in order for the indicator to function. The operational voltage range is 100 V to 750 V a.c.
- Modular design - it is possible to assemble multi pole versions on customer's site for VLC 8, VLC 10, VLC 14 and VLC 22.

## Fuse disconnector VLC 8

[illegible] max. 20 A | [illegible] 400 V | [illegible] AC22B

| 1 pole | | | | | |
|---|---|---|---|---|---|
| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 400 | 20 | 002521000 | - | 65 | 12/108 |
| | | 002521100 | L-LED | | |
| | | 002521200 | I-NEON | | |

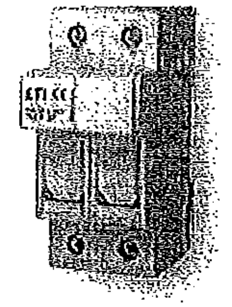


| 1 pole + N | | | | | |
|---|---|---|---|---|---|
| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 400 | 20 | 002522000 | - | 128 | 6/54 |
| | | 002522100 | L-LED | | |
| | | 002522200 | I-NEON | | |
| | | *002522001 | - | 128 | 6/54 NEW! |
| | | *002522101 | L-LED | | |
| | | *002522201 | I-NEON | | |

*N pole on left "French version"

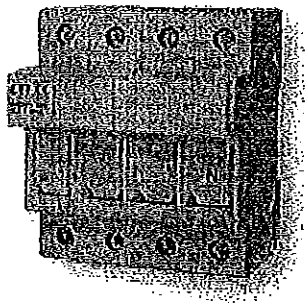
**2-pole**

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002523000 | - | 124 | 6/54 |
| | | 002523100 | L-LED | | |
| | | 002523200 | I-NEON | | |



**3-pole**

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002524000 | - | 187 | 4/36 |
| | | 002524100 | L-LED | | |
| | | 002524200 | I-NEON | | |



**3-pole + N**

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400 | 20 | 002525000 | - | 270 | 3/27 |
| | | 002525100 | L-LED | | |
| | | 002525200 | I-NEON | | |
| | | *002525001 | - | 270 | 3/27 NEW! |
| | | *002525101 | L-LED | | |
| | | *002525201 | I-NEON | | |

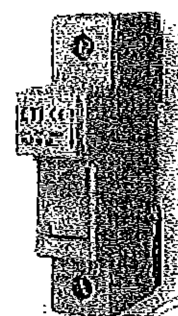
*N pole on left "French version"

## Fuse disconnector VLC 10

max. 32 A | 690 V | AC22B

**1-pole**

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 32 | 002541000 | - | 65 | 12/108 |
| | | 002541100 | L-LED | | |
| | | 002541200 | I-NEON | | |



**1-pole + N**

| U/U (V) | I (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 400/690 | 32 | 002542000 | - | 128 | 6/54 |
| | | 002542100 | L-LED | | |
| | | 002542200 | I-NEON | | |
| | | *002542001 | - | 128 | 6/54 NEW! |
| | | *002542101 | L-LED | | |
| | | *002542201 | I-NEON | | |

*N pole on left "French version"

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КИМТЕКС БЪЛГАРИЯ ООД КИМТЕКС БУРГАС

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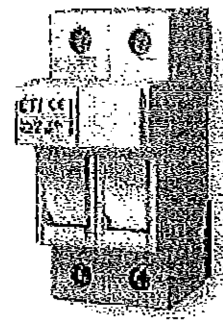
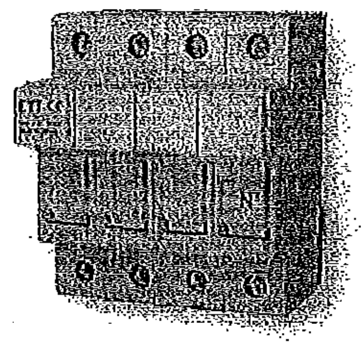


| 2 pole | | | | | |
|---|---|---|---|---|---|
| $U_n$ [V] | $I_n$ [A] | code No. | indicator | weight [g] | packaging [pcs] |
| 690 | 32 | 002543000 | - | 124 | 6/54 |
| | | 002543100 | L-LED | | |
| | | 002543200 | I-NEON | | |



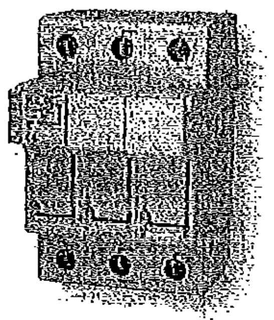
| 3 pole | | | | | |
|---|---|---|---|---|---|
| $U_n$ [V] | $I_n$ [A] | code No. | indicator | weight [g] | packaging [pcs] |
| 690 | 32 | 002544000 | - | 187 | 4/36 |
| | | 002544100 | L-LED | | |
| | | 002544200 | I-NEON | | |

| 3 pole + N | | | | | |
|---|---|---|---|---|---|
| $U_n$ [V] | $I_n$ [A] | code No. | indicator | weight [g] | packaging [pcs] |
| 690 | 32 | 002545000 | - | 270 | 3/27 |
| | | 002545100 | L-LED | | |
| | | 002545200 | I-NEON | | |
| | | *002545001 | - | 270 | 3/27 NEW! |
| | | *002545101 | L-LED | | |
| | | *002545201 | I-NEON | | |

* N pole on left "French version"

## Fuse disconnector VLC CC

| Rated current | Rated operational voltage | Utilization category |
|---|---|---|
| max. 30 A | 600 V | AC22B |



| 1 pole | | | | | |
|---|---|---|---|---|---|
| $U_n$ [V] | $I_n$ [A] | code No. | indicator | weight [g] | packaging [pcs] |
| 600 | 30 | 002541300 | - | 65 | 12/108 |

| 2 pole | | | | | |
|---|---|---|---|---|---|
| $U_n$ [V] | $I_n$ [A] | code No. | indicator | weight [g] | packaging [pcs] |
| 600 | 30 | 002543300 | - | 124 | 6/54 |

| 3 pole | | | | | |
|---|---|---|---|---|---|
| $U_n$ [V] | $I_n$ [A] | code No. | indicator | weight [g] | packaging [pcs] |
| 600 | 30 | 002544300 | - | 187 | 4/36 |

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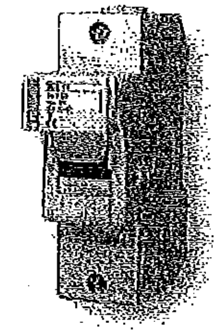
# Varovalčni ločilnik VLC 14

max. 50 A | 690 V | AC22B

1 pole

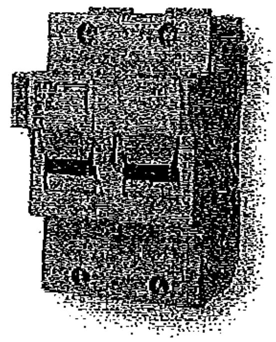
| $U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 50 | 002561000 | - | 100 | 12/96 |
| | | 002561100 | L-LED | | |



1 pole + N

| $U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 50 | 002562000 | - | 222 | 6/48 |
| | | 002562100 | L-LED | | |
| | | *002562001 | - | 222 | 6/48 NEW! |
| | | *002562101 | L-LED | | |

*N pole on left *French version*

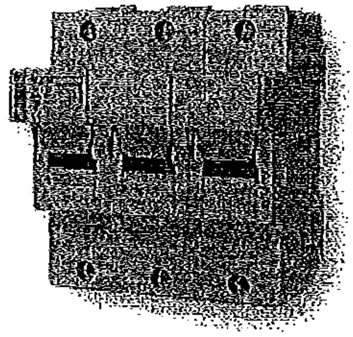


2 pole

| $U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 50 | 002563000 | - | 201 | 6/48 |
| | | 002563100 | L-LED | | |

3 pole

| $U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 50 | 002564000 | - | 308 | 4/32 |
| | | 002564100 | L-LED | | |



3 pole + N

| $U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 50 | 002565000 | - | 437 | 3/24 |
| | | 002565100 | L-LED | | |
| | | *002565001 | - | 437 | 3/24 NEW! |
| | | *002565101 | L-LED | | |

*N pole on left *French version*

# Fuse disconnector VLC 22

max. 100 A | 690 V | AC21B

1 pole

| $U_e$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
|---|---|---|---|---|---|
| 690 | 100 | 002571000 | - | 160 | 3/105 |
| | | 002571100 | L-LED | | |



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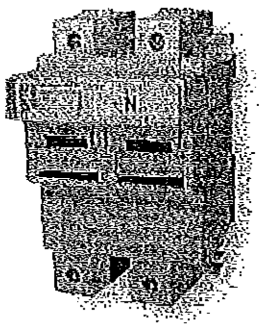
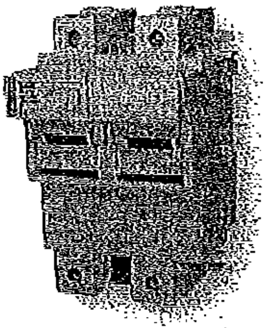
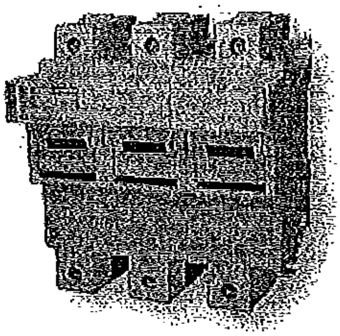


| 1-pole + N | | | | | |
|---|---|---|---|---|---|
| $U_n$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 690 | 100 | 002572000 | - | 355 | 2/48 |
| | | 002572100 | L-LED | | |
| | | *002572001 | - | 355 | 2/48 NEW! |
| | | *002572101 | L-LED | | |

* N pole on left "French version"



| 2-pole | | | | | |
|---|---|---|---|---|---|
| $U_n$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 690 | 100 | 002573000 | - | 310 | 2/48 |
| | | 002573100 | L-LED | | |



| 3-pole | | | | | |
|---|---|---|---|---|---|
| $U_n$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 690 | 100 | 002574000 | - | 480 | 1/35 |
| | | 002574100 | L-LED | | |

| 3-pole + N | | | | | |
|---|---|---|---|---|---|
| $U_n$ (V) | $I_n$ (A) | code No. | indicator | weight (g) | packaging (pcs) |
| 690 | 100 | 002575000 | - | 680 | 1/24 |
| | | 002575100 | L-LED | | |
| | | *002575001 | - | 680 | 1/24 NEW! |
| | | *002575101 | L-LED | | |

* N pole on left "French version"

## Accessories

| Auxiliary switch PS VLC | | | | | | |
|---|---|---|---|---|---|---|
| U (V) | I (A) | code No. VLC14 | code No. VLC22 | weight (g) | packaging (pcs) | contact |
| 250 | [illegible] | 002569001 | 002579001 | 50 | 1/10 | 1x make<br>1x breake |

Auxiliary switch PS VLC is intended to be mounted with disconnectors VLC 14 and VLC 22 for all versions (1p, 2p, 2p+N, 3p, 3p+N). The width of apparatus is 9 mm, other dimensions comply with VLC 14 and VLC 22 series switches. Auxiliary switch PS VLC signals the operation of CH 14 or CH 22 fuse-links only in the case a fuse-link is fitted with striking pin - see IEC 60 269-2-1 Figure 1a (III).





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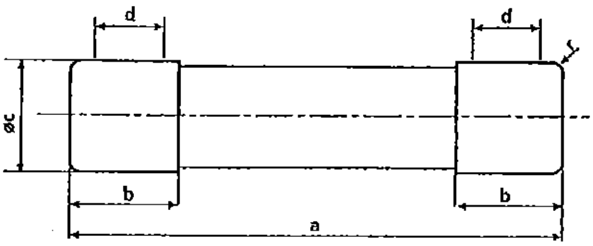
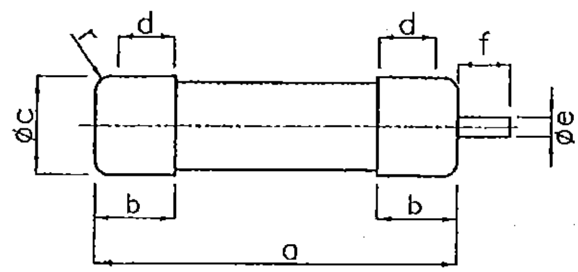
# Cylindrical fuse-link

| Technical data | | |
|---|---|---|
| Rated Voltage | 400 V a.c., 500 V a.c., 690 V a.c. | |
| Rated current | CH 8 | 1-25 A/400 V |
| | CH 10 | 0,5-16 A/500 V, 20-32 A/400 V |
| | CH 14 | 2-25 A/690 V, 32-50 A/500 V |
| | CH 22 | 16-40 A/690 V (50 A/690 V aM), 50-100 A/500 V |
| Rated frequency | 50 Hz | |
| Rated breaking capacity | CH 8 | 50 kA |
| | CH 10 | 100 kA |
| | CH 14 | 2-25 A/80 kA, 32-50 A/120 kA |
| | CH 22 | 16-40 A/80 kA (50 A/80 kA aM), 50-100 A/120 kA |
| Characteristics | gG, aM | |
| Body material | ceramic | |
| Material of contact parts | CuZn28, gal Ag | |




| [illegible] | a | b min | c | d | r |
|---|---|---|---|---|---|
| 8 x 32 | 31,5±0,5 | 6,7 | 8,5±0,1 | 4 | 1±0,5 |
| 10 x 38 | 38,0±0,6 | 10,5 | 10,3±0,1 | 6 | 1,5±0,5 |
| 14 x 51 | 51,0+0,6/-1 | 13,8 | 14,3±0,1 | 7,5 | ±1 |
| 22 x 58 | 58,0+0,1 | 16,2 | 22,2±0,1 | 11 | ±1 |




With striker pin

| [illegible] | e | f |
|---|---|---|
| 14 x 51 | 3,8 | 7,5 |
| 22 x 58 | 3,8 | 7,5 |

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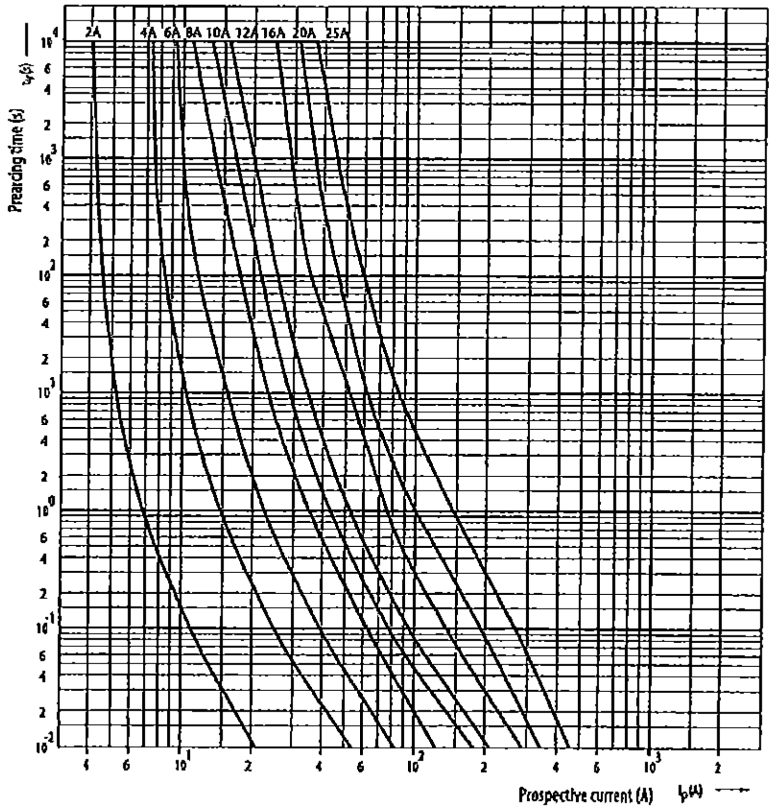
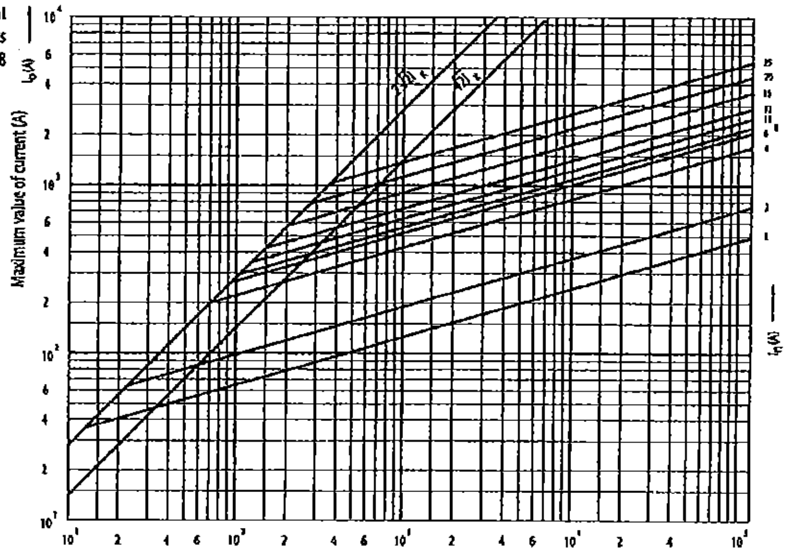
КИМТЕКС БЪЛГАРИЯ ООД БУРГАС
КИМТЕХ

Time current characteristics I/t, gG CH8




Cut-off current characteristics CH8

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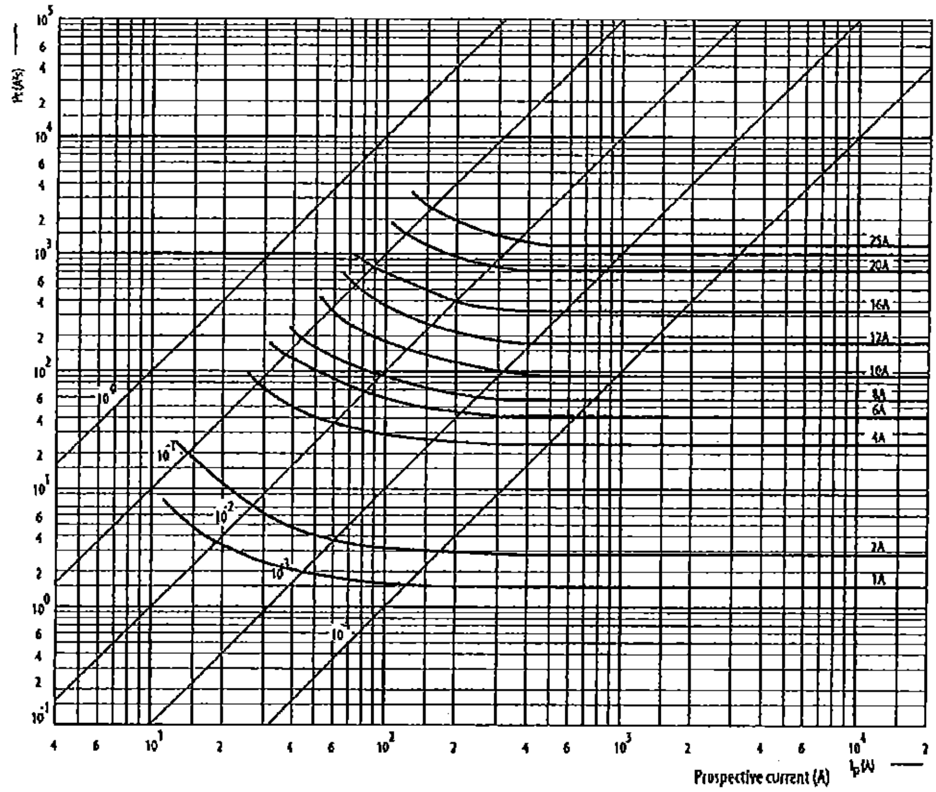
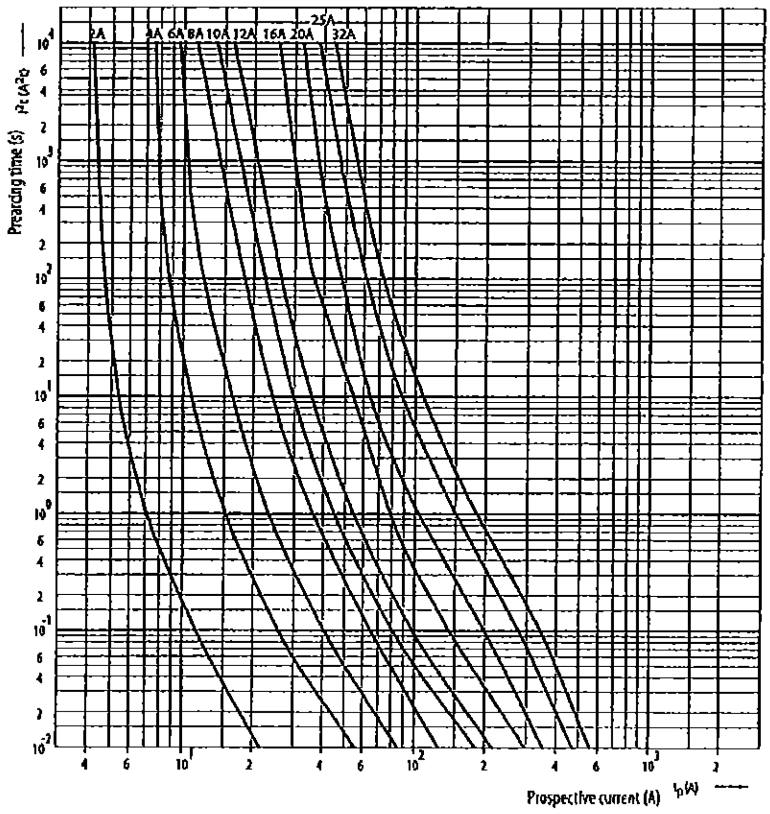
ETI



Melting energy characteristics I²t CH8



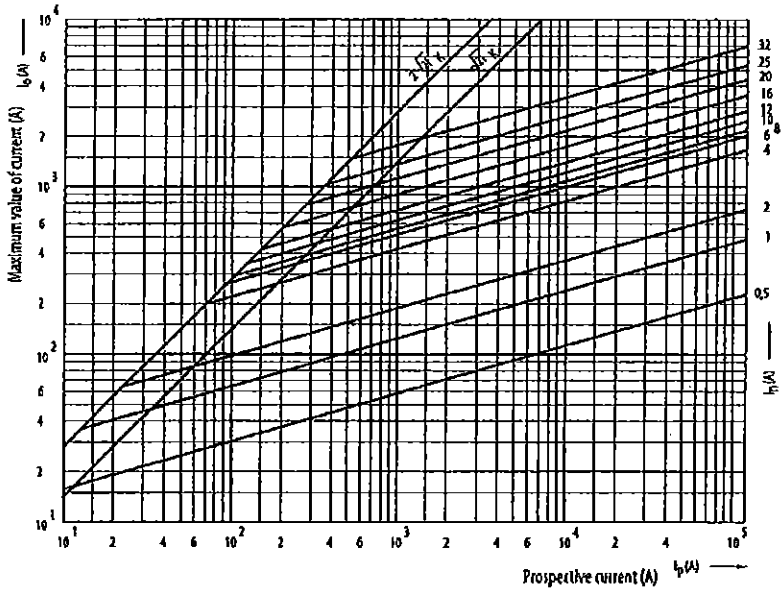

Time current characteristics I/t, gG CH10



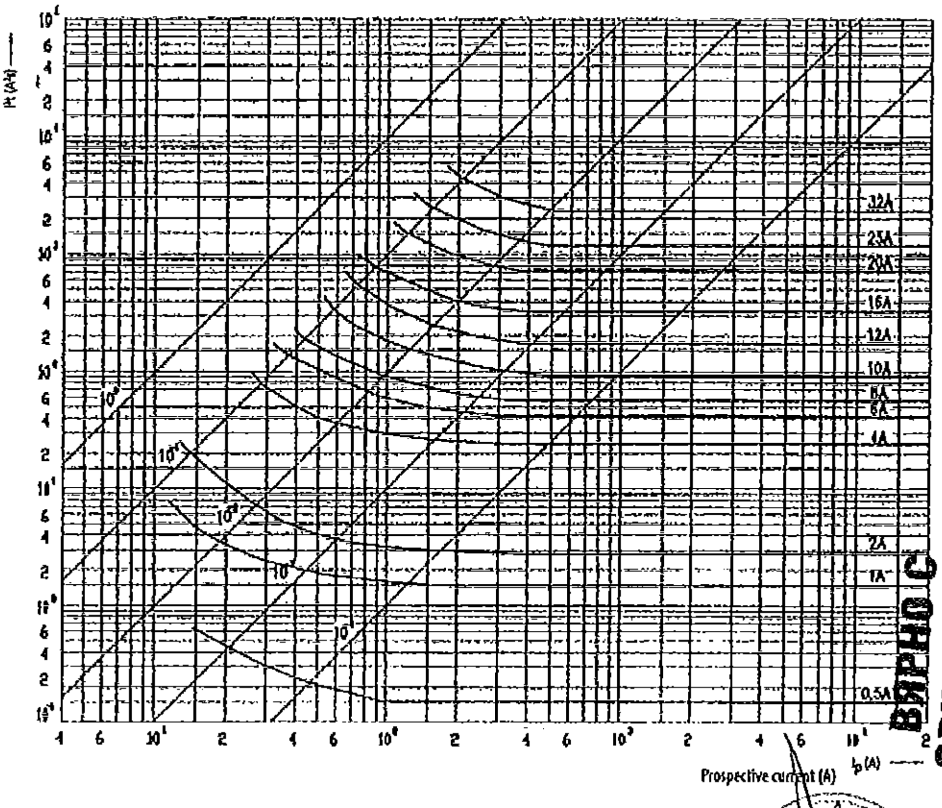

ВЯРНО С ОРИГИНАЛА

КИМТЕХ

Cut-off current characteristics CH10



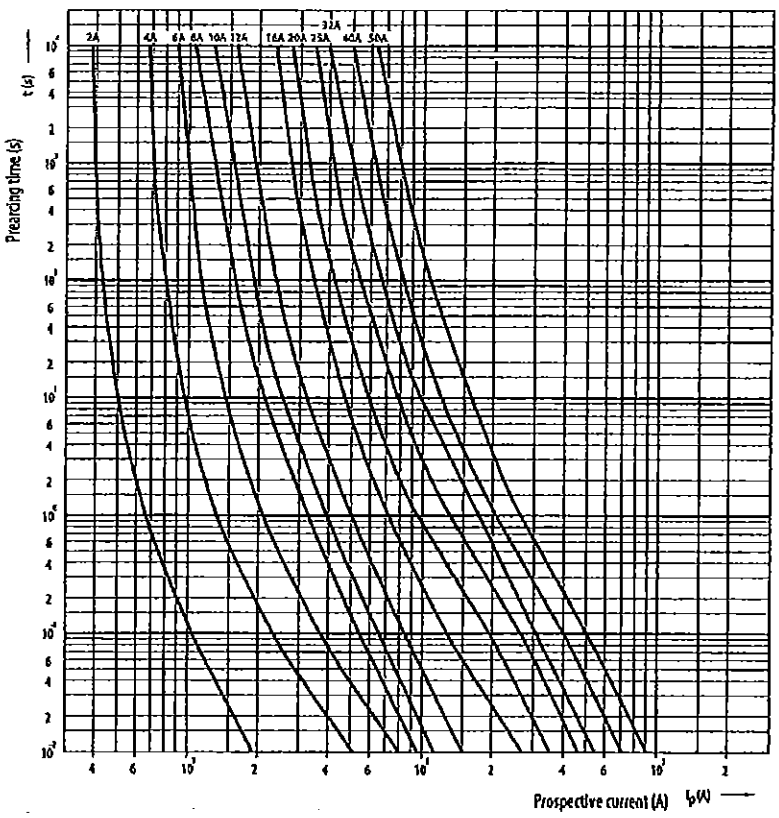

Melting energy characteristics $I^2t$ CH10



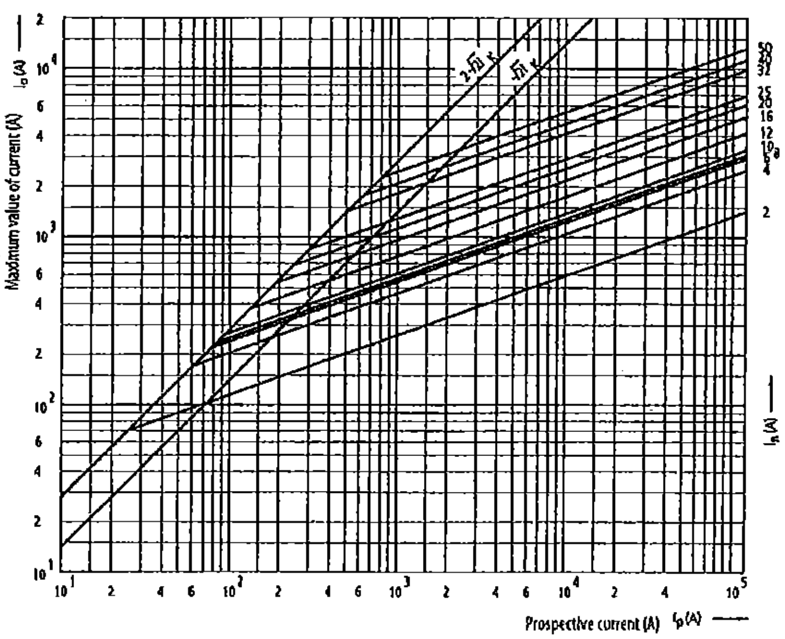

ВЯРНО С ОРИГИНАЛА

КИМТЕХ БЪЛГАРИЯ ЕООД БУРГАС

Time current characteristics I/t, gG CH14

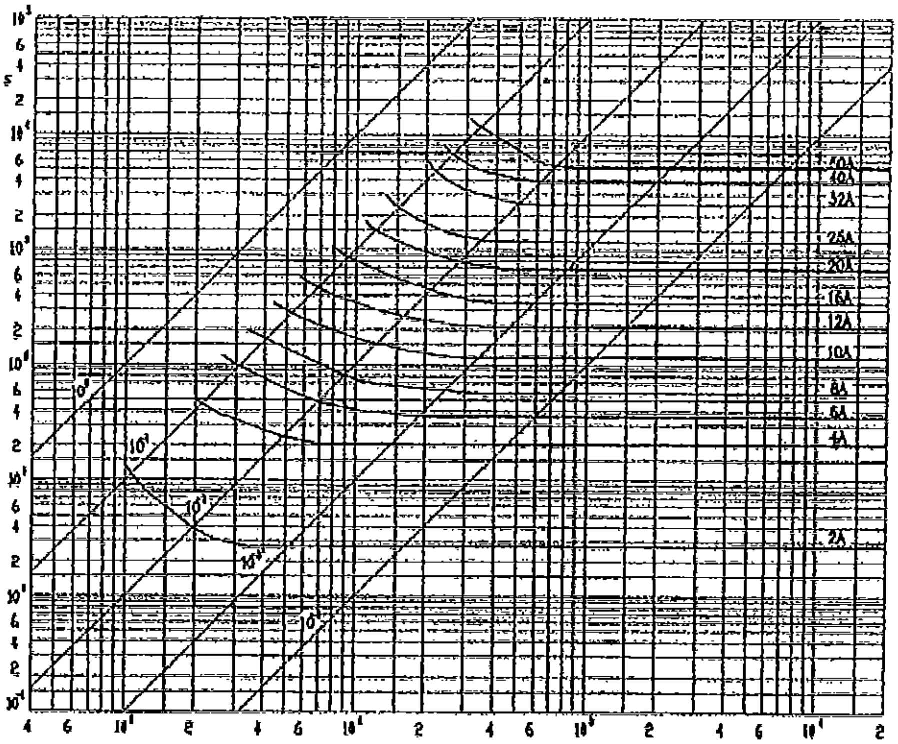



Cut-off current characteristics CH14

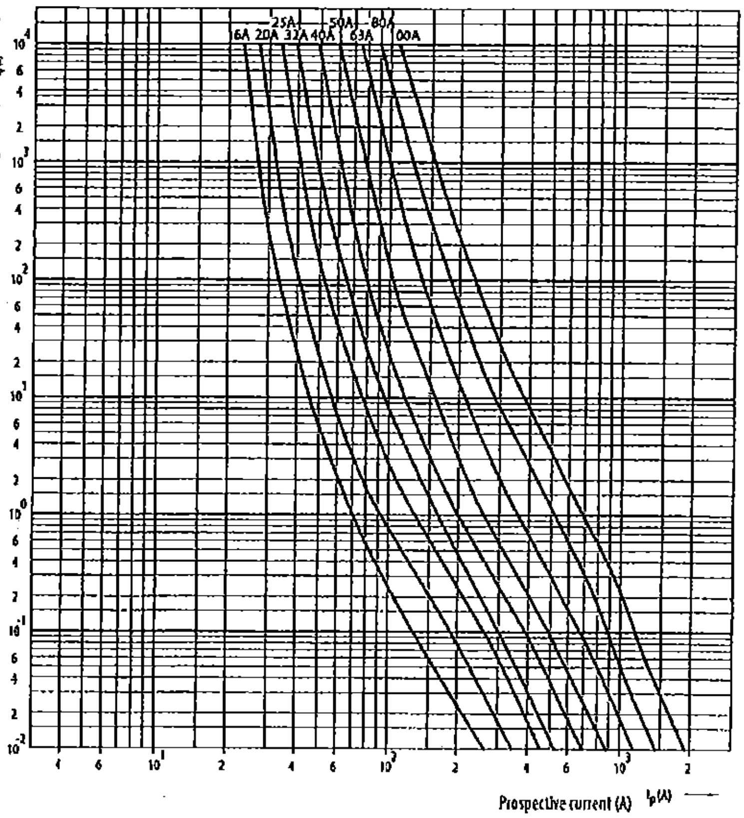



ВЯРНО С ОРИГИНАЛА
„КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС КИМТЕХ

Melting energy characteristics I²t CH14




Time current characteristics I/t, gG CH22

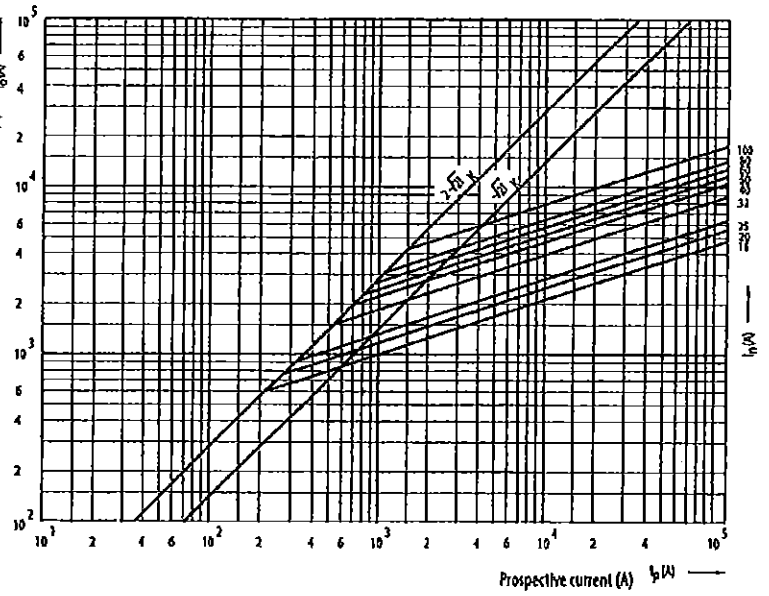



ВЯРНО С ОРИГИНАЛА

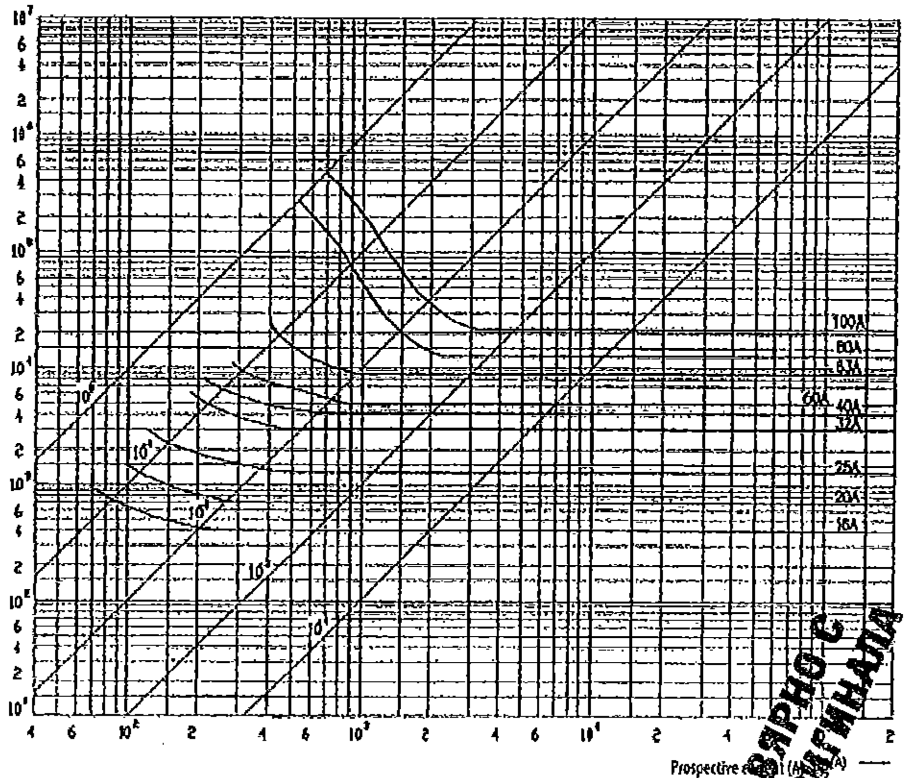
ETI



Cut-off current characteristics CH22



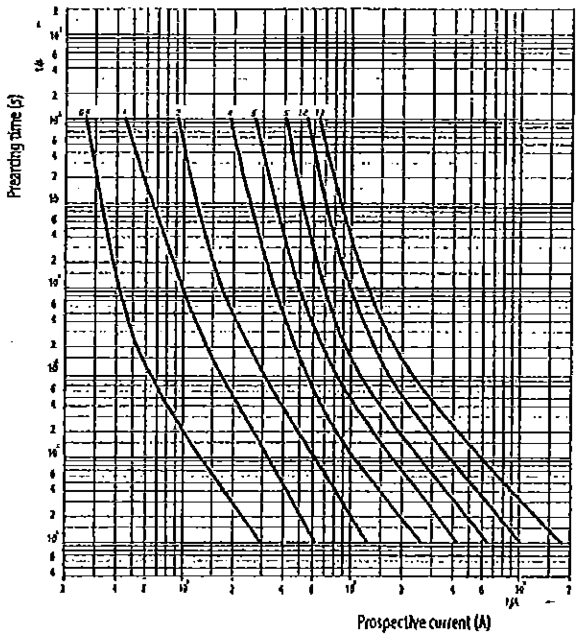

Melting energy characteristics $I^2t$ CH22



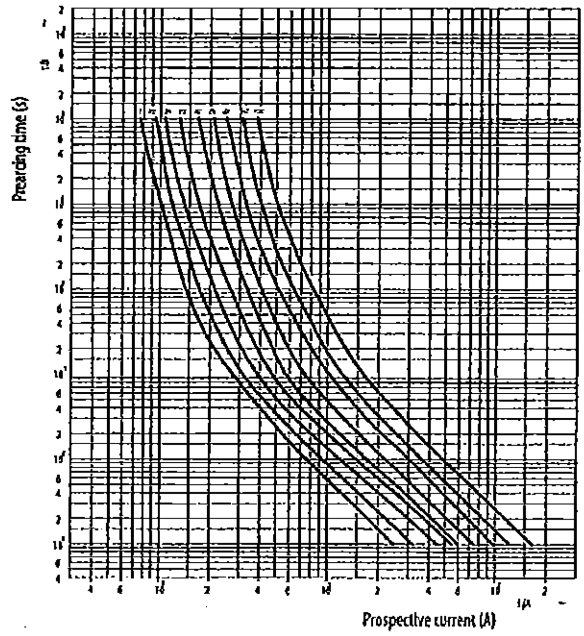

ВЯРНО С ОРИГИНАЛА

ETI

Time current characteristics I/t, aM CH10, 14, 22




Time current characteristics I/t, aM CH10, 14, 22




ВЯРНО С ОРИГИНАЛА

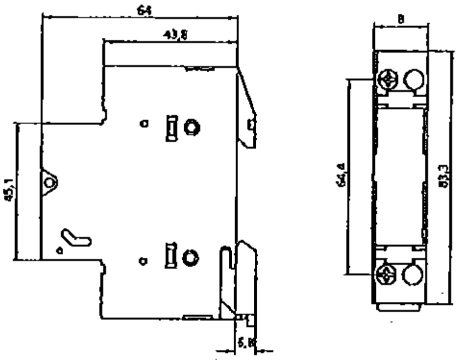
КИМТЕХ БЪЛГАРИЯ ООД БУРГАС

## Fuse disconnectors for cylindrical fuse-links

Technical data

| Type | VLC8 | PCF8 | VLC10 | PCF10 | VLC CC | VLC14 | VLC22 |
|---|---|---|---|---|---|---|---|
| Number of poles | 1p, 1p+N, 2p, 3p, 3p+N | | | | 1p, 2p, 3p | 1p, 1p+N, 2p, 3p, 3p+N | |
| Type of current | a.c. | | | | | | |
| Utilization category | AC-22B | | | | | | AC(21)B |
| Rated Operational Voltage Ue (V) | 400 | 400 | 400/690 1p+N | 400/690 1p+N | 600 | 690 | 690 |
| Rated frequency (Hz) | 50 | | | | 60 | 50 | |
| Rated impulse withstand voltage Uimp (kV) | 8 | 4 | 8 | 4 | 8 | 8 | 8 |
| Rated operational current (A) | 20 | 20 | 32 | 32 | 30 | 50 | 125 |
| Rated short time withstand Icw (A) | 240 | 240 | 390 | 390 | 160 | 600 | 1500 |
| Rated conditional short circuit current (kA) | 50 | 100 | | 200 | | 100 | |
| Cage clamps (max mm²) | 25 | 10 | 25 | 10 | 25 | 35 | 50 |
| Maximal power dissipation (W) | 2,5 | 2,5 | 3 | 3 | 3 | 5 | 9,5 |
| Test reports | UL | Int. | CCA/CB, UL, CSA | CCA/CB, UL | Int., UL | CCA/CB, UL, CSA | CCA/CB |

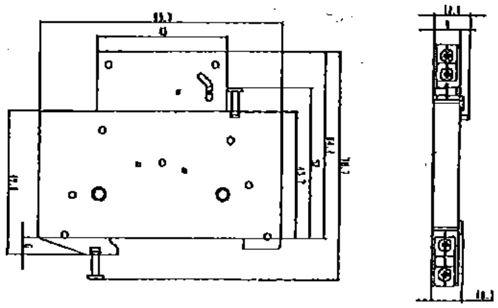
## Fuse disconnector PCF




Fuse disconnector PCF 8, PCF 10

| Type | dimension B |
|---|---|
| 1p | 17,8 |
| 1p+N | 17,8 |
| 2p | 35,6 |
| 3p | 53,4 |
| 3p+N | 53,4 |

## Auxiliary switch PS PCF



ВЯРНО С ОРИГИНАЛА

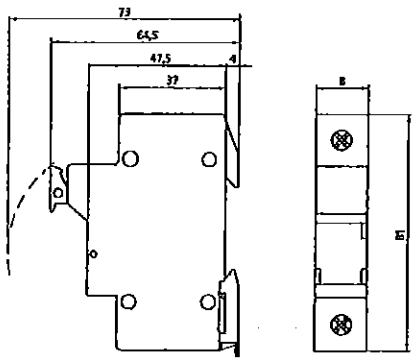
КОМТЕХ-БЪЛГАРИЯ ЕООД БУРГАС

DATA

# Fuse disconnector VLC

**Fuse disconnector VLC 8, VLC 10**

| type | dimension B |
|---|---|
| VLC 8, 10 1p | 17,5 |
| VLC 8, 10 1p+N | 35 |
| VLC 8, 10 2p | 35 |
| VLC 8, 10 3p | 52,5 |
| VLC 8, 10 3p+N | 70 |

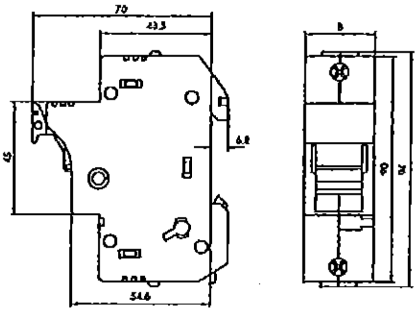



**Fuse disconnector VLC CC**

| type | dimension B |
|---|---|
| VLC CC 1p | 17,5 |
| VLC CC 2p | 35 |
| VLC CC 3p | 52,5 |

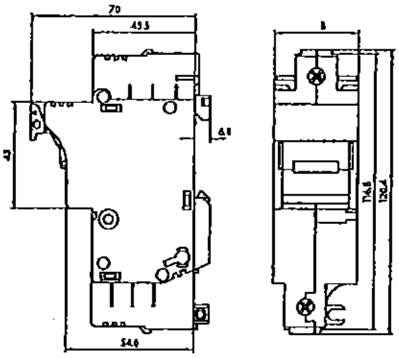
**Fuse disconnector VLC 14**

| type | dimension B |
|---|---|
| VLC 14 1p | 27 |
| VLC 14 1p+N | 54 |
| VLC 14 2p | 54 |
| VLC 14 3p | 81 |
| VLC 14 3p+N | 108 |

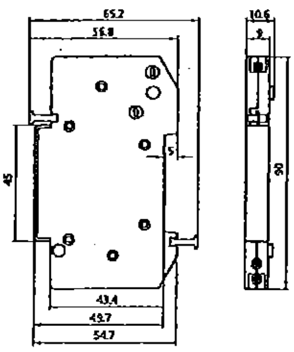



**Fuse disconnector VLC 22**

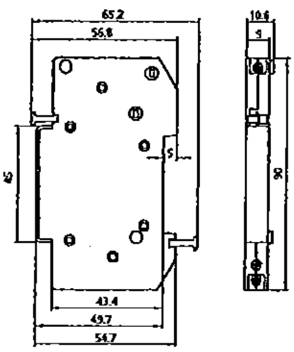
| type | dimension B |
|---|---|
| VLC 22 1p | 35,6 |
| VLC 22 1p+N | 71,2 |
| VLC 22 2p | 71,2 |
| VLC 22 3p | 106,8 |
| VLC 22 3p+N | 142,4 |




# Auxiliary switch VLC




PSVLC 14




PSVLC 22

ВЯРНО С ОРИГИНАЛА

| Technical parameter | VLC 10 | VLC 10 DC | VLC CC | VLC 14 | VLC 14 DC | VLC 22 | PCF 10 | PCF 10 DC | PCF 10 DC |
|---|---|---|---|---|---|---|---|---|---|
| rated current (A) | 32 1p+N | 25 | 30 | 50 | 50 | 125 | 32 | 20 | 25 |
| rated voltage (V) | 400/690 1p+N | 1000 | 600 | 690 | 1000 | 690 | 400/690 1p+N | 1000 | 900 |
| type of current | a.c. | d.c. | a.c. | a.c. | d.c. | a.c. | a.c. | d.c. | d.c. |
| max power dissipation of the fuse-link (W) | 3 | 3 | 3 | 5 | 5 | 9,5 | 3 | 3 | 3 |
| AC22-B acc. IEC 60947-3 | AC22-B | AC22-B | AC22-B | AC22-B | AC22-B | AC21-B | AC22-B | AC22-B | AC22-B |
| DC20-B acc. IEC 60947-3 | DC20-B | DC20-B | DC20-B | DC20-B | DC20-B | | DC20-B | DC20-B | DC20-B |
| rated conditional short-circuit current (kA) | 100 | 25 | 200 | 100 | 50 | 100 | 100/200 | 25 | 25 |
| rated short-time withstand current (A) | 390 | 300 | 360 | 600 | 600 | 1500 | 390 | 240 | 300 |
| operating cycles (mech) | 1700 | 2000 | 1700 | 1700 | 2000 | 1400 | 1700 | 2000 | 2000 |
| operating cycles (electr.) | 300 | 0 | 2000 | 300 | 0 | 200 | 300 | 0 | 0 |
| operating ambient temperature (°C) | -5..+40 | -5..+40 | -5..+40 | -5..+40 | -5..+40 | -5..+40 | -5..+40 | -5..+40 | -5..+40 |
| cross section (mm^2) | 1,5...25 | 1,5...25 | 1,5...25 | 1,5...35 | 1,5...35 | 4...50 | 0,5...10 | 0,5...10 | 0,5...10 |
| torque (Nm) | 2,5 | 2,5 | 2,5 | 3 | 3 | 3 | 1,2 | 1,2 | 1,2 |
| rated insulation voltage (V) | 690 | 1000 | 600 | 690 | 1000 | 390 | 690 | 1000 | 900 |
| rated imp. withstand voltage (kV) | 8 | 8 | 8 | 8 | 8 | 8 | 4 | 4 | 4 |
| overvoltage category | Overvoltage category III (according to Table H.1 in IEC 60947-1 and according to IEC 60099-1) | | | | | | | | |
| [illegible] acc. IEC 60947-3 (CB, CCA) | CCA/CB | Int. | | CCA/CB | CCA/CB | CCA/CB | CCA/CB | Int. | Int. |
| | UL | | UL | UL | UL | UL | UL | | |

| version with signal detector - LED indicator | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| min./max. voltage a.c. (V) | 50/690 | | | 50/690 | 50/690 | 50/690 | 50/690 | | |
| min./max. voltage d.c. (V) | | 50/1.000 | | | | | | 50/1.000 | 50/900 |

ВЯРНО С ОРИГИНАЛА

КИМТЕХ БУРГАС ЕООД

D:\Programi ETI in JM\VLC\ETI cylindrical fuseholders_Technical characteristics.xls

ETI
БЪЛГАРИЯ

Power needs control

# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

| | |
|---|---|
| Производител: | ETI Elektroelement d.d. |
| Адрес: | ETI Elektroelement d.d.<br>Obrezija 5<br>1411 Izlake<br>Slovenia |

Продукт: Основа разединител за цилиндрични стопяеми предпазители VLC

Размер: VLC10 1-p, 1p+N, 2p, 3p, 3p+N
32A/690V a.c

Продуктите отговарят на следните Европейски директиви:

| | |
|---|---|
| Директива: | 2006/95/EC<br>Директива на Европейския парламент и на Съвета на 12 Декември 2006 за хармонизиране на законите на държавите членки отнасящи се до електро оборудване, проектирано за употреба в определени граници на напрежение. |
| Хармозизирани Стандарти: | EN 60947-1:2007 , EN 60947-3;1999/A2;2005, EN 60947-3:2008, |

Описаните продукти са произведени съгласно изискванията на съответните стандарти и с това изпълняват изискванията на Европейската директива.

| | |
|---|---|
| Стандарти: | IEC 60947-1 Ed.5.0:2007, IEC 60947-3 Ed.3:2008 |
| Протоколи от изпитания: | CB/CCA/No. 2.03.00938.1.0/VLC10/CB/CCA |
| Маркировка CE: | На продукта; на опаковката |
| Място и дата: | София, 01 юни 2013 |
| Представляващ производителя | Александър Маркович |

ВЯРНО С ОРИГИНАЛА

ЕТИ БЪЛГАРИЯ ЕООД • ETI BULGARIA • София



КИНТЕКС БЪЛГАРИЯ • ЕООД • БУРГАС

Accredited by BMWA, No. BMWA-92.714/0532-I/12/2006 as test- and inspection body and according to BGBl. II, No. 244/2006 as certification body for personnel

**arsenal research**
*Ein Unternehmen der Austrian Research Centers*

# Test Report

Project Designation

TYPE TEST AT
FUSE-SWITCH-DISCONNECTORS
FOR CYLINDRICAL FUSE-LINKS
TYPE VLC 10

Client

ETI Elektroelement d.d.
1411 Izlake, Obrezija 5
SLOVENIA

Order from / No. 09/2008 / ---

Project Number 2.03.00938.1.0/VLC10 Test Engineer Ing.J.Alnetter

| | |
|---|---|
| Date of issue | 26.01.2009 |
| Total number of issues / No. | 1 / 1 |
| Number of pages | 5 |
| Annex | CB/CCA - Test Report No. 2.03.00938.1.0/VLC10/CB/CCA (30 pages) |

ВЯРНО С ОРИГИНАЛА

arsenal research
Ein Unternehmen der Austrian Research Centers.

## Test Item

### Identification:
Low-voltage fuse-switch-disconnectors for cylindrical fuse-links type VLC 10

| | |
|---|---|
| Manufacturer: | ETI Elektroelement d.d. |
| Trademark: | ETI |
| Number of poles: | 1p, 1p+N, 2p, 3p, 3p+N |
| Rated operational voltage(s): | 400V up to 690V |
| Rated operational current(s): | 10A up to 32A |
| Rated frequency: | 50Hz |

### Technical data and description:
See page 4

## Testing location, Period of testing

### Testing location:
Österreichisches Forschungs- und Prüfzentrum Arsenal Ges.m.b.H.
Business Unit Monitoring, Energy and Drive Technologies – Power Service Center
Giefinggasse 2
1210 Wien
AUSTRIA

### Period of testing:
10 ... 12/2008

## Test(s)

### Test(s) performed:
Type test

### Test standard(s):
IEC 60947-1:2007 (5th Edition) and IEC 60947-3:2008 (3rd Edition)
EN 60947-1:2007 and EN 60947-3:1999+A1:2001+A2:2005

### Test procedure(s):
CB Scheme and CCA Scheme

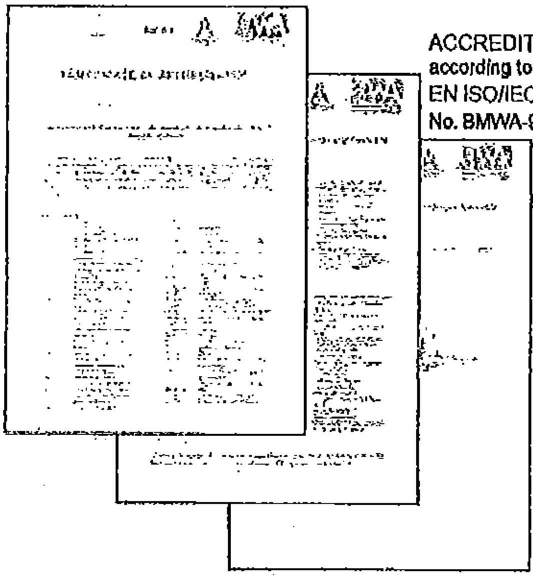
## Result

The low-voltage fuse-switch-disconnectors for cylindrical fuse-links type VLC 10 have passed the type test successfully.

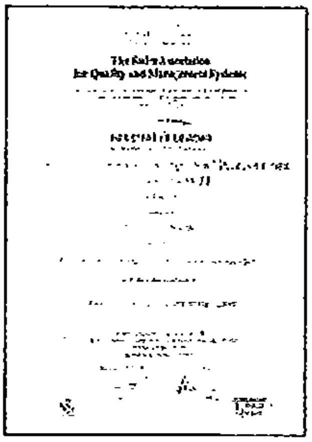
ВЯРНО С ОРИГИНАЛА

| Test Engineer | Project Engineer, technical responsibility |
|---|---|
| Ing.J.Ainetter | Ing.K.Farthofer |

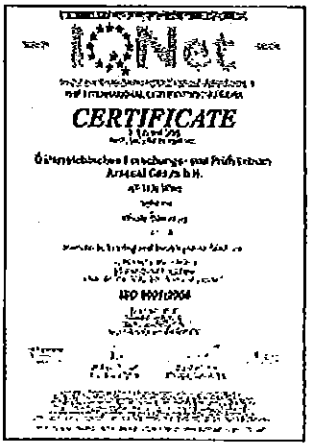
## Testing laboratory



ACCREDITED
according to
EN ISO/IEC 17025
No. BMWA-92.714/0532-I/12/2006



CERTIFICATED
according to
ISO 9001
Reg. No. 12769-03

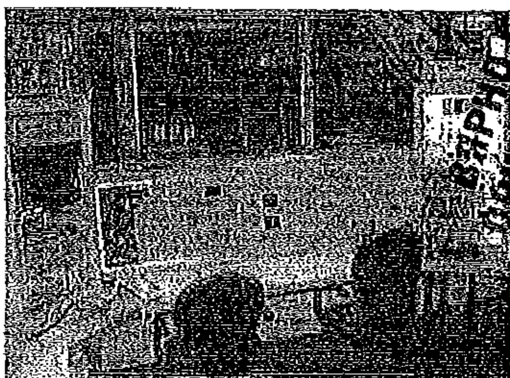




RECOGNIZED
CB TESTING LABORATORY
under the responsibility of OVE
as the National Certification Body

### PSC – Power Service Center:

Control station for tests up to 15kA



Control station for tests above 15kA

ВЯРНО С ОРИГИНАЛА

КИМТЕХ БУРГАС

## Technical data and description

| | |
|---|---|
| Test item | Low-voltage fuse-switch-disconnectors for use with cylindrical fuse-links |
| Trademark | ETI |
| Model/Type reference | VLC 10 |
| Manufacturer | ETI Elektroelement d.d. |
| Place of manufacture | 1411 Izlake, Obrezija 5 |
| Method of operation | Dependent manual operation |
| Switching positions | ON / OFF |
| Number of poles | 1p, 1p+N, 2p, 3p, 3p+N |
| Nature of supply | AC |
| Utilization category | AC-22B at 690V/32A |
| Rated operational voltage | p to 69000V up t |
| Rated operational current | p to 32A10A up t |
| Rated frequency | 50Hz |
| Conventional free air thermal current | 10A up to 32A (max. 3W) |
| Rated insulation voltage | 690V |
| Rated impulse withstand voltage | 8kV |
| Rated short-time withstand current | 300A / 1s |
| Rated conditional short-circuit current | 100kA at 400V (with 32A fuse-links) |
| Kind of protective device | Cylindrical fuse-link CH 10 (10 x 38) |
| Degree of protection | IP 20 |

[redacted]

С
НАЛА

ЛГАРИЯ
ИМТЕХ
БУРГАС

[redacted]

## Measuring equipment

| Measured quantity | Device | Manufacturer | Code |
|---|---|---|---|
| Voltage (tests up to 15kA) | Voltage divider 1:2000<br>Difference amplifier AM 502<br>Signal memory recorder TRA 800 | ÖFPZ Arsenal<br>Tektronix<br>W&W | -<br>AM 502/1...3<br>TRA800 |
| Current (tests up to 15kA) | Lin. current transformer LGSSO<br>Burden 1Ω<br>Signal memory recorder TRA 800 | Ritz<br>ÖFPZ Arsenal<br>W&W | WLIN5000/1...3<br>-<br>TRA800 |
| Current (tests at reduced voltage) | Current transformer GE 4461<br>Current transformer AETt10<br>True-RMS amperemeter Kl. 0,5<br>Digital multimeter Fluke 185 | Goerz<br>Siemens<br>Norma<br>Fluke | WI600/1...3<br>WI4000/1...3<br>A0,5/1...3<br>FLUKE185/1, 2 |
| Transient recovery voltage | Adjustment equipment for TRV<br>Oscilloscope G 801.1 | ÖFPZ Arsenal<br>Tektronix | -<br>G801.1 |
| Dielectric properties | High-voltage test equipment 90-1F with measuring equipment<br>Impulse tester 35<br>Impulse voltmeter 64M<br>Oscilloscope 9410 | Elabo<br>Haefely<br>Haefely<br>Le Croy | HSG5KV<br>G304<br>G502<br>G803 |
| Leakage current | High-voltage test equipment 90-1F<br>Digital multimeter Fluke 185<br>Digital multimeter Fluke 185 | Elabo<br>Fluke<br>Fluke | HSG5KV<br>FLUKE185/1<br>FLUKE185/2 |
| Time | Signal memory recorder TRA 800<br>Stopwatch | W&W<br>Junghans | TRA800<br>938-2 |
| Temperature | 24 channel recorder Polycomp SK30<br>Temperature meter TESTO 901 | H & B<br>Testoterm | SK 30<br>TESTO |
| Abnormal heat and fire | Glow-wire test device with measuring equipment | ÖFPZ Arsenal | - |
| Mechanical strength of terminals | Test equipment | ÖFPZ Arsenal | - |
| Insertability of unprepared conductors | Gauges | ÖFPZ Arsenal | - |
| Strength of actuator mechanism | Test equipment | Schatz | - |
| Degree of protection | Test probe | PTL | - |
| Clearances, creepage distances | Digital slide gauge CD-20D | Mitutoyo | SCHUB |

Kimtech

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1113 гр. София
ул. Акад. Георги Бончев № 20

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кабели, трансформатори,
електрооборудване

тел: 02 9733373
факс: 02 9733370
web:www.kimtech.bg
e-mail: office@kimtech.bg

**Списък на проведените изпитвания на Триполюсни и еднополюсни стопяем цилиндричен предпазител-прекъсвач-разединители, размер 10x38 mm**

1. Изпитване напрежение до 15кV;
2. Изпитване ток до 15кV;
3. Изпитване ток при редуцирано напрежение;
4. Възстановяване на предходно напрежение;
5. Диелектрични свойства;
6. Ток на утечка;
7. Време;
8. Температура
9. Анормално нагряване и пламък;
10. Механична якост;
11. Нестабилност на неподготвени проводници;
12. Якост на задвижващия механизъм;
13. Степен на защита;
14. Отстояния, утечки;

13.01.2016г.

Подпис и печат:

"КИМТЕХ-БЪЛГАРИЯ" ООД • БУРГАС

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*Превод от английски език*

**Фирмена бланка на Akkreditierung Austria**

Националният акредитиращ орган

**Akkreditierung Austria**

потвърждава акредитацията на

**Лаборатория за изпитване**

**AIT Austrian Institute of Technology GmbH**
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Идентификационен номер: 0001

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Начална дата на акредитация: **01.12.1993 г.**

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12.08.2014 г.
Дата

(*подпис не се чете*)
Допл. инж. д-р. Норман Брунер
Ръководител на Акредитация Австрия

Кръгъл фирмен печат

*Долуподписаният, Жасмин Кръстев Кръстев, удостоверявам верността на извършения от мен превод от английски език на български език на приложения документ: Удостоверение за акредитация с дата 12.08.2014 г. Преводът се състои от 1 стр.*

*Подпис:*
*Жасмин Кръстев Кръстев*

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ВЯРНО С ОРИГИНАЛА

12.08.2014
Datum / *Date*

Dipl.-Ing. Dr. Norman Brunner
Leiter Akkreditierung Austria / *Head Akkreditierung Austria*

КИМТЕХ БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | | P |
| | **Type SL2-3x/3A: AC-22B at 500V/630A (Test1: L1 and L2 closed, L3 operated; Test2: L1 operated, L2 closed, L3 open)** | | |
| | - utilization category ...: | AC-22B | — |
| | - rated operational voltage Ue (V) ...: | 500 | — |
| | - rated operational current Ie (A) ...: | 630 | — |
| | Conditions for make operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ...(V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... 10 x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor ...: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for break operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ...(V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... 8 x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor ...: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for make/break operations, other than AC-23A and AC-23B: | | P |
| | - test voltage, U = 1,05 Ue ...(V): | L1: 527<br>L2: 528<br>L3: 526 | — |
| | - test current, I = ... 3 x Ie (A): | L1: 1903<br>L2: 1910<br>L3: 1898 | — |
| | - power factor / time constant ...: | L1: 0,62<br>L2: 0,62<br>L3: 0,62 | — |
| | Number of make/break or make and break operations ...: | 5 | P |
| | - recovery voltage duration ≥ 50 ms (ms)...: | 260 | P |
| | - current duration (ms) ...: | 290 | — |
| | - time interval between operations (s)...: | 30 | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only: | | P |
| | - oscillatory frequency (kHz) ...: | 62,68 | — |
| | - measured oscillatory frequency (kHz) ...: | L1: 62,7<br>L2: 62,7<br>L3: 62,7 | P |

ВЯРНО С ОРИГИНАЛА

„КИМТЕХ-БЪЛГАРИЯ" ООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - factor γ ...........................................................: | L1: 1,1<br>L2: 1,1<br>L3: 1,1 | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...........................................: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...............................................: | < 1 | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | |
| | - manufacturer's name, trademark or identification mark ...........................................................: | Jean Müller | |
| | - manufacturer's model or type reference ..............: | M2gG400/69 | |
| | - rated voltage (V) ...................................................: | 690 | |
| | - rated current (A) ...................................................: | 400 | |
| | - power loss (W) ......................................................: | 45 max. | |
| | - rated breaking capacity (kA) ................................: | 100 | |
| | Conductor cross-section (mm²) ..............................: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | |
| | Test current Ie (A) ...................................................: | 400 (fuse-links)<br>630 (solid-links) | |

ВЯРНО С ОРИГИНАЛА

„КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС КИМТЕХ

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 61 (fuse-links) ≤ 70 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 5 (fuse-links) ≤ 7 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 31 (fuse-links) ≤ 25 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 39 (fuse-links) ≤ 36 (solid-links) | 60 | P |
| 8.3.3.7 | Strength of actuator mechanism | | | P |
| 8.2.5 | Verification of the strength of actuator mechanism and position indicating device | | | P |
| | - actuator type (fig.) ...: | 1e | | |
| 8.2.5.2.1 | Dependent and independent manual operation | | | P |
| | - actuating force for opening (N) ...: | 141 | | |
| | - test force with blocked main contacts (N) ...: | 400 | | |
| | - used method to keep the contact closed ...: | Brazing | | |
| | During and after the test, open position not indicated ...: | No open position | | P |
| | Equipment with locking mean, no locking in the open position while test force is applied...: | No locking mechanism | | N/A |
| 8.2.5.2.2 | Dependent power operation | | | N/A |
| | - main contacts fixed together in the closed position ...: | - | | N/A |
| | - used method to keep the contact closed ...: | - | | N/A |
| | - 110% of the rated supply voltage applied to the equipment (3 times) ...: | - | | N/A |
| | During and after the test, open position not indicated ...: | - | | N/A |
| | Equipment show no damage impairing its normal operation...: | - | | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied...: | - | | N/A |

ВЯРНО С ОРИГИНАЛА

„КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС КИМТЕХ

**IEC 60947-3**

| Clause | Requirement + Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.2.5.2.3 | Independent power operation | | N/A |
| | - main contacts fixed together in the closed position .......................................................: | - | N/A |
| | - used method to keep the contact closed ..............: | - | N/A |
| | - stored energy of the power operator released (3 times).......................................................: | - | N/A |
| | During and after the test, open position not indicated .......................................................: | - | N/A |
| | Equipment show no damage impairing its normal operation.......................................................: | - | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied..................: | - | N/A |

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | | P |
| | **Type SL2-3x3/3A: AC-22B at 500V/630A** | | |
| | - utilization category ...: | AC-22B | |
| | - rated operational voltage Ue (V) ...: | 500 | |
| | - rated operational current Ie (A) ...: | 630 | |
| | Conditions for make operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ...(V): | L1: -<br>L2: -<br>L3: - | |
| | - test current, I = ... 10 x Ie (A): | L1: -<br>L2: -<br>L3: - | |
| | - power factor ...: | L1: -<br>L2: -<br>L3: - | |
| | Conditions for break operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ...(V): | L1: -<br>L2: -<br>L3: - | |
| | - test current, I = ... 8 x Ie (A): | L1: -<br>L2: -<br>L3: - | |
| | - power factor ...: | L1: -<br>L2: -<br>L3: - | |
| | Conditions for make/break operations, other than AC-23A and AC-23B: | | P |
| | - test voltage, U = 1,05 Ue ...(V): | L1: 527<br>L2: 528<br>L3: 526 | |
| | - test current, I = ... 3 x Ie (A): | L1: 1903<br>L2: 1910<br>L3: 1898 | |
| | - power factor / time constant ...: | L1: 0,62<br>L2: 0,62<br>L3: 0,62 | |
| | Number of make/break or make and break operations ...: | 5 | P |
| | - recovery voltage duration ≥ 50 ms (ms)...: | Permanent | P |
| | - current duration (ms) ...: | 290 | |
| | - time interval between operations (s)...: | 30 | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only: | | P |
| | - oscillatory frequency (kHz) ...: | 62,68 | |
| | - measured oscillatory frequency (kHz) ...: | L1: 62,7<br>L2: 62,7<br>L3: 62,7 | P |

ВЯРНО С ОРИГИНАЛА

КИМТЕХ-БЪЛГАРИЯ ООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - factor γ ...: | L1: 1,1<br>L2: 1,1<br>L3: 1,1 | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ...: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | |
| | - manufacturer's model or type reference ...: | M2gG400/69 | |
| | - rated voltage (V) ...: | 690 | |
| | - rated current (A) ...: | 400 | |
| | - power loss (W) ...: | 45 max. | |
| | - rated breaking capacity (kA) ...: | 100 | |
| | Conductor cross-section (mm²) ...: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | |
| | Test current Ie (A) ...: | 400 (fuse-links)<br>630 (solid-links) | |

ВЯРНО С ОРИГИНАЛА

КИМТЕХ-БЪЛГАРИЯ ООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 62 (fuse-links) ≤ 69 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 5 (fuse-links) ≤ 7 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 31 (fuse-links) ≤ 26 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 39 (fuse-links) ≤ 35 (solid-links) | 60 | P |
| 8.3.3.7 | Strength of actuator mechanism | | | P |
| 8.2.5 | Verification of the strength of actuator mechanism and position indicating device | | | P |
| | - actuator type (fig.) ...: | 1e | | |
| 8.2.5.2.1 | Dependent and independent manual operation | | | P |
| | - actuating force for opening (N) ...: | 178 | | |
| | - test force with blocked main contacts (N) ...: | 400 | | |
| | - used method to keep the contact closed ...: | Brazing | | |
| | During and after the test, open position not indicated ...: | No open position | | P |
| | Equipment with locking mean, no locking in the open position while test force is applied...: | No locking mechanism | | N/A |
| 8.2.5.2.2 | Dependent power operation | | | N/A |
| | - main contacts fixed together in the closed position ...: | - | | N/A |
| | - used method to keep the contact closed ...: | - | | N/A |
| | - 110% of the rated supply voltage applied to the equipment (3 times) ...: | - | | N/A |
| | During and after the test, open position not indicated ...: | - | | N/A |
| | Equipment show no damage impairing its normal operation...: | - | | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied...: | - | | N/A |

ВЯРНО С ОРИГИНАЛА

„КИМТЕХ-БЪЛГАРИЯ" ООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.2.5.2.3 | Independent power operation | | N/A |
| | - main contacts fixed together in the closed position ........: | - | N/A |
| | - used method to keep the contact closed ........: | - | N/A |
| | - stored energy of the power operator released (3 times)........: | - | N/A |
| | During and after the test, open position not indicated ........: | - | N/A |
| | Equipment show no damage impairing its normal operation........: | - | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied........: | - | N/A |

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | | P |
| | **Type SL2-3x/3A: AC-21B at 690V/630A (Test1: L1 and L2 closed, L3 operated; Test2: L1 operated, L2 closed, L3 open)** | | |
| | - utilization category ......: | AC-21B | — |
| | - rated operational voltage Ue (V) ......: | 690 | — |
| | - rated operational current Ie (A) ......: | 630 | — |
| | Conditions for make operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ......(V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ...... 10 x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor ......: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for break operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ......(V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ...... 8 x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor ......: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for make/break operations, other than AC-23A and AC-23B: | | P |
| | - test voltage, U = 1,05 Ue ......(V): | L1: 729<br>L2: 730<br>L3: 728 | — |
| | - test current, I = ...... 1,5 x Ie (A): | L1: 955<br>L2: 960<br>L3: 951 | — |
| | - power factor / time constant ......: | L1: 0,95<br>L2: 0,94<br>L3: 0,95 | — |
| | Number of make/break or make and break operations ......: | 5 | P |
| | - recovery voltage duration ≥ 50 ms (ms)......: | 340 | P |
| | - current duration (ms) ......: | 280 | — |
| | - time interval between operations (s) ......: | 30 | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only: | | N/A |
| | - oscillatory frequency (kHz) ......: | - | — |
| | - measured oscillatory frequency (kHz) ......: | L1: -<br>L2: -<br>L3: - | — |

ВЯРНО С ОРИГИНАЛА

"КИМТЕХ БЪЛГАРИЯ" ООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - factor γ ...: | L1: -<br>L2: -<br>L3: - | N/A |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ...: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | |
| | - manufacturer's model or type reference ...: | M2gG400/69 | |
| | - rated voltage (V) ...: | 690 | |
| | - rated current (A) ...: | 400 | |
| | - power loss (W) ...: | 45 max. | |
| | - rated breaking capacity (kA) ...: | 100 | |
| | Conductor cross-section ($mm^2$) ...: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | |
| | Test current Ie (A) ...: | 400 (fuse-links)<br>630 (solid-links) | |

ВЯРНО С ОРИГИНАЛА

"БЪЛГАРИЯ" ООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 61 (fuse-links) ≤ 66 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 5 (fuse-links) ≤ 6 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 30 (fuse-links) ≤ 26 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 37 (fuse-links) ≤ 33 (solid-links) | 60 | P |
| 8.3.3.7 | Strength of actuator mechanism | | | P |
| 8.2.5 | Verification of the strength of actuator mechanism and position indicating device | | | P |
| | - actuator type (fig.) .....: | 1e | | |
| 8.2.5.2.1 | Dependent and independent manual operation | | | P |
| | - actuating force for opening (N) .....: | 141 | | |
| | - test force with blocked main contacts (N) .....: | 400 | | |
| | - used method to keep the contact closed .....: | Brazing | | |
| | During and after the test, open position not indicated .....: | No open position | | P |
| | Equipment with locking mean, no locking in the open position while test force is applied.....: | No locking mechanism | | N/A |
| 8.2.5.2.2 | Dependent power operation | | | N/A |
| | - main contacts fixed together in the closed position .....: | - | | N/A |
| | - used method to keep the contact closed .....: | - | | N/A |
| | - 110% of the rated supply voltage applied to the equipment (3 times) .....: | - | | N/A |
| | During and after the test, open position not indicated .....: | - | | N/A |
| | Equipment show no damage impairing its normal operation.....: | - | | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied.....: | - | | N/A |

ВЯРНО С ОРИГИНАЛА

КИМТЕХ „КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.2.5.2.3 | Independent power operation | | N/A |
| | - main contacts fixed together in the closed position ...: | - | N/A |
| | - used method to keep the contact closed ...: | - | N/A |
| | - stored energy of the power operator released (3 times)...: | - | N/A |
| | During and after the test, open position not indicated ...: | - | N/A |
| | Equipment show no damage impairing its normal operation...: | - | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied...: | - | N/A |

ВЯРНО С ОРИГИНАЛА

„КИМТЕХ-БЪЛГАРИЯ" ООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | | P |
| | **Type SL2-3x3/3A: AC-21B at 690V/630A** | | |
| | - utilization category ......: | AC-21B | — |
| | - rated operational voltage Ue (V) ......: | 690 | — |
| | - rated operational current Ie (A) ......: | 630 | — |
| | Conditions for make operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ......(V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ...... 10 x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor ......: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for break operation, AC-23A and AC-23B only: | | N/A |
| | - test voltage, U = 1,05 Ue ......(V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ...... 8 x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor ......: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for make/break operations, other than AC-23A and AC-23B: | | P |
| | - test voltage, U = 1,05 Ue ......(V): | L1: 729<br>L2: 730<br>L3: 728 | — |
| | - test current, I = ...... 1,5 x Ie (A): | L1: 955<br>L2: 960<br>L3: 951 | — |
| | - power factor / time constant ......: | L1: 0,95<br>L2: 0,94<br>L3: 0,95 | — |
| | Number of make/break or make and break operations ......: | 5 | P |
| | - recovery voltage duration ≥ 50 ms (ms)......: | Permanent | P |
| | - current duration (ms) ......: | 280 | — |
| | - time interval between operations (s)......: | 30 | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only: | | N/A |
| | - oscillatory frequency (kHz) ......: | - | — |
| | - measured oscillatory frequency (kHz) ......: | L1: -<br>L2: -<br>L3: - | N/A |

ВЯРНО С ОРИГИНАЛА

„КИМТЕКС-БЪЛГАРИЯ" ООД БУРГАС КИМТЕКС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| - | - factor γ ...: | L1: -<br>L2: -<br>L3: - | N/A |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ...: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | |
| | - manufacturer's model or type reference ...: | M2gG400/69 | |
| | - rated voltage (V) ...: | 690 | |
| | - rated current (A) ...: | 400 | |
| | - power loss (W) ...: | 45 max. | |
| | - rated breaking capacity (kA) ...: | 100 | |
| | Conductor cross-section (mm²) ...: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | |
| | Test current Ie (A) ...: | 400 (fuse-links)<br>630 (solid-links) | |

ВЯРНО С ОРИГИНАЛА

КИМТЕХ-БЪЛГАРИЯ ЕООД КИМТЕХ БУРГАС

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 62 (fuse-links) ≤ 66 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 5 (fuse-links) ≤ 6 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 30 (fuse-links) ≤ 28 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 38 (fuse-links) ≤ 36 (solid-links) | 60 | P |
| 8.3.3.7 | Strength of actuator mechanism | | | P |
| 8.2.5 | Verification of the strength of actuator mechanism and position indicating device | | | P |
| | - actuator type (fig.) ........................................: | 1e | | — |
| 8.2.5.2.1 | Dependent and independent manual operation | | | P |
| | - actuating force for opening (N) ..........................: | 178 | | — |
| | - test force with blocked main contacts (N) ...........: | 400 | | — |
| | - used method to keep the contact closed .............: | Brazing | | — |
| | During and after the test, open position not indicated ........................................................: | No open position | | P |
| | Equipment with locking mean, no locking in the open position while test force is applied.................: | No locking mechanism | | N/A |
| 8.2.5.2.2 | Dependent power operation | | | N/A |
| | - main contacts fixed together in the closed position ...............................................................: | - | | N/A |
| | - used method to keep the contact closed .............: | - | | N/A |
| | - 110% of the rated supply voltage applied to the equipment (3 times) ...........................................: | - | | N/A |
| | During and after the test, open position not indicated ..............................................................: | - | | N/A |
| | Equipment show no damage impairing its normal operation...............................................................: | - | | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied.................: | - | | N/A |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.2.5.2.3 | Independent power operation | | N/A |
| | - main contacts fixed together in the closed position ......................................................................: | - | N/A |
| | - used method to keep the contact closed ..............: | - | N/A |
| | - stored energy of the power operator released (3 times).................................................................: | - | N/A |
| | During and after the test, open position not indicated ..................................................................: | - | N/A |
| | Equipment show no damage impairing its normal operation................................................................: | - | N/A |
| | Equipment with locking mean, no locking in the open position while test force is applied..................: | - | N/A |



ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY | | P |
| 8.3.4.1 | Operational performance test | | P |
| | **Type SL2-3x/3A: AC-23B at 400V/400A (Test1: L1 and L2 closed, L3 operated; Test2: L1 operated, L2 closed, L3 open)** | | |
| | - utilization category ...: | AC-23B | — |
| | - rated operational voltage (V) ...: | 400 | — |
| | - rated operational current (A) ...: | 400 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V) ...: | L1: 403<br>L2: 402<br>L3: 403 | — |
| | - test current (A) ...: | L1: 409<br>L2: 413<br>L3: 407 | — |
| | - power factor / ~~time constant~~ ...: | L1: 0,65<br>L2: 0,65<br>L3: 0,65 | — |
| | Number of cycles with current ...: | 200 | P |
| | Number of cycles without current ...: | 800 | P |
| | First test sequence (with/without current) ...: | With | — |
| | Second test sequence (with/without current) ...: | Without | — |
| | - time interval between first and second test sequence ...: | No time interval | — |
| | - recovery voltage duration at operations with current ≥ 50 ms (ms)...: | 260 | P |
| | - current duration (ms) ...: | 280 | — |
| | - time interval between operations (s) ...: | 60 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| 8.3.4.2 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | | — |
| | No breakdown or flashover | | | P |
| 8.3.4.3 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | | P |
| 8.3.4.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | | — |
| | - manufacturer's model or type reference ...: | M2gG400/69 | | — |
| | - rated voltage (V) ...: | 690 | | — |
| | - rated current (A) ...: | 400 | | — |
| | - power loss (W) ...: | 45 max. | | — |
| | - rated breaking capacity (kA) ...: | 100 | | — |
| | Conductor cross-section (mm²) ...: | 1 x 240 | | — |
| | Test current Ie (A) ...: | 400 | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 67 | 80 | P |
| | Manual operating means: non-metallic | 5 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 35 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 44 | 60 | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4.1 | Operational performance test | | P |
| | **Type SL2-3X3/3A: AC-23B at 400V/400A** | | |
| | - utilization category ................: | AC-22B | — |
| | - rated operational voltage (V) ................: | 400 | — |
| | - rated operational current (A) ................: | 400 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V) ................: | L1: 403<br>L2: 402<br>L3: 403 | — |
| | - test current (A) ................: | L1: 409<br>L2: 413<br>L3: 407 | — |
| | - power factor / ~~time constant~~ ................: | L1: 0,65<br>L2: 0,65<br>L3: 0,65 | — |
| | Number of cycles with current ................: | 200 | P |
| | Number of cycles without current ................: | 800 | P |
| | First test sequence (with/without current) ................: | With | — |
| | Second test sequence (with/without current) ................: | Without | — |
| | - time interval between first and second test sequence ................: | No time interval | — |
| | - recovery voltage duration at operatons with current ≥ 50 ms (ms)................: | Permanent | P |
| | - current duration (ms) ................: | 380 | — |
| | - time interval between operations (s) ................: | 30 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

ВЯРНО С ОРИГИНАЛА

**IEC 60947-3**

| Clause | Requirement + Test | Result - Remark | | Verdict |
|---|---|---|---|---|
| 8.3.4.2 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | | — |
| | No breakdown or flashover | | | P |
| 8.3.4.3 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | | P |
| 8.3.4.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | | — |
| | - manufacturer's model or type reference ...: | M2gG400/69 | | — |
| | - rated voltage (V) ...: | 690 | | — |
| | - rated current (A) ...: | 400 | | — |
| | - power loss (W) ...: | 45 max. | | — |
| | - rated breaking capacity (kA) ...: | 100 | | — |
| | Conductor cross-section (mm²) ...: | 1 x 240 | | — |
| | Test current Ie (A) ...: | 400 | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 66 | 80 | P |
| | Manual operating means: non-metallic | 5 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 34 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 43 | 60 | P |

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4.1 | Operational performance test | | P |
| | **Type SL2-3X/3A: AC-22B at 500V/630A (Test1: L1 and L2 closed, L3 operated; Test2: L1 operated, L2 closed, L3 open)** | | |
| | - utilization category .....: | AC-22B | — |
| | - rated operational voltage (V) .....: | 500 | — |
| | - rated operational current (A) .....: | 630 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V) .....: | L1: 509<br>L2: 510<br>L3: 509 | — |
| | - test current (A) .....: | L1: 637<br>L2: 641<br>L3: 632 | — |
| | - power factor / ~~time constant~~ .....: | L1: 0,80<br>L2: 0,80<br>L3: 0,80 | — |
| | Number of cycles with current .....: | 200 | P |
| | Number of cycles without current .....: | 800 | P |
| | First test sequence (with/without current) .....: | With | — |
| | Second test sequence (with/without current) .....: | Without | — |
| | - time interval between first and second test sequence .....: | No time interval | — |
| | - recovery voltage duration at operations with current ≥ 50 ms (ms).....: | 260 | P |
| | - current duration (ms) .....: | 280 | — |
| | - time interval between operations (s) .....: | 60 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| 8.3.4.2 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | | — |
| | No breakdown or flashover | | | P |
| 8.3.4.3 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ........................................: | 760 | | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ................................................: | < 1 | | P |
| 8.3.4.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark .................................................................: | Jean Müller | | — |
| | - manufacturer's model or type reference .............: | M2gG400/69 | | — |
| | - rated voltage (V) ..............................................: | 690 | | — |
| | - rated current (A) ..............................................: | 400 | | — |
| | - power loss (W) ..................................................: | 45 max. | | — |
| | - rated breaking capacity (kA) ..............................: | 100 | | — |
| | Conductor cross-section (mm²) ............................: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | | — |
| | Test current Ie (A) ..............................................: | 400 (fuse-links)<br>630 (solid-links) | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 66 (fuse-links)<br>≤ 73 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 6 (fuse-links)<br>≤ 7 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 34 (fuse-links)<br>≤ 31 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 43 (fuse-links)<br>≤ 40 (solid-links) | 60 | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4.1 | Operational performance test | | P |
| | **Type SL2-3X3/3A: AC-22B at 500V/630A** | | |
| | - utilization category ...: | AC-22B | — |
| | - rated operational voltage (V) ...: | 500 | — |
| | - rated operational current (A) ...: | 630 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V) ...: | L1: 509<br>L2: 510<br>L3: 509 | — |
| | - test current (A) ...: | L1: 637<br>L2: 641<br>L3: 632 | — |
| | - power factor / ~~time constant~~ ...: | L1: 0,80<br>L2: 0,80<br>L3: 0,80 | — |
| | Number of cycles with current ...: | 200 | P |
| | Number of cycles without current ...: | 800 | P |
| | First test sequence (with/without current) ...: | With | — |
| | Second test sequence (with/without current) ...: | Without | — |
| | - time interval between first and second test sequence ...: | No time interval | — |
| | - recovery voltage duration at operations with current ≥ 50 ms (ms)...: | Permanent | P |
| | - current duration (ms) ...: | 280 | — |
| | - time interval between operations (s) ...: | 60 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| 8.3.4.2 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | | |
| | No breakdown or flashover | | | P |
| 8.3.4.3 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | | P |
| 8.3.4.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | | |
| | - manufacturer's model or type reference ...: | M2gG400/69 | | |
| | - rated voltage (V) ...: | 690 | | |
| | - rated current (A) ...: | 400 | | |
| | - power loss (W) ...: | 45 max. | | |
| | - rated breaking capacity (kA) ...: | 100 | | |
| | Conductor cross-section ($mm^2$) ...: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | | |
| | Test current Ie (A) ...: | 400 (fuse-links)<br>630 (solid-links) | | |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 66 (fuse-links)<br>≤ 72 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 6 (fuse-links)<br>≤ 7 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 34 (fuse-links)<br>≤ 32 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 45 (fuse-links)<br>≤ 41 (solid-links) | 60 | P |

ВЯРНО С ОРИГИНАЛА

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| Clause | Requirement + Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.3.4.1 | Operational performance test | | P |
| | **Type SL2-3X/3A: AC-21B at 690V/630A (Test1: L1 and L2 closed, L3 operated; Test2: L1 operated, L2 closed, L3 open)** | | |
| | - utilization category ............................................: | AC-21B | — |
| | - rated operational voltage (V) ................................: | 690 | — |
| | - rated operational current (A) ................................: | 690 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V) ......................................................: | L1: 694<br>L2: 694<br>L3: 695 | — |
| | - test current (A) ......................................................: | L1: 640<br>L2: 643<br>L3: 634 | — |
| | - power factor / ~~time constant~~ ...............................: | L1: 0,96<br>L2: 0,95<br>L3: 0,95 | — |
| | Number of cycles with current ...............................: | 200 | P |
| | Number of cycles without current ..........................: | 800 | P |
| | First test sequence (with/without current) ..............: | With | — |
| | Second test sequence (with/without current) .........: | Without | — |
| | - time interval between first and second test sequence ..................................................................: | No time interval | — |
| | - recovery voltage duration at operations with current ≥ 50 ms (ms)..............................................: | 270 | P |
| | - current duration (ms) ...........................................: | 280 | — |
| | - time interval between operations (s) ....................: | 60 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| 8.3.4.2 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ....: | 1380 | | — |
| | No breakdown or flashover | | | P |
| 8.3.4.3 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ....: | 760 | | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ....: | < 1 | | P |
| 8.3.4.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark ....: | Jean Müller | | — |
| | - manufacturer's model or type reference ....: | M2gG400/69 | | — |
| | - rated voltage (V) ....: | 690 | | — |
| | - rated current (A) ....: | 400 | | — |
| | - power loss (W) ....: | 45 max. | | — |
| | - rated breaking capacity (kA) ....: | 100 | | — |
| | Conductor cross-section ($mm^2$) ....: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | | — |
| | Test current Ie (A) ....: | 400 (fuse-links)<br>630 (solid-links) | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 67 (fuse-links)<br>≤ 73 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 7 (fuse-links)<br>≤ 7 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 33 (fuse-links)<br>≤ 32 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 46 (fuse-links)<br>≤ 42 (solid-links) | 60 | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4.1 | Operational performance test | | P |
| | **Type SL2-3X/3A: AC-21B at 690V/630A** | | |
| | - utilization category .......: | AC-21B | — |
| | - rated operational voltage (V) .......: | 690 | — |
| | - rated operational current (A) .......: | 690 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V) .......: | L1: 694<br>L2: 694<br>L3: 695 | — |
| | - test current (A) .......: | L1: 640<br>L2: 643<br>L3: 634 | — |
| | - power factor / ~~time constant~~ .......: | L1: 0,96<br>L2: 0,95<br>L3: 0,95 | — |
| | Number of cycles with current .......: | 200 | P |
| | Number of cycles without current .......: | 800 | P |
| | First test sequence (with/without current) .......: | With | — |
| | Second test sequence (with/without current) .......: | Without | — |
| | - time interval between first and second test sequence .......: | No time interval | — |
| | - recovery voltage duration at operations with current ≥ 50 ms (ms).......: | Permanent | P |
| | - current duration (ms) .......: | 280 | — |
| | - time interval between operations (s) .......: | 60 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

ВЯРНО С ОРИГИНАЛА

**IEC 60947-3**

| Clause | Requirement + Test | Result - Remark | | Verdict |
|---|---|---|---|---|
| 8.3.4.2 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | | — |
| | No breakdown or flashover | | | P |
| 8.3.4.3 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | | P |
| 8.3.4.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | | — |
| | - manufacturer's model or type reference ...: | M2gG400/69 | | — |
| | - rated voltage (V) ...: | 690 | | — |
| | - rated current (A) ...: | 400 | | — |
| | - power loss (W) ...: | 45 max. | | — |
| | - rated breaking capacity (kA) ...: | 100 | | — |
| | Conductor cross-section (mm²) ...: | 1 x 240 (fuse-links)<br>2 x 185 (solid-links) | | — |
| | Test current Ie (A) ...: | 400 (fuse-links)<br>630 (solid-links) | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 67 (fuse-links)<br>≤ 74 (solid-links) | 80 | P |
| | Manual operating means: non-metallic | ≤ 5 (fuse-links)<br>≤ 7 (solid-links) | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | ≤ 30 (fuse-links)<br>≤ 34 (solid-links) | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | ≤ 38 (fuse-links)<br>≤ 41 (solid-links) | 60 | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.5 | TEST SEQUENCE III: SHORT-CIRCUIT PERFORMANCE CAPABILITY | | P |
| 8.3.5.1 | Short-time withstand current test | | P |
| | **Type SL2-3x/3A** | | |
| | Rated short-time withstand current Icw (A) (≥ 12 Ie max.) ...: | 10000 / 1s | P |
| | - test voltage (V) ...: | L1: 695<br>L2: 695<br>L3: 694 | — |
| | - r.m.s. test current (A) ...: | L1: 10470<br>L2: 10790<br>L3: 10200 | — |
| | - peak test current (A) ...: | L1: 15240<br>L2: 17100<br>L3: 18280 | — |
| | - power factor / ~~time constant~~ ...: | L1: 0,46<br>L2: 0,46<br>L3: 0,46 | — |
| | - factor n ...: | 1,79 | — |
| | Test duration (ms) ...: | 1010 | — |
| 8.3.5.1.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.5.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |



ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.5.2 | Short-circuit making capacity | | N/A |
| | Rated short-circuit making capacity Icm (A) ..........: | - | N/A |
| | - test voltage (1,05 x Ue) ....................................(V): | L1: -<br>L2: -<br>L3: - | |
| | - r.m.s. test current (A) .......................................(A): | L1: -<br>L2: -<br>L3: - | |
| | - maximum peak test current (factor n) ...................: | - | N/A |
| | - power factor / time constant ................................: | L1: -<br>L2: -<br>L3: - | N/A |
| | Current duration (s) ..................................................: | - | |
| | Time interval between the cycles ..........................: | - | |
| 8.3.5.2.5 | Behaviour of the equipment during the test | | N/A |
| | Test performed without: | | |
| | - endanger to the operator | | N/A |
| | -cause damage to adjacent equipment | | N/A |
| | No permanent arcing | | N/A |
| | No flash over between poles and poles and frame | | N/A |
| | No melting of the fuse in the detection circuit | | N/A |
| 8.3.5.2.6 | Condition of the equipment after making and breaking capacity tests | | N/A |
| | Immediately after the test equipment must work satisfactorily | | N/A |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N/A |
| | - equipment is able to carry its rated current after normal closing operation | | N/A |

ВЯРНО С ОРИГИНАЛА

**IEC 60947-3**

| Clause | Requirement + Test | Result - Remark | | Verdict |
|---|---|---|---|---|
| 8.3.5.3 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | | — |
| | No flashover or breakdown | | | P |
| 8.3.5.4 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | | P |
| 8.3.5.5 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | | — |
| | - manufacturer's model or type reference ...: | M2gG400/69 | | — |
| | - rated voltage (V) ...: | 690 | | — |
| | - rated current (A) ...: | 400 | | — |
| | - power loss (W) ...: | 45 max. | | — |
| | - rated breaking capacity (kA) ...: | 100 | | — |
| | Conductor cross-section (mm²) ...: | 1 x 240 | | — |
| | Test current Ie (A) ...: | 400 | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | N/A |
| | Terminals | ≤ 61 | 80 | N/A |
| | Manual operating means: non-metallic | 5 | 35 | N/A |
| | Parts intended to be touched but not hand-held: non-metallic | 30 | 50 | N/A |
| | Parts which need not be touched during normal operation: non-metallic | 37 | 60 | N/A |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.5.1 | Short-time withstand current test | | P |
| | Type SL2-3x3/3A | | |
| | Rated short-time withstand current Icw (A) (≥ 12 Ie max.) ..........: | 15000 / 1s | P |
| | - test voltage (V) ..........: | L1: 695<br>L2: 695<br>L3: 694 | – |
| | - r.m.s. test current (A) ..........: | L1: 15130<br>L2: 15180<br>L3: 15090 | – |
| | - peak test current (A) ..........: | L1: 24150<br>L2: 29100<br>L3: 30590 | – |
| | - power factor / ~~time constant~~ ..........: | L1: 0,27<br>L2: 0,27<br>L3: 0,27 | – |
| | - factor n ..........: | 2,02 | – |
| | Test duration (ms) ..........: | 1010 | – |
| 8.3.5.1.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | – |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.5.1.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| 8.3.5.2 | Short-circuit making capacity | | N/A |
| | Rated short-circuit making capacity Icm (A) ..........: | - | N/A |
| | - test voltage (1,05 x Ue) ....................................(V): | L1: -<br>L2: -<br>L3: - | – |
| | - r.m.s. test current (A) ........................................(A): | L1: -<br>L2: -<br>L3: - | – |
| | - maximum peak test current (factor n) ..................: | - | N/A |
| | - power factor / time constant .................................: | L1: -<br>L2: -<br>L3: - | N/A |
| | Current duration (s) ..................................................: | - | – |
| | Time interval between the cycles ...........................: | - | – |
| 8.3.5.2.5 | Behaviour of the equipment during the test | | N/A |
| | Test performed without: | | – |
| | - endanger to the operator | | N/A |
| | -cause damage to adjacent equipment | | N/A |
| | No permanent arcing | | N/A |
| | No flash over between poles and poles and frame | | N/A |
| | No melting of the fuse in the detection circuit | | N/A |
| 8.3.5.2.6 | Condition of the equipment after making and breaking capacity tests | | N/A |
| | Immediately after the test equipment must work satisfactorily | | N/A |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N/A |
| | - equipment is able to carry its rated current after normal closing operation | | N/A |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| 8.3.5.3 | Dielectric verification | | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | | — |
| | No flashover or breakdown | | | P |
| 8.3.5.4 | Leakage current | | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | | P |
| 8.3.5.5 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | | — |
| | - manufacturer's model or type reference ...: | M2gG400/69 | | — |
| | - rated voltage (V) ...: | 690 | | — |
| | - rated current (A) ...: | 400 | | — |
| | - power loss (W) ...: | 45 max. | | — |
| | - rated breaking capacity (kA) ...: | 100 | | — |
| | Conductor cross-section (mm²) ...: | 1 x 240 | | — |
| | Test current Ie (A) ...: | 400 | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | N/A |
| | Terminals | ≤ 60 | 80 | N/A |
| | Manual operating means: non-metallic | 5 | 35 | N/A |
| | Parts intended to be touched but not hand-held: non-metallic | 30 | 50 | N/A |
| | Parts which need not be touched during normal operation: non-metallic | 37 | 60 | N/A |

КИМТЕХ

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.6 | TEST SEQUENCE IV: CONDITIONAL SHORT-CIRCUIT CURRENT | | P |
| | Conditional short-circuit current test | | P |
| | **Type SL2-3x/3A: 120kA at 500V/400A (L1 open, L2 closed, L3 operated)** | | |
| | Protective device details: | | P |
| | - manufacturer's name, trademark or identification mark ..........: | Jean Müller | — |
| | - manufacturer's model or type reference ..........: | M2gL400 | — |
| | - rated voltage (V) ..........: | 500 | — |
| | - rated current (A) ..........: | 400 | — |
| | - rated breaking capacity (kA) ..........: | 120 | — |
| 8.3.6.2 | Conditional short-circuit current test values | | P |
| | - test voltage (1,05 Ue) (V) ..........: | L1: 528<br>L2: 530<br>L3: 527 | — |
| | - test current (A) ..........: | L1: 120940<br>L2: 121300<br>L3: 120630 | — |
| | - rated frequency (Hz) ..........: | 50 | — |
| | - power factor ..........: | 0,17 | — |
| | - time constant (ms) ..........: | - | — |
| | - factor n ..........: | 2,22 | — |
| | Fuse protected short-circuit withstand (equipment in closed position) | | P |
| | - max. let-through current (A) ..........: | L1: 27500<br>L2: 18400<br>L3: 31540 | — |
| | - Joule integral $I^2dt$ ($A^2s$) ..........: | L1: 1085400<br>L2: 411000<br>L3: 1489500 | — |
| | Fuse protected short-circuit making (equipment closing on to short-circuit) | | P |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) ..........: | 0,98 | — |
| | - point at which the measurement is made ..........: | Handle of the actuator | — |
| | - test speed during the fuse protected short-circuit making (m/s) ..........: | 1,1 | — |
| | - max. let-through current (A) ..........: | L1: -<br>L2: 36500<br>L3: 36500 | — |
| | - Joule integral $I^2dt$ ($A^2s$) ..........: | L1: -<br>L2: 1556000<br>L3: 1556000 | — |

КИМТЕХ-БЪЛГАРИЯ ООД БУРГАС КИМТЕХ

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.6.2.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.6.3 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.6.4 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | P |
| 8.3.6.5 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | — |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | — |
| | - manufacturer's model or type reference ...: | M2gG400/69 | — |
| | - rated voltage (V) ...: | 690 | — |
| | - rated current (A) ...: | 400 | — |
| | - power loss (W) ...: | 45 max. | — |
| | - rated breaking capacity (kA) ...: | 100 | — |
| | Conductor cross-section (mm²) ...: | 1 x 240 | — |
| | Test current Ie (A) ...: | 400 | — |

КИМТЕХ-БЪЛГАРИЯ ООД БУРГАС

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 61 | 80 | P |
| | Manual operating means: non-metallic | 5 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 31 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 38 | 60 | P |

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Conditional short-circuit current test | | P |
| | **Type SL2-3x3/3A: 120kA at 500V/400A** | | |
| | Protective device details: | | P |
| | - manufacturer's name, trademark or identification mark ......: | Jean Müller | – |
| | - manufacturer's model or type reference ......: | M2gL400 | – |
| | - rated voltage (V) ......: | 500 | – |
| | - rated current (A) ......: | 400 | – |
| | - rated breaking capacity (kA) ......: | 120 | – |
| 8.3.6.2 | Conditional short-circuit current test values | | P |
| | - test voltage (1,05 Ue) (V) ......: | L1: 528<br>L2: 530<br>L3: 527 | – |
| | - test current (A) ......: | L1: 120940<br>L2: 121300<br>L3: 120630 | – |
| | - rated frequency (Hz) ......: | 50 | – |
| | - power factor ......: | 0,17 | – |
| | - time constant (ms) ......: | - | – |
| | - factor n ......: | 2,22 | – |
| | Fuse protected short-circuit withstand (equipment in closed position) | | P |
| | - max. let-through current (A) ......: | L1: 44120<br>L2: 44990<br>L3: 4980 | – |
| | - Joule integral $I^2dt$ ($A^2s$) ......: | L1: 1085400<br>L2: 1273500<br>L3: 80010 | – |
| | Fuse protected short-circuit making (equipment closing on to short-circuit) | | P |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) ......: | 0,98 | – |
| | - point at which the measurement is made ......: | Handle of the actuator | – |
| | - test speed during the fuse protected short-circuit making (m/s) ......: | 1,1 | – |
| | - max. let-through current (A) ......: | L1: 30120<br>L2: 35470<br>L3: 29860 | – |
| | - Joule integral $I^2dt$ ($A^2s$) ......: | L1: 1178000<br>L2: 1269990<br>L3: 1154200 | – |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.6.2.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.6.3 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.6.4 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | — |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | P |
| 8.3.6.5 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | — |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | — |
| | - manufacturer's model or type reference ...: | M2gG400/69 | — |
| | - rated voltage (V) ...: | 690 | — |
| | - rated current (A) ...: | 400 | — |
| | - power loss (W) ...: | 45 max. | — |
| | - rated breaking capacity (kA) ...: | 100 | — |
| | Conductor cross-section (mm²) ...: | 1 x 240 | — |
| | Test current Ie (A) ...: | 400 | — |

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 62 | 80 | P |
| | Manual operating means: non-metallic | 5 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 31 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 38 | 60 | P |

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| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| 8.3.6 | Conditional short-circuit current test | | P |
| | **Type SL2-3x/3A: 80kA at 690V/400A (L1 open, L2 closed, L3 operated)** | | |
| | Protective device details: | | P |
| | - manufacturer's name, trademark or identification mark ......: | Jean Müller | — |
| | - manufacturer's model or type reference ......: | M2gG400/69 | — |
| | - rated voltage (V) ......: | 690 | — |
| | - rated current (A) ......: | 400 | — |
| | - rated breaking capacity (kA) ......: | 100 | — |
| 8.3.6.2 | Conditional short-circuit current test values | | P |
| | - test voltage (1,05 Ue) (V) ......: | L1: 726<br>L2: 727<br>L3: 726 | — |
| | - test current (A) ......: | L1: 80790<br>L2: 81130<br>L3: 80350 | — |
| | - rated frequency (Hz) ......: | 50 | — |
| | - power factor ......: | 0,17 | — |
| | - time constant (ms) ......: | - | — |
| | - factor n ......: | 2,21 | — |
| | Fuse protected short-circuit withstand (equipment in closed position) | | P |
| | - max. let-through current (A) ......: | L1: 31520<br>L2: 5650<br>L3: 36110 | — |
| | - Joule integral $I^2dt$ ($A^2s$) ......: | L1: 882000<br>L2: 125000<br>L3: 1110200 | — |
| | Fuse protected short-circuit making (equipment closing on to short-circuit) | | P |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) ......: | 0,98 | — |
| | - point at which the measurement is made ......: | Handle of the actuator | — |
| | - test speed during the fuse protected short-circuit making (m/s) ......: | 1,1 | — |
| | - max. let-through current (A) ......: | L1: -<br>L2: 35700<br>L3: 35700 | — |
| | - Joule integral $I^2dt$ ($A^2s$) ......: | L1: -<br>L2: 1288000<br>L3: 1288000 | — |

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| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.6.2.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.6.3 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ....: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.6.4 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ....: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ....: | < 1 | P |
| 8.3.6.5 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | |
| | - manufacturer's name, trademark or identification mark ....: | Jean Müller | |
| | - manufacturer's model or type reference ..............: | M2gG400/69 | |
| | - rated voltage (V) ....: | 690 | |
| | - rated current (A) ....: | 400 | |
| | - power loss (W) ....: | 45 max. | |
| | - rated breaking capacity (kA) ....: | 100 | |
| | Conductor cross-section (mm²) ....: | 1 x 240 | |
| | Test current Ie (A) ....: | 400 | |

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| Clause | Requirement + Test | Result - Remark | | Verdict |
|---|---|---|---|---|
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 62 | 80 | P |
| | Manual operating means: non-metallic | 5 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 32 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 38 | 60 | P |

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.6 | Conditional short-circuit current test | | P |
| | **Type SL2-3x3/3A: 80kA at 690V/400A** | | |
| | Protective device details: | | P |
| | - manufacturer's name, trademark or identification mark ......: | Jean Müller | |
| | - manufacturer's model or type reference ......: | M2gG400/69 | |
| | - rated voltage (V) ......: | 690 | |
| | - rated current (A) ......: | 400 | |
| | - rated breaking capacity (kA) ......: | 100 | |
| 8.3.6.2 | Conditional short-circuit current test values | | P |
| | - test voltage (1,05 Ue) (V) ......: | L1: 726<br>L2: 727<br>L3: 726 | |
| | - test current (A) ......: | L1: 80790<br>L2: 81130<br>L3: 80350 | |
| | - rated frequency (Hz) ......: | 50 | |
| | - power factor ......: | 0,17 | |
| | - time constant (ms) ......: | - | |
| | - factor n ......: | 2,21 | |
| | Fuse protected short-circuit withstand (equipment in closed position) | | P |
| | - max. let-through current (A) ......: | L1: 25950<br>L2: 35200<br>L3: 15400 | |
| | - Joule integral $I^2dt$ ($A^2s$) ......: | L1: 982560<br>L2: 1195200<br>L3: 365000 | |
| | Fuse protected short-circuit making (equipment closing on to short-circuit) | | P |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) ......: | 0,98 | |
| | - point at which the measurement is made ......: | Handle of the actuator | |
| | - test speed during the fuse protected short-circuit making (m/s) ......: | 1,1 | |
| | - max. let-through current (A) ......: | L1: 35120<br>L2: 34590<br>L3: 7100 | |
| | - Joule integral $I^2dt$ ($A^2s$) ......: | L1: 1168000<br>L2: 1008500<br>L3: 100020 | |

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| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.6.2.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.6.3 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.6.4 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ...: | < 1 | P |
| 8.3.6.5 | Temperature-rise verification | | P |
| | Fuse-link details (fuse-combination units only): | | |
| | - manufacturer's name, trademark or identification mark ...: | Jean Müller | |
| | - manufacturer's model or type reference ...: | M2gG400/69 | |
| | - rated voltage (V) ...: | 690 | |
| | - rated current (A) ...: | 400 | |
| | - power loss (W) ...: | 45 max. | |
| | - rated breaking capacity (kA) ...: | 100 | |
| | Conductor cross-section (mm²) ...: | 1 x 240 | |
| | Test current Ie (A) ...: | 400 | |

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 62 | 75 | P |
| | Manual operating means: non-metallic | 6 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 32 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 39 | 60 | P |

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| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.7 | TEST SEQUENCE V: OVERLOAD PERFORMANCE CAPABILITY | | P |
| 8.3.7.1 | Overload test | | P |
| | **Type SL2-3x/3A** | | |
| | ambient temperature 10-40 °C ......: | 22 | |
| | test enclosure W x H x D (mm x mm x mm) ......: | - | |
| | material of enclosure ......: | - | |
| | test current 1,6 x Ithe or 1,6 x Ith (A) ......: | 640 | |
| | cable/busbar cross-section (mm²)/(mm x mm)......: | 1 x 240 / 30 x 10 | |
| | cable/busbar length (mm)/(mm)......: | 2000 / 600 | |
| | Fuse-link details: | | P |
| | - manufacturer's name, trademark or identification mark ......: | Jean Müller | |
| | - manufacturer's model or type reference ......: | M2gG400/69 | |
| | - rated voltage (V) ......: | 690 | |
| | - rated current (A) ......: | 400 | |
| | - power loss (W) ......: | 45 max. | |
| | - rated breaking capacity (kA) ......: | 100 | |
| | Time duration of the overload test (s) ......: | 770 | |
| | Within 3 to 5 min after the fuse(s) has(have) operated (or 1 h), the equipment has been operated once, i.e. opened and closed | Opened and closed | P |
| | Required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | The equipment has not undergone any impairment hindering such operation | | P |
| 8.3.7.2 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.7.3 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ......: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ......: | < 1 | P |

КИМТЕХ

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | | |
|---|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | | Verdict |
| 8.3.7.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | – |
| | - manufacturer's name, trademark or identification mark ......: | Jean Müller | | – |
| | - manufacturer's model or type reference ......: | M2gG400/69 | | – |
| | - rated voltage (V) ......: | 690 | | – |
| | - rated current (A) ......: | 400 | | – |
| | - power loss (W) ......: | 45 max. | | – |
| | - rated breaking capacity (kA) ......: | 100 | | – |
| | Fuse link(s) aged during the overload test are replaced by new fuse-link(s)......: | Yes | | P |
| | Conductor cross-section (mm²) ......: | 1 x 240 | | – |
| | Test current Ie (A) ......: | 400 | | – |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 62 | 75 | P |
| | Manual operating means: non-metallic | 5 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 32 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 38 | 60 | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.7.1 | Overload test | | P |
| | **Type SL2-3x3/3A** | | |
| | ambient temperature 10-40 °C ...............................: | 22 | |
| | test enclosure W x H x D (mm x mm x mm) ..........: | - | |
| | material of enclosure ..............................................: | - | |
| | test current 1,6 x Ithe or 1,6 x Ith (A) ......................: | 640 | |
| | cable/busbar cross-section (mm²)/(mm x mm)......: | 1 x 240 / 30 x 10 | |
| | cable/busbar length (mm)/(mm)............................: | 2000 / 600 | |
| | Fuse-link details: | | P |
| | - manufacturer's name, trademark or identification mark ..........................................................................: | Jean Müller | |
| | - manufacturer's model or type reference ..............: | M2gG400/69 | |
| | - rated voltage (V) ....................................................: | 690 | |
| | - rated current (A) ....................................................: | 400 | |
| | - power loss (W) ........................................................: | 45 max. | |
| | - rated breaking capacity (kA) ................................: | 100 | |
| | Time duration of the overload test (s) .....................: | 802 | |
| | Within 3 to 5 min after the fuse(s) has(have) operated (or 1 h), the equipment has been operated once, i.e. opened and closed | Opened and closed | P |
| | Required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | The equipment has not undergone any impairment hindering such operation | | P |
| 8.3.7.2 | Dielectric verification | | P |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | 1380 | |
| | No flashover or breakdown | | P |
| 8.3.7.3 | Leakage current | | P |
| | test voltage 1,1 Ue (V) ...........................................: | 760 | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ....................................................: | < 1 | P |

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| Clause | Requirement + Test | Result - Remark | | Verdict |
|---|---|---|---|---|
| 8.3.7.4 | Temperature-rise verification | | | P |
| | Fuse-link details (fuse-combination units only): | | | — |
| | - manufacturer's name, trademark or identification mark ..........: | Jean Müller | | — |
| | - manufacturer's model or type reference ..........: | M2gG400/69 | | — |
| | - rated voltage (V) ..........: | 690 | | — |
| | - rated current (A) ..........: | 400 | | — |
| | - power loss (W) ..........: | 45 max. | | — |
| | - rated breaking capacity (kA) ..........: | 100 | | — |
| | Fuse link(s) aged during the overload test are replaced by new fuse-link(s)..........: | Yes | | P |
| | Conductor cross-section ($mm^2$) ..........: | 1 x 240 | | — |
| | Test current Ie (A) ..........: | 400 | | — |
| | Temperature-rise dT of part: | dT (K) measured | dT (K) required | P |
| | Terminals | ≤ 62 | 75 | P |
| | Manual operating means: non-metallic | 5 | 35 | P |
| | Parts intended to be touched but not hand-held: non-metallic | 32 | 50 | P |
| | Parts which need not be touched during normal operation: non-metallic | 38 | 60 | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.4 | ELECTROMAGNETIC COMPATIBILITY TESTS | | P |
| 8.4.1 | Immunity | | P |
| 8.4.1.1 | Equipment not incorporating electronic circuits: no tests necessary | | P |
| 8.4.1.2 | Equipment incorporating electronic circuits: | | N/A |
| | Equipment utilizing circuits in which all components are passive are not required to be tested | | N/A |
| | All other equipment, requirements according to 7.3.3.2 and limits according table 6 apply | | N/A |
| | Performed tests......................................................: | - | N/A |
| | No unintentional separation or closing of contacts has occurred during these tests ............................: | - | N/A |
| 8.4.2 | Emission | | P |
| 8.4.2.1 | Equipment not incorporating electronic circuits: no tests necessary | | P |
| 8.4.2.2 | Equipment incorporating electronic circuits: | | N/A |
| | Equipment utilizing circuits in which all components are passive are not required to be tested | | N/A |
| | All other equipment, requirements according to 7.3.3.2 and limits according table 7 apply | | N/A |
| | Performed tests......................................................: | - | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| Annex A (normative) | | | N/A |
|---|---|---|---|
| A | Equipment for direct switching of a single motor | | N/A |
| A.1 | Additional rated duties ............................................: | - | N/A |
| A.1.1 | - Intermittent periodic duty | | N/A |
| | - Intermittent duty | | N/A |
| A.1.1.1 | Classes of intermittent duty ....................................: | - | N/A |
| | -class 1: up to 1 operating cycle per hour | | N/A |
| | -class 3: up to 3 operating cycle per hour | | N/A |
| | -class 12: up to 12 operating cycles per hour | | N/A |
| | -class 30: up to 30 operating cycles per hour | | N/A |
| | -class 120: up to 120 operating cycles per hour | | N/A |
| A.1.2 | Temporary duty.......................................................: | - | N/A |
| A.5 | Mechanical durability: | | N/A |
| | Equipment mounted according to manufacturer's instruction | | N/A |
| | Preferred number of no-load operating cycles expressed in millions............................................: | - | N/A |
| | 0,001 – 0,003 – 0,01 – 0,03 – 0,1 – 0,3 - 1 | | N/A |
| | If no mechanical endurance is stated by the manufacturer, a minimum mechanical endurance according to the class of intermittent duty shall be tested. | | N/A |
| | Number of no-load operating cycles performed......: | - | N/A |
| A.6 | Electrical durability: | | N/A |
| | - test according to manufacturer's instruction | | N/A |
| A.7 | Verification of making and breaking capacities: | | N/A |
| | - utilization category ..............................................: | - | |
| | - rated operational voltage Ue (V) ..........................: | - | |
| | - rated operational current Ie (A) ...........................: | - | |
| | Conditions for make/break operations or make operations: | | |
| | - test voltage, U = 1,05 Ue ..................................(V): | L1: -<br>L2: -<br>L3: - | |
| | - test current, I = .................................... _ x Ie (A): | L1: -<br>L2: -<br>L3: - | |
| | - power factor .........................................................: | L1: -<br>L2: -<br>L3: - | |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Conditions for make/break operations: | | N/A |
| | - test voltage, U = 1,05 Ue ................................(V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ................................... _ x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor / time constant ................................: | L1: -<br>L2: -<br>L3: - | |
| | Number of make/break or make and break operations ...........................................................: | - | N/A |
| | - recovery voltage duration ≥ 50 ms (ms) | | N/A |
| | - current duration (ms) ...........................................: | - | |
| | - time interval between operations (s) ....................: | - | N/A |
| | Characteristic of transient recovery voltage if necessary: | | N/A |
| | - oscillatory frequency (kHz) .................................: | - | |
| | - measured oscillatory frequency (kHz) .................: | L1: -<br>L2: -<br>L3: - | N/A |
| | - factor γ ...........................................................: | L1: -<br>L2: -<br>L3: - | N/A |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | N/A |
| | Test performed without: | | |
| | - endanger to the operator | | N/A |
| | - cause damage to adjacent equipment | | N/A |
| | No permanent arcing | | N/A |
| | No flash over between poles and poles and frame | | N/A |
| | No melting of the fuse in the detection circuit | | N/A |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | N/A |
| | Immediately after the test equipment must work satisfactorily | | N/A |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N/A |
| | - equipment is able to carry its rated current after normal closing operation | | N/A |
| 8.3.3.4 | Dielectric verification | | N/A |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | - | — |
| | No flashover or breakdown | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.5 | Leakage current | | N/A |
| | test voltage 1,1 Ue (V) ...: | - | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B): ≤ 0,5 mA/pole .....: | - | N/A |
| | Leakage current (other utilization categories): ≤ 2 mA/pole (mA) ...: | - | N/A |
| 8.3.3.6 | Temperature-rise verification | | N/A |
| | - conductor cross-section (mm²) ...: | - | |
| | - test current Ie (A) ...: | - | |
| | Measured temperature-rise ...: | - | N/A |
| A.8 | Operational performance test: | | N/A |
| | - utilization category ...: | - | |
| | - rated operational voltage (V) ...: | - | |
| | - rated operational current (A) ...: | - | |
| | Test conditions for electrical operation cycles: | | N/A |
| | - test voltage (V) ...: | L1: -<br>L2: -<br>L3: - | |
| | - test current (A) ...: | L1: -<br>L2: -<br>L3: - | |
| | - power factor / time constant ...: | L1: -<br>L2: -<br>L3: - | |
| | Number of cycles with current ...: | - | N/A |
| | Number of cycles without current ...: | - | N/A |
| | First test sequence (with/without current) ...: | - | |
| | Second test sequence (with/without current) ...: | - | |
| | - time interval between first and second test sequence ...: | - | |
| | - recovery voltage duration at operatons with current ≥ 50 ms (ms)...: | - | N/A |
| | - current duration (ms) ...: | - | |
| | - time interval between operations (s) ...: | - | N/A |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | N/A |
| | Test performed without: | | |
| | - endanger to the operator | | N/A |
| | -cause damage to adjacent equipment | | N/A |
| | No permanent arcing | | N/A |



ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | No flash over between poles and poles and frame | | N/A |
| | No melting of the fuse in the detection circuit | | N/A |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | N/A |
| | Immediately after the test equipment must work satisfactorily | | N/A |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N/A |
| | - equipment is able to carry its rated current after normal closing operation | | N/A |
| 8.3.4.2 | Dielectric verification | | N/A |
| | test voltage 2 Ue with a minimum of 1000V~ (V) ...: | - | |
| | No breakdown or flashover | | N/A |
| 8.3.4.3 | Leakage current | | N/A |
| | test voltage 1,1 Ue (V) ..........................................: | - | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA/pole ......: | - | N/A |
| | Leakage current (other utilization categories) ≤ 2 mA/pole (mA) ..............................................: | - | N/A |
| 8.3.4.4 | Temperature-rise verification | | N/A |
| | - conductor cross-section (mm²) ............................: | - | |
| | - test current Ie (A) ..............................................: | - | |
| | Measured temperature-rise ....................................: | - | N/A |
| A.9 | Special tests: | - | N/A |

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | **Annex C (normative)** | | P |
| C | Single pole operated three pole switches | | P |
| C.1 | Three pole operated switches of fundamentally the same design, already successfully tested are deemed to satisfy the requirements of individually operated three pole devices. | | P |
| C.2 | Additional-tests to be performed on single pole operated three pole switches | | P |
| | Test "8.3.3.3 Making and breaking capacities" according to test sequence I with following modifications | | P |
| | L1 and L2 are closed, L3 is subjected to the required make-break operation cycle.......................: | see pages 16 to 19<br>see pages 24 to 27<br>see pages 32 to 35 | P |
| | L2 closed and L3 opened, L1 is subjected to the required make-break operation cycle.......................: | see pages 16 to 19<br>see pages 24 to 27<br>see pages 32 to 35 | P |
| | Test performed in a three phase circuit | | P |
| | Test "8.3.4.1 Operational performance" according to test sequence II with following modifications | | P |
| | L1 and L2 are closed, L3 is subjected to the required make-break operation cycle.......................: | see pages 40 to 41<br>see pages 44 to 45<br>see pages 48 to 49 | P |
| | L2 closed and L3 opened, L1 is subjected to the required make-break operation cycle.......................: | see pages 40 to 41<br>see pages 44 to 45<br>see pages 48 to 49 | P |
| | Test performed in a three phase circuit | | P |
| | Test "8.3.6.2 Fuse protected short circuit test" according to test sequence IV with following modifications | | P |
| | For the making test L1 shall be open and L2 closed, L3 is subjected to the required make operation cycle.........................................................: | see pages 58 to 60<br>see pages 64 to 66 | P |
| | L2 closed and L3 opened, L1 is subjected to the required make-break operation cycle.......................: | - | N/A |
| | Test performed in a three phase circuit | | P |
| C.5 | Instruction for use | | P |
| | The product literature includes following statement...............................................................: | | P |
| | These devices are intended for power distribution systems where switching and/or isolating of an individual phase may be necessary and shall not be used for the switching of the primary circuit of three-phase equipment. | | P |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.3.1 | **TABLE 1: Temperature-rise at SL2-3x/3A with fuse-links 400A** | | | P |
|---|---|---|---|---|
| **Temperature rise dT of part:** | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | L1 | 42 | 65 |
| | | L2 | 42 | |
| | | L3 | 43 | |
| | Outgoing (tin plated copper) | L1 | 47 | 65 |
| | | L2 | 48 | |
| | | L3 | 58 | |
| Manual operating means: non-metallic | | | 6 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | 27 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | 35 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | |

| 8.3.3.1 | **TABLE 2: Temperature-rise at SL2-3x3/3A with fuse-links 400A** | | | P |
|---|---|---|---|---|
| **Temperature rise dT of part:** | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | L1 | 40 | 65 |
| | | L2 | 42 | |
| | | L3 | 43 | |
| | Outgoing (tin plated copper) | L1 | 48 | 65 |
| | | L2 | 48 | |
| | | L3 | 60 | |
| Manual operating means: non-metallic | | | 6 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | 27 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | 34 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.3.1 | TABLE 3: Temperature-rise at SL2-3x/3A with solid-links 630A | | | | P |
|---|---|---|---|---|---|
| **Temperature rise dT of part:** | | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | | L1 | 45 | 65 |
| | | | L2 | 45 | |
| | | | L3 | 46 | |
| | Outgoing (tin plated copper) | | L1 | 54 | 65 |
| | | | L2 | 55 | |
| | | | L3 | 64 | |
| Manual operating means: non-metallic | | | | 4 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | | 23 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | | 31 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | | |

| 8.3.3.1 | TABLE 4: Temperature-rise at SL2-3x3/3A with solid-links 630A | | | | P |
|---|---|---|---|---|---|
| **Temperature rise dT of part:** | | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | | L1 | 45 | 65 |
| | | | L2 | 46 | |
| | | | L3 | 45 | |
| | Outgoing (tin plated copper) | | L1 | 56 | 65 |
| | | | L2 | 55 | |
| | | | L3 | 63 | |
| Manual operating means: non-metallic | | | | 4 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | | 24 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | | 30 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | | |

ВЯРНО С ОРИГИНАЛА

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.3.1 | TABLE 5: Temperature-rise at SL2-3x/KM2G-F with fuse-links 400A | | | | P |
|---|---|---|---|---|---|
| Temperature rise dT of part: | | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | | L1 | 40 | 65 |
| | | | L2 | 42 | |
| | | | L3 | 41 | |
| | Outgoing (tin plated copper) | | L1 | 48 | 65 |
| | | | L2 | 48 | |
| | | | L3 | 57 | |
| Manual operating means: non-metallic | | | | 6 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | | 25 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | | 34 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | | |

| 8.3.3.1 | TABLE 6: Temperature-rise at SL2-3x3/KM2G-F with fuse-links 400A | | | | P |
|---|---|---|---|---|---|
| Temperature rise dT of part: | | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | | L1 | 40 | 65 |
| | | | L2 | 43 | |
| | | | L3 | 42 | |
| | Outgoing (tin plated copper) | | L1 | 48 | 65 |
| | | | L2 | 50 | |
| | | | L3 | 56 | |
| Manual operating means: non-metallic | | | | 6 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | | 26 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | | 35 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | | |

ВЯРНО С ОРИГИНАЛА

КИМТЕХ БЪЛГАРИЯ ООД БУРГАС

| IEC 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.3.1 | **TABLE 7: Temperature-rise at SL2-3x/KM2G with fuse-links 400A** | | | | P |
|---|---|---|---|---|---|
| **Temperature rise dT of part:** | | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | | L1 | 41 | 65 |
| | | | L2 | 43 | |
| | | | L3 | 41 | |
| | Outgoing (tin plated copper) | | L1 | 49 | 65 |
| | | | L2 | 51 | |
| | | | L3 | 57 | |
| Manual operating means: non-metallic | | | | 6 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | | 25 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | | 36 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | | |

| 8.3.3.1 | **TABLE 8: Temperature-rise at SL2-3x3/KM2G with fuse-links 400A** | | | | P |
|---|---|---|---|---|---|
| **Temperature rise dT of part:** | | | | dT (K) measured | dT (K) required |
| Terminals | Incoming (tin plated copper) | | L1 | 42 | 65 |
| | | | L2 | 43 | |
| | | | L3 | 41 | |
| | Outgoing (tin plated copper) | | L1 | 50 | 65 |
| | | | L2 | 52 | |
| | | | L3 | 58 | |
| Manual operating means: non-metallic | | | | 6 | 25 |
| Parts intended to be touched but not hand-held: non-metallic | | | | 25 | 40 |
| Parts which need not be touched during normal operation: non-metallic | | | | 37 | 50 |
| **Supplementary information:**<br>Ambient temperature: 22°C | | | | | |

ВЯРНО С
ОРИГИНАЛА

**List of test equipment used:**

| Measured quantity | Device | Manufacturer | Code |
|---|---|---|---|
| Voltage<br>(tests up to 15kA) | Voltage divider 1:2000<br>Difference amplifier AM 502<br>Signal memory recorder TRA 800 | AIT<br>Tektronix<br>W&W | -<br>AM 502/1...3<br>TRA800 |
| Current<br>(tests up to 15kA) | Lin. current transformer LGSSO<br>Burden 1Ω<br>Signal memory recorder TRA 800 | Ritz<br>AIT<br>W&W | WLIN5000/1...3<br>-<br>TRA800 |
| Voltage<br>(tests above 15kA) | 3-channel<br>Insulating measuring amplifier<br>Signal memory recorder Nicolet | Rohrer<br>W&W | Arcus 930-1<br>2580-P |
| Current<br>(tests above 15kA) | Lin. current transformer LGSSO<br>Burden 0,7mΩ<br>Signal memory recorder Nicolet | Ritz<br>AIT<br>W&W | WLIN6000.HVF/1...3<br>-<br>2580-P |
| Current<br>(tests at reduced voltage) | Current transformer GE 4461<br>Current transformer AETt10<br>True-RMS amperemeter Kl. 0,5<br>Digital multimeter Fluke 185 | Goerz<br>Siemens<br>Norma<br>Fluke | WI600/1...3<br>WI4000/1...3<br>A0,5/1 /4<br>FLUKE185/2 |
| Transient recovery voltage | Adjustment equipment for TRV<br>Oscilloscope G 801.1 | AIT<br>Tektronix | -<br>G801.1 |
| Dielectric properties | High-voltage test equipment 90-1F<br>with measuring equipment<br>Impulse tester 35<br>Impulse voltmeter SV642<br>Oscilloscope 9430 | Elabo<br>Haefely<br>Haefely<br>Le Croy | HSG5KV<br>G304<br>G503<br>G805 |
| Leakage current | High-voltage test equipment 90-1F<br>Digital multimeter Fluke 187<br>Digital multimeter Fluke 185 | Elabo<br>Fluke<br>Fluke | HSG5KV<br>G922<br>FLUKE185/2 |
| Time | Signal memory recorders TA 800<br>Stopwatch | W&W<br>Quantum | TRA800<br>938-3 |
| Temperature | Data Acquisition/Data Logger Switch Unit 34970A<br>Temperature meter TESTO 901 | Agilent<br>Testoterm | 942<br>TESTO |
| Abnormal heat and fire | Glow-wire test device<br>with measuring equipment | Friborg | Glow |
| Mechanical strength<br>of terminals | Test equipment | AIT | MSD |
| Insertability of unprepared conductors | Gauges | AIT | Gauge 1...16 |
| Strength of<br>actuator mechanism | Test equipment | Sauter GmbH | FH1K |
| Degree of protection | Test probe | PTL | PTL 1...3 |
| Clearances,<br>creepage distances | Digital slide gauge CD-20D | Mitutoyo | SCH |

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Accredited by BMWA, No. BMWA-92.714/0532-I/12/2006 as test- and inspection body and according to BGBl. II, No. 244/2005 as certification body for personnel

arsenal research
Ein Unternehmen der Austrian Research Centers.

# Test Report

Project Designation

TYPE TEST
AT A LOW-VOLTAGE
FUSE-SWITCH-DISCONNECTOR
TYPE
SL2G-3x and SL2G-3x3

Client

Jean Müller GmbH
H.J.-Müller Straße 7
D-65343 Eltville, Germany

Order from / No. 01/2009 / ---

Project Number 2.03.00954.1.0 /SL2G

Test Engineer Ing.J.Ainetter

| | |
|---|---|
| Date of issue | 08.04.2009 |
| Total number of issues / No. | 1 / 1 |
| Number of pages | 5 |
| Annex | CB/CCA - Test Report No. 2.03.00954.1.0 /SL2G/CB/CCA (45 pages) |



КИМТЕХ-БЪЛГАРИЯ-ООД БУРГАС

ВЯРНО С ОРИГИНАЛА

## Test item

### Identification:
Low-voltage fuse-switch-disconnector type SL2G-3x and SL2G-3x3

| | |
|---|---|
| Manufacturer: | Jean Müller GmbH |
| Trademark: | Jean Müller |
| Number of poles: | 3-pole |
| Rated operational voltage(s): | AC 400V, AC 500V, AC 690V |
| Rated operational current(s): | 400A |
| Rated frequency: | 50Hz |

### Technical data and description:
See page 4

## Testing location, Period of testing

### Testing location:
Österreichisches Forschungs- und Prüfzentrum Arsenal Ges.m.b.H.
Business Unit Electric Energy Systems
Power Service Center
Giefinggasse 2
1210 Vienna
AUSTRIA

### Period of testing:
01...03/2009

## Test(s)

### Test(s) performed:
Type test

### Test standard(s):
IEC 60947-1:2007 (5th Edition) and IEC 60947-3:2008 (3rd Edition)
EN 60947-1:2004 and EN 60947-3:1999+A1:2001+A2:2005

### Test procedure(s):
CB Scheme and CCA Scheme

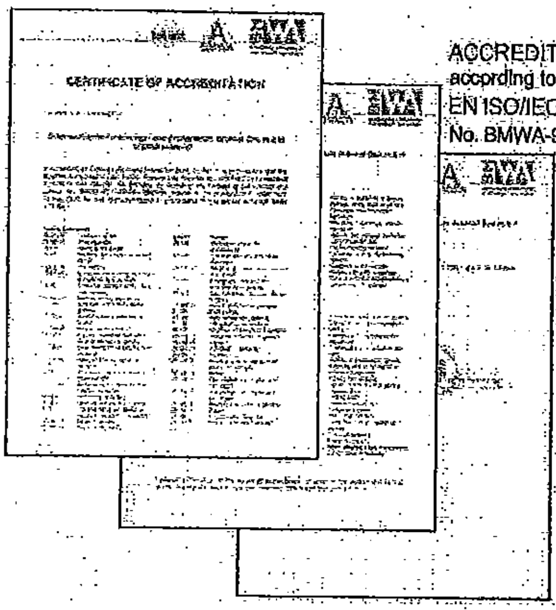
## Result

The low-voltage fuse-switch-disconnectors type SL2G-3x and SL2G-3x3 have passed the type test successfully.

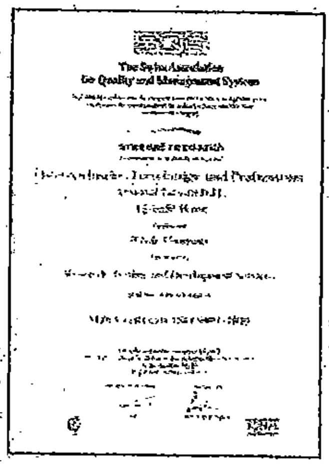
| Test Engineer | Project Engineer, technical responsibility |
|---|---|
| Ing.J.Ainetter | Ing.K.Farthofer |

ВЯРНО С ОРИГИНАЛА

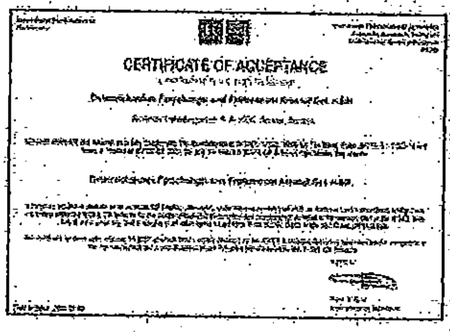
## Testing laboratory




ACCREDITED
according to
EN ISO/IEC 17025
No. BMWA-92.714/0532-I/12/2006



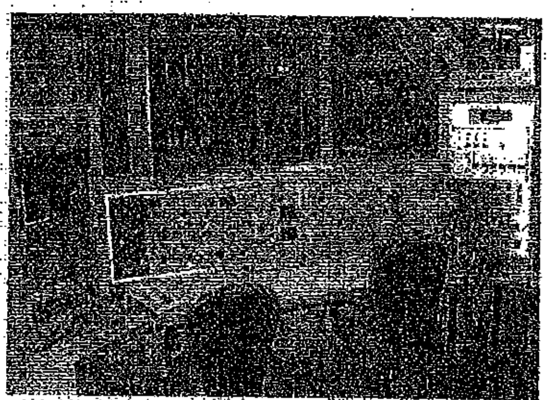
CERTIFICATED
according to
ISO 9001
Reg. No. 12769-03


RECOGNIZED
CB TESTING LABORATORY
under the responsibility of OVE
as the National Certification Body

## POWER SERVICE CENTER:

Control station for tests up to 15kA



Control station for tests above 15kA

ВЯРНО С ОРИГИНАЛА

## Technical data and description

| | |
|---|---|
| Test item | Low-voltage fuse-switch-disconnector |
| Trademark | Jean Müller |
| Model/Type reference | SL2G-3x and SL2G-3x3 |
| Manufacturer | Jean Müller GmbH |
| Place of manufacture | H.J.-Müller Straße7, D-65343 Eltville, Germany |
| Method of operation | Dependent manual operation |
| Switching positions | ON / OFF |
| Number of poles | 3-pole |
| Nature of supply | AC |
| Utilization category | AC-22B |
| Rated operational voltage | 400V, 500V, 690V |
| Rated operational current | 400A |
| Rated frequency | 50Hz |
| conventional free air thermal current Ith | 400A |
| Rated insulation voltage | 1000V |
| Rated impulse withstand voltage | 12kV |
| Rated conditional short-circuit current | 80kA |
| Degree of protection | IP30 |
| Kind of protective device | Fuse-link NH2 |



ВЯРНО С ОРИГИНАЛА

„КИМТЕХ-БЪЛГАРИЯ" ООД • БУРГАС • КИМТЕХ

## Measuring equipment

| Measured quantity | Device | Manufacturer | Code |
|---|---|---|---|
| Voltage<br>(tests up to 15kA) | Voltage divider 1:2000<br>Difference amplifier AM 502<br>Signal memory recorder TRA 800 | ÖFPZ Arsenal<br>Tektronix<br>W&W | -<br>AM 502/1...3<br>TRA800 |
| Current<br>(tests up to 15kA) | Lin. current transformer LGSSO<br>Burden 1Ω<br>Signal memory recorder TRA 800 | Ritz<br>ÖFPZ Arsenal<br>W&W | WLIN5000/1...3<br>-<br>TRA800 |
| Voltage<br>(tests above 15kA) | 3-channel<br>insulating measuring amplifier<br>Signal memory recorder SMR II | Rohrer<br>W&W | T908D<br>SMRII64/1 |
| Current<br>(tests above 15kA) | Lin. current transformer LGSSO<br>Burden 0,7mΩ<br>Signal memory recorder SMR II | Ritz<br>ÖFPZ Arsenal<br>W&W | WLIN6000.HVF/1...3<br>-<br>SMRII64/1 |
| Current<br>(tests at reduced voltage) | Current transformer GE 4461<br>Current transformer AETt10<br>True-RMS amperemeter Kl. 0,5<br>Digital multimeter Fluke 185 | Goerz<br>Siemens<br>Norma<br>Fluke | WI600/1...3<br>WI4000/1...3<br>A0,5/1...3<br>FLUKE185/1, 2 |
| Transient<br>recovery voltage | Adjustment equipment for TRV<br>Oscilloscope G 801.1 | ÖFPZ Arsenal<br>Tektronix | -<br>G801.1 |
| Dielectric properties | High-voltage test equipment 90-1F<br>with measuring equipment<br>Impulse tester 35<br>Impulse voltmeter 64M<br>Oscilloscope 9410 | Elabo<br>Haefely<br>Haefely<br>Le Croy | HSG5KV<br>G304<br>G502<br>G803 |
| Leakage current | High-voltage test equipment 90-1F<br>Digital multimeter Fluke 185<br>Digital multimeter Fluke 185 | Elabo<br>Fluke<br>Fluke | HSG5KV<br>FLUKE185/1<br>FLUKE185/2 |
| Time | Signal memory recorder TRA 800<br>Stopwatch | W&W<br>Junghans | TRA800, SMRII64/1<br>938-2 |
| Temperature | 24-channel recorder Polycomp SK30<br>Temperature meter TESTO 901 | H & B<br>Testoterm | SK 30<br>TESTO |
| Abnormal heat and fire | Glow-wire test device<br>with measuring equipment | Friborg | - |
| Mechanical strength<br>of terminals | Test equipment | ÖFPZ Arsenal | - |
| Insertability of<br>unprepared conductors | Gauges | ÖFPZ Arsenal | - |
| Strength of<br>actuator mechanism | Test equipment | Schatz | - |
| Degree of protection | Test probe | PTL | - |
| Clearances,<br>creepage distances | Digital slide gauge CD-20D | Mitutoyo | SCHUB |

ВЯРНО С ОРИГИНАЛА

Test Report issued under the responsibility of OVE

# TEST REPORT
# IEC / EN 60947-3
## Low-voltage switchgear and controlgear
## Part 3: Switches, disconnectors, switch-disconnectors and fuse combination units

| | |
|---|---|
| Report Reference No. | 2.03.00954.1.0 /SL2G/CB/CCA |
| Date of issue | 08.04.2009 |
| Total number of pages | 45 |
| **CB / CCA Testing Laboratory** | ÖFPZ Arsenal Ges.m.b.H. |
| Address | A-1210 Wien, Giefinggasse 2 |
| **Applicant's name** | Jean Müller GmbH |
| Address | H.J.-Müller Strasse 7, D-65343 Eltville, Germany |
| **Test specification:** | |
| Standard | ☒ IEC 60947-3:1999 (Second Edition) + A1:2001 + A2:2005 in conjunction with IEC 60947-1:2004 (Fourth Edition)<br>☒ EN 60947-3:1999 + A1:2001 + A2:2005 in conjunction with EN 60947-1:2004 |
| Test procedure | CB / CCA |
| Non-standard test method | N/A |
| **Test Report Form No.** | IECEN60947_3B |
| Test Report Form(s) Originator | OVE |
| Master TRF | Dated 2006-08 |



**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

**This report is not valid as a CCA Test Report unless signed by an approved CCA Testing Laboratory and appended to a CCA Test Certificate issued by an NCB un accordance with CCA.**

| | |
|---|---|
| **Test item description** | Fuse-switch-disconnector |
| Trade Mark | JEAN MÜLLER |
| Manufacturer | Jean Müller GmbH<br>H.J.-Müller Strasse7, D-65343 Eltville, Germany |
| Model/Type reference | SL2G-3x and SL2G-3x3 |
| Ratings | AC-22B; 690V; 400A; 3-pole |

ВЯРНО С ОРИГИНАЛА

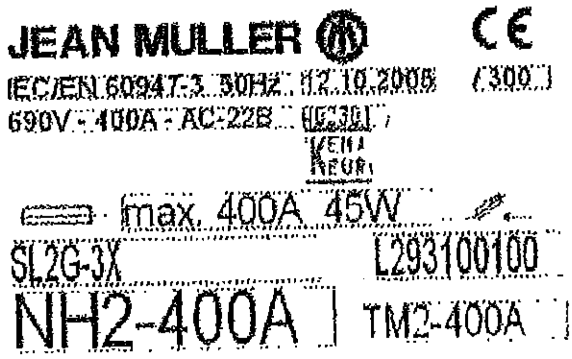
| **Summary of testing:** | |
|---|---|
| **Tests performed (name of test and test clause):** | **Testing location:** |
| A type test was performed according to<br>• IEC 60947-1:2007 (5th Edition)<br>• IEC 60947-3:2008 (3rd Edition)<br>and<br>• EN 60947-1:2004<br>• EN 60947-3:1999+A1:2001+A2:2005.<br>The fuse-switch-disconnectors type<br>• SL2G-3x and SL2G-3x3<br>have passed the type test successfully. | ÖFPZ Arsenal Ges.m.b.H.<br>Business Unit Electric Energy Systems<br>Power Service Center<br>Giefinggasse 2<br>1210 Wien<br>AUSTRIA<br><br>The ÖFPZ Arsenal Ges.m.b.H. is a recognized CB Testing Laboratory under the responsibility of OVE as the National Certification Body. |

**Summary of compliance with National Differences:**

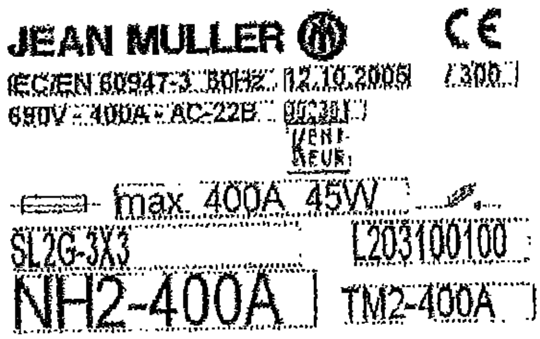
—

**Copy of marking plate:**

**SL2G-3x:**




**SL2G-3x3:**

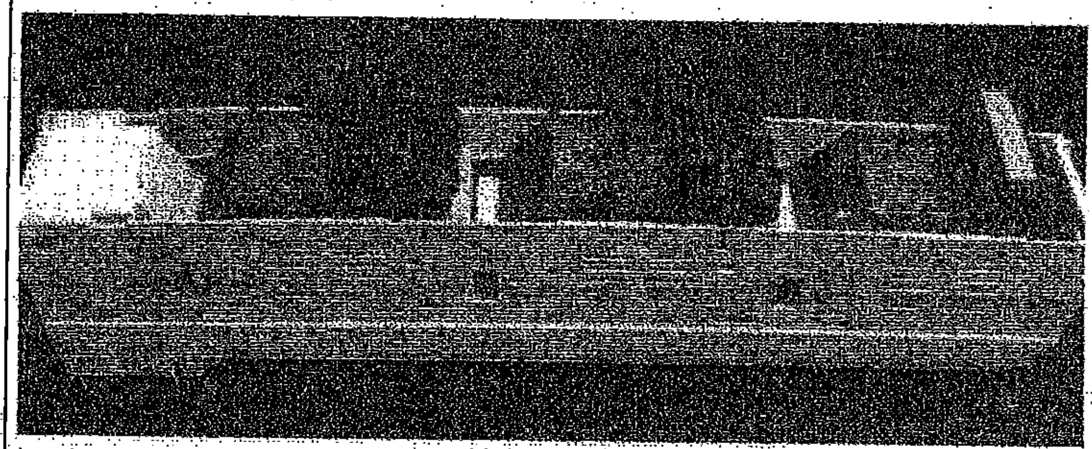




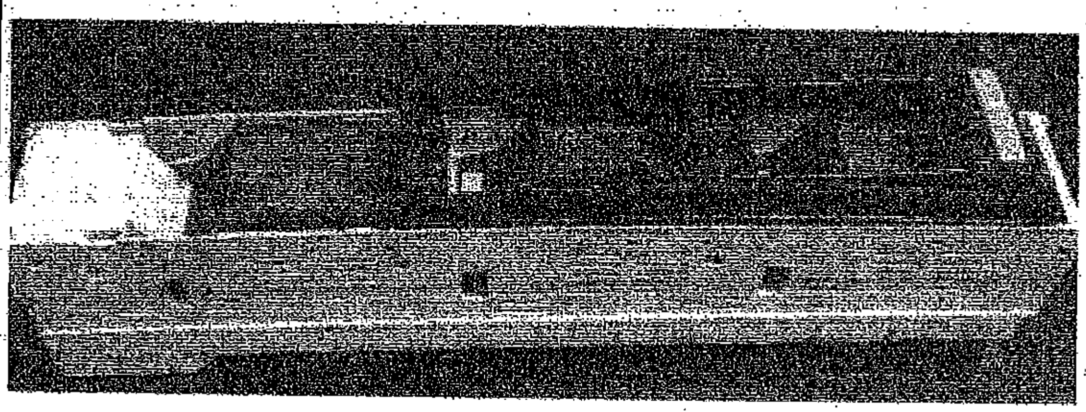

ВЯРНО С ОРИГИНАЛА

**Picture(s) of the test item:**

**SL2G-3x: Fuse-switch-disconnector, 3-poles, independent switching pole after pole**



**SL2G-3x3: Fuse-switch-disconnector, 3-poles,switching 3-poles together, with locking device in close and open position**





ВЯРНО С ОРИГИНАЛА

| | |
|---|---|
| **Test item particulars:** | |
| - method of mounting : | Dependent manual operation |
| - switching positions : | I / O |
| - number of poles : | 3 |
| - kind of current : | AC |
| - number of positions of the main contacts : | 2 |
| Rated and limiting values, main circuit: | |
| - rated operational voltage Ue (V) : | 400, 500, 690 |
| - rated insulation voltage Ui (V) : | 1000 |
| - rated impulse withstand voltage Uimp (kV) : | 12 |
| - rated operational current Ie with solid-links (A) : | 400 |
| - conventional free air thermal current Ith with fuse-links (A) : | 400 |
| - rated uninterrupted current Iu with fuse-links (A) : | 400 |
| - rated frequency (Hz) : | 50 to 60 |
| - utilization category : | AC-22B |
| Short-circuit characteristic: | |
| - rated short-time withstand current Icw (A) : | - |
| - rated short-time making capacity Icm (A) : | - |
| - rated conditional short-circuit current (kA) : | 80 |
| Rated and limiting values, auxiliary circuit(s): | |
| - rated operational voltage (V) : | - |
| - rated frequency (Hz) : | - |
| - number of circuits : | - |
| - number and kind of contact elements : | - |
| Co-ordination of short-circuit protective devices: | |
| - kind of protective device : | NH-fuse 400A gG (size 02) |
| **Possible test case verdicts:** | |
| - test case does not apply to the test object : | N (Not applicable) |
| - test object does meet the requirement : | P (Pass) |
| - test object does not meet the requirement : | F (Fail) |
| **Testing:** | |
| Date of receipt of test item : | 01/2009 |
| Date (s) of performance of tests : | 01 ... 3/2009 |

ВЯРНО С ОРИГИНАЛА

**General remarks:**

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

**Note: EN Group Differences together with National Differences and Special National Conditions, if any, are stated in the Appendix to the main body of this TRF.**

Throughout this report a comma is used as the decimal separator.

**The making and breaking and the short-circuit tests are carried out with a metalic screen placed at:**
**-right side 130mm**
**-left side 120mm**
**-upper side 160mm**

**General product information:**

**Low-voltage fuse-switch-disconnector**
**size 2**
**for use with NH fuse-links**

**type**

**SL2G-3x and SL2G-3x3**



БУРГАС ООД

**ВЯРНО С ОРИГИНАЛА**

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 5.2 | MARKING | | P |
| | Marking on equipment itself or on nameplate or nameplates attached to the equipment and legible from the front after mounting | | P |
| | - indication of the open and closed position | Visible open and closed position | P |
| | - suitability for isolation | Yes | P |
| | - disconnectors AC-20 and DC-20 only: marked "Do not operate under load" | | N |
| | Marking on equipment not needed to be visible after mounting: | | P |
| | - manufacturer's name or trademark | JEAN MÜLLER | P |
| | - type designation or serial number | SL2G-3x<br>SL2G-3x3 | P |
| | - rated operational current | 400A | P |
| | - rated operational voltage | 400V, 500V, 690V | P |
| | - utilization category | AC-22B | P |
| | - rated frequency | 50-60Hz | P |
| | - manufacturer's claim for compliance with IEC/EN 60947-3 | EN 60947-3 | P |
| | - degree of protection | IP30 | P |
| | Marking on fuse-combination units: | | P |
| | - fuse type | NH fuse-link size 2 | P |
| | - maximum rated current | 400A | P |
| | - power loss of the fuse-link | 45W | P |
| | Identification of terminals: | | P |
| | - line terminals | | P |
| | - load terminals | | P |
| | - neutral pole terminal | | N |
| | - protective earth terminal | | N |
| | Data in the manufacturer's published information: | | P |
| | - rated insulation voltage | 1000V | P |
| | - rated impulse withstand voltage for equipment suitable for isolation or when determined | 12kV | P |
| | - pollution degree, if different from 3 | 3 | P |
| | - rated duty | Uninterrupted duty | P |
| | - rated short-time withstand current and duration | - | N |
| | - rated short-circuit making capacity | - | N |
| | - rated conditional short-circuit current | 80kA | P |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 7.1 | CONSTRUCTION | | P |
| 7.1.1 | Materials | | P |
| 7.1.1.1 | Resistance to abnormal heat and fire | | P |
| | Glow-wire test according to IEC 60695-2-10 and IEC 60695-2-11 | | P |
| | Parts made of insulating material necessary to retain current-carrying parts in position: test temperature 960 °C | | P |
| | No visible flame and no sustained glowing..........: | No visible flame | P |
| | Flames and glowing extinguish within 30 s .........: | - | N |
| | No ignition of the tissue paper | | P |
| | Parts of insulating material not necessary to retain current-carrying parts in position, even though in contact with them: test temperature 650 °C | | P |
| | No visible flame and no sustained glowing..........: | No visible flame | P |
| | Flames and glowing extinguish within 30 s .........: | - | N |
| | No ignition of the tissue paper | | P |
| 7.1.2 | Current-carrying parts and their connection | | P |
| 7.1.3 | Clearances | | P |
| | Rated impulse withstand voltage (kV) ...................: | 8 | — |
| | Minimum clearances (mm) ...................................: | 8 | — |
| | Measured clearances (mm)...................................: | > 8 | P |
| | Creepage distances | | P |
| | Pollution degree.........................................................: | 3 | — |
| | Comparative tracking index (V) ............................: | 600 | — |
| | Material group ..........................................................: | I | — |
| | Rated insulation voltage Ui (V) ............................: | 1000 | — |
| | Minimum creepage distances (mm)......................: | 14 | — |
| | Measured creepage distances (mm) ....................: | > 14 | P |
| 7.1.4 | Actuator | | — |
| 7.1.4.1 | Insulation | | — |
| | Actuator insulated from live parts for | | — |
| | - rated insulation voltage | Ui = 1000V | P |
| | - rated impulse withstand voltage | Uimp = 12kV | P |
| | Actuator made of metal | No | — |
| | - connected to a protective conductor or provided with an additional insulation | | N |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Actuator made of or covered by insulating material: | Thermoplastic material | — |
| | - Internal metal parts, which might become accessible in the event of an insulation failure, are also insulated from live parts for the rated insulation voltage | | P |
| 7.1.4.2 | Direction of movement | | P |
| | The direction of operation for actuators shall where applicable conform to IEC 60447 | | P |
| | There is no doubt of the "I" and "O" position and the direction of operation | | P |
| 7.1.5 of Part 1 | Indication of contact position | | P |
| 7.1.5.1 | Indicating means | | P |
| 7.1.5.2 | Indication by the actuator | Yes | P |
| 7.1.6 | Additional safety requirements for equipment suitable for isolation | | P |
| 7.1.6.1 | Additional constructional requirements for equipment suitable for isolation (Ue > 50 V): | | P |
| | - marking according to 5.2.1b | | P |
| | - indication of the position of the contacts | | P |
| | - construction of the actuating mechanism | | P |
| | - minimum clearances across open contacts (see Table 13, Part 1) (mm) ..............................: | 14 | — |
| | - measured clearances (mm)..............................: | > 14 | P |
| | - test Uimp across gap (kV) ..............................: | 18,5 | P |
| 7.1.6.2 | Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers: | | N |
| | Auxiliary switch is rated according to IEC 60947-5-1 (unless the equipment is rated AC-23) | | N |
| | Time interval between opening of the contacts of the auxiliary contact and the contacts of the main poles: ≥ 20 ms..............................: | - | — |
| | Measured time interval (ms) ..............................: | - | N |
| | During the closing operation the contacts of the auxiliary switch closes after or simultaneously with the contacts of the main poles | | N |

КИМТЕХ БЪЛГАРИЯ ООД БУРГАС КИМТЕХ

ВЯРНО С ОРИГИНАЛА

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 7.1.6.3 | Supplementary requirements for equipment provided with means for padlocking the open position: | | N |
| | The locking means is so designed that it cannot be removed with the appropriate padlock(s) installed | | N |
| | Test force F applied to the actuator in an attempt to operate to the closed position (N)....................: | - | — |
| | Rated impulse withstand voltage (kV) .................: | - | — |
| | Test Uimp on open main contacts at test force (kV).........................................................................: | - | N |
| 7.1.7 of Part 1 | Terminals | | P |
| 7.1.7.1 | All parts of terminals which maintain contact and carry current are of metal having adequate mechanical strength | See 8.2.4 below | P |
| | Terminal connections are such that necessary contact pressure is maintained | See 8.2.4 below | P |
| | Terminals are so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal | See 8.2.4 below | P |
| | Terminals do not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage is not reduced below the rated value | See 8.2.4 below | P |
| 8.2.4 | Mechanical properties of terminals | | P |
| | Mechanical strength of terminals | | P |
| | Maximum cross-sectional area of conductor........: | 240mm² | — |
| | Diameter of thread (mm).......................................: | M12 | — |
| | Torque (Nm)..........................................................: | 40Nm x 11% = 44Nm | — |
| | 5 times on 2 separate clamping units | | P |
| | Testing for damage to and accidental loosening of conductor (flexion test) | | N |
| | Type of terminals tested.......................................: | - | — |
| | Conductor of the smallest cross-sectional area (mm²).............................................................: | - | — |
| | Number of conductors of the smallest cross section..................................................................: | - | — |
| | Diameter of bushing hole (mm) ..........................: | - | — |

ВЯРНО С ОРИГИНАЛА

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Height between equipment and platen (mm)........: | - | — |
| | Mass at the conductor(s) (kg)..............................: | - | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | — |
| | Pull-out test | | N |
| | Force (N), applied for 1 min................................: | - | — |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | — |
| | Conductor of the largest cross-sectional area (mm²)...........................................................: | - | — |
| | Number of conductors of the largest cross section...........................................................: | - | — |
| | Diameter of bushing hole (mm) ..........................: | - | — |
| | Height between equipment and platen (mm)........: | - | — |
| | Mass at the conductor(s) (kg)..............................: | - | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | — |
| | Pull-out test | | N |
| | Force (N), applied for 1 min................................: | - | — |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | N |
| | Conductor of the largest and smallest cross-sectional area (mm²)............................................: | - | — |
| | Number of conductor of the smallest cross section, number of conductor of the largest cross section ..: | - | — |
| | Diameter of bushing hole (mm) ..........................: | - | — |
| | Height between equipment and platen (mm)........: | - | — |
| | Mass at the conductor(s) (kg)..............................: | - | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | N |
| | Pull-out test | | N |
| | Force (N), applied for 1 min.................................: | - | — |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | N |



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ОРИГИНАЛА

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 7.1.7.2 | Connection capacity | | P |
| | Type of conductors ............................................: | Cable lugs for busbars | — |
| | Minimum cross-sectional area of conductor.........: | | — |
| | Maximum cross-sectional area of conductor........: | | — |
| | Number of conductors simultaneously connectable to the terminal...................................: | | — |
| 7.1.7.3 | Connection | | P |
| | Terminals for connection to external conductors are readily accessible during installation | | P |
| | Clamping screws and nuts do not serve to fix any other component | | P |
| 7.1.7.4 | Terminal identification and marking | | P |
| | Terminal intended exclusively for the neutral conductor | | N |
| | Protective earth terminal | | N |
| | Other terminals | | P |
| 7.1.8 | Additional requirements for equipment provided with a neutral pole | | N |
| | Equipment provided with a pole intended for the connection of neutral, this pole shall be clearly marked by the letter "N" | | N |
| | The switched neutral pole does not break before and does not make after the other poles except | | N |
| | - a pole having the appropriate short-circuit breaking and making capacity is used as neutral pole, all poles may operate together | | N |
| | Conventional thermal current of neutral pole | | N |
| 7.1.9 | Provisions for protective earthing | | N |
| 7.1.9.1 | The exposed conductive parts are electrically interconnected and connected to a protective earth terminal | | N |
| 7.1.9.2 | Protective earth terminal is readily accessible | | N |
| | Protective earth terminal is suitably protected against corrosion | | N |
| | Electrical continuity between exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors | | N |
| | Protective earth terminal has no other functions | | N |
| 7.1.9.3 | Protective earth terminal marking and identification | | N |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 7.1.10 | Enclosure for equipment | | N |
| 7.1.10.1 | Design | | N |
| | When the enclosure is opened, all parts requiring access for installation and maintenance are readily accessible | | N |
| | Sufficient space is provided inside the enclosure | | N |
| | The fixed parts of a metal enclosure are electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor | | N |
| | Under no circumstances a removable metal part of the enclosure is insulated from the part carrying the earth terminal when the removable part is in place | | N |
| | The removable parts of the enclosure are firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations | | N |
| | When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices | | N |
| | If the enclosure is used for mounting push-buttons, it is not possible to remove the buttons from the outside of the enclosure | | N |
| 7.1.10.2 | Insulation | | N |
| | If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining is securely fixed to the enclosure | | N |
| 7.1.11 | Degree of protection of enclosed equipment | | P |
| | Degree of protection ...........................................: | IP30 | P |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.3 | TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS | | P |
| 8.3.3.1 | Temperature-rise | | P |
| | ambient temperature 10-40°C .............................: | 25 | — |
| | test enclosure W x H x D (mm x mm x mm) .........: | - | — |
| | material of enclosure.........................................: | - | — |
| | Main circuits, test conditions: | | P |
| | - conventional thermal current Ith (A) ..................: | 400A | — |
| | - conventional enclosed thermal current Ithe (A)..: | - | — |
| | - cable/busbar cross-section (mm²)/(mmxmm).....: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | Fuse-link details (fuse-combination units only): | | P |
| | - manufacturer's name, trademark or identification mark.............................................: | Dummy | — |
| | - manufacturer's model or type reference.............: | - | — |
| | - rated voltage (V) ..............................................: | - | |
| | - rated current (A)................................................: | 400A | — |
| | - power loss (W)....................................................: | 45W | — |
| | - rated breaking capacity (kA)..............................: | - | — |
| | Temperature-rise of phase poles | See appended table 1 | P |
| | Temperature-rise of neutral pole (if applicable) | | N |
| | Temperature-rise of accessible parts | See appended table 1 | P |
| | Auxiliary circuits, test conditions: | | N |
| | - rated operation current (A) ................................: | - | — |
| | - cable cross-section (mm²)...................................: | - | — |
| | Temperature-rise of terminals | | N |
| | Temperature-rise of accessible parts | | N |



ВЯРНО С ОРИГИНАЛА

**IEC / EN 60947-3**

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.3.3.2 | Test of dielectric properties | | P |
| | Rated impulse withstand voltage (kV) ..................: | 12 | — |
| | - test Uimp main circuits (kV)...............................: | 14,8 | P |
| | - test Uimp auxiliary circuits (kV) ..........................: | - | N |
| | - test Uimp on open main contacts<br>(equipment suitable for isolation) (kV)................: | 18,5 | P |
| | Power-frequency withstand voltage (V)................: | 1000 | — |
| | - main circuits, test voltage for 5 sec. (V).............: | 2200 | P |
| | - control and auxiliary circuits,<br>test voltage for 5 sec. (V) ..................................: | - | N |
| | Devices, which have been disconnected for the power-frequency withstand voltage test ..............: | - | N |
| | Equipment suitable for isolation, leakage current not exceed 0,5 mA | | — |
| | Test voltage 1,1 Ue (V).........................................: | 760 | P |
| | Measured leakage current (mA)..........................: | < 0,2 | P |

ВЯРНО С
ОРИГИНАЛА

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | | P |
| | **SL2G-3x3** | | |
| | - utilization category ............................................: | AC-22B | — |
| | - rated operational voltage Ue (V)........................: | 690 | — |
| | - rated operational current Ie (A) or ~~power (kW)~~...: | 400 | — |
| | Conditions for make operations, AC-23A and AC-23B only: | | N |
| | - test voltage, U = 1,05 Ue (V) ..............................: | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... x Ie (A) ..................................: | L1: -<br>L2: -<br>L3: - | — |
| | - power factor.........................................................: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for break operations, AC-23A and AC-23B only: | | N |
| | - test voltage, U = 1,05 Ue (V) ..............................: | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... x Ie (A) ..................................: | L1: -<br>L2: -<br>L3: - | — |
| | - power factor.........................................................: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for make/break operations, other than AC-23A and AC-23B: | | P |
| | - test voltage, U = 1,05 Ue (V) ..............................: | L1: 742<br>L2: 746<br>L3: 742 | — |
| | - test current, I = 3 x Ie (A)....................................: | L1: 1231<br>L2: 1221<br>L3: 1225 | — |
| | - power factor/~~time constant~~ ...............................: | L1: 0,65<br>L2: 0,65<br>L3: 0,65 | — |
| | Number of make/break or make and break operations ...........................................................: | 5 | P |
| | - recovery voltage duration ( ≥ 50 ms)...................: | Permanent | P |
| | - current duration (ms) ..........................................: | 500 | — |
| | - time interval between operations (s)...................: | 30 | P |



„КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС

ВЯРНО С ОРИГИНАЛА

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only: | | P |
| | - oscillatory frequency (kHz) ...: | 44,2 | — |
| | - measured oscillatory frequency (kHz) ...: | L1: 48,1<br>L2: 48,1<br>L3: 47,9 | P |
| | - factor $\gamma$ ...: | L1: 1,1<br>L2: 1,1<br>L3: 1,1 | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles or poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)...: | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | test voltage (1,1 Ue) (V)...: | 759 (tested with 800V) | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ...: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ...: | < 2 | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | - conductor cross-section (mm²) / (mmxmm)...: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | - test current Ie (A) ...: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)...: | 60 | P |

**IEC / EN 60947-3**

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.3.3.7 | Strength of actuator mechanism | | P |
| 8.2.5 | Verification of the strength of actuator mechanism and position indicating device | | P |
| | - actuator type (fig.).......................................: | One-hand operated (1e) | — |
| 8.2.5.2.1 | Dependent and independent manual operation | | P |
| | - actuating force for opening (N)..........................: | 154 | — |
| | - test force with blocked main contacts (N)..........: | 400 | — |
| | - used method to keep the contact closed............: | Welding | — |
| | During and after the test, open position not indicated.......................................................: | No open position | P |
| | Equipment with locking mean, no locking in the open position while test force is applied ...............: | - | N |
| 8.2.5.2.2 | Dependent power operation | | N |
| | - main contacts fixed together in the closed position.........................................................: | - | N |
| | - used method to keep the contact closed............: | - | N |
| | - 110% of the rated supply voltage applied to the equipment (3 times)..........................................: | - | N |
| | During and after the test, open position not indicated.......................................................: | - | N |
| | Equipment show no damage impairing its normal operation.......................................................: | - | N |
| | Equipment with locking mean, no locking in the open position while test force is applied ...............: | - | N |
| 8.2.5.2.3 | Independent power operation | | N |
| | - main contacts fixed together in the closed position.........................................................: | - | N |
| | - used method to keep the contact closed............: | - | N |
| | - stored energy of the power operator released (3 times).......................................................: | - | N |
| | During and after the test, open position not indicated.......................................................: | - | N |
| | Equipment show no damage impairing its normal operation.......................................................: | - | N |
| | Equipment with locking mean, no locking in the open position while test force is applied ...............: | - | N |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | | P |
| | SL2G-3x | | |
| | - utilization category: | AC-22B | — |
| | - rated operational voltage Ue (V): | 690 | — |
| | - rated operational current Ie (A) or ~~power (kW)~~: | 400 | — |
| | Conditions for make operations, AC-23A and AC-23B only: | | N |
| | - test voltage, U = 1,05 Ue (V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for break operations, AC-23A and AC-23B only: | | N |
| | - test voltage, U = 1,05 Ue (V): | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... x Ie (A): | L1: -<br>L2: -<br>L3: - | — |
| | - power factor: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for make/break operations, other than AC-23A and AC-23B: | | P |
| | - test voltage, U = 1,05 Ue (V): | L1: 741<br>L2: 747<br>L3: 742 | — |
| | - test current, I = 3 x Ie (A): | L1: 1235<br>L2: 1228<br>L3: 1219 | — |
| | - power factor/~~time constant~~: | L1: 0,66<br>L2: 0,65<br>L3: 0,65 | — |
| | Number of make/break or make and break operations: | 5 operations (L1 closed, L2 closed, L3 operated)<br>5 operations (L1 operated, L2 closed, L3 open) | P |
| | - recovery voltage duration ( ≥ 50 ms): | Permanent | P |
| | - current duration (ms): | 500 | |
| | - time interval between operations (s): | 30 | P |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only: | | P |
| | - oscillatory frequency (kHz) ...: | 44,2 | — |
| | - measured oscillatory frequency (kHz) ...: | L1: 48,1<br>L2: 48,1<br>L3: 48,1 | P |
| | - factor γ ...: | L1: 1,1<br>L2: 1,1<br>L3: 1,1 | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles or poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)...: | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | test voltage (1,1 Ue) (V)...: | 769 (tested with 800V) | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ...: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ...: | < 2 | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | - conductor cross-section (mm²) / (mmxmm)...: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | - test current Ie (A) ...: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K) ...: | 58 | P |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.3.7 | Strength of actuator mechanism | | P |
| 8.2.5 | Verification of the strength of actuator mechanism and position indicating device | | P |
| | - actuator type (fig.) ......: | One-hand operated (1e) | — |
| 8.2.5.2.1 | Dependent and independent manual operation | | P |
| | - actuating force for opening (N) ......: | 130 | — |
| | - test force with blocked main contacts (N) ......: | 390 | — |
| | - used method to keep the contact closed ......: | Welding | — |
| | During and after the test, open position not indicated ......: | No open position | P |
| | Equipment with locking mean, no locking in the open position while test force is applied ......: | - | N |
| 8.2.5.2.2 | Dependent power operation | | N |
| | - main contacts fixed together in the closed position ......: | - | N |
| | - used method to keep the contact closed ......: | - | N |
| | - 110% of the rated supply voltage applied to the equipment (3 times) ......: | - | N |
| | During and after the test, open position not indicated ......: | - | N |
| | Equipment show no damage impairing its normal operation ......: | - | N |
| | Equipment with locking mean, no locking in the open position while test force is applied ......: | - | N |
| 8.2.5.2.3 | Independent power operation | | N |
| | - main contacts fixed together in the closed position ......: | - | N |
| | - used method to keep the contact closed ......: | - | N |
| | - stored energy of the power operator released (3 times) ......: | - | N |
| | During and after the test, open position not indicated ......: | - | N |
| | Equipment show no damage impairing its normal operation ......: | - | N |
| | Equipment with locking mean, no locking in the open position while test force is applied ......: | - | N |

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| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY<br>Type SL2G-3x3 | | P |
| 8.3.4.1 | Operational performance test | | P |
| | - utilization category: | AC-22B | — |
| | - rated operational voltage Ue (V): | 690 | — |
| | - rated operational current Ie (A) ~~or power~~ (kW)...: | 400 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V): | L1: 701<br>L2: 698<br>L3: 695 | — |
| | - test current (A): | L1: 402<br>L2: 403<br>L3: 401 | — |
| | - power factor/~~time constant~~: | L1: 0,79<br>L2: 0,78<br>L3: 0,79 | — |
| | Number of cycles with current: | 200 | P |
| | Number of cycles without current: | 800 | P |
| | First test sequence (with/without current): | With | — |
| | Second test sequence (with/without current): | Without | — |
| | - time interval between first and second test sequence: | No time interval | — |
| | - recovery voltage duration ( ≥ 50 ms): | Permanent | P |
| | - current duration (ms): | 320 | — |
| | - time interval between operations (s): | 60 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles or poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after the operational performance test | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

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| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.4.2 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)... : | 1380 | — |
| | No breakdown or flashover | | P |
| 8.3.4.3 | Leakage current | | P |
| | test voltage (1,1 Ue) (V).......................................: | 759 | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ..................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ...........................................: | < 2 | P |
| 8.3.4.4 | Temperature-rise verification | | P |
| | - conductor cross-section (mm²) / (mmxmm)........: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | - test current Ie (A)..............................................: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)............................................................: | < 57 | P |



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| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY<br>Type SL2G-3x | | P |
| 8.3.4.1 | Operational performance test | | P |
| | - utilization category ............................................: | AC-22B | — |
| | - rated operational voltage Ue (V)........................: | 690 | — |
| | - rated operational current Ie (A) ~~or power~~ (kW)...: | 400 | — |
| | Test conditions for electrical operation cycles: | | P |
| | - test voltage (V)...............................................: | L1: 702<br>L2: 699<br>L3: 695 | — |
| | - test current (A) ...............................................: | L1: 401<br>L2: 402<br>L3: 401 | — |
| | - power factor/~~time constant~~ ...............................: | L1: 0,79<br>L2: 0,78<br>L3: 0,79 | — |
| | Number of cycles with current ...............................: | 200 | P |
| | Number of cycles without current .........................: | 800 | P |
| | First test sequence (with/without current).............: | With | — |
| | Second test sequence (with/without current)........: | Without | — |
| | - time interval between first and second test sequence ...........................................................: | No time interval | — |
| | - recovery voltage duration ( ≥ 50 ms)..................: | Permanent | P |
| | - current duration (ms) .........................................: | 320 | — |
| | - time interval between operations (s)..................: | 60 | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles or poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after the operational performance test | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.4.2 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)... : | 1380 | — |
| | No breakdown or flashover | | P |
| 8.3.4.3 | Leakage current | | P |
| | test voltage (1,1 Ue) (V)..........: | 759 | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ..........: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ..........: | < 2 | P |
| 8.3.4.4 | Temperature-rise verification | | P |
| | - conductor cross-section (mm²) / (mmxmm)........: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | - test current Ie (A)..........: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)..........: | < 57 | P |

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| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.5 | TEST SEQUENCE III: SHORT-CIRCUIT PERFORMANCE CAPABILITY | | N |
| 8.3.5.1 | Short-time withstand current test | | N |
| | Rated short-time withstand current Icw (A) ..........: | - | N |
| | test voltage (V)......: | L1: -<br>L2: -<br>L3: - | — |
| | r.m.s. test current (A) ......: | L1: -<br>L2: -<br>L3: - | — |
| | peak test current (A) ......: | L1: -<br>L2: -<br>L3: - | — |
| | power factor/time constant......: | L1: -<br>L2: -<br>L3: - | — |
| | factor *n* ......: | - | N |
| | test duration (ms)......: | - | N |
| 8.3.5.1.5 | Behaviour of the equipment during the test | | N |
| | Test performed without: | | — |
| | - endanger to the operator | | N |
| | - cause damage to adjacent equipment | | N |
| | No permanent arcing | | N |
| | No flash over between poles or poles and frame | | N |
| | No melting of the fuse in the detection circuit | | N |
| 8.3.5.1.6 | Conditions of the equipment after the test | | N |
| | Immediately after the test equipment must work satisfactorily | | N |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N |
| | - equipment is able to carry its rated current after normal closing operation | | N |

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| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.5.2 | Short-circuit making capacity | | N |
| | Rated short-circuit making capacity Icm (A).........: | - | N |
| | test voltage (1,05 Ue) (V)........................................: | L1: -<br>L2: -<br>L3: - | — |
| | r.m.s. test current (A) ..........................................: | L1: -<br>L2: -<br>L3: - | — |
| | peak test current (A) ..........................................: | L1: -<br>L2: -<br>L3: - | — |
| | power factor/time constant.................................: | L1: -<br>L2: -<br>L3: - | N |
| | factor *n* ..................................................................: | - | N |
| | current duration (ms).........................................: | - | N |
| | Time interval between the cycles (min) ................: | - | N |
| | Number of making cycles ...................................: | - | N |
| 8.3.5.2.5 | Behaviour of the equipment during the test | | N |
| | Test performed without: | | — |
| | - endanger to the operator | | N |
| | - cause damage to adjacent equipment | | N |
| | No permanent arcing | | N |
| | No flash over between poles or poles and frame | | N |
| | No melting of the fuse in the detection circuit | | N |
| 8.3.5.2.6 | Conditions of the equipment after the test | | N |
| | Immediately after the test equipment must work satisfactorily | | N |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N |
| | - equipment is able to carry its rated current after normal closing operation | | N |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.5.3 | Dielectric verification | | N |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)...: | - | — |
| | No flashover or breakdown | | N |
| 8.3.5.4 | Leakage current | | N |
| | test voltage (1,1 Ue) (V).......................................: | - | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ..................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ..........................................: | - | N |
| 8.3.5.5 | Temperature-rise verification | | N |
| | - conductor cross-section (mm²) / (mmxmm)........: | - | — |
| | - test current Ie (A).............................................: | - | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)..............................................................: | - | N |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| 8.3.6 | TEST SEQUENCE IV: CONDITIONAL SHORT-CIRCUIT CURRENT<br>Type SL2G-3x3, tested at 690V/80k | | P |
| | Conditional short-circuit current test | | P |
| | Protective device details: | | P |
| | - manufacturer's name, trademark or identification mark.......: | Jean Müller | — |
| | - manufacturer's model or type reference..........: | M2gL400/69 | — |
| | - rated voltage (V) .......: | 690 | — |
| | - rated current (A).......: | 400 | — |
| | - rated breaking capacity (kA).......: | 80 | — |
| 8.3.6.2 | Test conditions for conditional short-circuit current test | | P |
| | test voltage (1,05 Ue) (V).......: | L1: 729<br>L2: 732<br>L3: 733 | — |
| | test current (A) .......: | L1: 81390<br>L2: 81500<br>L3: 81900 | — |
| | rated frequency (Hz) .......: | 50 | — |
| | power factor .......: | 0,20 | P |
| | time constant (ms) .......: | - | N |
| | factor *n* .......: | 2,24 | P |
| a) | Fuse protected short-circuit withstand: | | P |
| | - max. let-through current (A).......: | L1: 11000<br>L2: 33800<br>L3: 32200 | — |
| | - Joule integral I²dt (A²s) .......: | L1: 151000<br>L2: 1080000<br>L3: 724000 | — |
| b) | Fuse protected short-circuit withstand: | | P |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) .......: | 0,97 | — |
| | - point at which the measurement is made.......: | Maximum distance of actuator | — |
| | - test speed during short-circuit making (m/s) ......: | 1,0 | — |
| | - max. let-through current (A).......: | L1: 32100<br>L2: 11000<br>L3: 29000 | — |
| | - Joule integral I²dt (A²s) .......: | L1: 1100000<br>L2: 830000<br>L3: 810000 | — |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles or poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.6.2.6 | Condition of the equipment after the test | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.6.3 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)... : | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.6.4 | Leakage current | | P |
| | test voltage (1,1 Ue) (V)......................................: | 759 (tested with 800V) | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) .................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA).............................................: | < 2 | P |
| 8.3.6.5 | Temperature-rise verification | | P |
| | - conductor cross-section (mm²) / (~~mmxmm~~)........: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | - test current Ie (A)...................................................: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)...........................................................: | 61K | P |



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| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.6 | TEST SEQUENCE IV: CONDITIONAL SHORT-CIRCUIT CURRENT<br>Type SL2G-3x, tested at 690V/80k | | P |
| | Conditional short-circuit current test | | P |
| | Protective device details: | | P |
| | - manufacturer's name, trademark or identification mark: | Jean Müller | — |
| | - manufacturer's model or type reference: | M2gL400/69 | — |
| | - rated voltage (V): | 690 | — |
| | - rated current (A): | 400 | — |
| | - rated breaking capacity (kA): | 100 | — |
| 8.3.6.2 | Test conditions for conditional short-circuit current test | | P |
| | test voltage (1,05 Ue) (V): | L1: 727<br>L2: 730<br>L3: 730 | — |
| | test current (A): | L1: 82000<br>L2: 82200<br>L3: 83400 | — |
| | rated frequency (Hz): | 50 | — |
| | power factor: | 0,20 | P |
| | time constant (ms): | - | N |
| | factor *n*: | 2,24 | P |
| a) | Fuse protected short-circuit withstand: | | P |
| | - max. let-through current (A): | L1: 20200<br>L2: 42200<br>L3: 43400 | — |
| | - Joule integral $I^2dt$ ($A^2s$): | L1: 55600<br>L2: 1000000<br>L3: 769000 | — |
| b) | Fuse protected short-circuit withstand: | | P |
| | - mean velocity of 15 manually under no-load conditions operations (m/s): | 0,97 | — |
| | - point at which the measurement is made: | Maximum distance of actuator | — |
| | - test speed during short-circuit making (m/s): | 1,0 | — |
| | - max. let-through current (A): | L1: -<br>L2: 37000<br>L3: 37000 | — |
| | - Joule integral $I^2dt$ ($A^2s$): | L1: -<br>L2: 890000<br>L3: 890000 | |

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|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | P |
| | Test performed without: | | — |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles or poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.6.2.6 | Condition of the equipment after the test | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.6.3 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)...: | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.6.4 | Leakage current | | P |
| | test voltage (1,1 Ue) (V).......................................: | 759 (tested with 800V) | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ..................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA)............................................: | < 2 | P |
| 8.3.6.5 | Temperature-rise verification | | P |
| | - conductor cross-section ($mm^2$) / (~~mmxmm~~)........: | Supply: copper bar 30x10mm<br>Load: 240$mm^2$, 2m length | — |
| | - test current Ie (A)...............................................: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)........................................................: | 60K | P |

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| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.3.7 | TEST SEQUENCE V: OVERLOAD PERFORMANCE CAPABILITY<br>Type SL2G-3x3, tested with 400A fuse-links | | P |
| 8.3.7.1 | Overload test | | P |
| | ambient temperature 10-40 °C ............................: | 25 | — |
| | test enclosure W x H x D (mm x mm x mm) .........: | - | — |
| | material of enclosure.............................................: | - | — |
| | test current 1,6 x Ithe or 1,6 x Ith (A) ....................: | 640 | — |
| | - cable/busbar cross-section (mm²)/(~~mmxmm~~).....: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | Fuse-link details: | | P |
| | - manufacturer's name, trademark or identification mark...............................................: | Jean Müller | — |
| | - manufacturer's model or type reference.............: | M02gG400/69 | — |
| | - rated voltage (V) ................................................: | 690 | — |
| | - rated current (A).................................................: | 400 | — |
| | - power loss (W).....................................................: | 34 | — |
| | - rated breaking capacity (kA)..............................: | 100 | — |
| | - time duration of the overload test (s)..................: | 2290 | P |
| | Within 3 to 5 min after the fuse(s) has(have) operated (or 1 h), the equipment has been operated once, i.e. opened and closed | Opening and closing operation | P |
| | Required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | The equipment has not undergone any impairment hindering such operation | | P |
| 8.3.7.2 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)... : | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.7.3 | Leakage current | | P |
| | test voltage (1,1 Ue) (V).........................................: | 759 | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ..................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ............................................: | < 2 | P |
| 8.3.7.4 | Temperature-rise verification | | P |
| | Fuse links aged during the overload test are replaced by new fuse-links | | P |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - conductor cross-section (mm²) / (~~mmxmm~~)........: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | - test current Ie (A)............................................: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)...........................................................: | 67K | P |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.7 | TEST SEQUENCE V: OVERLOAD PERFORMANCE CAPABILITY<br>Type SL2G-3x | | P |
| 8.3.7.1 | Overload test | | P |
| | ambient temperature 10-40 °C ............................: | 25 | — |
| | test enclosure W x H x D (mm x mm x mm) .........: | - | — |
| | material of enclosure...........................................: | - | — |
| | test current 1,6 x Ithe or 1,6 x Ith (A) ....................: | 640 | — |
| | - cable/busbar cross-section (mm²)/(~~mmxmm~~).....: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | Fuse-link details: | | P |
| | - manufacturer's name, trademark or identification mark..............................................: | Jean Müller | — |
| | - manufacturer's model or type reference.............: | M02gG400/69 | — |
| | - rated voltage (V) ..............................................: | 690 | — |
| | - rated current (A)...............................................: | 400 | — |
| | - power loss (W)...................................................: | 34 | — |
| | - rated breaking capacity (kA)...............................: | 100 | — |
| | - time duration of the overload test (s)..................: | 2300 | P |
| | Within 3 to 5 min after the fuse(s) has(have) operated (or 1 h), the equipment has been operated once, i.e. opened and closed | Opening and closing operation | P |
| | Required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | The equipment has not undergone any impairment hindering such operation | | P |
| 8.3.7.2 | Dielectric verification | | P |
| | test voltage: 2*Ue with a minimum of 1000V~ (V)...: | 1380 | — |
| | No flashover or breakdown | | P |
| 8.3.7.3 | Leakage current | | P |
| | test voltage (1,1 Ue) (V).........................................: | 759 | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ..................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ............................................: | < 2 | P |
| 8.3.7.4 | Temperature-rise verification | | P |
| | Fuse links aged during the overload test are replaced by new fuse-links | | P |



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| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | - conductor cross-section ($mm^2$) / (~~mmxmm~~)........: | Supply: copper bar 30x10mm<br>Load: 240mm², 2m length | — |
| | - test current Ie (A)...............................................: | 400A | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)..............................................................: | 67K | P |

IEC / EN 60947-3

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.4 | ELECTROMAGNETIC COMPATIBILITY TESTS | | |
| 8.4.1 | Immunity | | N |
| 8.4.1.1 | Equipment not incorporating electronic circuits: no tests necessary | | N |
| 8.4.1.2 | Equipment incorporating electronic circuits: | | N |
| | Equipment utilizing circuits in which all components are passive are not required to be tested | | N |
| | All other equipment, requirements according to 7.3.2.2 and limits according table 6 apply | | N |
| | Performed tests...............................................: | - | N |
| | No unintentional separation or closing of contacts has occurred during these tests...........................: | - | N |
| 8.4.2 | Emission | | N |
| 8.4.2.1 | Equipment not incorporating electronic circuits: no tests necessary | | N |
| 8.4.2.2 | Equipment incorporating electronic circuits: | | N |
| | Equipment utilizing circuits in which all components are passive are not required to be tested | | N |
| | All other equipment, requirements according to 7.3.3.2 and limits according table 7 apply | | N |
| | Performed tests...............................................: | - | N |
| | No unintentional separation or closing of contacts has occurred during these tests...........................: | - | N |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | **Annex A (normative)** | | N |
| A | Equipment for direct switching of a single motor | | N |
| A.1 | Additional rated duties: | | — |
| A.1.1 | Intermittent periodic duty.......................................: | - | N |
| | Intermittent duty .....................................................: | - | N |
| A.1.1.1 | Classes of intermittent duty ..................................: | - | N |
| | - class 1: up to 1 operating cycle per hour | | N |
| | - class 3: up to 3 operating cycles per hour | | N |
| | - class 12: up to 12 operating cycles per hour | | N |
| | - class 30: up to 30 operating cycles per hour | | N |
| | - class 120: up to 120 operating cycles per hour | | N |
| A.1.2 | Temporary duty.....................................................: | - | N |
| A.5 | Mechanical durability: | | N |
| | Equipment mounted according to manufacturer's instruction | | N |
| | Preferred number of no-load operating cycles expressed in millions (0,001 – 0,003 – 0,01– 0,03 – 0,1 – 0,3 - 1)...............................................: | - | N |
| | Number of no-load operating cycles performed ...: | - | N |
| | If no mechanical endurance is stated by the manufacturer, a minimum mechanical endurance according to the class of intermittent duty shall be tested (corresponding to 8000 h of operation). | | N |
| A.6 | Electrical durability: | | N |
| | Test according to manufacturer's instruction | | N |
| | Number of operating cycles performed ................: | - | N |



ВЯРНО С ОРИГИНАЛА

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| A.7 | Verification of making and breaking capacities: | | N |
| | - utilization category ..........: | - | — |
| | - rated operational voltage Ue (V)..........: | - | — |
| | - rated operational current Ie (A) or power (kW)...: | - | — |
| | Conditions for make/break operations or make operations: | | N |
| | - test voltage, U= 1,05 Ue (V) ..........: | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... x Ie (A) ..........: | L1: -<br>L2: -<br>L3: - | — |
| | - power factor ..........: | L1: -<br>L2: -<br>L3: - | — |
| | Conditions for make/break operations: | | N |
| | - test voltage, U = 1,05 Ue (V) ..........: | L1: -<br>L2: -<br>L3: - | — |
| | - test current, I = ... x Ie (A) ..........: | L1: -<br>L2: -<br>L3: - | — |
| | - power factor/ time constant ..........: | L1: -<br>L2: -<br>L3: - | — |
| | Number of make/break or make and break operations ..........: | - | N |
| | - recovery voltage duration ( ≥ 50 ms) | | N |
| | - current duration (ms) ..........: | - | — |
| | - time interval between operations (s)..........: | - | N |
| | Characteristic of transient recovery voltage if necessary: | | N |
| | - oscillatory frequency (kHz) ..........: | - | — |
| | - measured oscillatory frequency (kHz)..........: | L1: -<br>L2: -<br>L3: - | N |
| | - factor γ ..........: | L1: -<br>L2: -<br>L3: - | N |

**IEC / EN 60947-3**

| Clause | Requirement - Test | Result - Remark | Verdict |
|---|---|---|---|
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | N |
| | Test performed without: | | — |
| | - endanger to the operator | | N |
| | - cause damage to adjacent equipment | | N |
| | No permanent arcing | | N |
| | No flash over between poles or poles and frame | | N |
| | No melting of the fuse in the detection circuit | | N |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | N |
| | Immediately after the test equipment must work satisfactorily | | N |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N |
| | - equipment is able to carry its rated current after normal closing operation | | N |
| 8.3.3.4 | Dielectric verification | | N |
| | test voltage: 2*Ue with a minimum of 1000V~......: | - | — |
| | No flashover or breakdown | | N |
| 8.3.3.5 | Leakage current | | N |
| | test voltage (1,1 Ue) (V)......................................: | - | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) ..................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA)............................................: | - | N |
| 8.3.3.6 | Temperature-rise verification | | N |
| | - conductor cross-section (mm²) / (mmxmm)........: | - | — |
| | - test current Ie (A)..............................................: | - | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)..........................................................: | - | N |
| | Supplementary information: | | N |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| A.8 | Operational performance test: | | N |
| | - utilization category .............................................: | - | — |
| | - rated operational voltage Ue (V).........................: | - | — |
| | - rated operational current Ie (A) or power (kW)...: | - | — |
| | Test conditions for electrical operation cycles: | | N |
| | - test voltage (V)...................................................: | L1: -<br>L2: -<br>L3: - | — |
| | - test current (A)...................................................: | L1: -<br>L2: -<br>L3: - | — |
| | - power factor/time constant ...............................: | L1: -<br>L2: -<br>L3: - | — |
| | Number of cycles with current ............................: | - | N |
| | Number of cycles without current ........................: | - | N |
| | First test sequence (with/without current).............: | - | — |
| | Second test sequence (with/without current)........: | - | — |
| | - time interval between first and second test sequence ..........................................................: | - | — |
| | - recovery voltage duration ( ≥ 50 ms) | | N |
| | - current duration (ms) ........................................: | - | — |
| | - time interval between operations (s)..................: | - | N |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | N |
| | Test performed without: | | — |
| | - endanger to the operator | | N |
| | - cause damage to adjacent equipment | | N |
| | No permanent arcing | | N |
| | No flash over between poles or poles and frame | | N |
| | No melting of the fuse in the detection circuit | | N |
| 8.3.4.1.6 | Condition of the equipment after the operational performance test | | N |
| | Immediately after the test equipment must work satisfactorily | | N |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | N |
| | - equipment is able to carry its rated current after normal closing operation | | N |



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| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| 8.3.4.2 | Dielectric verification | | N |
| | test voltage: 2*Ue with a minimum of 1000V~......: | - | — |
| | No breakdown or flashover | | N |
| 8.3.4.3 | Leakage current | | N |
| | test voltage (1,1 Ue) (V)......................................: | - | — |
| | Leakage current (utilization categories AC-20A/B, and DC-20A/B): ≤ 0,5 mA / pole (mA) .................: | - | N |
| | Leakage current (other utilization categories): ≤ 2,0 mA / pole (mA) ..........................................: | - | N |
| 8.3.4.4 | Temperature-rise verification | | N |
| | - conductor cross-section (mm²) / (mmxmm)........: | - | — |
| | - test current Ie (A) ..............................................: | - | — |
| | Temperature rise of main circuit terminals ≤ 80 K (K)..........................................................: | - | N |
| | Supplementary information: | | N |
| A.9 | Special tests: | | N |
| | - performed tests...................................................: | - | N |

| IEC / EN 60947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |

| Annex C (normative) | | | N |
|---|---|---|---|
| C | Single pole operated three pole switches | | N |
| C.1 | Three pole operated switches of fundamentally the same design, already successfully tested are deemed to satisfy the requirements of individually operated three pole devices. | | N |
| C.2 | Additional-tests to be performed on single pole operated three pole switches | | N |
| | Test "8.3.3.3 Making and breaking capacities" according to test sequence I with following modifications | | N |
| | L1 and L2 are closed, L3 is subjected to the required make-break operation cycle ...................: | - | N |
| | L2 closed and L3 opened, L1 is subjected to the required make-break operation cycle ...................: | - | N |
| | Test performed in a three phase circuit | | N |
| | Test "8.3.4.1 Operational performance" according to test sequence II with following modifications | | N |
| | L1 and L2 are closed, L3 is subjected to the required make-break operation cycle ...................: | - | N |
| | L2 closed and L3 opened, L1 is subjected to the required make-break operation cycle ...................: | - | N |
| | Test performed in a three phase circuit | | N |
| | Test "8.3.6.2 Fuse protected short circuit test" according to test sequence IV with following modifications | | N |
| | For the making test L1 shall be open and L2 closed, L3 is subjected to the required make operation cycle.....................................................: | - | N |
| | Test performed in a three phase circuit | | N |
| C.5 | Instructions for use | | N |
| | The product literature includes following statement: | | N |
| | These devices are intended for power distribution systems where switching and/or isolating of an individual phase may be necessary and shall not be used for the switching of the primary circuit of three-phase equipment. | | N |

**Table 1:**

| Temperature rise measurements (with dummy 45 W)<br>Sequence F, type SL2G-3x, new | | | |
|---|---|---|---|
| Temperature rise dT of part: | Phase | Measured dT (K) | Required dT (K) |
| Cable terminals | L1 | 50,7 | ≤ 70 |
| | L2 | 50,7 | |
| | L3 | 50,7 | |
| Busbar terminals | L1 | 50,7 | |
| | L2 | 50,7 | |
| | L3 | 50,7 | |
| Actuator | --- | 5 | ≤25 |
| Parts intended to be touched but not hand-held: | | | |
| Metallic | --- | --- | ≤ 30 |
| Non-metallic | --- | 25 | ≤ 40 |
| Parts which need not be touched during normal operation: | | | |
| Metallic | --- | --- | ≤ 40 |
| Non-metallic | --- | 34 | ≤ 50 |

Remarks

ВЯРНО С
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Kimtech

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електрооборудване

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e-mail: office@kimtech.bg

**Списък на проведените изпитвания на Вертикален предпазител-разединител НН 400 А, с триполюсно управление**

1. Изпитване устойчивост на стареене;
2. Краткотрайно изпитване на ток;
3. Изпитване ток на късо съединение;
4. Изпитване претоварване;
5. Изпитване електромагнитна съвместимост;

13.01.2016г.

Подпис и печат:

„КИМТЕХ-БЪЛГАРИЯ“ ООД КИМТЕХ БУРГАС

KEMA

*CCA*
*CENELEC CERTIFICATION AGREEMENT*
*ACCORD DE CERTIFICATION DU CENELEC*
*CENELEC-ZERTIFIZIERUNGS-ABKOMMEN*

Ref.no. NTR-NL 4744

# NOTIFICATION OF TEST RESULTS

| | |
|---|---|
| Product | fuse-switch-disconnectors |
| Tested by request of | Jean Müller GmbH, Friedrichstrasse 21, D-65343 Eltville am Rhein, Germany |
| Manufactured at (name and place) | Jean Müller GmbH, Friedrichstrasse 21, D-65343 Eltville am Rhein, Germany |
| Rating and principal characteristics | Ui 1000V, Ith 722 A/1000 A |
| Pre-licence factory inspection carried out by | VDE |
| Trade mark (if any) | JEAN MÜLLER |
| Model/Type Ref. | SL 3-3x/1000 and SL 3-3x3/1000 |
| Additional information (if any) | |
| A sample of product has been tested and found to be in conformity with the current HD/EN and equivalent national standard, (number and edition) | EN 60947-3:1999 |
| as shown in the Test Report (ref.No.) | 2001980.54 (36 pages) |

This Notification of Test Results is the result of testing a sample of the product submitted, in accordance with the provisions of the relevant specific standard.

This Notification of Test Results has been established by a body which participates in the CENELEC Certification Agreement (CCA) of 11th September 1973 as amended on 29th March 1983. Any other body participating in the CCA will take this Notification as a basis for granting a national mark of conformity or a national approval as specified in the CCA, as long as the standard referred to above is still in force in the country of that body.

N.V. KEMA

Arnhem

Date: December 6, 2000

Internal ref: HLS/Sco

Signature:

B.T.M. Holtus

N.V. KEMA
Utrechtseweg 310, 6812 AR Arnhem
P.O. Box 9035, 6800 ET Arnhem
The Netherlands
Telephone +31 26 3 56 28 50
Telefax +31 26 3 51 49 22

603P1X07
9605

KEMA

# TEST REPORT
# EN 60 947-3

## Low-voltage switchgear and controlgear
## Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

**Report**

Reference No. ............................: *2001980.54*

Tested by (+ signature) ...............: *H.L. Schendstok*

Approved by (+ signature) ..........: *L.J.W. van Megen*

Date of issue.............................: *2000-11-30*

Contents ...................................: *36* pages

..............................................:

This report is based on a blank test report that was prepared by KEMA using information obtained from the TRF originator (see below).

**Testing laboratory**

Name.......................................: KEMA Registered Quality B.V.

Address.....................................: Utrechtseweg 310, 6812 AR Arnhem, The Netherlands

Testing location...........................: as above *and*

..............................................: *Holec Laagspanning B.V., Hengelo, The Netherlands*
*All tests were observed by compiler*

**Client**

Name.......................................: *Jean Müller GmbH*

Address.....................................: *Friedrichstrasse 21*

..............................................: *D-65343 ELTVILLE am Rhein, Germany*

**Test specification**

Standard ...................................: EN 60 947-3:99

Test procedure ..........................: CCA-scheme

Procedure deviation......................: N.A.

Non-standard test method.............: N.A.

..............................................:

**Test Report Form/blank test report**

Test Report Form No......................: 60947-3B/98-09

TRF originator. ...........................: KEMA

Master TRF..................................: dated 98-05



**Test item**

Description ...............................: *fuse-switch-disconnector*

Trademark .................................: *Jean Müller*

Model and/or type reference...........: *SL 3-3x/1000 and SL 3-3x3/1000*

Manufacturer ..............................: *Jean Müller GmbH, Eltville am Rhein, Germany*

| | |
|---|---|
| Rating(s) : | *Ui 1000 V, Ith 722 A / 1000 A* |
| : | |
| **Particulars: test item vs. test requirements** | |
| - method of operation : | *dependent manual operation* |
| - switching positions : | *2 (on and off)* |
| - number of poles : | *3-poles* |
| - kind of current : | *AC* |
| - number of phases : | *3* |
| - rated frequency (Hz) : | *50 Hz* |
| - number of positions of the main contacts : | *2 (on and off)* |
| Rated and limiting values, main circuit : | |
| - rated operational voltage Ue (V) : | *400 V, 500 V and 690 V* |
| - rated insulation voltage Ui (V) : | *1000 V* |
| - rated impulse withstand voltage Uimp (kV) : | *12 kV* |
| - conventional free air thermal current Ith (A) : | *fuse: 722 A*<br>*disconnect knife: 1000 A* |
| - conventional enclosed thermal current Ithe (A) : | |
| - rated operational current Ie (A) : | *fuse: 722 A*<br>*disconnect knife: 1000 A* |
| - rated uninterrupted current Iu (A) : | *fuse: 722 A*<br>*disconnect knife: 1000 A* |
| - utilization category : | *with disconnect knife:*<br>*AC-21B 630 A 690 V*<br>*AC-22B 1000 A 400 V*<br>*AC-22B 800 A 500 V*<br><br>*with fuse:*<br>*AC-21B 630 A 690 V*<br>*AC-22B 722 A 400 V*<br>*AC-22B 630 A 500 V* |
| Short-circuit characteristic : | |
| - rated short-time withstand current Icw (kA) : | - |
| - rated short-time making capacity Icm (kA) : | - |
| - rated conditional short-circuit current : | *50 kA at 400 V* |
| Rated and limiting values, auxiliary circuits : | *N* |
| - rated operational voltage (V) : | |
| - rated frequency (Hz) : | |

| | |
|---|---|
| - number of circuits .......................................: | |
| - number and kind of contact elements ..................: | |
| Co-ordination of short-circuit protective devices .....: | |
| - kind of protective device ..................................: | *fuse-link, M3gTr722 NH3 500 kVA (722 A)* |
| **Test case verdicts** | |
| Test case does not apply to the test object ..........: | N(.A.) |
| Test item does meet the requirement ......................: | P(ass) |
| Test item does not meet the requirement .............: | F(ail) |
| ..................................................................: | |

| | |
|---|---|
| **Testing** | |
| Date of receipt of test item ..................................: | *2000-02-24* |
| Date(s) of performance of test ............................: | *2000-03 and 2000-05* |
| ..................................................................: | |

General remarks

This test report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item tested.

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

*The making and breaking tests and short-circuit tests were carried out with a metallic screen placed at 165 mm at the top and 150 mm from the side of the fuse-switch-disconnector, with the cable terminals at the top.*

*The fuse-switch-disconnector type SL 3-3x/1000 were tested as follows:*

*Test sequence I and II: tests were done on phase L2, the load circuit was connected to phase L2, phases L1 and L3 were connected to the supply.*

*Test sequence IV: tests were done with a 3-phase supply, in the 'O-test' the load circuit was connected to all phases, in the 'CO-test' the load circuit was connected to L1 and L2.*

Copy of marking plate

JEAN MULLER CE
IEC/EN 60947-3 50Hz
400V -1000A - AC-22B
KEMA KEUR
max. 1000A 51W
SL3-3X3/1000 L3021300
TM3-1000A NH3-722A

JEAN MULLER CE
IEC/EN 60947-3 50Hz
400V -1000A - AC-22B
KEMA KEUR
max. 1000A 51W
SL3-3X/1000 L3921300
TM3-1000A NH3-722A

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 5.2 | MARKING | | |
| | Marking on equipment itself or on nameplate or nameplates attached to the equipment and legible from the front after mounting | | |
| | - indication of the open and closed position | *main contacts are visible in the open position* | *P* |
| | - suitability for isolation | | *P* |
| | - disconnectors AC-20 and DC-20 only: marked "Do not open under load" | | *N* |
| | Marking on equipment not needed to be visible after mounting: | | |
| | - manufacturer's name or trademark | *JEAN MÜLLER* | *P* |
| | - type designation or serial number | *SL 3-3x/1000 and SL 3-3x3/1000* | *P* |
| | - rated operational current | *1000 A AC-22B 400 V* | *P* |
| | - rated operational voltage | *400 V* | *P* |
| | - utilization category | *AC-22B* | *P* |
| | - rated frequency | *50* Hz | *P* |
| | - manufacturer's claim for compliance with IEC 60 947-3 | *IEC/EN 60947-3* | *P* |
| | - degree of protection | IP | *N* |
| | Marking on fuse-combination units: | | |
| | - fuse type | *NH3-722A* | *P* |
| | - maximum rated current | *722* A | *P* |
| | - power loss of the fuse-link | *51 W* | *P* |
| | Identification of terminals: | | |
| | - line terminals | *immaterial* | *P* |
| | - load terminals | *L1, L2, L3* | *P* |
| | - neutral pole terminal | | *N* |
| | - protective earth terminal | | *N* |
| | Data in the manufacturer's published information: | | |
| | - rated insulation voltage | *1000* V | *P* |
| | - rated impulse withstand voltage for equipment suitable for isolation or when determined | *12* kV | *P* |
| | - pollution degree, if different from 3 | *3* | *P* |
| | - rated duty | *uninterrupted duty* | *P* |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - rated short-time withstand current and duration | | *N* |
| | - rated short-circuit making capacity | | *N* |
| | - rated conditional short-circuit current | *50* kA | *P* |

| | | | |
|---|---|---|---|
| 7.1 | CONSTRUCTION | | |
| 7.1.2 | Current-carrying parts and their connection | *no contact pressure through insulation material* | *P* |
| 7.1.3 | Clearances | | |
| | Rated impulse withstand voltage | (see test sequence I) | *P* |
| | Creepage distances | | — |
| | Pollution degree ........................................: | *3* | — |
| | Comparative tracking index (V) ......................: | *600* V, *450* V, *375* V | — |
| | Material group ..........................................: | *I, II, IIIa* | — |
| | Rated insulation voltage Ui (V) ......................: | *1000* V | — |
| | Minimum creepage distances (mm) ..................: | *16* mm | — |
| | Measured creepage distances (mm) ..................: | > *16* mm | *P* |
| | In case Uimp is not indicated | | *N* |
| 7.1.4 | Actuator | | |
| 7.1.4.1 | Insulation | | |
| 7.1.4.2 | Direction of movement | (IEC 447) | *P* |
| 7.1.5 | Indication of contact position | | |
| 7.1.5.1 | Indicating means | *by actuator* | *P* |
| 7.1.5.2 | Indication by the actuator | *all main contacts are visible in the open position* | *P* |
| 7.1.6 | Additional safety requirements for equipment suitable for isolation | | |
| 7.1.6.1 | Additional constructional requirements for equipment suitable for isolation (Ue > 50 V): | | |
| | - marking according to 5.2b | | *P* |
| | - indication of the position of the contacts | *all main contacts are visible in the open position* | *P* |
| | - construction of the actuating mechanism | | *P* |
| | - minimum clearances across open contacts (see Table XIII, Part 1) (mm) ..............................: | *14* mm | |
| | - measured clearances (mm) ..............................: | > *14* mm | *P* |
| | - test Uimp across gap (kV) ..............................: | *18,5* kV | *P* |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 7.1.6.2 | Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers: | | N |
| | auxiliary switch shall be rated according to IEC 60 947-5-1 | | |
| | minimum time interval between opening of the contacts of the auxiliary contact and the contacts of the main poles (ms) ....................: | | – |
| | measured time interval (ms) ..........................: | | – |
| | During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles | | |
| 7.1.6.3 | Supplementary requirements for equipment provided with means for padlocking the open position: | | N |
| | the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed | | |
| | test force F applied to the actuator in an attempt to operate to the closed position (N) ..............: | | – |
| | rated impulse withstand voltage (kV) .............: | | – |
| | test Uimp on open main contacts at the test force | | |
| 7.1.7 | Terminals | | |
| 7.1.7.1 | All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength | (see 8.2.4 below) | P |
| | Terminal connections shall be such that necessary contact pressure is maintained | (see 8.2.4 below) | P |
| | Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal | (see 8.2.4 below) | P |
| | Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value | (see 8.2.4 below) | P |
| 8.2.4 | Mechanical properties of terminals | | P |
| | Mechanical strength of terminals | | |
| | maximum cross-sectional area of conductor ($mm^2$) ...................................................: | *(cable lugs or busbars)* | [illegible] |
| | diameter of thread (mm) ...............................: | *M12* | [illegible] |
| | torque (Nm) ...................................................: | *40 Nm x 110% = 44 Nm* | – |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | 5 times on 2 separate clamping units | .. | P |
| | Testing for damage to and accidental loosening of conductor (flexion test) | | N |
| | conductor of the smallest cross-sectional area (mm²) ..........: | | – |
| | number of conductor of the smallest cross section ..........: | | – |
| | diameter of bushing hole (mm) ..........: | | – |
| | height between the equipment and the platen ..: | | – |
| | mass at the conductor(s) (kg) ..........: | | – |
| | 135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit | | N |
| | Pull-out test | | N |
| | force (N) ..........: | | – |
| | 1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit | | N |
| | conductor of the largest cross-sectional area (mm²) ..........: | | – |
| | number of conductor of the largest cross section ..........: | | – |
| | diameter of bushing hole (mm) ..........: | | – |
| | height between the equipment and the platen ..: | | – |
| | mass at the conductor(s) (kg) ..........: | | – |
| | 135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit | | N |
| | Pull-out test | | N |
| | force (N) ..........: | | – |
| | 1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit | | N |
| | conductor of the largest and smallest cross-sectional area (mm²) ..........: | | – |
| | number of conductor of the smallest cross section, number of conductor of the largest cross section ..........: | | – |
| | diameter of bushing hole (mm) ..........: | | – |
| | height between the equipment and the platen ..: | | – |
| | mass at the conductor(s) (kg) ..........: | | – |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement - Test | Result - Remark | Verdict |
| | 135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit | | N |
| | Pull-out test | | N |
| | force (N) ...: | | – |
| | 1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit | | N |
| 7.1.7.2 | Connection capacity | | |
| | type of conductors ...: | *(cable lugs or busbars)* | – |
| | minimum cross-sectional area of conductor ($mm^2$) ...: | | – |
| | maximum cross-sectional area of conductor ($mm^2$) ...: | | – |
| | number of conductors simultaneously connectable to the terminal ...: | | – |
| 7.1.7.3 | Connection | | |
| | terminals for connection to external conductors shall be readily accessible during installation | | P |
| | clamping screws and nuts shall not serve to fix any other component | | P |
| 7.1.7.4 | Terminal identification and marking | | |
| | terminal intended exclusively for the neutral conductor | | N |
| | protective earth terminal | | N |
| | other terminals | *L1, L2, L3* | P |
| 7.1.8 | Additional requirements for equipment provided with a neutral pole | | N |
| | Marking of neutral pole | | N |
| | The switched neutral pole shall not break before and shall not make after the other poles | | N |
| | Conventional thermal current of neutral pole | | N |
| 7.1.9 | Provisions for protective earthing | | N |
| 7.1.9.1 | The exposed conductive parts shall be electrically interconnected and connected to a protective earth terminal | | N |
| 7.1.9.2 | The protective earth terminal shall be readily accessible | | N |
| | The protective earth terminal shall be suitably protected against corrosion | | N |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | The electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors | | N |
| | The protective earth terminal shall have no other functions | | N |
| 7.1.9.3 | Protective earth terminal marking and identification | | N |
| 7.1.10 | Enclosure for equipment | | N |
| 7.1.10.1 | Design | | N |
| | The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible | | N |
| | Sufficient space shall be provided inside the enclosure | | N |
| | The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor | | N |
| | Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place | | N |
| | The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations | | N |
| | When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices | | N |
| | If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure | | N |
| 7.1.10.2 | Insulation | | N |
| | If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure | | N |
| 7.1.11 | Degree of protection of enclosed equipment | | N |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Degree of protection ...................................: | IP | N |

| | | | |
|---|---|---|---|
| 8.3.3 | TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS | | |
| 8.3.3.1 | Temperature-rise | | |
| | ambient temperature 10-40 °C ........................: | 23 °C | – |
| | test enclosure W x H x D (mm x mm x mm) ....: | - | – |
| | material of enclosure ...................................: | - | – |
| | Main circuits, test conditions: | | |
| | - conventional thermal current Ith (A) ..............: | *722 A with fuse-links*<br><br>*1000 A with disconnect knives* | – |
| | - conventional enclosed thermal current Ithe (A) : | | – |
| | - cable/busbar cross-section (mm²) / (mm) .......: | *fuse-links: 50 x 10 mm busbar and 2 x 240 mm² cable*<br><br>*disconnect knives: 60 x 10 mm horizontal busbar and 2 x 60 x 5 mm outgoing terminals* | – |
| | Fuse-link details (fuse-combination units only): | | |
| | - manufacturer's name, trademark or identification mark ..........................................: | *Jean Müller* | |
| | - manufacturer's model or type reference ........: | *M3gTr722 NH3* | |
| | - rated current (A) ........................................: | *500 kVA (722 A)* | |
| | - power loss (W) ............................................: | *51 W* | |
| | - rated breaking capacity (kA) ........................: | *100* kA | |
| | Temperature-rise | (see appended table) | P |
| | Auxiliary circuits: temperature rise of connecting terminals (K) ..................................................: | | N |
| | idem, requirement (K) ...................................: | ≤ | |
| | rated operation current (A) ............................: | | |
| | cross-section (mm²) ........................................: | | |
| 8.3.3.2 | Test of dielectric properties, impulse withstand voltage (Uimp indicated): | | |
| | - rated impulse withstand voltage (kV) ...........: | *12* kV | – |
| | - test Uimp main circuits (kV) .........................: | *14,8* kV | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - test Uimp auxiliary circuits (kV) ....................: | | *N* |
| | - test Uimp on open main contacts (equipment suitable for isolating) (kV) ..............................: | *18,5* kV | *P* |
| | Test of dielectric properties, dielectric withstand voltage (Uimp not indicated): | | *N* |
| | - rated insulation voltage (V) ..........................: | | – |
| | - main circuits, test voltage for 1 min (V) ........: | | |
| | - control and auxiliary circuits, test voltage for 1 min (V) ......................................................: | | |

| | | | |
|---|---|---|---|
| 8.3.3.3 | Making and breaking capacity | *fuse-switch-disconnector type SL 3-3x3/1000* | |
| | utilization category .....................................: | *AC-22B* | – |
| | rated operational voltage Ue (V) ....................: | *400* V | – |
| | rated operational current Ie (A) or power (kW) ..: | *1000* A | – |
| | Conditions, make/break operations or make operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) ......................: | L1: *421 V*<br>L2: *421 V*<br>L3: *420 V* | – |
| | - test current I/Ie = (A) ................................: | L1: *3800 A*<br>L2: *3830 A*<br>L3: *3860 A* | |
| | - power factor/time constant .........................: | L1: *0,64*<br>L2: *0,64*<br>L3: *0,64* | |
| | Conditions, break operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) ......................: | L1:<br>L2:<br>L3: | |
| | - test current I/Ie = (A) ................................: | L1:<br>L2:<br>L3: | |
| | - power factor ................................................: | L1:<br>L2:<br>L3: | |
| | transient recovery voltage (V) ........................: | L1: *421 V*<br>L2: *421 V*<br>L3: *420 V* | |
| | current duration (ms) ....................................: | *440* ms | – |
| | time interval between operations ....................: | *180 s* | – |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Number of make/break or make and break operations ......: | *5 x make/break* | *P* |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | |
| | oscillatory frequency (kHz) ......: | *86,3* kHz | – |
| | Measured oscillatory frequency (kHz) ......: | L1: *87,1 kHz*<br>L2: *87,1 kHz*<br>L3: *87,1 kHz* | *P* |
| | Factor y ......: | L1: *1,11*<br>L2: *1,11*<br>L3: *1,11* | *P* |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | *P* |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | *P* |
| 8.3.3.4 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ......: | *2000* V | – |
| | No flashover or breakdown | | *P* |
| 8.3.3.5 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ......: | | *N* |
| | Leakage current (other utilization categories) ≤ 2 mA) ......: | *< 5 μA* | *P* |
| | test voltage (1,1 Ue) (V) ......: | *440 V* | – |
| 8.3.3.6 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ......: | *fuse-links: 38 K – 60 K*<br>*disconnect knives: 52 K – 80 K* | *P* |
| | conductor cross-sectional area (mm²) ......: | *fuse-links: 50 x 10 mm busbar and 2 x 240 mm² cable*<br>*disconnect knives: 60 x 10 mm busbar and 4 x 150 mm² cable* | – |
| | test current Ie (A) ......: | *fuse-links: 722 A*<br>*disconnect knives 1000 A* | – |
| 8.3.3.7 | Strength of actuator mechanism (switch-disconnectors and Ue > 50 V only) | | |
| | actuator type (fig.) ......: | *one-hand operated (e)* | – |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | actuating force for opening (N) ......................: | *215* N | – |
| | test force with blocked main contacts (N) .......: | *400* N | – |
| | Lockability of driving mechanism in OFF-position at test force and blocked main contacts ..........: | | *N* |
| | Position indicator does not show OFF-position after capture of test force at blocked main contacts | | *P* |

| | | | |
|---|---|---|---|
| 8.3.3.3 | Making and breaking capacity | *fuse-switch-disconnector type SL 3-3x/1000* | |
| | utilization category ........................................: | *AC-22B* | – |
| | rated operational voltage Ue (V) ....................: | *400* V | – |
| | rated operational current Ie (A) or power (kW) ..: | *1000* A | – |
| | Conditions, make/break operations or make operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) .......................: | L1:<br>L2: *426 V*<br>L3: | – |
| | - test current I/Ie = (A) ...............................: | L1:<br>L2: *3768 A*<br>L3: | – |
| | - power factor/time constant ........................: | L1:<br>L2: *0,64*<br>L3: | – |
| | Conditions, break operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) .......................: | L1:<br>L2:<br>L3: | – |
| | - test current I/Ie = (A) ...............................: | L1:<br>L2:<br>L3: | – |
| | - power factor ................................................: | L1:<br>L2:<br>L3: | – |
| | transient recovery voltage (V) ........................: | L1:<br>L2: *426 V*<br>L3: | – |
| | current duration (ms) .......................................: | *600* ms | – |
| | time interval between operations ...................: | *180 s* | – |
| | Number of make/break or make and break operations ..........................................: | *5 x make/break* | *P* |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | |
| | oscillatory frequency (kHz) ...........................: | 85,9 kHz | — |
| | Measured oscillatory frequency (kHz) .............: | L1:<br>L2: 89,6 kHz<br>L3: | P |
| | Factor γ ...................................................: | L1:<br>L2: 1,11<br>L3: | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| 8.3.3.4 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ......................: | 2000 V | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | N |
| | Leakage current (other utilization categories) ≤ 2 mA) ...........................................................: | 4,0 μA – 8,3 μA | P |
| | test voltage (1,1 Ue) (V) ..............................: | 440 V, tested with 800 V | — |
| 8.3.3.6 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ......................................................: | fuse-links: 49 K – 72 K<br>disconnect knives:<br>51 K – 74 K | P |
| | conductor cross-sectional area (mm²) .............: | fuse-links: 50 x 10 mm busbar and 2 x 240 mm² cable<br>disconnect knives:<br>60 x 10 mm horizontal busbar and 2 x 60 x 5 mm outgoing terminals | |
| | test current Ie (A) .........................................: | fuse-links: 722 A<br>disconnect knives 1000 A | |
| 8.3.3.7 | Strength of actuator mechanism (switch-disconnectors and Ue > 50 V only) | | |
| | actuator type (fig.) ..........................................: | one-hand operated (e) | — |
| | actuating force for opening (N) ......................: | 181 N | — |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | test force with blocked main contacts (N) .......: | *400* N | – |
| | Lockability of driving mechanism in OFF-position at test force and blocked main contacts .........: | | *N* |
| | Position indicator does not show OFF-position after capture of test force at blocked main contacts | | *P* |

| | | | |
|---|---|---|---|
| 8.3.3.3 | Making and breaking capacity | *fuse-switch-disconnector type SL 3-3x3/1000* | |
| | utilization category .....................................: | *AC-21B* | – |
| | rated operational voltage Ue (V) ......................: | *690* V | – |
| | rated operational current Ie (A) or power (kW) ..: | *630* A | – |
| | Conditions, make/break operations or make operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) ......................: | L1: *747 V*<br>L2: *747 V*<br>L3: *747 V* | – |
| | - test current I/Ie = (A) ................................: | L1: *974 A*<br>L2: *986 A*<br>L3: *985 A* | – |
| | - power factor/time constant ........................: | L1: *0,95*<br>L2: *0,95*<br>L3: *0,95* | – |
| | Conditions, break operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) ......................: | L1:<br>L2:<br>L3: | |
| | - test current I/Ie = (A) ................................: | L1:<br>L2:<br>L3: | |
| | - power factor ...............................................: | L1:<br>L2:<br>L3: | |
| | transient recovery voltage (V) .......................: | L1: *741 V*<br>L2: *747 V*<br>L3: *748 V* | – |
| | current duration (ms) ....................................: | *460* ms | – |
| | time interval between operations ...................: | *60 s* | – |
| | Number of make/break or make and break operations ..................................................: | *5 x make/break* | *P* |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | oscillatory frequency (kHz) ..........................: | kHz | – |
| | Measured oscillatory frequency (kHz) .............: | L1:<br>L2:<br>L3: | N |
| | Factor γ ..................................................: | L1:<br>L2:<br>L3: | N |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| 8.3.3.4 | Dielectric verification | | – |
| | test voltage (2 Ui) for 1 min (V) ....................: | 2000 V | – |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | N |
| | Leakage current (other utilization categories) ≤ 2 mA) ..................................................: | 4,6 μA – 8,2 μA | P |
| | test voltage (1,1 Ue) (V) ............................: | 759 V, tested with 800 V | – |
| 8.3.3.6 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ..................................................: | fuse-links: 57 K – 74 K | P |
| | conductor cross-sectional area (mm²) .............: | fuse-links: 40 x 10 mm busbar and 2 x 185 mm² cable | |
| | test current Ie (A) ........................................: | fuse-links: 630 A | |
| 8.3.3.7 | Strength of actuator mechanism (switch-disconnectors and Ue > 50 V only) | | |
| | actuator type (fig.) ........................................: | one-hand operated (e) | |
| | actuating force for opening (N) ......................: | 215 N | |
| | test force with blocked main contacts (N) .......: | 400 N | |
| | Lockability of driving mechanism in OFF-position at test force and blocked main contacts ..........: | | N |
| | Position indicator does not show OFF-position after capture of test force at blocked main contacts | | P |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | *fuse-switch-disconnector type SL 3-3x/1000* | |
| | utilization category ........................................: | *AC-21B* | – |
| | rated operational voltage Ue (V) ......................: | *690* V | – |
| | rated operational current Ie (A) or power (kW) ..: | *630* A | – |
| | Conditions, make/break operations or make operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) .......................: | L1:<br>L2: *747 V*<br>L3: | – |
| | - test current I/Ie = (A) ..............................: | L1:<br>L2: *991 A*<br>L3: | – |
| | - power factor/time constant .........................: | L1:<br>L2: *0,94*<br>L3: | – |
| | Conditions, break operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) .......................: | L1:<br>L2:<br>L3: | – |
| | - test current I/Ie = (A) ..............................: | L1:<br>L2:<br>L3: | – |
| | - power factor ............................................: | L1:<br>L2:<br>L3: | – |
| | transient recovery voltage (V) .......................: | L1:<br>L2: *744 V*<br>L3: | – |
| | current duration (ms) ...................................: | *360* ms | – |
| | time interval between operations ....................: | *60 s* | – |
| | Number of make/break or make and break operations ..........................................: | *5 x make/break* | *P* |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | |
| | oscillatory frequency (kHz) ...........................: | kHz | – |
| | Measured oscillatory frequency (kHz) ..............: | L1:<br>L2:<br>L3: | *N* |
| | Factor γ ......................................................: | L1:<br>L2:<br>L3: | *N* |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| 8.3.3.4 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ......................: | 2000 V | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | N |
| | Leakage current (other utilization categories) ≤ 2 mA) ....................................................: | 4,4 μA – 8,1 μA | P |
| | test voltage (1,1 Ue) (V) ................................: | 759 V, tested with 800 V | — |
| 8.3.3.6 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ..........................................................: | fuse-links: 58 K – 73 K | P |
| | conductor cross-sectional area (mm²) ..............: | fuse-links: 40 x 10 mm busbar and 2 x 185 mm² cable | — |
| | test current Ie (A) ..........................................: | fuse-links: 630 A | — |
| 8.3.3.7 | Strength of actuator mechanism (switch-disconnectors and Ue > 50 V only) | | |
| | actuator type (fig.) ......................................: | one-hand operated (e) | — |
| | actuating force for opening (N) ......................: | 181 N | — |
| | test force with blocked main contacts (N) .......: | 400 N | — |
| | Lockability of driving mechanism in OFF-position at test force and blocked main contacts ..........: | | N |
| | Position indicator does not show OFF-position after capture of test force at blocked main contacts | | P |

| | | | |
|---|---|---|---|
| 8.3.3.3 | Making and breaking capacity | fuse-switch-disconnector type SL 3-3x3/1000 | |
| | utilization category ......................................: | AC-22B | — |
| | rated operational voltage Ue (V) ....................: | 500 V | — |
| | rated operational current Ie (A) or power (kW) ..: | 800 A | — |
| | Conditions, make/break operations or make operation AC-23A and AC-23B only: | | |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - test voltage U/Ue = 1,05 (V) ...: | L1: *528 V*<br>L2: *532 V*<br>L3: *533 V* | – |
| | - test current I/Ie = (A) ...: | L1: *2466 A*<br>L2: *2456 A*<br>L3: *2410 A* | – |
| | - power factor/time constant ...: | L1: *0,65*<br>L2: *0,65*<br>L3: *0,65* | – |
| | Conditions, break operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) ...: | L1:<br>L2:<br>L3: | – |
| | - test current I/Ie = (A) ...: | L1:<br>L2:<br>L3: | – |
| | - power factor ...: | L1:<br>L2:<br>L3: | – |
| | transient recovery voltage (V) ...: | L1: *528 V*<br>L2: *532 V*<br>L3: *533 V* | – |
| | current duration (ms) ...: | *360* ms | – |
| | time interval between operations ...: | *60 s* | – |
| | Number of make/break or make and break operations ...: | *5 x make/break* | *P* |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | |
| | oscillatory frequency (kHz) ...: | *65,75* kHz | – |
| | Measured oscillatory frequency (kHz) ...: | L1: *66,7 kHz*<br>L2: *67,6 kHz*<br>L3: *65,8 kHz* | *P* |
| | Factor γ ...: | L1: *1,12*<br>L2: *1,11*<br>L3: *1,11* | *P* |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | *P* |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | *P* |
| 8.3.3.4 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ...: | *2000* V | – |
| | No flashover or breakdown | | *P* |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 8.3.3.5 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA .......: | | N |
| | Leakage current (other utilization categories) ≤ 2 mA) ..............................................: | *3,9 μA – 8,4 μA* | P |
| | test voltage (1,1 Ue) (V) ..............................: | *550 V, tested with 800 V* | — |
| 8.3.3.6 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K .......................................................: | *fuse-links: 61 K – 78 K*<br><br>*disconnect knives: 48 K – 61 K* | P |
| | conductor cross-sectional area (mm²) .............: | *fuse-links: 40 x 10 mm busbar and 2 x 185 mm² cable*<br><br>*disconnect knives: 50 x 10 mm busbar and 2 x 240 mm² cable* | — |
| | test current Ie (A) ........................................: | *fuse-links: 630 A*<br><br>*disconnect knives 800 A* | — |
| 8.3.3.7 | Strength of actuator mechanism (switch-disconnectors and Ue > 50 V only) | | |
| | actuator type (fig.) ........................................: | *one-hand operated (e)* | — |
| | actuating force for opening (N) .......................: | *215* N | — |
| | test force with blocked main contacts (N) .......: | *400* N | — |
| | Lockability of driving mechanism in OFF-position at test force and blocked main contacts ..........: | | N |
| | Position indicator does not show OFF-position after capture of test force at blocked main contacts | | P |

| | | | |
|---|---|---|---|
| 8.3.3.3 | Making and breaking capacity | *fuse-switch-disconnector type SL 3-3x/1000* | |
| | utilization category .......................................: | *AC-22B* | — |
| | rated operational voltage Ue (V) ...................: | *500* V | — |
| | rated operational current Ie (A) or power (kW) ..: | *800* A | — |
| | Conditions, make/break operations or make operation AC-23A and AC-23B only: | | |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - test voltage U/Ue = 1,05 (V) ......................: | L1:<br>L2: *528 V*<br>L3: | – |
| | - test current I/Ie = (A) ..............................: | L1:<br>L2: *2414 A*<br>L3: | – |
| | - power factor/time constant .........................: | L1:<br>L2: *0,66*<br>L3: | – |
| | Conditions, break operation AC-23A and AC-23B only: | | |
| | - test voltage U/Ue = 1,05 (V) ......................: | L1:<br>L2:<br>L3: | – |
| | - test current I/Ie = (A) ..............................: | L1:<br>L2:<br>L3: | – |
| | - power factor ...........................................: | L1:<br>L2:<br>L3: | – |
| | transient recovery voltage (V) .......................: | L1:<br>L2: *532 V*<br>L3: | – |
| | current duration (ms) ..................................: | *480* ms | – |
| | time interval between operations ...................: | *60 s* | – |
| | Number of make/break or make and break operations ...............................................: | *5 x make/break* | *P* |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | |
| | oscillatory frequency (kHz) ..........................: | *65,75* kHz | – |
| | Measured oscillatory frequency (kHz) .............: | L1:<br>L2: *66,7 kHz*<br>L3: | *P* |
| | Factor γ ...................................................: | L1:<br>L2: *1,12*<br>L3: | *P* |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | *P* |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | *P* |
| 8.3.3.4 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ....................: | *2000* V | – |
| | No flashover or breakdown | | *P* |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 8.3.3.5 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | *N* |
| | Leakage current (other utilization categories) ≤ 2 mA) ........: | *4,7 µA – 8,3 µA* | *P* |
| | test voltage (1,1 Ue) (V) ........: | *550 V, tested with 800 V* | – |
| 8.3.3.6 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ........: | *fuse-links: 55 K – 73 K*<br>*disconnect knives: 52 K - 60 K* | *P* |
| | conductor cross-sectional area (mm²) ........: | *fuse-links: 40 x 10 mm busbar and 2 x 185 mm² cable*<br>*disconnect knives: 50 x 10 mm busbar and 2 x 240 mm² cable* | – |
| | test current Ie (A) ........: | *fuse-links: 630 A*<br>*disconnect knives 800 A* | – |
| 8.3.3.7 | Strength of actuator mechanism (switch-disconnectors and Ue > 50 V only) | | |
| | actuator type (fig.) ........: | *one-hand operated (e)* | – |
| | actuating force for opening (N) ........: | *181* N | – |
| | test force with blocked main contacts (N) ........: | *400* N | – |
| | Lockability of driving mechanism in OFF-position at test force and blocked main contacts ........: | | *N* |
| | Position indicator does not show OFF-position after capture of test force at blocked main contacts | | *P* |

| | | | |
|---|---|---|---|
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY<br>*fuse-switch-disconnector type SL3-3x/1000* | | |
| 8.3.4.1 | Operational performance test | | |
| | utilization category ........: | *AC-22B* | – |
| | rated operational voltage (V) ........: | *400 V* | – |
| | rated operational current (A) ........: | *1000 A* | – |
| | Test conditions electrical operation cycles: | | |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | test voltage (V) ...: | L1: -<br>L2: *413 V*<br>L3: - | – |
| | test current (A) ...: | L1: -<br>L2: *1003 A*<br>L3: - | – |
| | power factor/time constant ...: | L1: -<br>L2: *0,81*<br>L3: - | – |
| | Number of cycles with current ...: | *100* | *P* |
| | Number of cycles without current ...: | *500* | *P* |
| | First test sequence (with/without current) ...: | *with current* | – |
| | Second test sequence (with/without current) ...: | *without current* | – |
| | time interval between first and second test sequence ...: | *1 hour* | – |
| 8.3.4.2 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ...: | *2000* V | – |
| | No breakdown or flashover | | *P* |
| 8.3.4.3 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ...: | | *N* |
| | Leakage current (other utilization categories) ≤ 2 mA ...: | *5,7 μA – 7,1 μA* | *P* |
| | test voltage (1,1 Ue) (V) ...: | *440 V, tested with 800 V* | – |
| 8.3.4.4 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ...: | *fuse-links: 59 K – 71 K*<br>*disconnect knives: 47 K – 57 K* | *P* |
| | conductor cross-sectional area (mm²) ...: | *fuse-links: 50 x 10 mm busbar and 2 x 240 mm² cable*<br>*disconnect knives: 60 x 10 mm horizontal busbar and 2 x 60 x 5 mm outgoing terminals* | – |
| | test current Ie (A) ...: | *fuse-links: 722 A*<br>*disconnect knives: 1000 A* | – |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY<br>*fuse-switch-disconnector type SL3-3x/1000* | | |
| 8.3.4.1 | Operational performance test | | |
| | utilization category ....: | *AC-22B* | – |
| | rated operational voltage (V) ....: | *500 V* | – |
| | rated operational current (A) ....: | *800 A* | – |
| | Test conditions electrical operation cycles: | | |
| | test voltage (V) ....: | L1: -<br>L2: *510 V*<br>L3: - | – |
| | test current (A) ....: | L1: -<br>L2: *814 A*<br>L3: - | – |
| | power factor/time constant ....: | L1: -<br>L2: *0,80*<br>L3: - | – |
| | Number of cycles with current ....: | *200* | *P* |
| | Number of cycles without current ....: | *800* | *P* |
| | First test sequence (with/without current) ....: | *with current* | – |
| | Second test sequence (with/without current) ....: | *without current* | – |
| | time interval between first and second test sequence ....: | *1 hour* | – |
| 8.3.4.2 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ....: | *2000 V* | – |
| | No breakdown or flashover | | *P* |
| 8.3.4.3 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ....: | | *N* |
| | Leakage current (other utilization categories) ≤ 2 mA ....: | *4,8 μA – 7,3 μA* | *P* |
| | test voltage (1,1 Ue) (V) ....: | *550 V, tested with 800 V* | – |
| 8.3.4.4 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ....: | *fuse-links: 56 K – 72 K*<br>*disconnect knives: 45 K – 60 K* | *P* |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | conductor cross-sectional area (mm²) ............: | *fuse-links: 40 x 10 mm busbar and 2 x 185 mm² cable*<br><br>*disconnect knives: 50 x 10 mm busbar and 2 x 240 mm² cable* | – |
| | test current Ie (A) ......................................: | *fuse-links: 630 A*<br><br>*disconnect knives: 800 A* | – |

| | | | |
|---|---|---|---|
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY<br>*fuse-switch-disconnector type SL3-3x/1000* | | |
| 8.3.4.1 | Operational performance test | | |
| | utilization category ......................................: | *AC-21B* | – |
| | rated operational voltage (V) ........................: | *690 V* | – |
| | rated operational current (A) .........................: | *630 A* | – |
| | Test conditions electrical operation cycles: | | |
| | test voltage (V) ..............................................: | L1: -<br>L2: *689 V*<br>L3: - | – |
| | test current (A) ..............................................: | L1: -<br>L2: *632 A*<br>L3: - | |
| | power factor/time constant ...........................: | L1: -<br>L2: *0,95*<br>L3: - | |
| | Number of cycles with current .......................: | *200* | *P* |
| | Number of cycles without current ...................: | *800* | *P* |
| | First test sequence (with/without current) .......: | *with current* | |
| | Second test sequence (with/without current) ...: | *without current* | |
| | time interval between first and second test sequence ......................................................: | *1 hour* | |
| 8.3.4.2 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) .....................: | 2000 V | |
| | No breakdown or flashover | | *P* |
| 8.3.4.3 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | *N* |



ВЯРНО С ОРИГИНАЛА

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Leakage current (other utilization categories) ≤ 2 mA ......: | *5,6 μA – 7,8 μA* | *P* |
| | test voltage (1,1 Ue) (V) ......: | *759 V, tested with 800 V* | – |
| 8.3.4.4 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ......: | *fuse-links: 55 K – 76 K* | *P* |
| | conductor cross-sectional area ($mm^2$) ......: | *fuse-links: 40 x 10 mm busbar and 2 x 185 $mm^2$ cable* | – |
| | test current Ie (A) ......: | *fuse-links: 630 A* | – |

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|---|---|---|---|
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY<br>*fuse-switch-disconnector type SL3-3x3/1000 only without current* | | |
| 8.3.4.1 | Operational performance test | | |
| | utilization category ......: | *AC-22B* | – |
| | rated operational voltage (V) ......: | *400 V* | – |
| | rated operational current (A) ......: | *1000 A* | – |
| | Test conditions electrical operation cycles: | | |
| | test voltage (V) ......: | L1: -<br>L2:<br>L3: - | – |
| | test current (A) ......: | L1: -<br>L2:<br>L3: - | – |
| | power factor/time constant ......: | L1: -<br>L2:<br>L3: - | |
| | Number of cycles with current ......: | | *P* |
| | Number of cycles without current ......: | *500 + 100* | *P* |
| | First test sequence (with/without current) ......: | *without current* | |
| | Second test sequence (with/without current) ...: | | |
| | time interval between first and second test sequence ......: | | |
| 8.3.4.2 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ......: | *2000* V | – |
| | No breakdown or flashover | | *P* |
| 8.3.4.3 | Leakage current | | |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | *N* |
| | Leakage current (other utilization categories) ≤ 2 mA ........: | *4,8 µA – 7,3 µA* | *P* |
| | test voltage (1,1 Ue) (V) ........: | *440 V, tested with 800 V* | – |
| 8.3.4.4 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ........: | *fuse-links: 51 K – 68 K*<br>*disconnect knives: 51 K – 74 K* | *P* |
| | conductor cross-sectional area (mm²) ........: | *fuse-links: 50 x 10 mm busbar and 2 x 240 mm² cable*<br>*disconnect knives: 60 x 10 mm horizontal busbar and 2 x 60 x 5 mm outgoing terminals* | – |
| | test current Ie (A) ........: | *fuse-links: 722 A*<br>*disconnect knives: 1000 A* | – |

| | | | |
|---|---|---|---|
| 8.3.5 | TEST SEQUENCE III: SHORT-CIRCUIT PERFORMANCE CAPABILITY | | *N* |
| 8.3.5.1 | Short-time withstand current test | | |
| | Rated short-time withstand current Icw (A) ........: | | |
| | test voltage (V) ........: | L1:<br>L2:<br>L3: | |
| | r.m.s. test current (A) ........: | L1:<br>L2:<br>L3: | |
| | peak test current (A) ........: | L1:<br>L2:<br>L3: | |
| | power factor/time constant ........: | L1:<br>L2:<br>L3: | |
| | test duration (s) ........: | | |
| | Equivalent with ........: | | |
| 8.3.5.1.5 | Behaviour of the equipment during the test | | |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 8.3.5.1.6 | Conditions of the equipment after the test | ... | |
| 8.3.5.2 | Short-circuit making capacity | | |
| | Rated short-circuit making capacity Icm (A) .....: | | |
| | test voltage (V) ........................................: | L1:<br>L2:<br>L3: | – |
| | r.m.s. test current (A) ..............................: | L1:<br>L2:<br>L3: | – |
| | peak test current (A) ..............................: | L1:<br>L2:<br>L3: — | – |
| | power factor/time constant .........................: | L1:<br>L2:<br>L3: | – |
| | current duration (s) .....................................: | | – |
| | number of making cycles ..............................: | | – |
| 8.3.5.2.5 | Behaviour of the equipment during the test | | |
| 8.3.5.2.6 | Conditions of the equipment after the test | | |
| 8.3.5.3 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ....................: | | – |
| | No flashover or breakdown | | |
| 8.3.5.4 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | |
| | Leakage current (other utilization categories) ≤ 2,0 mA ...............................................: | | |
| | test voltage (1,1 Ue) (V) .............................: | | – |
| 8.3.5.5 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ...............................................: | | |
| | cross-sectional area (mm²) ..........................: | | – |
| | test current Ie (A) ........................................: | | – |

| | | |
|---|---|---|
| 8.3.6 | TEST SEQUENCE IV: CONDITIONAL SHORT-CIRCUIT CURRENT<br>*fuse-switch-disconnector type SL 3-3x3/1000* | |
| | Protective device details: | |

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|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | - manufacturer's name, trademark or identification mark .......................................: | *Jean Müller* | – |
| | - manufacturer's model or type reference ........: | *M3gTr722 NH3* | – |
| | - rated voltage (V) .......................................: | *400* V | – |
| | - rated current (A) .......................................: | *500 kVA (722 A)* | – |
| | - rated breaking capacity (kA) ......................: | *100* kA | – |
| 8.3.6.2 | Fuse protected short-circuit withstand | | |
| | test voltage (1,05 Ue) (V) ............................: | L1: *420* V<br>L2: *420* V<br>L3: *420* V | – |
| | test current (kA) ..........................................: | L1: *50,4* kA<br>L2: *51,8* kA<br>L3: *50,0* kA | – |
| | rated frequency (Hz) ....................................: | *50* Hz | – |
| | power factor ...................................................: | *0,22* | – |
| | Fuse protected short-circuit withstand | | |
| | - max. let-through current (kA) ......................: | L1: *40,4* kA<br>L2: *48,8* kA<br>L3: *40,4* kA | – |
| | - Joule integral $I^2dt$ ($A^2s$) .............................: | L1: *3690* $kA^2s$<br>L2: *3970* $kA^2s$<br>L3: *3710* $kA^2s$ | – |
| | Fuse protected short-circuit making | | |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) ..........................: | *1,77* m/s | – |
| | - point at which the measurement is made .......: | | – |
| | - test speed during the fuse protected short-circuit making (m/s) .......................................: | *0,65* m/s | – |
| | - max. let-through current (kA) ......................: | L1: *42,7* kA<br>L2: *42,7* kA<br>L3: *5,50* kA | – |
| | - Joule integral $I^2dt$ ($A^2s$) .............................: | L1: *3390* $kA^2s$<br>L2: *3240* $kA^2s$<br>L3: *88,2* $kA^2s$ | – |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | *P* |
| 8.3.6.2.6 | Conditions of the equipment after the test | | *P* |
| 8.3.6.3 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ...................: | *2000* V | – |
| | No flashover or breakdown | | *P* |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| 8.3.6.4 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA ........: | | |
| | Leakage current (other utilization categories) ≤ 2,0 mA ........................................: | *4,2 µA – 9,3 µA* | *P* |
| | test voltage (1,1 Ue) (V) ..............................: | *440 V, tested with 800 V* | – |
| 8.3.6.5 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ....................................................: | *50* K – *69* K | *P* |
| | cross-sectional area (mm²) ..............................: | *50 x 10 mm busbar and*<br>*2 x 240 mm² cable* | – |
| | test current Ie (A) ..........................................: | *fuse-links: 722 A* | – |

| | | | |
|---|---|---|---|
| 8.3.6 | TEST SEQUENCE IV: CONDITIONAL SHORT-CIRCUIT CURRENT<br>*fuse-switch-disconnector type SL 3-3x/1000* | | |
| | Protective device details: | | |
| | - manufacturer's name, trademark or identification mark ..........................................: | *Jean Müller* | – |
| | - manufacturer's model or type reference ........: | *M3gTr722 NH3* | – |
| | - rated voltage (V) ..........................................: | *400* V | – |
| | - rated current (A) ..........................................: | *722 A* | – |
| | - rated breaking capacity (kA) .......................: | *100* kA | – |
| 8.3.6.2 | Fuse protected short-circuit withstand | | |
| | test voltage (1,05 Ue) (V) ............................: | L1: *420* V<br>L2: *420* V<br>L3: *420* V | – |
| | test current (kA) ..........................................: | L1: *50,4* kA<br>L2: *51,8* kA<br>L3: *50,0* kA | – |
| | rated frequency (Hz) ....................................: | *50* Hz | – |
| | power factor ..................................................: | *0,22* | – |
| | Fuse protected short-circuit withstand | | |
| | - max. let-through current (kA) ....................: | L1: *38,1* kA<br>L2: *50,2* kA<br>L3: *38,1* kA | – |
| | - Joule integral I²dt (A²s) ............................: | L1: *3840* kA²s<br>L2: *4160* kA²s<br>L3: *3300* kA²s | – |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | Fuse protected short-circuit making | | |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) ..........: | *1,15* m/s | – |
| | - point at which the measurement is made .......: | | – |
| | - test speed during the fuse protected short-circuit making (m/s) ..........: | *0,65* m/s | – |
| | - max. let-through current (kA) ..........: | L1: *39,7* kA<br>L2: *39,7* kA<br>L3: | – |
| | - Joule integral $I^2dt$ ($A^2s$) ..........: | L1: *2960* $kA^2s$<br>L2: *2960* $kA^2s$<br>L3: | – |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | *P* |
| 8.3.6.2.6 | Conditions of the equipment after the test | | *P* |
| 8.3.6.3 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ..........: | *2000* V | – |
| | No flashover or breakdown | | *P* |
| 8.3.6.4 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA .......: | | |
| | Leakage current (other utilization categories) ≤ 2,0 mA ..........: | *4,0* µA – *8,7* µA | *P* |
| | test voltage (1,1 Ue) (V) ..........: | *440 V, tested with 800 V* | – |
| 8.3.6.5 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K ..........: | *51* K – *74* K | *P* |
| | cross-sectional area ($mm^2$) ..........: | *50 x 10 mm busbar and*<br>*2 x 240 mm² cable* | – |
| | test current Ie (A) ..........: | *fuse-links: 722 A* | – |

| | | | |
|---|---|---|---|
| 8.3.7 | TEST SEQUENCE V: OVERLOAD PERFORMANCE CAPABILITY | | |
| 8.3.7.1 | Overload test | | |
| | ambient temperature 10-40 °C ..........: | *23* °C | – |
| | test enclosure W x H x D (mm x mm x mm) ....: | - | – |
| | material of enclosure ..........: | | – |
| | test current 1,6 Ithe or 1,6 Ith (A) ..........: | *1155 A* | – |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |
| | cable/busbar cross-section (mm²) / (mm) ........: | *busbar 50 x 10 mm*<br>*cable 2 x 240 mm²* | – |
| | Fuse-link details: | | |
| | - manufacturer's name, trademark or identification mark ........................................: | *Jean Müller* | – |
| | - rated current (A) ........................................: | *500kVA (722 A)* | – |
| | - power loss (W) ........................................: | *51* W | – |
| | - rated breaking capacity (kA) ........................: | *100* kA | – |
| | - time duration of the overload test (s) ...........: | *1860* s | – |
| | Within 3 min after the fuse(s) has(have) operated (or 1 h), the equipment shall be operated once, i.e. opened and closed | | *P* |
| | The equipment shall not have undergo any impairment hindering such operation | | *P* |
| 8.3.7.2 | Dielectric verification | | |
| | test voltage (2 Ui) for 1 min (V) ....................: | *2000* V | – |
| | No flashover or breakdown | | *P* |
| 8.3.7.3 | Leakage current | | |
| | Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B) ≤ 0,5 mA .......: | | |
| | Leakage current (other utilization categories) ≤ 2 mA) ........................................................: | *5,9* µA – *7,4* µA | *P* |
| | test voltage (1,1 Ue) (V) ..................................: | *440 V, tested with 800 V* | – |
| 8.3.7.4 | Temperature-rise verification | | |
| | Temperature rise of main circuit terminals ≤ 80 K (K) ........................................................: | *53* K – *70* K | *P* |
| | cross-sectional area (mm²) .............................: | *50 x 10 mm busbar and*<br>*2 x 240 mm² cable* | – |
| | test current Ie (A) ........................................: | *fuse-links: 722 A* | – |

| EN 60 947-3 | | | |
|---|---|---|---|
| Clause | Requirement – Test | Result - Remark | Verdict |

| | TABLE: temperature rise measurements<br>*with fuse-links* | |
|---|---|---|

| temperature rise dT of part: | phase | dT (K) | required dT (K) |
|---|---|---|---|
| *terminal to horizontal busbar system (line terminal)* | *L1*<br>*L2*<br>*L3* | *48*<br>*53*<br>*62* | *70*<br>*70*<br>*70* |
| *terminal to cable(s) (load terminal)* | *L1*<br>*L2*<br>*L3* | *66*<br>*66*<br>*58* | *70*<br>*70*<br>*70* |
| *internal busbar near insulation material* | *L1* | *122* | *145* |
| *actuator* | - | *3* | *25* |
| | | | |

| | TABLE: temperature rise measurements<br>*with contact knifes* | |
|---|---|---|

| temperature rise dT of part: | phase | dT (K) | required dT (K) |
|---|---|---|---|
| *terminal to horizontal busbar system (line terminal)* | *L1*<br>*L2*<br>*L3* | *53*<br>*49*<br>*47* | *70*<br>*70*<br>*70* |
| *terminal to cable(s) (load terminal)* | *L1*<br>*L2*<br>*L3* | *62*<br>*64*<br>*61* | *70*<br>*70*<br>*70* |
| | | | |

Remarks

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*Additional test:*

*- Parts of insulation material necessary to retain current carrying parts were subjected to a glow-wire test according EN 60947-1, at 960 °C for the other insulation materials 650 °C.*
*These tests withstood the requirements.*

*description:*

| | | |
|---|---|---|
| *Type SL 3-3x/1000* | *:* | *fuse-switch-disconnector, 3-poles, switching pole after pole* |
| *Type SL 3-3x3/1000* | *:* | *fuse-switch-disconnector, 3-poles, switching 3-poles* |

# СПИСЪК

на типовите изпитвания, проведени от независима изпитвателна лаборатория, за предлаганите вертикални разединители, както следва:

**Марка:** Jean Muller
**Продукт:** вертикален предпазител-разединители
**Серия:** SL3

5.2 Маркировка
7.1 Конструкция
8.3.3 Основни характеристики
8.3.3.1 Повишаване на температурата
8.3.3.2 Диелектрични свойства
8.3.3.3 Работна и гранична изключвателна възможност при късо съединение
8.3.3.4 Проверка на диелектричните свойства
8.3.3.5 Ток на утечка
8.3.3.6 Проверка при повишаване на температурата
8.3.3.7 Експлоатационна възможност на задвижващия механизъм
8.3.4 Работни характеристики
8.3.4.1 Изпитване на експлоатационната възможност
8.3.4.2 Проверка на диелектричните свойства на прекъсвач-разединителя
8.3.4.3 Ток на утечка
8.3.4.4 Проверка при повишаване на температурата
8.3.5 Характеристики при късо съединение
8.3.5.1 Издържан импулсен ток
8.3.5.2 Работна изключвателна възможност при късо съединение
8.3.5.3 Проверка на диелектричните свойства
8.3.5.4 Ток на утечка
8.3.5.5 Проверка при повишаване на температурата
8.3.6 Условен ток на късо съединение
8.3.6.2 Издържан ток на късо съединение със стопяем предпазител
8.3.6.3 Проверка на диелектричните свойства
8.3.6.4 Ток на утечка
8.3.6.5 Проверка при повишаване на температурата
8.3.7 Характеристики при претоварване
8.3.7.1 Изпитване на претоварване
8.3.7.2 Проверка на диелектричните свойства
8.3.7.3 Ток на утечка
8.3.7.4 Проверка при повишаване на температурата

ВЯРНО С ОРИГИНАЛА

КИМТЕХ-БЪЛГАРИЯ ООД БУРГАС КИМТЕХ

Немска Служба по Акредитация
Предоставено съгласно

с подписано многостранно споразумение на EA, ILAC и IAF за взаимно одобрение

АКРЕДИТАЦИЯ

С настоящото Немска служба за акредитация потвърждава, че лабораторията за изпитване

RWE Eurotest

ул. Унтерще-Вилмс № 52, 44143 Дортмунд

ıритежава правомощия съгласно ISO/IEC 17025:2005 да провежда изпитвания в областта на

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Регистрационен номер на свидетелството: D-PL-15207-01-01

Франкфурт на Майн, 18.10.2011 дипл. инж. Ралф Егнер

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Deutsche
Akkreditierungsstelle

# Deutsche Akkreditierungsstelle GmbH

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Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

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Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

**RWE Eurotest GmbH**
**Unterste-Wilms-Str. 52, 44143 Dortmund**

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

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Registrierungsnummer der Urkunde: D-PL-15207-01-01

Frankfurt am Main, 18.10.2011

Dipl.-Ing. (FH) Ralf Egner
Leiter Abteilung 2

ВЯРНО С ОРИГИНАЛА

Siehe Hinweise auf der Rückseite

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*Превод от английски език*

**Фирмена бланка на Akkreditierung Austria**

Националният акредитиращ орган

**Akkreditierung Austria**

потвърждава акредитацията на

**Лаборатория за изпитване**

**AIT Austrian Institute of Technology GmbH**
ул. Донау-Сити 1, А-1220 Виена
Идентификационен номер: **0001**

Акредитацията е въз основа на:
**ÖVE/ÖNORM EN ISO/IEC 17025:2007**
Начална дата на акредитация: **01.12.1993 г.**

Информация относно обхвата на акредитацията и Akkreditierung Austria
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12.08.2014 г.
Дата

(*подпис не се чете*)
Допл. инж. д-р. Норман Брунер
Ръководител на Акредитация Австрия

Кръгъл фирмен печат

*Долуподписаният, Жасмин Кръстев Кръстев, удостоверявам верността на извършения от мен превод от английски език на български език на приложения документ: Удостоверение за акредитация с дата 12.08.2014 г. Преводът се състои от 1 стр.*

*Подпис:*
*Жасмин Кръстев Кръстев*

Bundesministerium für Wissenschaft, Forschung und Wirtschaft

Die Nationale Akkreditierungsstelle / *The National Accreditation Body*

**AKKREDITIERUNG AUSTRIA**

bestätigt die Akkreditierung der / *confirms the accreditation of*

**Prüfstelle / *Testing Laboratory***

**AIT Austrian Institute of Technology GmbH**

Donau-City-Straße 1, A-1220 Wien

Identifikationsnummer / *ID-number*: **0001**

Akkreditierungsgrundlage / *Accreditation basis*:

**ÖVE/ÖNORM EN ISO/IEC 17025:2007**

Datum der Erstakkreditierung / *Initial date of accreditation*: **01.12.1993**

Informationen zum Akkreditierungsumfang und zu Akkreditierung Austria /
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12.08.2014
Datum / *Date*

Dipl.-Ing. Dr. Norman Brunner
Leiter Akkreditierung Austria / *Head Akkreditierung Austria*

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Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

## Location where activities are performed under accreditation

### Head Office

Meander 1051
6825 MJ
Arnhem
The Netherlands

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| | | **A. Electrical Safety Tests** | | |
| 1a | Cables and cords **(CABL)** | Type test of cables and cords according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | HD 21<br>HD 22<br>HD 603<br>HD 604<br>HD 605<br><br>EN 13501, EN 50143;<br>EN 50214; EN 50267;<br>EN 50525; EN 50288;<br>EN 50399; EN 50618<br><br>NEN/EN 50200<br>NEN/EN/IEC 60228<br>NEN-EN 50525<br>NEN/EN 50266<br>NEN/EN 50362<br>NEN/EN /IEC 61034<br><br>IEC 60092; IEC 60227 *;<br>IEC 60245 *; IEC 60331;<br>IEC 60332; IEC 60502-1;<br>IEC 60502-2; IEC 60754;<br>IEC 60800; IEC 60840;<br>IEC 62067 | * see note 3 |

This annex has been approved by:

Ir. J.C. van der Poel
Chief Executive

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 1a | Cables and cords **(CABL)** | Type test of cables and cords according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | DEKRA K 42; DEKRA K 102<br>DEKRA K 145; DEKRA K 146<br>DEKRA K 151; DEKRA K 152<br>DEKRA K 156; DEKRA K 157<br>DEKRA K 158; DEKRA K160<br>DEKRA K 161; DEKRA K 162<br>DEKRA K 163; DEKRA K 164<br>DEKRA K 165; DEKRA K 167<br>DEKRA K 168; DEKRA K 169<br>DEKRA K 170; DEKRA K 171<br>DEKRA K 175; DEKRA K 176<br>DEKRA K 177; DEKRA K 178<br>DEKRA K 179<br><br>BS 6004; BS 6007; BS 4553; BS 5467; BS 6231; BS 6346; BS 6387; BS 6500; BS 6622; BS 6724; BS 6883; BS 7211; BS 7629; BS 7835; BS 7846; BS 7889; BS 8491;<br><br>BS EN 50288-7<br>BS EN 50525<br><br>DIN VDE0815; DIN VDE0250 | * see note 3 |
| | | Test methods for non-metallic materials | IEC 60811-201; IEC 60811-202<br>IEC 60811-203; IEC 60811-401<br>IEC 60811-402; IEC 60811-403<br>IEC 60811-404; IEC 60811-405<br>IEC 60811-406; IEC 60811-408<br>IEC 60811-409; IEC 60811-411<br>IEC 60811-412; IEC 60811-501<br>IEC 60811-502; IEC 60811-503<br>IEC 60811-504; IEC 60811-505<br>IEC 60811-506; IEC 60811-507<br>IEC 60811-508; IEC 60811-509<br>IEC 60811-510; IEC 60811-511<br>IEC 60811-605; IEC 60811-606<br>IEC 60811-607 | |
| | | Electrical test methods for low voltage energy cables | NEN-EN 50395 | |
| | | Non electrical test methods for low voltage energy cables | NEN-EN 50396 | |

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 1b | Conduits | Type test of conduits according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | NEN/EN/IEC 61386<br>DEKRA K24<br>EN 50086 | |
| 1c | Installation systems<br>Cable trays<br>Cable ladders | Type test of cable trays and cable ladders, according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | KEMA 55<br>NEN/EN 50085<br>NEN/IEC/EN 61537<br>BS EN 61537 | |
| 1d | Boxes and enclosures for electrical installations | Type test of boxes and enclosures for electrical installations, according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | NEN/EN/IEC 60670 | |
| 2a | Switches for appliances and automatic controls for electrical household appliances<br>**(CONT)** | Type test of switches according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests. | IEC/EN 60730*, 61095*<br>IEC/EN 60691, 60934, 61058*, 60529<br>IEC 60265, 62271-1, 62271-100, 62271-101, 62271-102, 62271-105, 62271-110, 62271-200, 62271-201, 62271-202, 62271-203, EN 50152-1<br>IEEE Std C37.09, C37.081, 37.60, C37.013, C37.34,<br>ANSI C37.41, C37.73, C37.20.2, C37.122<br>ANSI/IEEE C37.21<br>ANSI C37.54, C37.55, C37.20.2, C37.72 | * see note 3 |

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 3 | Household and similar equipment **(HOUS)** | Type test of household equipment according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60335*<br>IEC/EN 61770<br>IEC/EN 62233<br>EN 50366<br>IEC/EN 60204<br>IEC/EN 60730-1/ 2-8 / 2-9<br>IEC/EN 61558-1/ 2-3 / 2-6 / 2-5 / 2-6 / 2-16<br>IEC/EN 62061<br>EN/ISO 13849-1 | * see note 3 |
| | | Low power measurements | IEC/EN 62301 | |
| 4 | Installation accessories and connection devices **(INST)** | Type test of installation accessories and connection devices according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60309*, 60320*, 60669*, 60670*, 60799*, 60884*, 60998*, 61058*, 61242*, 61534*, 61984*, 62208*;<br>IEC/EN 60335-2-76, 60974, 61316, 61386, 62094<br>EN 50075, 50066, 50146, 50250, 50393<br>NEN 1251,<br>IEC 60884*, 61238, 62080<br>BS 1363-1, BS 1363-2, BS 1363-3, BS 1363-4<br>SS 145<br>BS 546<br>BS 4573<br>BS 5733<br>NEN 1020<br>NF C61-314<br>DIN VDE 0620-1<br>DIN VDE 0620-2-1<br>CEI 23-50<br>NBN C 61-112-1<br>NEK IEC 60884-1<br>NEK 502<br>ÖVE/ÖNORM E 8684-1<br>ÖVE/ÖNORM E 8620-2(-3,-4, -5)<br>SFS 5610<br>SS 428 08 34<br>DS 60884-2-D1<br>SEV 1011<br>UNE 20315-1-1;<br>UNE 20315-1-2<br>IEC/EN 61535<br>EN 50428 required with 60669 | * see note 3 |

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|---|---|---|---|---|
| 5 | Luminaires<br>**(LITE)** | Type test of luminaires according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60155*, 60238*, 60400*, 60570*, 60598*, 60838*, 60921*, 60968*, 60969*, 61347*, 62471*<br>IEC/EN 60929, 61184, 62031, 62035, 60923, 60925, 60927, 61047, 62384, 62560, 61195, 62493 | * see note 3 |
| 6 | Measurement, control and laboratory equipment<br>**(MEAS)** | Type test of measurement-, control- and laboratory equipment according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 61010*<br>IEC/EN 60044<br><br>IEC/EN 61243<br>IEEE Std C57.13 | * see note 3 |
| 7 | Electrical equipment for medical use<br>**(MED)** | Type test of electrical equipment for medical use according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60601*<br>IEC/EN/ISO 80601<br>HD 395 | * see note 3 |
| 8 | Miscellaneous equipment<br>**(MISC)** | Type test of miscellaneous equipment according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60825* | * see note 3 |

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| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 9 | IT and office equipment **(OFF)** | Type test of IT and office equipment according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60950*<br>IEC/EN 62040*<br>IEC/EN 60825<br>IEC 62368<br>EN 41003 | * see note 3 |
| 10 | Low voltage, high power switching equipment **(POW)** | Type test of low voltage, high power switching equipment according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60439*, 61439,<br>IEC/EN 60947*<br>IEC/EN 60282, 62208<br>EN 50178, IEC 60470, 60549, 60644, EN 60282-1<br>IEEE Std C37.41, C37.60<br>ANSI C37.44<br>IEC 61921 | * see note 3 |
| 11 | Installation protective equipment **(PROT)** | Type test of installation protective equipment according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60127*, 60269*, 60529*, 60898*, 61008*, 61009*, 61643*, 60755, 62019<br>IEC 60099, 60137, 60168, 60383, 60507, 60660, 61109, 60815<br>HD 630, 639, 60269<br>IEEE Std 62.11<br>ANSI C29<br>CAN/CSA C411.1 | * see note 3 |
| 12 | Safety transformers and similar equipment **(SAFE)** | Type test of safety transformers and simillar equipment according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60044*, IEC/EN 61558*<br>IEC/EN 62040,<br>IEC/EN 60076, IEC/EN 60353<br>EN 50091, EN 50464-1<br>HD 538.1<br>IEEE Std. C57.12.90, C57.21<br>NEMA 107<br>CISPR 16 | * see note 3 |

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| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 13 | Electric tools<br>**(TOOL)** | Type test of electric tools according to the tests in the standard, among others:<br>- electrical safety tests<br>- mechanical tests<br>- environmental tests | IEC/EN 60745*<br>IEC/EN 61029*<br>IEC/EN 60335* (Gardening)<br>IEC/EN 62233, IEC/EN 60204<br>EN 50144<br>EN 50260-2-7<br>EN 792<br>EN/ISO 1114<br>IEC/EN 62061<br>EN/ISO 13849-1 | * see note 3 |
| 14 | Electronics, entertainment equipment<br>**(TRON)** | Type test according to the tests as mentioned in the standard, except the following tests which are subcontracted:<br><br>60065, cl. 20.1.3 Pre-conditioning of printed circuit boards<br>60065, cl. 12.1.2 Vibration-sine | IEC / EN 60065*<br>IEC / EN 60491<br>IEC 62368 | * see note 3 |
| 15 | Products within the scope of the EMC Directive 2004/108/EC<br>**(EMC)** | Type test according to the tests as mentioned in the standard | CISPR11; CISPR12; CISPR13; CISPR14-*; CISPR15; CISPR16-*-*; CISPR20; CISPR22; CISPR24; CISPR25; IEC60601-*-*; IEC60945; IEC60947-*-*; IEC61000-*-*; IEC61008-1; IEC61009-1; IEC61131-2; IEC61204-3; IEC61326-*; IEC61543; IEC61547; IEC61800-*; IEC62040-2; IEC62052-*; IEC62053-*; IEC62054-*; | * see note 3 |
| | | **B. Electromagnetic Compatibility (EMC): Automotive tests** | | |
| 1 | Vehicles, Motorcycles, Motorboats and Spark-ignited engine-driven devices | Radiated emission<br>30 to 1000 MHz OATS | European Directives 2004/104/EC, 97/24/EC<br><br>European regulation ECE-R10.04<br><br>EN 55012, CISPR 12 | |
| 2 | Vehicles, Motorcycles, Motorboats and Spark-ignited engine-driven devices | Radiated Immunity up to 30 V/m<br>20 to 2000 MHz OATS | European Directive 2004/104, 97/24/EC<br><br>European regulation ECE-R10.04 | |

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| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 3 | Electrical/ electronic sub-assembly | Pulse emission for ESA's along supply lines 12V and 24V | European Directive 2004/104/EC<br>European regulation ECE-R10.04<br>ISO 7637-1<br>ISO 7637-2 | |
| 4 | | Conducted emission for ESA's (V–method, LISN) 150 kHz to 108 MHz | European Directive 2004/104/EC<br>European regulation ECE-R10.04<br>CISPR25 | |
| 5 | | Radiated emission for ESA's Anechoic Chamber method 30 to 1000 MHz | European Directive 2004/104/EC<br>European regulation ECE-R10.04<br>CISPR25 | |
| 6 | | Radiated Immunity for ESA's Anechoic Chamber method and GTEM method 20 to 2000 MHz up to 30V/m | European Directive 2004/104/EC<br>European regulation ECE-R10.04<br>ISO 11452-1, ISO 11452-2, ISO 11452-3 | |
| 7 | Electrical/ electronic sub-assembly | Bulk Current Injection for ESA's 20 to 400 MHz up to 100 mA | European Directive 2004/104/EC<br>European regulation ECE-R10.04<br>ISO 11452-1, ISO 11452-4 | |
| 8 | | Pulse immunity for ESA's along supply lines 12V and 24V | European Directive 2004/104/EC<br>European regulation ECE-R10.04<br>ISO 7637-1<br>ISO 7637-2 | |
| | | **C. Electromagnetic Compatibility (EMC): EMF tests** | | |
| 1 | Electrical and electronic equipment | EMF measurements: 0-400 kHz | EN 62233<br>EN 62493 | |

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| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| | | **D. Electromagnetic Compatibility (EMC): Emission tests** | | |
| 1 | Electrical and electronic equipment | Conducted emission<br>9 kHz to 30 MHz | EN 55011, CISPR 11<br>EN 55013, CISPR 13<br>EN 55014-1, CISPR 14-1<br>EN 55015, CISPR 15<br>EN 55022, CISPR 22 | |
| 2 | | Radiated Emission Electric (EM) Field<br>30 MHz to 18 GHz | EN 55011, CISPR 11<br>EN 55014-1, CISPR 14-1<br>EN 55022, CISPR 22 | |
| 3 | | Disturbance power<br>30 MHz to 300 MHz | EN 55014-1, CISPR 14-1 | |
| 4 | | Click disturbances<br>150 kHz to 30 MHz | EN 55011, CISPR 11<br>EN 55014-1, CISPR 14-1 | |
| 5 | | Radiated Emission Magnetic Field<br>9 kHz to 30 MHz | EN 55011, CISPR 11<br>EN 55015, CISPR 15 | |
| 6 | | Harmonic current emissions<br>0 Hz to 2 kHz<br>up to 16 A per phase | IEC / EN 61000-3-2 | |
| 7 | | Pulse magnetic field immunity<br>up to 1000 A/m | IEC/EN 61000-4-9 | |
| 8 | | Limitation of voltage fluctuations and flicker up to 16 A per phase | IEC / EN 61000-3-3 | |
| | | **E. Electromagnetic Compatibility (EMC): FCC tests (USA legislation)** | | |
| 1 | Radio-Frequency Devices<br>Industrial, Scientific and Medical Equipment | Emission<br>9 kHz to 3 GHz | 47 CFR FCC Part 15, Part 18<br>ANSI C63.4<br>FCC MP-5 | |
| | | **F. Electromagnetic Compatibility (EMC): Immunity test** | | |
| 1 | Electric and electronic equipment | Electrostatic discharge immunity<br>up to 30 kV | IEC/EN 61000-4-2 | |
| 2 | | Radiated EM field immunity<br>up to 2,5 GHz<br>up to 30 V/m | IEC/EN 61000-4-3 | |
| 3 | | EFT Burst immunity<br>up to 4 kV | IEC/EN 61000-4-4 | |

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|---|---|---|---|---|
| 4 | Electric and electronic equipment | Surge immunity<br>up to 10 kV | IEC/EN 61000-4-5 | |
| 5 | | Immunity to conducted RF disturbances<br>up to 230 MHz, up to 30 Vrms | IEC/EN 61000-4-6 | |
| 6 | | Power frequency magnetic field Immunity<br>up to 100 A/m | IEC/EN 61000-4-8 | |
| 7 | | Voltage dips and interruptions<br>Single phase equipment<br>up to 16 A | IEC/EN 61000-4-11 | |
| 8 | | Ring wave immunity test | IEC/EN 61000-4-12 | |
| | | **G. Electromagnetic Compatibility (EMC): MISC** | | |
| 1 | Railway applications - Electromagnetic compatibility | Electromagnetic compatibility testing according the listed product standards | EN 50121-1 to -5 | |
| 2 | Road traffic signal systems | Electromagnetic compatibility testing according the listed product standard | EN 50293 | |
| | | **H. Photometric Tests**<br>(all tests are in accordance with the reference method) | | |
| 1 | Headlamps low and high beams and front fog lamps | All tests as mentioned in the ECE Regulations stated under Test method<br><br>Photometry<br>Colorimetry<br>Heat tests<br>Plastic tests | ECE Regulations Nos. 1, 5, 8, 19, 20, 31, 56, 57, 72, 76, 82, 98, 112, 113 and 123;<br>European Directives 76/761, 76/762 and 97/24 | Note 1 |
| 2 | Signalling lamps | All tests as mentioned in the ECE Regulations stated under Test method<br><br>Photometry<br>Colorimetry<br>Heat test | ECE Regulations Nos. 6, 7, 23, 38, 50, 77, 87 and 91 and European Directives 76/757, 76/759, 76/758, 77/538, 77/539, 77/540 and 97/24<br>ECE Regulation 38 (rear fog lamps only) | |
| 3 | Devices for the illumination of rear registration plates | All tests as mentioned in the ECE Regulations stated under Test method<br><br>Luminance | ECE Regulations Nos. 4 and 50<br>European Directives 76/760 and 97/24 | |

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| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 4 | Retro-reflective devices | All tests as mentioned in the ECE Regulations stated under Test method<br><br>Retro-reflection<br>Colorimetry<br>Water resistance test<br>Corrosion<br>Fuel and oil resistance<br>Heat test<br>UV resistance | ECE Regulations Nos. 3, 27, 69, 70, 88 and 104<br>European Directive 76/757 | Note 2 |
| 5 | Light Sources | All tests as mentioned in the ECE Regulations stated under Test method<br><br>Geometry<br>Photometry<br>Colorimetry<br>Optical quality<br>Mechanical tests | ECE Regulations Nos. 37, 99<br>IEC 60809<br>IEC 60810<br>IEC 60983<br><br>IEC 60061 | |
| 6 | Special warning lamps (beacons and flash lights) | All tests as mentioned in the ECE Regulations stated under Test method<br><br>Photometry<br>Colorimetry<br>Water resistance test | ECE Regulation No. 65 | |
| 7 | Cornering Lamps | All tests as mentioned in the ECE Regulation stated under Test method<br><br>Photometry<br>Colorimetry | ECE Regulation No.119 | |

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|---|---|---|---|---|
| | | **I. Lighting testing: EPA ENERGY STAR Program** | | |
| 1 | Non-directional Fluorescent Luminaires | Specifications for Performance of Self-Ballasted Compact Fluorescent Lamps, Source Run-up Time (ms) | ANSI C78.5:2003 | |
| | | Method of Measurement of Fluorescent Lamp Ballasts, Power Factor, Operating Frequency | ANSI C82.2:2002 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering (CRI) | CIE Pub. No.13.3:1995 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Electric and Photometric Measurements of Fluorescent Lamps, Efficacy, Light Output, Lumen Maintenance, CCT, CRI | IES LM-9:2009 | |
| | | Life Testing of Fluorescent Lamps, Light Source Life, Lumen Maintenance | IES LM-40:2010 | |
| | | Life Testing of Compact Fluorescent Lamps, Light Source Life, Lumen Maintenance | IES LM-65:2010 | |
| | | Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps, Efficacy, Light Output, Lumen Maintenance, CCT, CRI | IES LM-66:2011 | |

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| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 2 | Directional Fluorescent Luminaires | Specifications for Performance of Self-Ballasted Compact Fluorescent Lamps, Source Run-up Time (ms) | ANSI C78.5:2003 | |
| | | Method of Measurement of Fluorescent Lamp Ballasts, Power Factor, Operating Frequency | ANSI C82.2:2002 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering (CRI) | CIE Pub. No.13.3:1995 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Electric and Photometric Measurements of Fluorescent Lamps, Efficacy, Light Output, Lumen Maintenance, CCT, CRI | IES LM-9:2009 | |
| | | Life Testing of Fluorescent Lamps, Light Source Life, Lumen Maintenance | IES LM-40:2010 | |
| | | Life Testing of Compact Fluorescent Lamps, Light Source Life, Lumen Maintenance | IES LM-65:2010 | |
| | | Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps, Efficacy, Light Output, Lumen Maintenance, CCT, CRI | IES LM-66:2011 | |
| | | Photometric Testing of Outdoor Fluorescent Luminaires, Efficacy, Light Output, Zonal Lumen Distribution | IES LM-10:2013 | |
| | | Approved Method for Photometric Testing of Indoor Fluorescent Luminaries, Efficacy, Light Output, Zonal Lumen Distribution | IES LM-41:2013 | |
| 3 | Luminaires CSD - Fluorescent Ballasts | Method of Measurement of Fluorescent Lamp Ballasts, Power Factor, Operating Frequency | ANSI C82.2:2002 | |

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 4 | Luminaires CSD - Fluorescent Lamps | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering | CIE Pub. No.13.3:1995 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Electric and Photometric Measurements of Fluorescent Lamps, Efficacy, Light Output, Lumen Maintenance, CCT, CRI | IES LM-9:2009 | |
| | | Life Testing of Fluorescent Lamps, Light Source Life, Lumen Maintenance | IES LM-40:2010 | |
| | | Life Testing of Compact Fluorescent Lamps, Light Source Life, Lumen Maintenance | IES LM-65:2010 | |
| | | Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps, Efficacy, Light Output, Lumen Maintenance, CCT, CRI | IES LM-66:2011 | |
| 5 | Non-Directional HID Luminaires | High-Intensity Discharge (HID)—Methods of Measuring Characteristics, Operating Frequency | ANSI C78.389:2004 (R2009) | |
| | | Ballasts for High Intensity Discharge (HID) Lamps - Methods of Measurement, Power Factor, Lamp Current Crest Factor | ANSI C82.6:2005 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering | CIE Pub. No.13.3:1995 | |
| | | Life Testing of High Intensity Discharge (HID) Lamps, Light Source Life, Lumen Maintenance | IES LM-47:2012 | |
| | | Electrical and Photometric Measurements of High Intensity Discharge Lamps, Efficacy, Light Output, CCT, CRI | IES LM-51:2013 | |

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|---|---|---|---|---|
| 6 | Directional HID Luminaires | High-Intensity Discharge (HID)— Methods of Measuring Characteristics, Operating Frequency | ANSI C78.389:2004<br>(R2009) | |
| | | Ballasts for High Intensity Discharge (HID) Lamps - Methods of Measurement,<br>Power Factor, Lamp Current Crest Factor | ANSI C82.6:2005 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering | CIE Pub. No.13.3:1995 | |
| | | Life Testing of High Intensity Discharge (HID) Lamps, Light Source Life, Lumen Maintenance | IES LM-47:2012 | |
| | | Electrical and Photometric Measurements of High Intensity Discharge Lamps, Efficacy, Light Output, CCT, CRI | IES LM-51:2013 | |
| | | Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge (HID) Lamps, Efficacy, Output, Zonal Lumen Distribution | IES LM-31:2013 | |
| | | Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps, Efficacy, Light Output, Zonal Lumen Distribution | IES LM-46:2004 | |
| 7 | Luminaires CSD - HID Ballasts | High-Intensity Discharge (HID)— Methods of Measuring Characteristics, Operating Frequency | ANSI C78.389:2004<br>(R2009) | |
| | | High-Intensity Discharge (HID)— Methods of Measuring Characteristics, Operating Frequency | ANSI C78.389:2004<br>(R2009) | |
| | | Ballasts for High Intensity Discharge (HID) Lamps - Methods of Measurement,<br>Power Factor, Lamp Current Crest Factor | ANSI C82.6:2005 | |

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|---|---|---|---|---|
| 8 | Luminaires CSD - HID Lamps | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering | CIE Pub. No.13.3:1995 | |
| | | Life Testing of High Intensity Discharge (HID) Lamps, Light Source Life, Lumen Maintenance | IES LM-47:2012 | |
| | | Electrical and Photometric Measurements of High Intensity Discharge Lamps, Efficacy, Light Output, CCT, CRI | IES LM-51:2013 | |
| 9 | Non-directional Solid State Luminaires and Subcomponents | Electrical and Photometric Measurements of Solid-State Lighting Products (section 10 not required for non-directional or subcomponents), Efficacy, Output, Lumen Maintenance, CCT, CRI, Color Maintenance | IES LM-79:2008 | |
| | | Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment, Power Factor | ANSI C82.77:2002 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, CRI | CIE Pub. No.13.3:1995 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature, Efficacy, Light Output, Lumen Maintenance, CCT , CRI, Color Maintenance, Light Source Life | IES LM-82-2012 | |
| 10 | Directional Solid State Luminaires | Electrical and Photometric Measurements of Solid-State Lighting Products (Goniophotometer), Zonal Lumen Distribution, Color Angular Uniformity, Luminaire Photometry | IES LM-79:2008 sections 10 and 12 | |
| | | Guide to Spectroradiometric Measurements, Color Angular Uniformity | IES LM-58:2013 | |

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|---|---|---|---|---|
| 10 | Directional Solid State Luminaires | Method of Measuring and Specifying Color Rendering of Light Sources, CRI | CIE Pub. No.13.3:1995 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Electrical and Photometric Measurements of Solid-State Lighting Products, Efficacy, Light Output, Lumen Maintenance, CCT, CRI, Color Maintenance | IES LM-79:2008 | |
| 11 | Lumen Maintenance of LED Packages, Arrays, and Modules | Method for Measuring Lumen Maintenance of LED Light Sources, Light Source Life, Lumen Maintenance | IES LM-80:2008 | |
| 12 | Non-Directional Outdoor Halogen Luminaires | Approved Method for Life Testing of Filament Lamps, Light Source Life Requirements | IES LM-49:2001,<br>IES LM-49:2011 | |
| 13 | Directional Outdoor Halogen Luminaires | Approved Method for Life Testing of Filament Lamps, Light Source Life Requirements | IES LM-49:2001 | |
| | | Photometric Testing of Outdoor Fluorescent Luminaires, Zonal Lumen Distribution | IES LM-10:1996 | |
| | | Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge (HID) Lamps, Zonal Lumen Distribution | IES LM-31:1991 | |
| | | Photometric Testing of Indoor Fluorescent Luminaires, Zonal Lumen Distribution | IES LM-41:1998 | |
| | | Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps, Zonal Lumen Distribution | IES LM-46:2004 | |
| | | Electrical and Photometric Measurements of Solid-State Lighting Products, Zonal Lumen Distribution | IES LM-79:2008 Section 10 | |

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 14 | CFL Directional Lamps | Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps, Efficacy, Light Output, Center beam Intensity, Lumen Maintenance, Lifetime, CCT, CRI | IES LM-66:2011 | |
| | | Life Testing of Compact Fluorescent Lamps, Lumen Maintenance, Lifetime, Rapid Cycle Stress Test | IES LM-65:2010 | |
| | | IEEE Recommended Practice on Characterization of surges in Low Voltage (1000V and Less) AC Power Circuits, Transient Protection | ANSI/IEEE C62.41.2-2002 | |
| | | Fluorescent Lamp Ballasts, Method of Measurement of Power Factor (included supplements) | ANSI C82.2:2002 | |
| | | Specifications for the Chromaticity of Fluorescent lamps, CCT | ANSI C78.376-2001 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering (CRI) | CIE Pub. No.13.3:1995 | |
| | | Tool for Calculating Minimum Center beam Intensity, Minimum Center Beam Intensity – PAR and MR Lamps | Energy Star Online CBCP Tool | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing, Lumen Maintenance, Lifetime | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing, ETLOR | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Light Output Ratio | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | |

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 14 | CFL Directional Lamps | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Run-up Time | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Run-up Time | |
| 15 | CFL Omnidirectional and Decorative Lamps | Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps, Efficacy, Light Output, Center beam Intensity, Lumen Maintenance, Lifetime, CCT, CRI | IES LM-66:2011 | |
| | | Life Testing of Compact Fluorescent Lamps, Lumen Maintenance, Lifetime, Rapid Cycle Stress Test | IES LM-65:2010 | |
| | | IEEE Recommended Practice on Characterization of surges in Low Voltage AC Power Circuits, Transient Protection | ANSI/IEEE C62.41.2-2002 | |
| | | Specifications for the Chromaticity of Fluorescent lamps, CCT | ANSI C78.376-2001 | |
| | | Method of Measurement of Fluorescent Lamp Ballasts, Power Factor | ANSI C82.2:2002 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering (CRI) | CIE Pub. No.13.3:1995 | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing, Lumen Maintenance, Lifetime | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Run-up Time | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Run-up Time | |

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 16 | LED Directional Lamps | Electrical and Photometric Measurements of Solid-State Lighting Products, Efficacy, Output, Center Beam Intensity, Luminous Intensity Distribution, Lumen Maintenance, Lifetime, CCT, CRI, Color Maintenance, Color Angular Uniformity | IES LM-79:2008 | |
| | | Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment, Power Factor | ANSI C82.77:2002 Sections 6 and 7 | |
| | | IEEE Recommended Practice on Characterization of surges in Low Voltage AC Power Circuits, Transient Protection | ANSI/IEEE C62.41.2-2002 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Chromaticity of Solid State Lighting Products, CCT | ANSI C78.377-2011 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering (CRI) | CIE Pub. No.13.3:1995 | |
| | | Tool for Calculating Minimum Center beam Intensity, Minimum Center Beam Intensity – PAR and MR Lamps | Energy Star Online CBCP Tool | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing, Lumen Maintenance, Lifetime | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Ambient Temperature Life Testing, Lumen Maintenance, Lifetime | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Ambient Temperature Life Testing | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing, ETLOR | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Light Output Ratio | |

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| 16 | LED Directional Lamps | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | |
| 17 | LED Omnidirectional and Decorative Lamps | Electrical and Photometric Measurements of Solid-State Lighting Products, Efficacy, Output, Center Beam Intensity, Luminous Intensity Distribution, Lumen Maintenance, Lifetime, CCT, CRI, Color Maintenance, Color Angular Uniformity | IES LM-79:2008 | |
| | | Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment, Power Factor | ANSI C82.77:2002 Sections 6 and 7 | |
| | | IEEE Recommended Practice on Characterization of surges in Low Voltage AC Power Circuits, Transient Protection | ANSI/IEEE C62.41.2-2002 | |
| | | Colorimetry, CCT | CIE Pub No. 15:2004 | |
| | | Method of Measuring and Specifying Color Rendering of Light Sources, Color Rendering (CRI) | CIE Pub. No.13.3:1995 | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing, Lumen Maintenance, Lifetime | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Ambient Temperature Life Testing, Lumen Maintenance, Lifetime | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Ambient Temperature Life Testing | |
| | | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time | |

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

| No. | Material or product | Type of activity | Reference number | Remarks |
|---|---|---|---|---|
| | | **I. Additional Standards related to Energy Star** | | |
| 1 | Reflector type lamps | Photometric Testing | IES LM-35:2002 | |
| 2 | Floodlights Using Incandescent Filament of Discharge Lamps | Electrical and photometric measurements | IES LM-45:2009 | |
| 3 | Fluorescent Lamps | Electrical measurements | ANSI C78.375:1997<br>ANSI C78.375:2014 | |
| 4 | Fluorescent Lamps | Chromaticity of Fluorescent Lamps | ANSI C78.376-2001 | |
| 5 | Fluorescent Lamps | Chromaticity of Solid State Lighting Products | ANSI C78.377-2011 | |
| 6 | Mercury Lamps | Measuring Characteristics | ANSI C78.386:1989 | |
| 7 | Metal-Halide Lamps | Measuring Characteristics | ANSI C78.387:1987 | |
| 8 | High Pressure Sodium Lamps | Measuring Characteristics | ANSI C78.388:1990 | |
| 9 | High-Frequency Fluorescent Lamp Ballast | Measurement of a High-Frequency Fluorescent Lamp Ballast | ANSI C82.11-2002 | |
| 10 | Light sources | The measurement of luminous flux | CIE 84:1989 | |
| 11 | Luminaires | The Photometry and goniophotometry of luminaires | CIE121:1996 | |
| 12 | All LED Products | Measurements of LEDs | CIE127:1997<br>CIE127:2007 | |
| 13 | All products | Transient protection | ANSI/IEEE C62.41.1<br>ANSI/IEEE C62.41.2 | |
| 14 | Decorative Light Strings | Weathering Test | ASTM G154-06<br>ASTM G154-12a | |
| 15 | Decorative Light Strings | ENERGY STAR Test Method for Decorative Light Strings | ENERGY STAR Test Method for Decorative Light Strings | |
| 16 | All products | ENERGY STAR Program requirements Product Specification for Lamps Version 1.0: Final Test Methods and Recommended Practices | ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Final Test Methods and Recommended Practices | |

Annex to ISO/IEC 17025:2005 declaration of accreditation for registration number: **L 022**

of **DEKRA Certification B.V.**

This annex is valid from: **29-04-2015** to **01-03-2018** Replaces annex dated: **03-11-2014**

Note 1: Weather-beaten tests of synthetic lenses is subcontracted
Note 2: Salt-nebula test is subcontracted
Note 3: See current list of sub set of standards on the IECEE CBTL website

TRANSLATION AGENCY

50 Hristo Smirnenski Blvd.
1164, Sofia, Bulgaria

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F +359 2 9817160
office@greg-bg.com
www.greg-bg.com

*Превод от английски език*

# Декларация за съответствие

Ние: *ЕТИ Електроелемент АД*
*Ул. Обрезия 5*
*1411 Излаке*
*СЛОВЕНИЯ*

декларираме на наша отговорност, че стоката(ите)

Модел/Тип
*NV лентов тип товарови прекъсвачи разединители със стопяеми предпазители SL*

за които се отнася тази декларация, са в съответствие с разпоредбите на следната директива(и) на ЕС:
*2006/95/ЕС Директива за ниско напрежение*
*2004/108/ЕС Директива за ЕМС*

и отговарят на следния стандарт(и):
*EN 60947-3*
*Комутационни апарати за ниско напрежение - Част 3: Товарови прекъсвачи, разединители, товарови прекъсвач-разединители и апарати, комбинирани със стопяеми предпазители*

Година на СЕ маркировка
*2000*

Място и дата: Излаке, 01.11.2008 г.

Подпис на представителя на производителя (*не се чете*)
Стане Верлич, Продуктов мениджър
Печат: Електроелемент АД

*Долуподписаният, Жасмин Кръстев Кръстев, удостоверявам верността на извършения от мен превод от английски език на български език на приложения документ: Декларация за съответствие с дата 01.11.2008 г. Преводът се състои от 1 стр.*

*Подпис:*
*Жасмин Кръстев Кръстев*

"АГЕНЦИЯ ГРЕГ" СОФИЯ

"КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС КИМТЕХ

ВЯРНО С ОРИГИНАЛА

# DECLARATION OF CONFORMITY

*We:* *ETI Elektroelement d.d.*
*Obrezija 5*
*1411 Izlake*
*SLOVENIA*

*declare under our sole responsibility that the product(s)*

*Model/Type:*

*NV Strip type fuse-switch disconnectors SL ....*

*to which this declaration relates are in conformity with the provisions of the following EC Directive(s)*

| | |
|---|---|
| *2006/95/EC* | *Low Voltage Directive* |
| *2004/108/EC* | *EMC Directive* |

*and comply with the following standard(s):*

*EN 60947-3*
*Low-voltage switchgear and controlgear — Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

*Year of CE marking:*
*2000*

*Place and date:* *Izlake, 1.11.2008*

*Manufacturer representative signature:*
*Stane Verlič, Product manager*

ELEKTROELEMENT d.d.
IZLAKE
46

ВЯРНО С ОРИГИНАЛА

"КИМТЕХ-БЪЛГАРИЯ" ООД · БУРГАС ·

KEMA

KEMA KEUR

# CERTIFICATE

KEMA No.: 2075805.02

Issued to:
Applicant:
Jean Müller GmbH
H.J. Müller Straße 7
65343, ELTVILLE, Germany

Manufacturer/Licensee:
Jean Müller GmbH
H.J. Müller Straße 7
65343, ELTVILLE, Germany

| | | |
|---|---|---|
| Product | : | fuse-switch-disconnectors |
| Trade names | : | JEAN MÜLLER |
| Types/models | : | SL2G-3x, SL2G-3x3 |

The product and any acceptable variation thereto is specified in the Annex to this certificate and the documents therein referred to.

KEMA hereby declares that the above-mentioned product has been certified on the basis of:

- a type test according to the standard EN 60947-3:1999
- an inspection of the production location according to CENELEC Operational Document CIG 021
- a certification agreement with the number 900446

KEMA hereby grants the right to use the KEMA-KEUR certification mark.

KEMA KEUR

The KEMA-KEUR certification mark may be applied to the product as specified in this certificate for the duration of the KEMA-KEUR certification agreement and under the conditions of the KEMA-KEUR certification agreement.

This certificate is issued on: December 12, 2005

H.R.M. Versteegen
Certification Manager



KEMA Quality B.V.
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 5185, 6802 ED Arnhem, The Netherlands
Telephone +31 26 3 56 23 00, Telefax +31 26 3 52 5
Website www.kema.com

ACCREDITED BY
THE DUTCH COUNCIL
FOR ACCREDITATION

ВЯРНО С
ОРИГИНАЛА

PHOENIX CONTACT KABEL

Visomatic
ELECTRICAL DISTRIBUTION & CONTROL

# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният Владимир Лазаров,

Управител на фирма "ВиВ Изоматик" ООД, София, ул.Пирин 40А

В качеството си на търговски представители на JEAN MULLER GMBH

Декларираме, че продуктът:

| | |
|---|---|
| Марка: | JEAN MULLER |
| Продукт: | Предпазител-разединител 400А, 630А |
| Серия: | SL2-3X3, SL3-3X3 |

За който се отнася тази декларация, при условие, че е инсталиран, обслужван и използван за приложения, за които е предназначен, е в съответствие със следните стандарти, технически одобрения или други нормативни актове:

IEC/EN 60947-1
IEC/EN 60947-3

София, 14.08.2012

...............................
Владимир Лазаров, управител
ВиВ Изоматик ООД

# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

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В качеството си на търговски представители на JEAN MULLER GMBH

Декларираме, че продуктът:

| | |
|---|---|
| Марка: | JEAN MULLER |
| Продукт: | Разединител 1000А |
| Серия: | SLT3-3S |

За който се отнася тази декларация, при условие, че е инсталиран, обслужван и използван за приложения, за които е предназначен, е в съответствие със следните стандарти, технически одобрения или други нормативни актове:

IEC/EN 60947-1
IEC/EN 60947-3

София, 14.08.2012

.......................................
Владимир Лазаров, управител
ВиВ Изоматик ООД

ВЯРНО С ОРИГИНАЛА

JEAN MULLER
THE NAME FOR SAFETY

# EG-Konformitätserklärung
# EC Conformity Declaration

Dok.-Nr. L_98_01
Doc. No.

| | |
|---|---|
| **Hersteller, Anschrift**<br>Manufacturer, Adress | Jean Müller GmbH Elektrotechnische Fabrik<br>H.J.-Müller-Straße 7, D-65343 Eltville am Rhein |
| **Produktbezeichnung**<br>Product designation | NH-Sicherungslastschaltleisten Baureihe SL, für Schalttafeleinbau und Schalttafelaufbau inklusive Zubehör.<br>LV HRC Strip type fuse switch disconnectors, series SL and accessories, for panel board building.<br>DIN-Size 00 (160A): SL00-3x3/100/; SL00-3x(3); SL00-3x/400A<br>DIN-Size 1 to 3 (250A/400A/630A):SL123-3x(3)<br>DIN-Size 3: SL3-3x(3)/1000A (NH-Trennleiste)<br>(LV HRC Busbar disconnect strip 1-and 3 pole switchable)<br>DIN-Size 3: SL3-3x2/1.250A or 1.600A<br>DIN-Size 3: SL3-3x(3)/910A<br>DIN-Size 3; SL3-3X6/2.000A<br>DIN-Size 3: SLT3-3SRSL)/3x(3)/50 (NH-Stromschienen-Trennleiste)<br>(busbar disconnect strip |

**Jahr der Anbringung der CE-Kennzeichnung : 1998**
Affixing of the CE marking

**Das bezeichnete Produkt stimmt mit den Vorschriften folgender EG-Richtlinie/n überein:**
The designated product conforms to the provisions of the following European directives

2006/95/EG
Richtlinie des Rates vom 12. Dezember 2006 zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten betreffen elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen.

*Directive of the European Parliament and of the concil of 12. December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.*

**Die Übereinstimmung des bezeichneten Produktes mit den Vorschriften der oben genannten Richtlinie/n wird nachgewiesen durch die Einhaltung folgender Normen:**
The conformity of the designated product with the provisions of the above mentioned Directives is proved by full compliance with the following standards

| | |
|---|---|
| **Europäische Normen**<br>Harmonized European standards | EN 60947-3 |
| **IEC-Standards**<br>IEC standards | |
| **Nationale Normen**<br>National standards | VDE 0660 Teil 107 |

| | |
|---|---|
| **Aussteller / Issuer** | G / QM |
| **Ort, Datum / Place, Date** | Eltville, den 16. Jan. 2008 |
| **Rechtsverb. Unterschriften**<br>Legally binding signature | Dr. B. Müller — I.V. A. Göttert |

*Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Mitgelieferte Sicherheitshinweise sind zu beachten.*
*This declaration certifies compliance with the indicated directives but implies no warranty of properties. The safety instructions of the accompanying product documentation shall be observed.*

F-0941 H

CE_L_98_01_A_SL00 bis SL3.doc

Kimtech

Кимтех България ООД
1113 гр. София
ул. Акад. Георги Бончев № 20

официален дистрибутор на
tyco Electronics
кабели, трансформатори,
електрооборудване

тел: 02 9733373
факс: 02 9733370
web:www.kimtech.bg
e-mail: office@kimtech.bg

# ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният Иван Вълков Костов, в качеството си на управител на Кимтех България ООД, гр. Бургас, жк. Братя Миладинови, бл. 57, вх. 4А официален дистрибутор на изделията на Tyco Electronics Raychem декларирам, на собствена отговорност, че продуктите:

1/ Вертикален предпазител – разединител НН 400А, с триполюсно управление

2/ Вертикален предпазител – разединител НН 1000А, с триполюсно управление

отговаря на изискванията на техническата спецификация и на стандарта EN 60947.

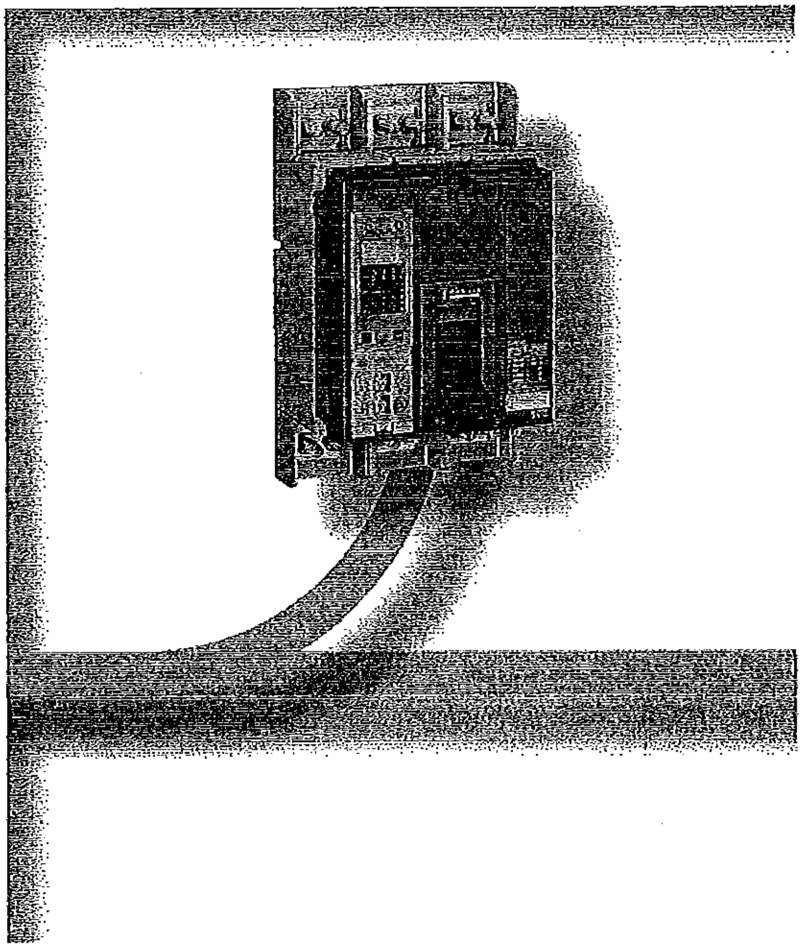
13.01.2016г.
гр. Бургас

Подпис и печат:
/И. Костов/

Low Voltage Products

# COMPACT NS630b to 1600 A

## User manual



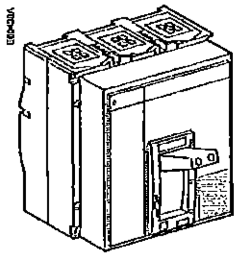
a brand of
Schneider
Electric

Merlin Gerin

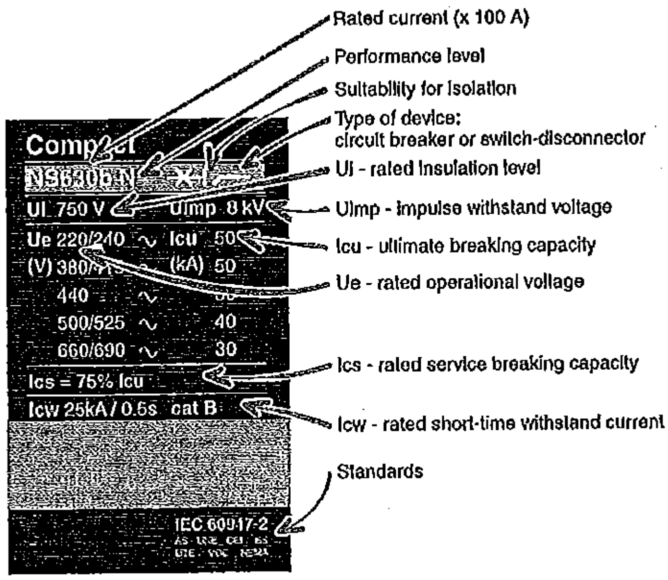
ВЯРНО С
ОРИГИНАЛА

*User manual for circuit breakers*

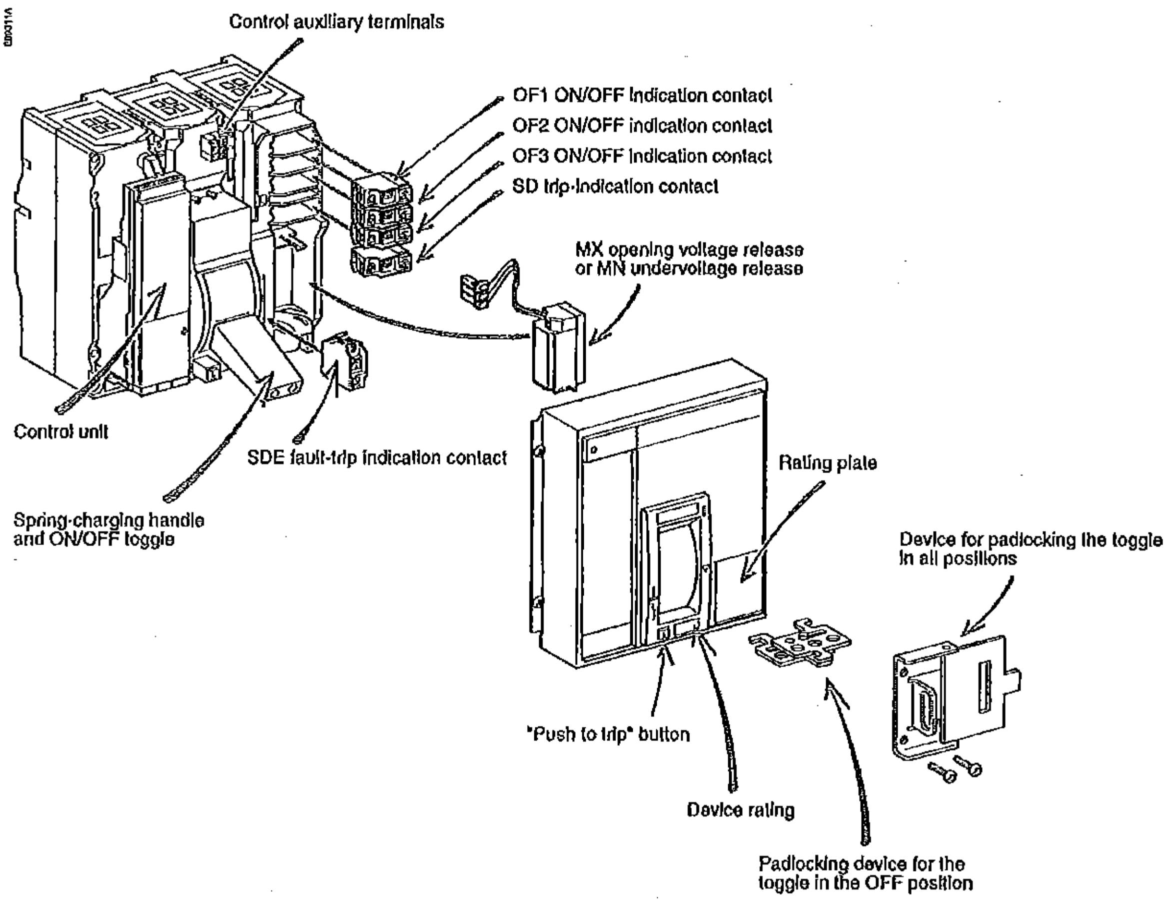
# COMPACT NS630b to 1600 A



## Rating plate

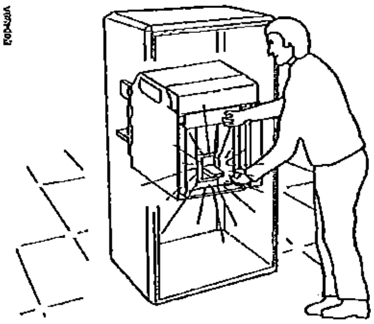


# Components



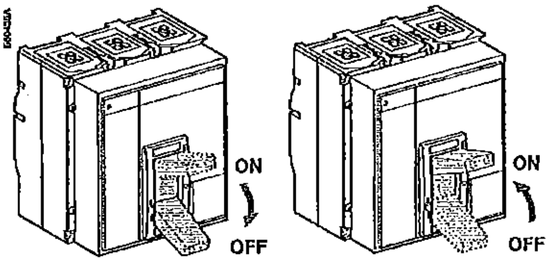

КИМТЕХ-БЪЛГАРИЯ ООД БУРГАС КИМТЕХ

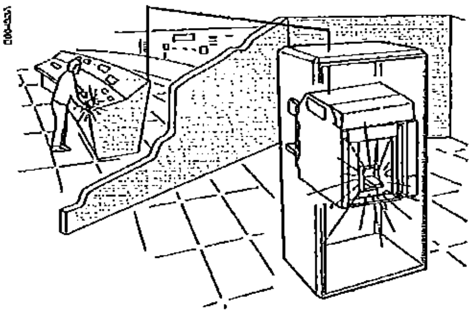
# Opening, closing, reset



## Local opening and closing

■ OFF: breaker open, ON: breaker closed.



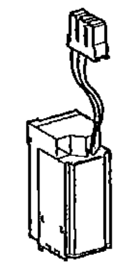



## Remote opening

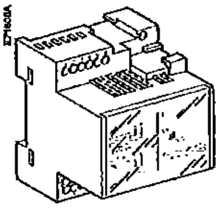
Use either:
■ an MX opening release
■ an MN undervoltage release
■ a delayed MN undervoltage release.

When connected to the control panel, these releases may be used to remotely open the device.

*MX, MN*

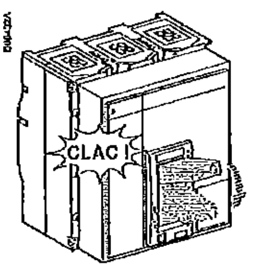


*Delay unit*

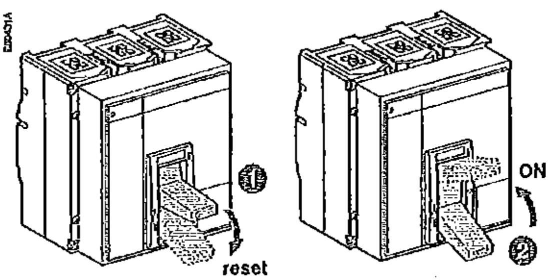


## Resetting the device following a trip

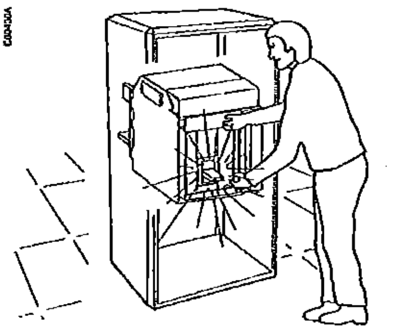
■ the device trips.



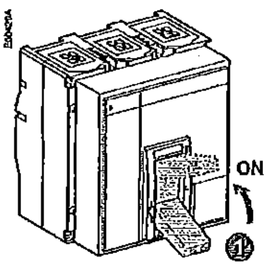

■ reset the device, then close it again.



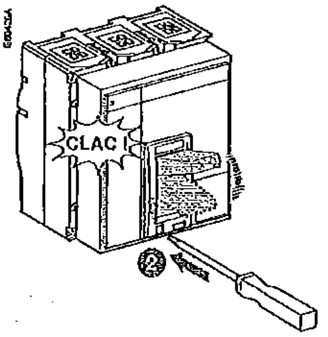
# Testing the device



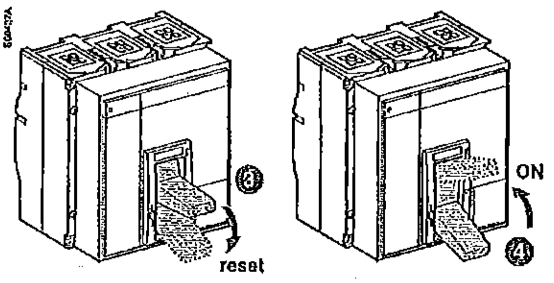
- close the device.



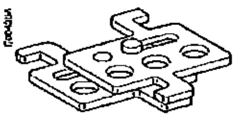

- press the "Press to trip" button.



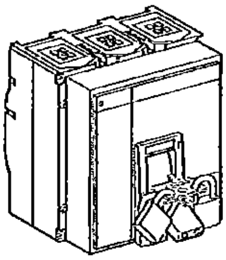

- push the toggle down to reset the device, then back up close it again.

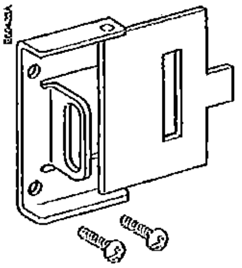


# Locking the toggle

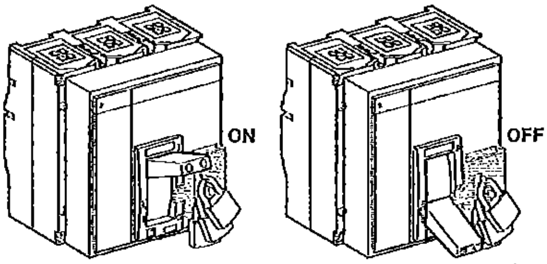


**Locking the toggle in the OFF position using one to three padlocks (shackle diameter 5 to 8 mm)**



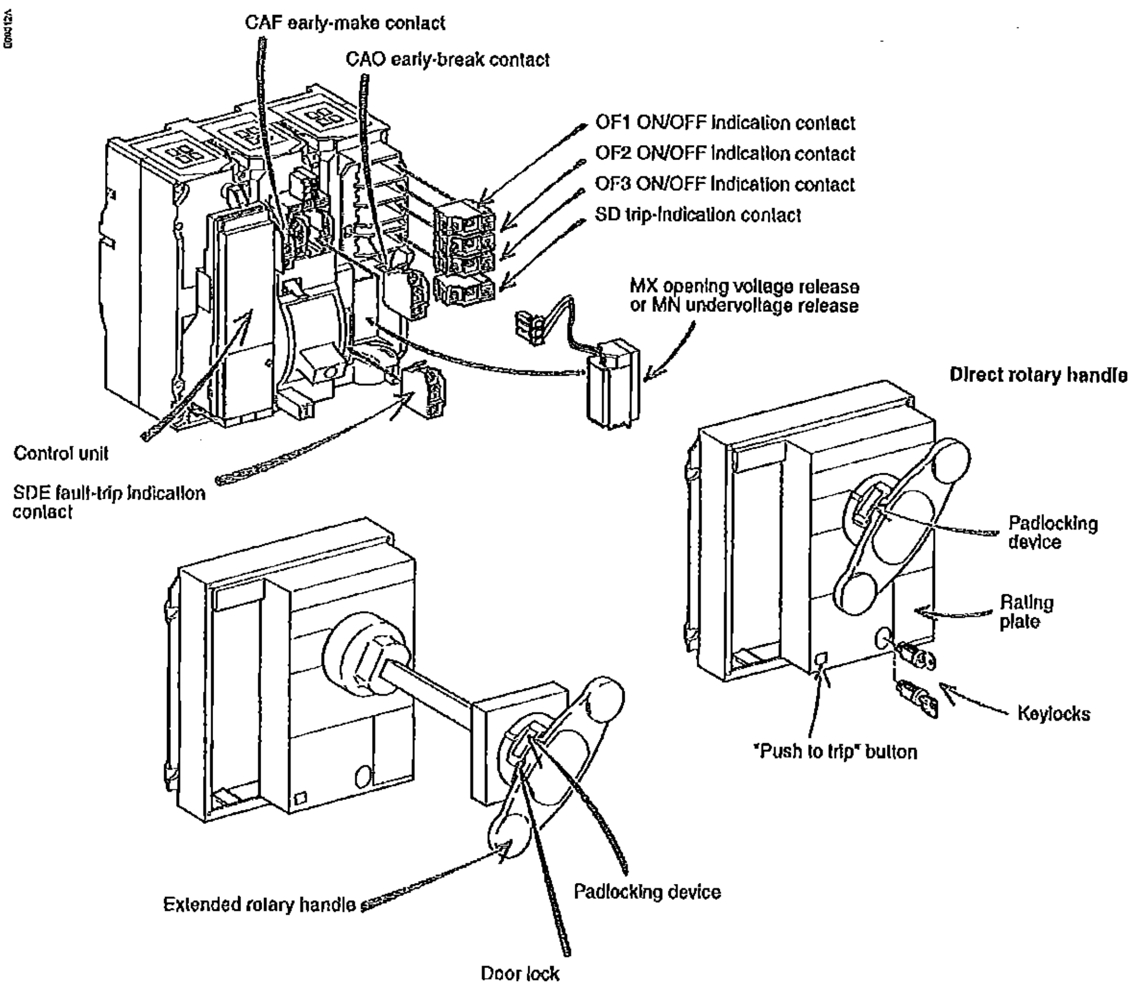



**Locking the toggle in the ON or OFF position using one to three padlocks (shackle diameter 5 to 8 mm)**

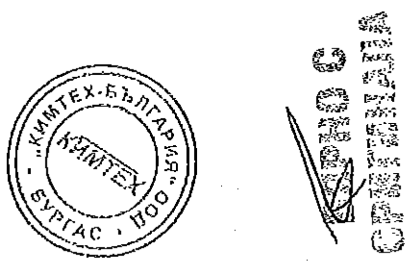


*Manually operated Compact with a rotary handle*

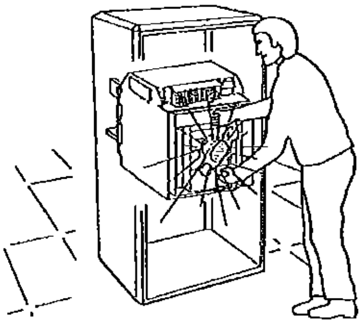
# Components




**Extended rotary handle**

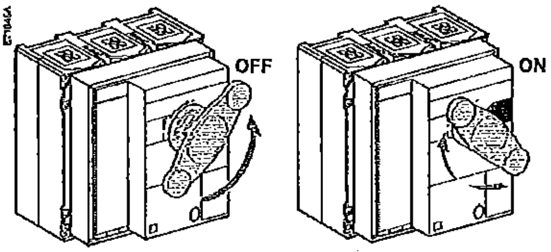


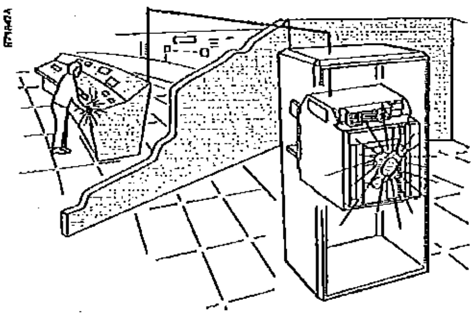
# Opening, closing, reset



## Local opening and closing

- OFF: breaker open, ON: breaker closed.



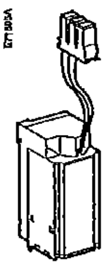



## Remote opening

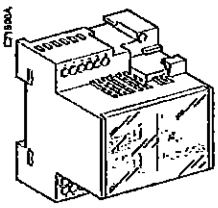
Use either:
- an MX opening release
- an MN undervoltage release
- a delayed MN undervoltage release.

When connected to the control panel, these releases may be used to remotely open the device.

*MX, MN*

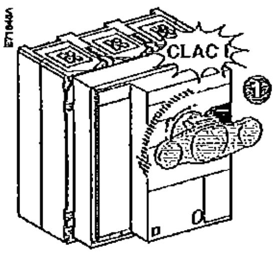


*Delay unit*

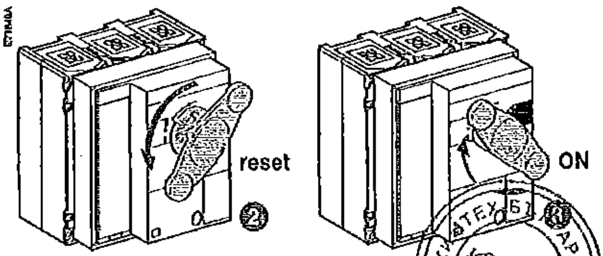


## Resetting the device following a trip

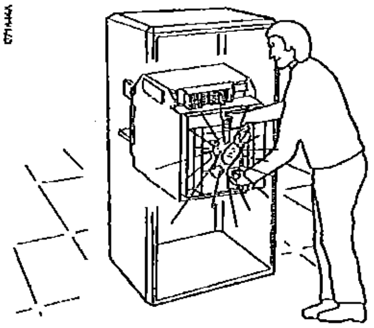
- the device trips.



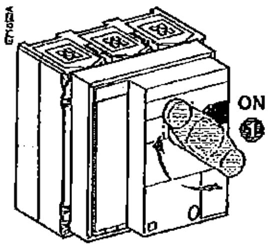

- reset the device, then close it again.



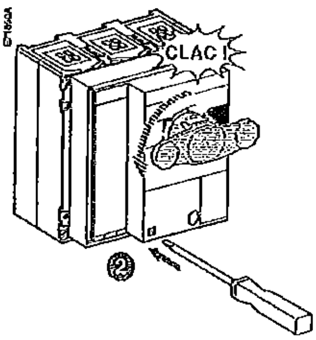
# Testing the device



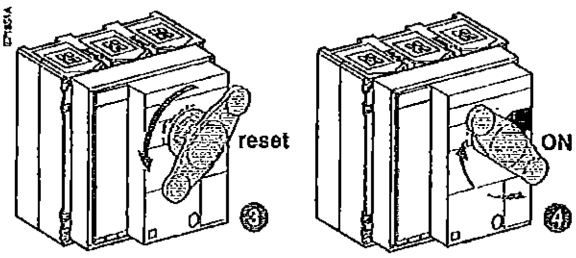
- close the device.



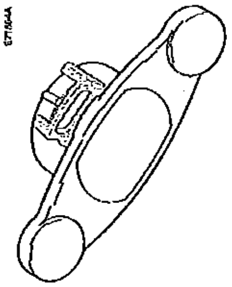

- press the "Press to trip" button.




- turn the handle to reset the device, then back to close it again.

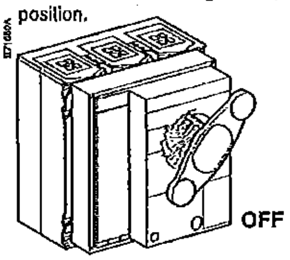


# Locking the rotary handle

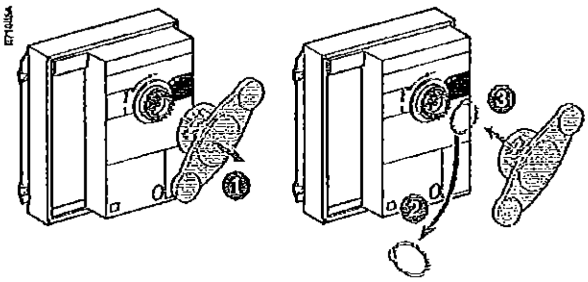


## Locking the direct or extended rotary handle in all positions using one to three padlocks (shackle diameter 5 to 8 mm)

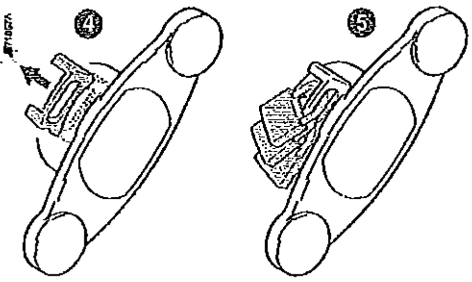
- In the standard configuration, the device may be locked in the OFF position.



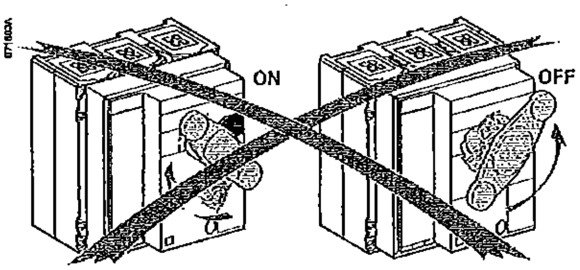

- remove the ring as indicated below to enable locking in both the ON and OFF positions.




- lock the handle.

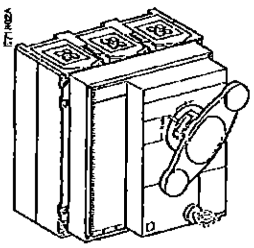



- the controls are locked.



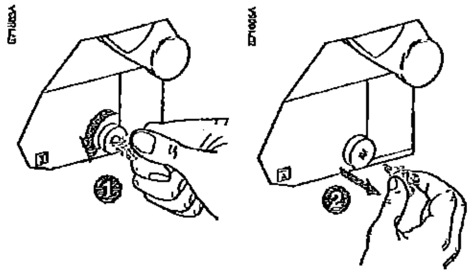

*Note:*
*the rotary handle can equipped for locking by both padlocks and keylocks.*

# Locking the rotary handle

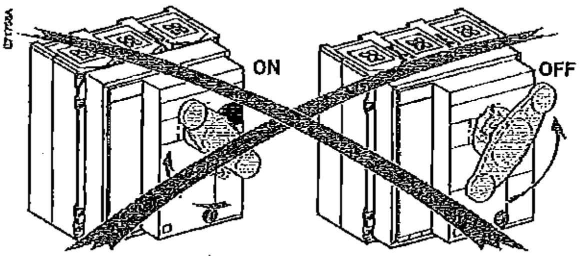


## Locking the direct rotary handle in all positions using a keylock

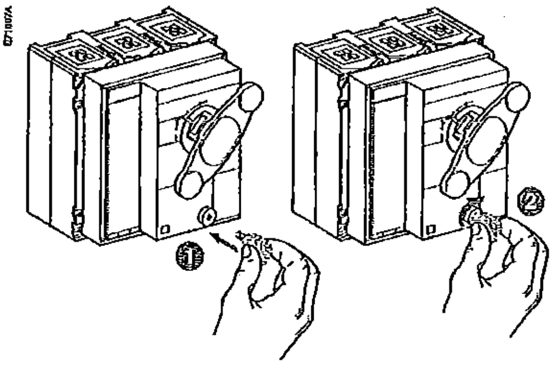
■ lock.




■ the controls are locked.

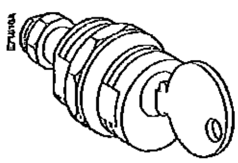



■ unlock.

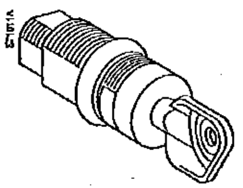



## Two types of keylocks are available

*RONIS*

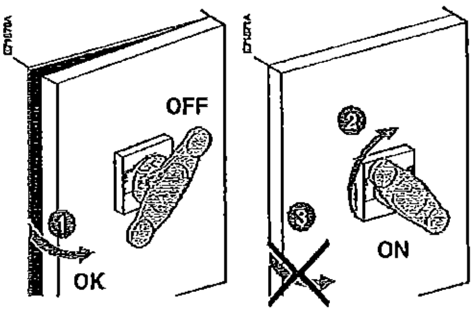


*PROFALUX*

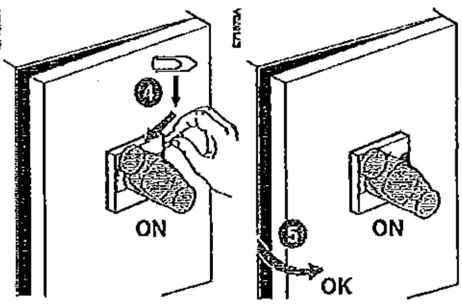


## Door locking when the device is in the ON position, using the extended rotary handle

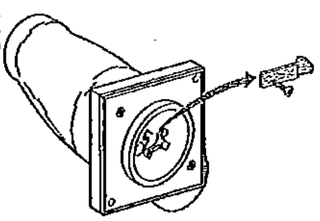
■ In the standard configuration, the door cannot be opened when the rotary handle is set to the ON position.




■ It is possible, however, to defeat the door lock.

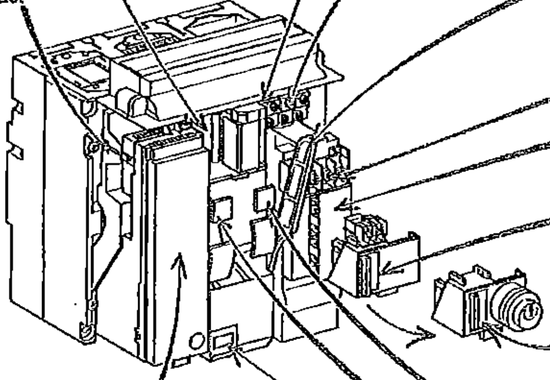



■ the door-lock function may be permanently disabled by removing the lock.

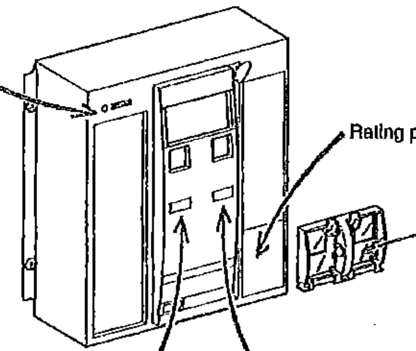


*Remote operated Compact* **Components**

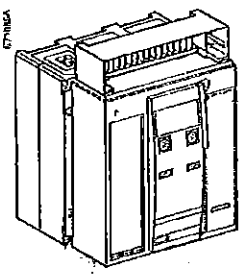
## Fixed device

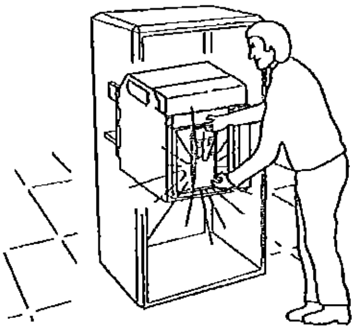



## Front



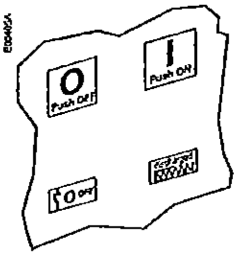
# Opening, closing, reset



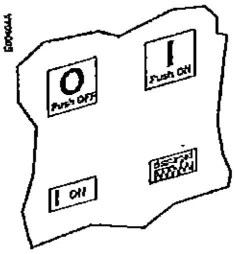


## Local opening and closing

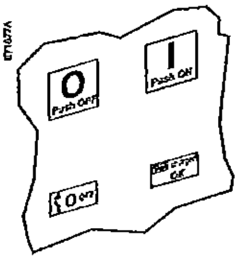
Device open (OFF), discharged



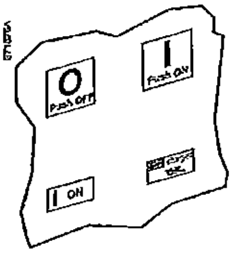

Device closed (ON), discharged

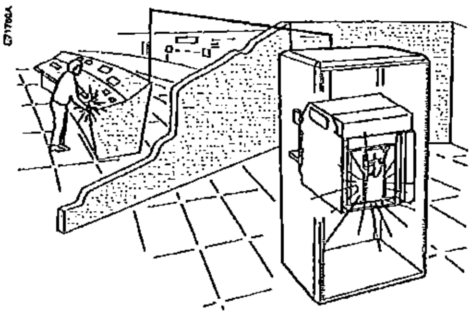



Device open (OFF), charged




Device closed (ON), charged



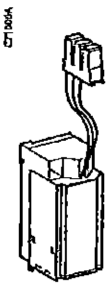


## Remote opening

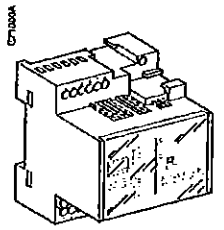
Use either:
- an MX opening release
- an MN undervoltage release
- a delayed MN undervoltage release
- a motor mechanism.

When connected to the control panel, these releases may be used to remotely open the device.

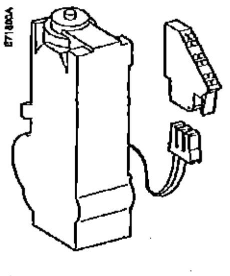
*MX, MN*

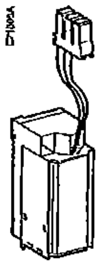


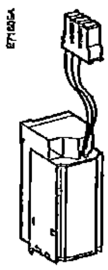
*Delay unit*

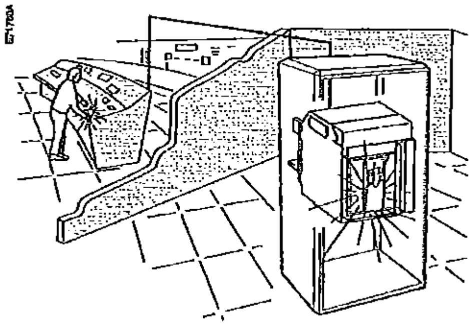


*Motor mechanism*



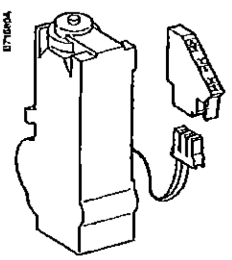


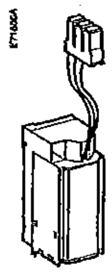


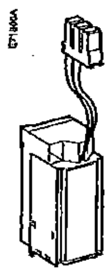


## Remotely close

*Motor mechanism*

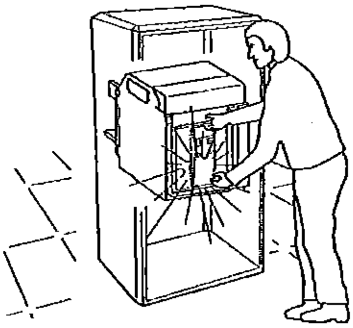






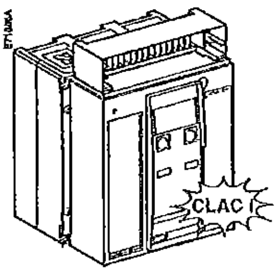
КИМТЕХ-БЪЛГАРИЯ КИМТЕХ БУРГАС ООД

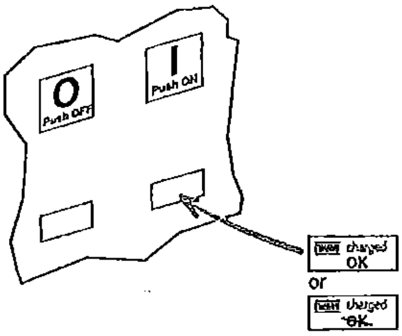
ВЯРНО С ОРИГИНАЛА



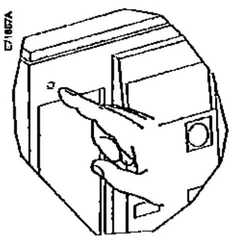
## Manually recharge the device following a trip

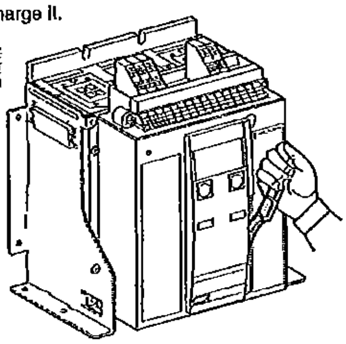
■ the device trips.



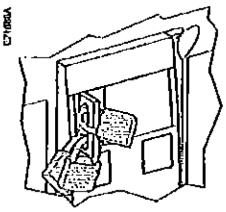




■ reset the device, then recharge it.





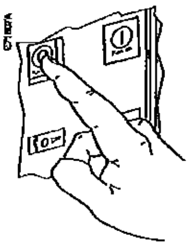
# Locking the controls
## Disabling local or remote closing

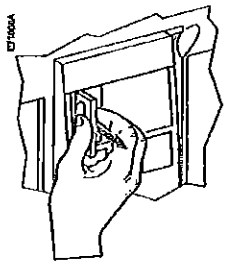


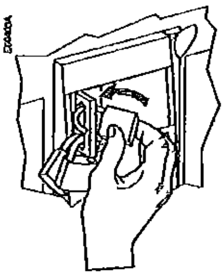
### Locking the device using one to three padlocks (shackle diameter 5 to 8 mm)

■ lock.

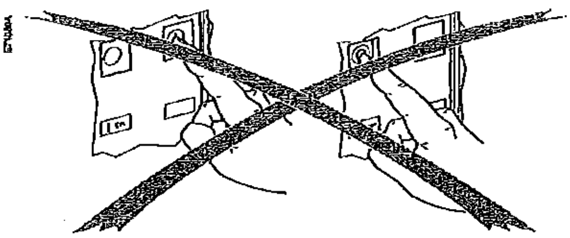
Open the device. Pull out the tab. Install the padlock(s).



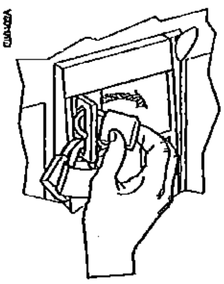


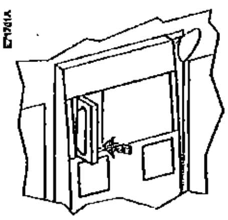


■ the controls are locked.

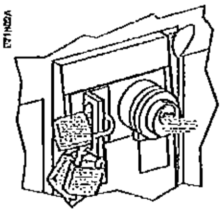


■ unlock. ■ push in the tab.





*Note:*
*Padlocks and keylocks may be used together.*

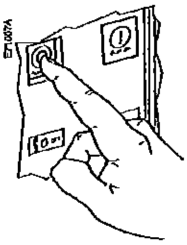


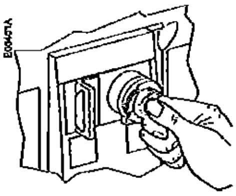
*Padlocks and keylocks may be used together.*
*Locking using padlocks is identical to the system on the previous page.*

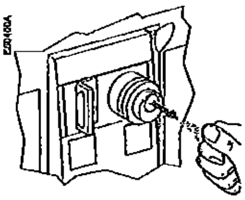
## Locking the device using a keylock and/or one to three padlocks (shackle diameter 5 to 8 mm)

■ keylocking.

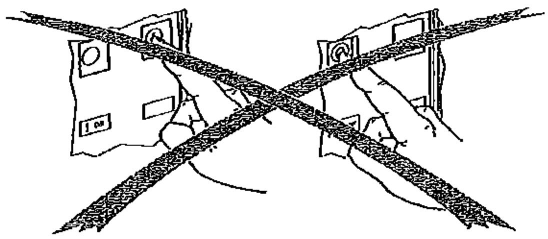
| | | |
|---|---|---|
| Open the device. | Turn the key. | Remove the key. |





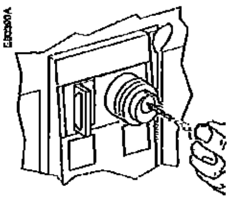


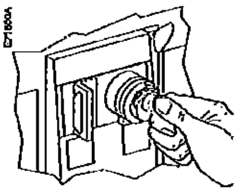
■ the controls are locked.

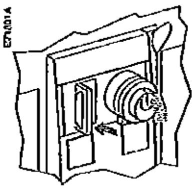


■ unlock.

| | | |
|---|---|---|
| Insert the key. | Turn the key. | Push in the tab. |

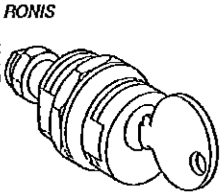




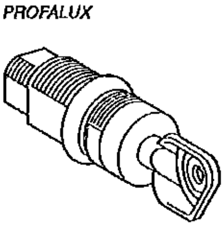


## Two types of keylocks are available

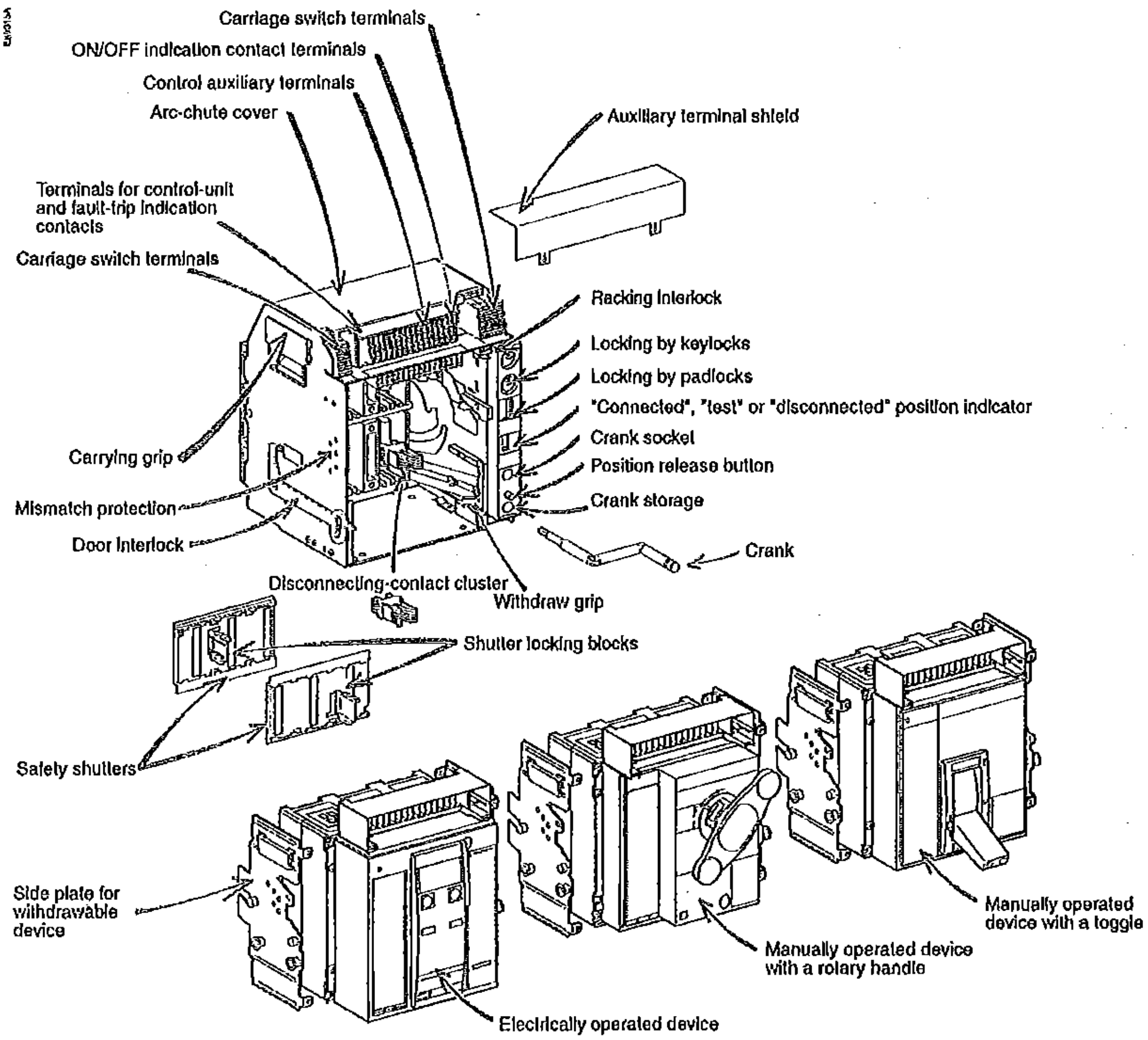
*RONIS*



*PROFALUX*



# Components



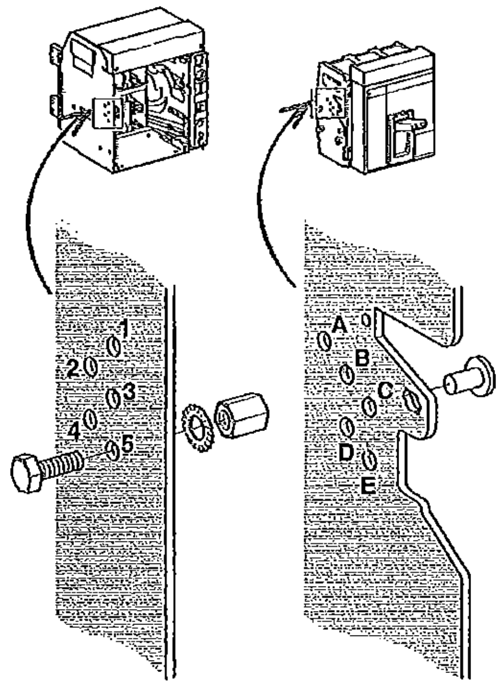
Carriage switch terminals
ON/OFF indication contact terminals
Control auxiliary terminals
Arc-chute cover
Auxiliary terminal shield
Terminals for control-unit and fault-trip indication contacts
Carriage switch terminals
Racking interlock
Locking by keylocks
Locking by padlocks
"Connected", "test" or "disconnected" position indicator
Crank socket
Position release button
Crank storage
Carrying grip
Mismatch protection
Door interlock
Crank
Disconnecting-contact cluster
Withdraw grip
Shutter locking blocks
Safety shutters
Side plate for withdrawable device
Manually operated device with a toggle
Manually operated device with a rotary handle
Electrically operated device

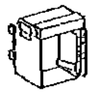
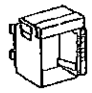
# Matching a device with its chassis

*To set up a mismatch-prevention combination for the device and the chassis, see the mismatch-prevention installation manual.*

The mismatch protection ensures that a device is installed only in a chassis with compatible characteristics.

The possible combinations are listed below.




|  |  |  |  |
|---|---|---|---|
| A B C | 4 5 | B C D | 1 5 |
| A B D | 3 5 | B C E | 1 4 |
| A B E | 3 4 | B C | 1 4 5 |
| A B | 3 4 5 | B D E | 1 3 |
| A C D | 2 5 | B D | 1 3 5 |
| A C E | 2 4 | B E | 1 3 4 |
| A C | 2 4 5 | C D E | 1 2 |
| A D E | 2 3 | C D | 1 2 5 |
| A D | 2 3 5 | C E | 1 2 4 |
| A E | 2 3 4 | D E | 1 2 3 |

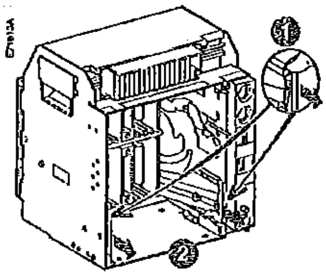
# Racking

*For complete information on Compact handling and mounting, see the installation manual(s).*

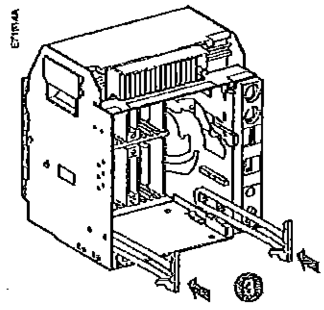
*Before mounting Compact NS, make sure it matches the chassis.*

## Removing the rails

Press the release tabs and pull the rails out.

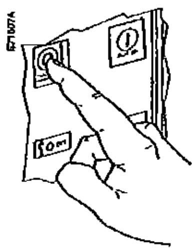


To put the rails back in, press the release tabs and push the rails in.

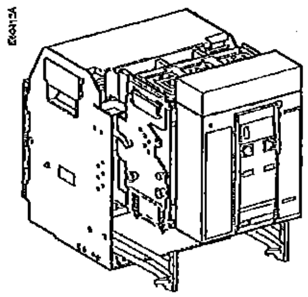


## Inserting the device

Open the circuit breaker (in any case, it opens automatically during connection).

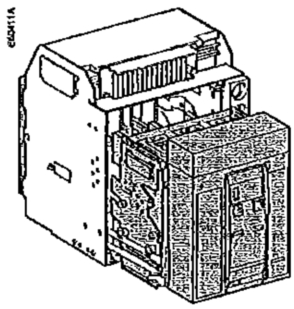


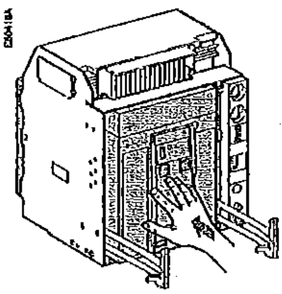
Position the circuit breaker on the rails. Check that it rests on all four supports.

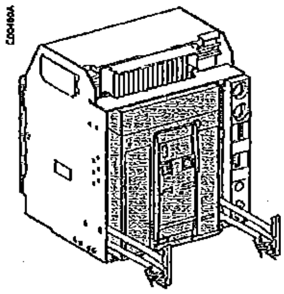


*If you cannot insert the device in the chassis, check that the mismatch protection on the chassis corresponds to that on the device.*

Push the device into the chassis, taking care not to push on the control unit.

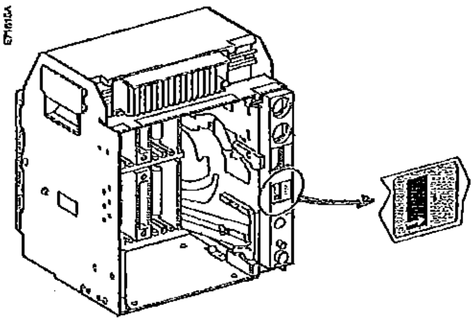




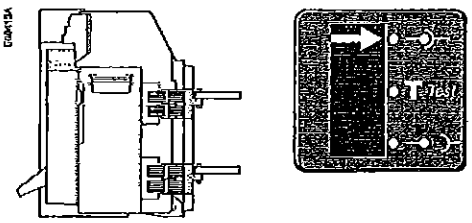


# Racking

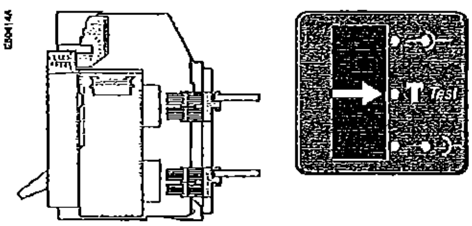
*Prerequisites*
*To connect and disconnect the device, the crank must be used.*
*The locking systems, padlocks and the racking interlock all inhibit use of the crank.*



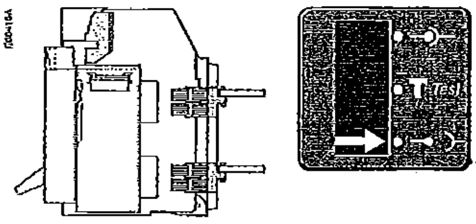
■ *"connected" position*




■ *"test" position*



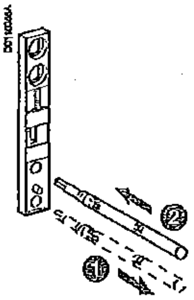

■ *"disconnected" position*

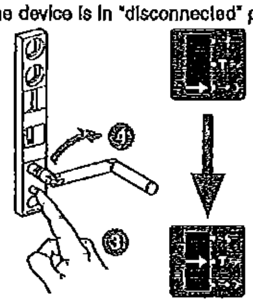



The indicator on the front signals the position of the circuit breaker in the chassis.

## Racking the circuit breaker from the "disconnected" to "test" position, then to "connected" position

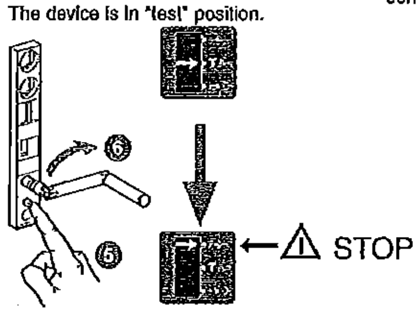
The device is in "disconnected" position.

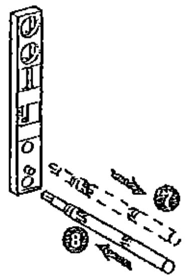




The device is in "test" position. Remove the crank or continue to "connected" position.

The device is in "test" position.

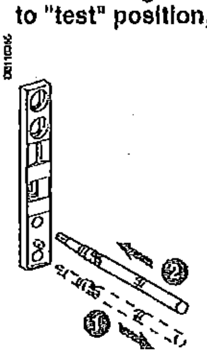


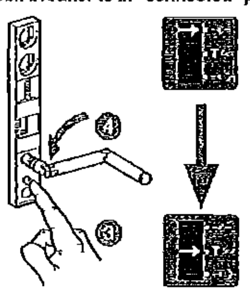



The device is in "connected" position.

## Withdrawing the circuit breaker from the "connected" to "test" position, then to "disconnected" position

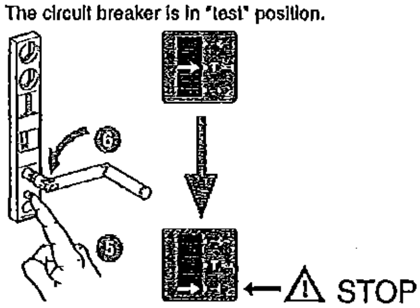
The circuit breaker is in "connected" position.

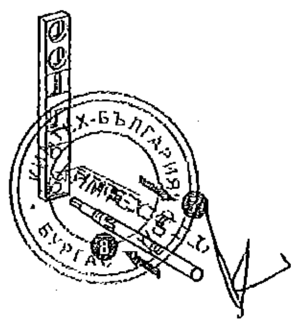




The circuit breaker is in "test" position. Remove the crank or continue to "disconnected" position.

The circuit breaker is in "test" position.



The circuit breaker is in "disconnected" position.

***Note:***
*These operations require that all chassis-locking functions be disabled (see page 24).*

Compact chassis

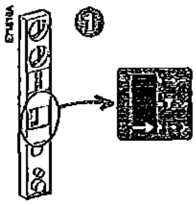
# Locking in the "disconnected" position
## Using one to three padlocks

*Combination of locking systems.*
*It is possible to lock the device on the chassis in the "disconnected" position using:*
- *one to three padlocks*
- *one or two keylocks*
- *a combination of both.*

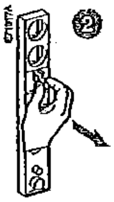
### Locking

Use padlocks with a maximum shackle diameter of 5 to 8 millimetres.

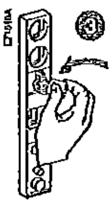
Device in "disconnected" position.



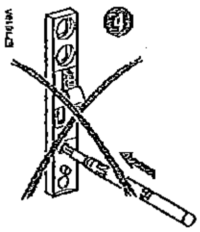
Pull out the tab.



Insert the shackle (max. diameter 5 to 8 mm) of the padlock(s).

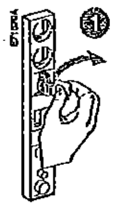


The crank cannot be inserted.

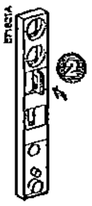


### Unlocking

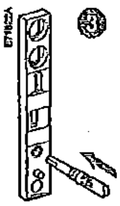
Remove the padlock(s).



Release the tab.



The crank can be inserted.

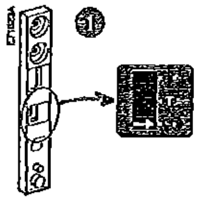


***Note:***
***Padlocks and keylocks may be used together.***
***If specified when ordering the chassis, this locking function may be adapted to operate in all positions ("connected", "test" and "disconnected"), instead of in "disconnected" position alone.***

# Using one or two keylocks

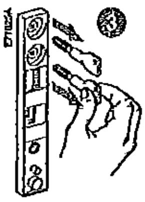
## Locking

Device in "disconnected" position.

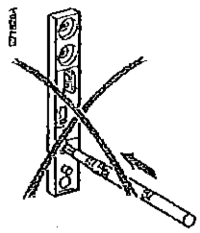


Turn the key(s).

Remove the key(s).

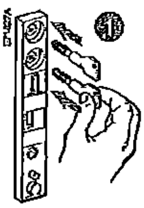


The crank cannot be inserted.



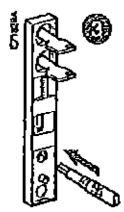
## Unlocking

Insert the key(s).



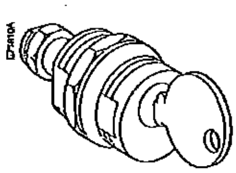
Turn the key(s).

The crank can be inserted.

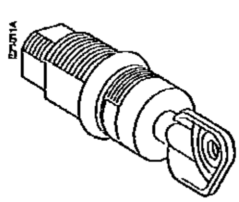


## Three types of keylocks are available.

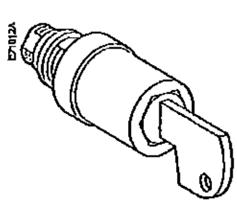
*RONIS*



*PROFALUX*



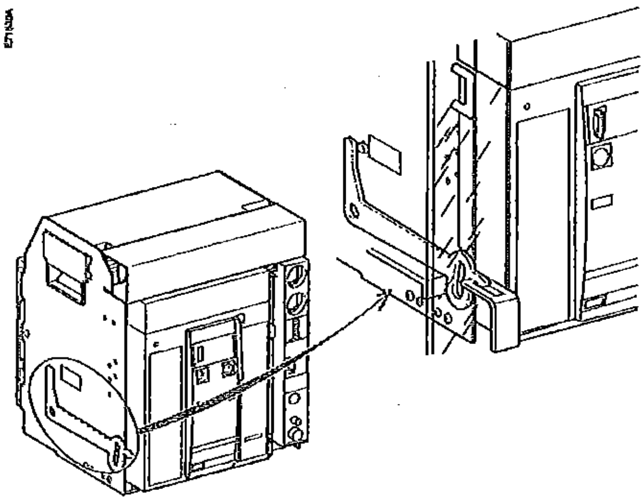
*CASTELL*



# Locking the switchboard door

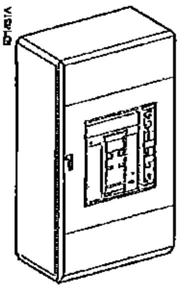
The locking device is installed on the left or right-hand side of the chassis.

- when the device is in "connected" or "test" position, the latch is lowered and the door is locked.
- when the device is in "disconnected" position, the latch is raised and the door is unlocked.

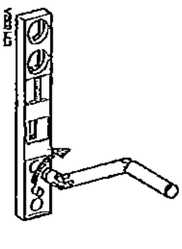


## Disabling door opening

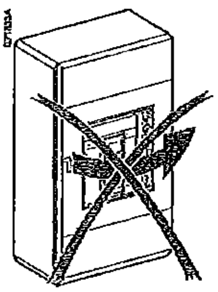
Close the door.



Turn the crank until the device is in "test" or "connected" position.

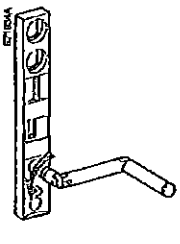


The door is locked.

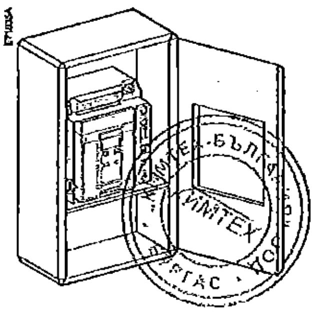


## Enabling door opening

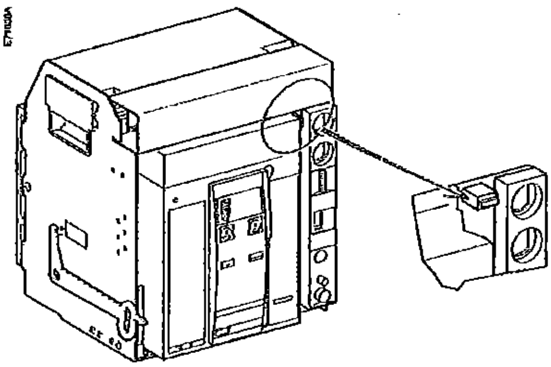
Turn the crank until the device is in "disconnected" position.



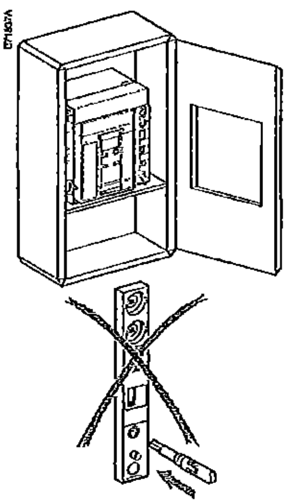
The door is unlocked.



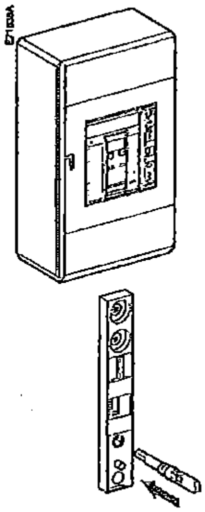
# Locking the device when the door is open



When the door is open,
the crank cannot be inserted.



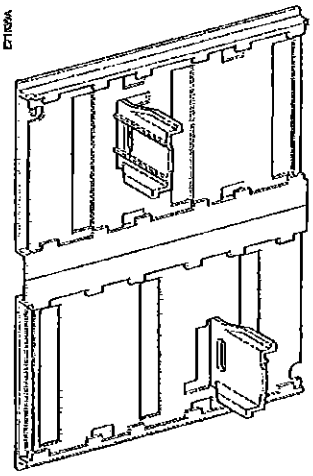
When the door is closed,
the crank can be inserted.



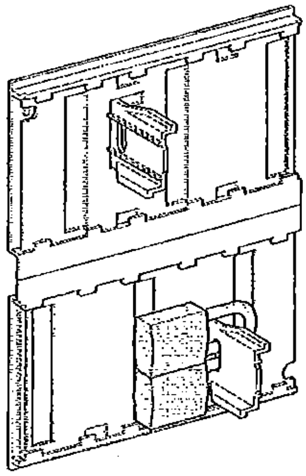
# Locking the safety shutters

**Four locking possibilities inside the chassis using one or two padlocks (maximum shackle diameter 5 to 8 mm) for each shutter**

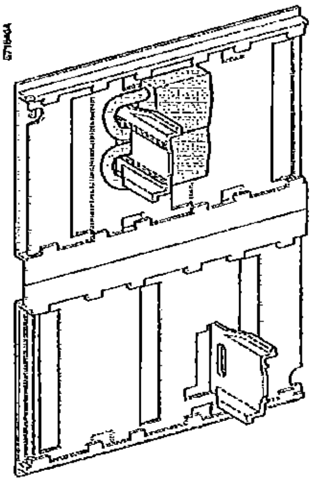
Top and bottom shutters not locked.



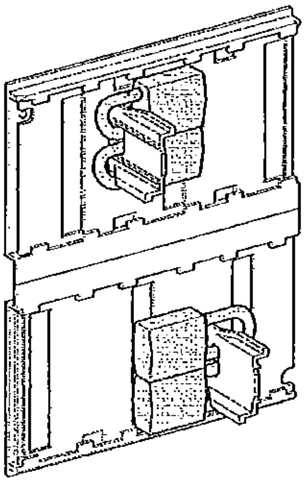
Top shutter not locked.
Bottom shutter locked.



Top shutter locked.
Bottom shutter not locked.



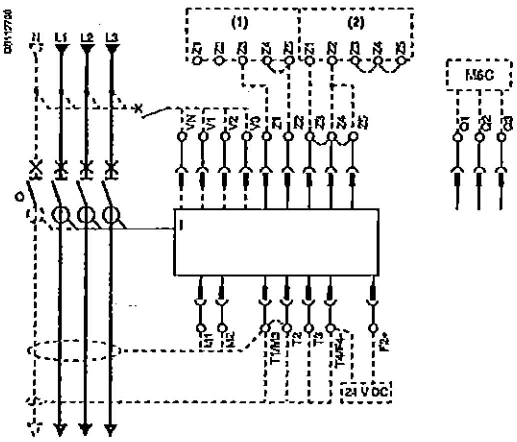
Top and bottom shutters locked.

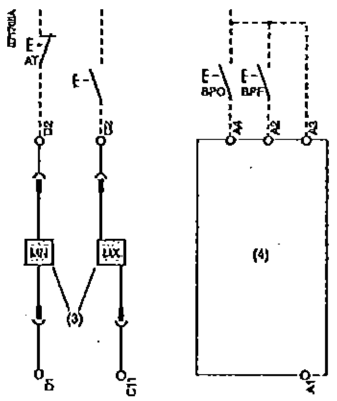


# Electrical diagrams
## Fixed and withdrawable devices

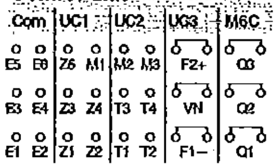
*The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.*

**Power** **Control unit** **Remote operation**

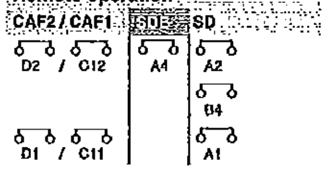



**Control unit**



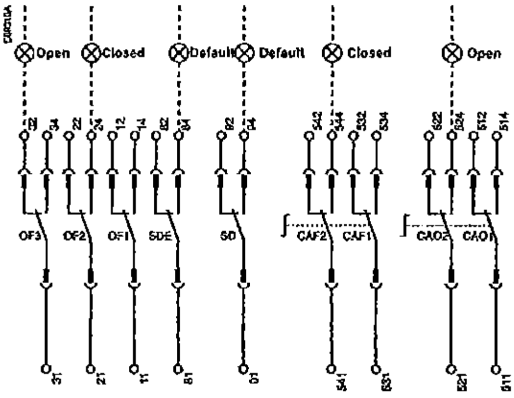

**Remote operation**



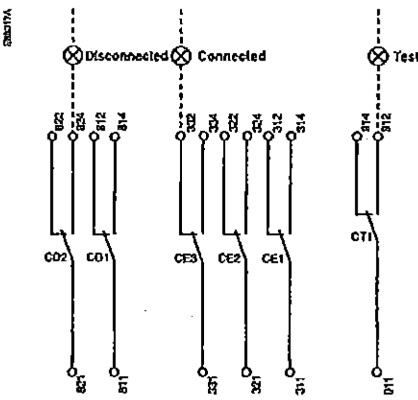

| A | P | Control unit | Remote operation |
|---|---|---|---|
| ■ | ■ | Com: E1-E6 communication | SDE : Fault-trip indication contact (supplied as standard) |
| ■ | ■ | UC1 : Z1-Z5 zone selective interlocking;<br>Z1 = ZSI = ZSI OUT SOURCE<br>Z2 = ZSI OUT; Z3 = ZSI IN SOURCE<br>Z4 = ZSI IN ST (short time)<br>Z5 = ZSI IN GF (ground fault) | SD : Trip-indication contact (supplied as standard)<br>MN : Undervoltage release<br>or<br>MX : Shunt release (standard or communicating) |
| ■ | ■ | M1 = Vigi module input (Micrologic 7) | |
| ■ | ■ | UC2 : T1, T2, T3, T4 = external neutral; | |
| ■ | ■ | M2, M3 = Vigi module input (Micrologic 7) | |
| ■ | ■ | UC3 : F2+, F1- external 24 V DC power supply | |
| | ■ | VN external voltage connector (must be connected to neutral with circuit breaker 3P) | |
| | ■ | M6C : 6 programmable contacts (must be connected to external relay M6C) ext. 24 V DC power supply required | |

*A: Digital ammeter*
*P: A + power meter + programmable protection*

## Indication contacts




## Chassis contacts




### Indication contacts

| CAF1 | CAF2 | SDE | SD | CAO2 | CAO1 | OF3 | OF2 | OF1 |
|---|---|---|---|---|---|---|---|---|
| 544 | 634 | 84 | 94 | 644 | 514 | 34 | 24 | 14 |
| 542 | 532 | 82 | 92 | 522 | 512 | 32 | 22 | 12 |
| 542 | 531 | 81 | 91 | 521 | 511 | 31 | 21 | 11 |

### Chassis contacts

| CD2 | CD1 | CE3 | CE2 | CE1 | CT1 |
|---|---|---|---|---|---|
| 824 | 814 | 334 | 324 | 314 | 914 |
| 822 | 812 | 332 | 322 | 312 | 912 |
| 821 | 811 | 331 | 321 | 311 | 911 |

### Indication contacts

**OF3 / OF2 / OF1**: ON/OFF indication contacts

### Chassis contacts

**CD2**: Disconnected-
**CD1** position contacts

**CE3**: Connected-
**CE2** position
**CE1** contacts

**CT1**: Test-position contacts

*Key:*

*Withdrawable device only*

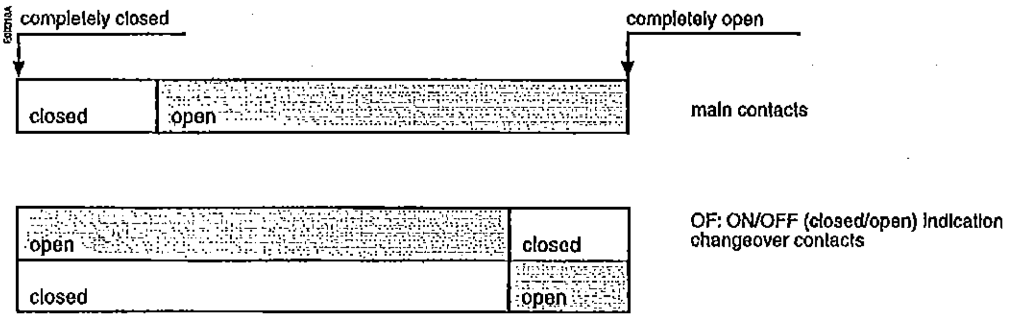
*SDE1, OF1, OF2, OF3, OF4 supplied as standard*

*Interconnected connections (only one wire per connection point)*

# Operation

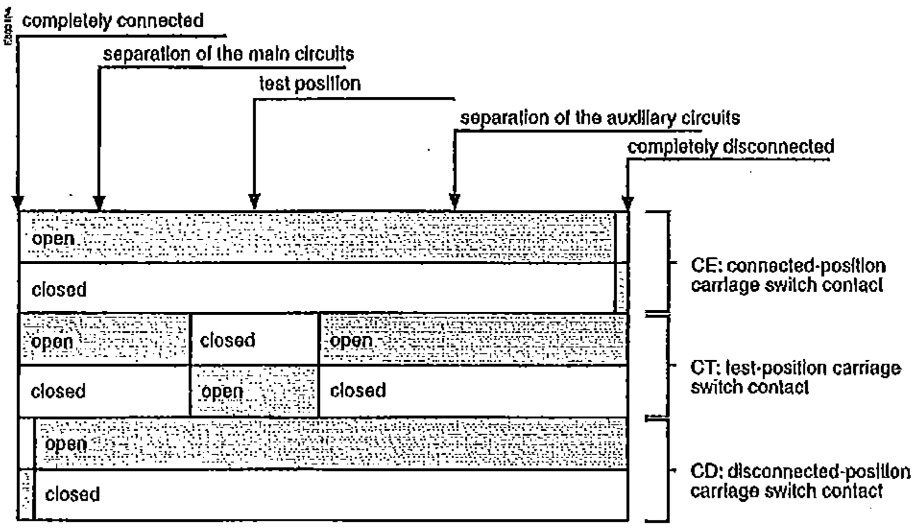
*The ON/OFF indication contacts signal the status of the device main contacts.*

## Device




*The carriage switches indicate the "connected", "test" and "disconnected" positions.*

## Chassis



# Electrical characteristics of contacts and control auxiliaries

## Device indication contacts

| designation | type | standard, minimum current 100 mA 24 V | | | low level, minimum current 2 mA 15 V | | |
|---|---|---|---|---|---|---|---|
| OF ON/OFF contact | 3 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1) | V AC | 240/380 | 6 A (rms) | V AC | 24/48 | 5 A (rms) |
| | | | 480 | 6 A (rms) | | 240 | 5 A (rms) |
| | | | 690 | 6 A (rms) | | 380 | 5 A (rms) |
| | | V DC | 24/48 | 2.5 A | V DC | 24/48 | 5 / 2.5 A |
| | | | 125 | 0.5 A | | 125 | 0.5 A |
| | | | 250 | 0.3 A | | 250 | 0.3 A |
| SD fault indication | 1 changeover contact breaking capacity (AC 12 / DC 12 as per 947-5-1) | V AC | 240/380 | 6 A (rms) | V AC | 24/48 | 5 A (rms) |
| | | | 480 | 6 A (rms) | | 240 | 5 A (rms) |
| | | | 690 | 6 A (rms) | | 380 | 5 A (rms) |
| | | V DC | 24/48 | 2.5 A | V DC | 24/48 | 5 / 2.5 A |
| | | | 125 | 0.5 A | | 125 | 0.5 A |
| | | | 250 | 0.3 A | | 250 | 0.3 A |
| SDE fault-trip indication for device with motor mechanism | 1 changeover contact breaking capacity (AC 12 / DC 12 as per 947-5-1) | V AC | 240/380 | 6 A (rms) | V AC | 24/48 | 5 A (rms) |
| | | | 480 | 6 A (rms) | | 240 | 5 A (rms) |
| | | | 690 | 6 A (rms) | | 380 | 5 A (rms) |
| | | V DC | 24/48 | 2.5 A | V DC | 24/48 | 5 / 2.5 A |
| | | | 125 | 0.5 A | | 125 | 0.5 A |
| | | | 250 | 0.3 A | | 250 | 0.3 A |
| CAO early-break switch for device with rotary handle | 2 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1) | V AC | 240/380 | 6 A (rms) | V AC | 24/48 | 5 A (rms) |
| | | | 480 | 6 A (rms) | | 240 | 5 A (rms) |
| | | | 690 | 6 A (rms) | | 380 | 5 A (rms) |
| | | V DC | 24/48 | 2.5 A | V DC | 24/48 | 5 / 2.5 A |
| | | | 125 | 0.5 A | | 125 | 0.5 A |
| | | | 250 | 0.3 A | | 250 | 0.3 A |
| CAF early-make switch for device with rotary handle | 2 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1) | V AC | 240/380 | 6 A (rms) | V AC | 24/48 | 5 A (rms) |
| | | | 480 | 6 A (rms) | | 240 | 5 A (rms) |
| | | | 690 | 6 A (rms) | | 380 | 5 A (rms) |
| | | V DC | 24/48 | 2.5 A | V DC | 24/48 | 5 / 2.5 A |
| | | | 125 | 0.5 A | | 125 | 0.5 A |
| | | | 250 | 0.3 A | | 250 | 0.3 A |

## Device control auxiliaries

| designation | power supply | threshold | consumption | response time |
|---|---|---|---|---|
| MX opening release | V AC: 50/60 Hz: 24/48 - 100/130 - 200/250 - 277 - 380/480<br>V DC: 12 - 24/30 - 48/60 - 100/130 - 200/250 | 0.7 to 1.1 Un | pick-up: 200 VA or W (80 ms)<br>hold: 4.5 VA or W | device at Un:<br>50 ms ± 10 |
| MN undervoltage release | V AC: 50/60 Hz: 24/48 - 100/130 - 200/250 - 380/480<br>V DC: 24/30 - 48/60 - 100/130 - 200/250 | open:<br>0.35 to 0.7 Un<br>close: 0.85 Un | pick-up: 200 VA or W (80 ms)<br>hold: 4.5 VA or W | device at Un:<br>40 ms ± 10 |
| Delay unit for undervoltage release | V AC: 50/60 Hz<br>V DC not adjustable: 100/130 - 200/250<br>V DC adjustable: 48/60 - 100/130 - 200/250 - 380/480 | open:<br>0.35 to 0.7 Un<br>close: 0.85 Un | 200 VA | device at Un:<br>not adjustable:<br>0.25 s<br>adjustable:<br>0.5 - 0.9 - 1.5 - 3 s |

## Motor mechanism

| designation | power supply | threshold | consumption and motor overcurrent | recharge time and operating rate |
|---|---|---|---|---|
| Motor mechanism | V AC: 50/60 Hz: 48/60 - 100/130 - 200/240 - 277 - 400/440 - 480<br>V DC: 24/30 - 48/60 - 100/125 - 200/250 | 0.85 to 1.1 Un | consumption: 180 VA or W<br>overcurrent: 2 to 3 In for 0.1 s | 3 seconds max.<br>3 cycles per minute |

## "Connected", "test" and "disconnected" position carriage switches

| designation | type | standard, minimum current 100 mA 24 V | | | low level, minimum current 2 mA 15 V | | |
|---|---|---|---|---|---|---|---|
| CE, CT, CD | 3 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1) | V AC | 240 | 8 A (rms) | V AC | 24/48 | 5 A (rms) |
| | | | 380 | 8 A (rms) | | 240 | 5 A (rms) |
| | | | 480 | 8 A (rms) | | 380 | 5 A (rms) |
| | | | 690 | 6 A (rms) | | | |
| | | V DC | 24/48 | 2.5 A | V DC | 24/48 | 2.5 A |
| | | | 125 | 0.8 A | | 125 | 0.8 A |
| | | | 250 | 0.3 A | | 250 | 0.3 A |

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# Electrical characteristics of contacts and control auxiliaries

## Wiring of control auxiliaries

Under pick-up conditions, the level of consumption is approximately 150 to 200 VA. Consequently, for low supply voltages (12, 24, 48 V), cables must not exceed a maximum length determined by the supply voltage and the cross-section of the cables.

Indicative values for maximum cable lengths (in meters)

| | | 12 V | | 24 V | | 48 V | |
|---|---|---|---|---|---|---|---|
| | | 2.5 mm² | 1.5 mm² | 2.5 mm² | 1.5 mm² | 2.5 mm² | 1.5 mm² |
| MN | 100% source voltage | — | — | 58 | 36 | 280 | 165 |
| | 85% source voltage | — | — | 16 | 10 | 75 | 45 |
| MX-XF | 100% source voltage | 21 | 12 | 115 | 70 | 650 | 330 |
| | 85% source voltage | 10 | 6 | 75 | 44 | 350 | 210 |

***Note:***
*The indicated length is that for each of the two supply wires.*

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# Start-up operations
## Procedure

*These operations must be carried out before using a device for the first time.*

A general check of the device takes only a few minutes and avoids any risk of mistakes due to errors or negligence.
A general check must be carried out:
- prior to initial use
- following an extended period during which the device is not used.

A check must be carried out with the entire switchboard de-energised.
In switchboards with compartments, only those compartments that may be accessed by the operators must be de-energised.

### Electrical tests

Insulation and dielectric-withstand tests must be carried out immediately after delivery of the switchboard. These tests are precisely defined by international standards and must be directed and carried out by a qualified expert.

Prior to running the tests, it is absolutely necessary to:
- disconnect all the electrical auxiliaries of the device (MCH, MX, MN)
- remove the long-time rating plug on the 7.0 A control units.
Removal of the rating plug disconnects the voltage measurement input.

### Switchboard inspection

Check that the devices are installed in a clean environment, free of any installation scrap or items (tools, electrical wires, broken parts or shreds, metal objects, etc.).

### Conformity with the installation diagram

Check that the devices conform with the installation diagram:
- breaking capacities indicated on the rating plates
- identification of the control unit (type, rating)
- presence of any optional functions (motor mechanism)
- protection settings (long time, short time, instantaneous, ground fault)
- identification of the protected circuit marked on the front of each device.

### Condition of connections and auxiliaries

Check device mounting in the switchboard and the tightness of power connections.
Check that all auxiliaries and accessories are correctly installed:
- electrical auxiliaries
- terminal blocks
- connections of auxiliary circuits.

### Operation

Check the mechanical operation of the devices:
- opening of contacts
- closing of contacts.

### Check on the control unit

Check the control unit of each circuit breaker using the respective user manuals.

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# What to do when the circuit breaker trips?

## Note the fault

Faults are signaled locally and remotely by the indicators and auxiliary contacts installed on devices (depending on each configuration). See page 32 in this manual and the user manual of the control unit for information on the fault indications available with your circuit breaker.

## Identify the cause of tripping

A circuit must never be reclosed (locally or remotely) before the cause of the fault has been identified and cleared.
Depending on the type of fault and the criticality of the loads, a number of precautionary measures must be taken, in particular the insulation and dielectric tests on a part of or the entire installation. These checks and test must be directed and carried out by qualified personnel.

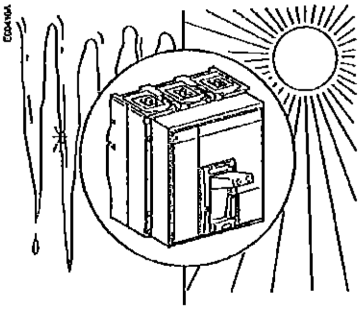
## Inspect the circuit breaker following a short-circuit

- check the tightness of connections (see the device installation manual)
- check the disconnecting-contact clusters.

## Reset the circuit breaker

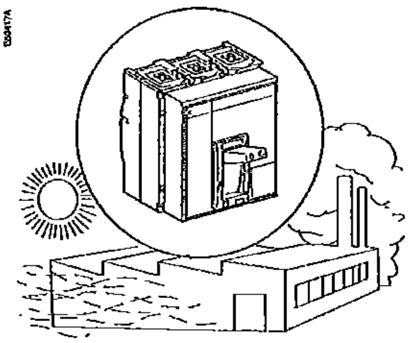
The circuit breaker can be reset locally or remotely. See pages 5, 9 and 15 in this manual for information on how the device can be reset.

# Compact operating conditions



## Ambient temperature

Compact devices can operate under the following temperature conditions:
- the electrical and mechanical characteristics are stipulated for an ambient temperature of -5° C to +70° C
- circuit-breaker closing is guaranteed down to -35° C
- Compact (without the control unit) can be stored in an ambient temperature of -40° C to +85° C
- the control unit can be stored in an ambient temperature of -25° C to +85° C.

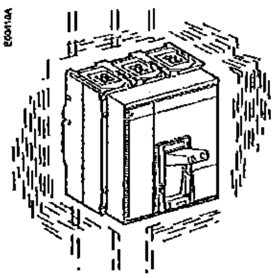


## Extreme atmospheric conditions

Compact devices have successfully passed the tests defined by the following standards for extreme atmospheric conditions:
- IEC 68-2-1: dry cold at -55° C
- IEC 68-2-2: dry heat at +85° C
- IEC 68-2-30: damp heat (temperature +55° C, relative humidity 95%)
- IEC 68-2-52 level 2: salt mist.

Compact devices can operate in the industrial environments defined by standard IEC 947 (pollution degree up to 3).

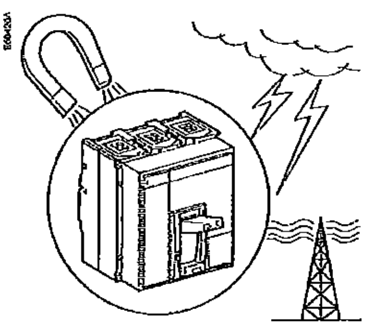
It is nonetheless advised to check that the devices are installed in suitably cooled switchboards without excessive dust.



## Vibrations

Compact devices resist electromagnetic or mechanical vibrations.
Tests are carried out in compliance with standard IEC 68-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):
- 2 to 13.2 Hz: amplitude ±1 mm
- 13.2 to 100 Hz: constant acceleration 0.7 g.

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.



## Electromagnetic disturbances

Compact devices are protected against:
- □ overvoltages caused by devices that generate electromagnetic disturbances
- □ overvoltages caused by an atmospheric disturbance or by a distribution-system outage (e.g. failure of a lighting system)
- □ devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- □ electrostatic discharges produced by users.

Compact devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards:
- ■ IEC 947-2, appendix F
- ■ IEC 947-2, appendix B (trip units with earth-leakage function).

The above tests guarantee that:
- ■ no nuisance tripping occurs
- ■ tripping times are respected.

## Cleaning

□ non-metallic parts:
never use solvent, soap or any other cleaning product. Clean with a dry cloth only
□ metal parts:
clean with a dry cloth whenever possible. If solvent, soap or any other cleaning product must be used, make sure that it does not come into contact with non-metallic parts.

# General Specification for Molded Case Circuit Breakers from 630 to 1600 A

Protective device for low voltage electrical installation

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ВЯРНО С ОРИГИНАЛА

*Specification for Tender*

**Table of contents:**

*Specification for Tender*

# 1 General

The present specification applies to molded case circuit breakers (MCCB) from 630A to 1600A for AC (50/60Hz) low voltage electrical installation from 220V to 690V.
- MCCB shall be equipped with a trip unit that offers the appropriate level of protection performance to fit to the application. All trip units could be proposed with versions that provide measurement, and communication functions.
- MCCB shall be available in fixed or withdrawable versions as well as in 3-pole and 4-pole versions. For withdrawable versions, a safety trip shall provide advanced opening to prevent connection and disconnection of a closed circuit breaker
- Fixed and manual MCCBs shall be designed for both vertical, horizontal or flat mounting, without any adverse effect on electrical performance.
- For a MCCB rating frame given, MCCBs dimensions shall be the same whatever the ultimate breaking capacity.
- MCCB shall have a rated operational voltage (Ue) of 690 V, a rated insulation voltage (Ui) of 800V (AC 50/60 Hz) and a rated impulse voltage (Uimp) of 8kV.

# 2 Compliance with Standards

| Reference | Title | Scope |
|---|---|---|
| EN /IEC 60947-1 & 2 | Low-voltage Switchgear and controlgear<br>Part 2 : Circuit Breaker | Characteristics of circuit-breakers;<br>- operation and behaviour in normal service;<br>- operation and behaviour in case of overload and operation and behaviour in case of short-circuit, including co-ordination in service (discrimination and back-up protection);<br>- dielectric properties;. |
| IEC 60947-2, annex B | Circuit Breaker incorporating residual current protection | |
| IEC 60947-2, annex F | Additional tests for circuit-breakers with electronic over-current protection | Electronic trip unit (rms current measurement, EMC) |
| IEC 60664-1 | Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests | Category IV for a rated insulation voltage up to 690 V, class II insulation between the front and internal power circuits |
| IEC 61000-4-1 | Electromagnetic compatibility (EMC)<br>Testing and measurement techniques | EMC Immunity |
| IEC 61557-12 | Combined performance measuring and monitoring devices for electrical parameters | Accuracy class |
| IEC 60068-2 | Environmental testing | Climatic withstand |

Versions complying with UL 489 shall also be available.

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# 3 Circuit breaker design

## 3.1 Safety

For maximum safety,

- The power contacts shall be insulated in an enclosure made of a thermosetting. material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries
- The molded case circuit breakers shall provide double insulation of the front face to allow on-site installation of auxiliaries without de-energising the installation. All electrical auxiliaries and accessories such as voltage releases, (shunt or undervoltage type) and auxiliary contacts shall be designed for easy on-site installation.
- The operating mechanism of the molded case circuit breakers shall be of the fast make and fast break type. Tripping on a fault shall be mechanically independent of the operating handle. The operating mechanism shall be designed to operate all poles of the circuit breaker simultaneously for making, breaking and tripping.
- If required, the circuit breaker shall be equipped with a rotary handle.
- The operating mechanism shall be designed in such a way that the position of the operating handle of the circuit breaker indicates the real position of the main contacts, even if the circuit breaker is equipped with a rotary handle.
- In order to ensure suitability for isolation complying with IEC 60947-2 § 7-27: The operating mechanism shall be designed such that the handle can only be in OFF position (O) if the power contacts are all actually separated, in OFF position, the handle shall indicate the isolation position.
- MCCBs shall be able to receive a device for locking in the "isolated" position, with up to 3 padlocks, Ø8 maximum or keylock (for rotary handle).
- MCCBs shall be designed to prevent access to live parts when the cover is removed
- MCCBs shall be equipped with a "push to trip" button in front to test operation and the opening of the poles.
- MCCB rating, "push to trip" button, performances and contact position indication must be clearly visible and accessible from the front, through the front panel or the door of the switchboard.
- In electronic trip units, protection functions shall be electronically managed independently of measurement and communication function by a dedicated ASIC.

## 3.2 Breaking capacity, Current limitation, discrimination, durability

- The molded case circuit breakers (except for current-limiting circuit breakers) shall belong to category B as defined in IEC60947-1. Certificates attesting to compliance with these rules shall be established taking into account the following performance levels for the test sequences: service breaking capacity (Ics) equal to at least 50% of the rated ultimate breaking capacity (Icu) and a rated short-time withstand current (Icw) of 25 kA / 0.5 s (except for current-limiting circuit breakers)
- If required current limiting circuit breakers shall be available.
- The rated ultimate breaking capacity (Icu) of each molded case circuit breaker shall be equal to at least the value of the short-circuit current (Isc) at the point of installation on the electric circuit, unless the upstream circuit breaker makes it possible to ensure coordination (as defined in Appendix A of IEC 60947-2); in this case, the coordination between the two circuit breakers shall be confirmed by manufacturer.
- MCCB's manufacturer shall provide selectivity and coordination tables with other devices such as other MCCBs, ACB, switches and contactors.

## 3.3 Auxiliaries and accessories

- The operating mechanism shall be of the stored-energy type only
- The addition of a motor mechanism or a rotary handle shall in no way affect circuit breaker characteristics:
    - o Only three stable tripping mechanism positions (ON, OFF and TRIPPED) shall be possible with the motor mechanism,
    - o Suitability for isolation shall be provided by positive contact indication (ON and OFF) in front of the motor mechanism module
- MCCBs shall be designed to enable safe on-site installation of auxiliaries such as voltage releases (shunt and undervoltage releases) and indication switches as follows:
    - o same field installable auxiliary contacts for signalising different functions, as: open/ closed position, fault signal, electrical fault (including electrical leakage) signal, all auxiliaries shall be common for the entire range,
    - o they shall be separated from power circuits,
    - o all electrical auxiliaries shall be of the snap-in type and fitted with terminal blocks,
    - o Auxiliary function and terminals shall be permanently engraved on the case of the circuit breaker and the auxiliary itself,
- The trip units shall not increase overall circuit breaker dimensions

### 3.3.1 Remote operation

- Coils:
  - o Manually operated circuit breaker could be equipped with one shunt opening release or one undervoltage opening release.
  - o Electrically operated circuit breaker could be equipped with one shunt opening release or one undervoltage opening release in addition to opening and closing order.
  - o Coils shall be designed for continuous-duty.
  - o Voltage release auxiliary power supply:
    - ▪ AC: 24 48 100/130 200/250 277 380/480 VAC
    - ▪ DC 12 24/30 48/60 100/130 200/250 VDC
  - o Opening time with shunt opening release 50ms +/- 10ms
  - o Electrical closing time 60ms +/- 10ms
- Electric motor for spring charge
  - o Motor auxiliary power supply:
    - ▪ AC: 24 48 100/130 200/250 277 380/415 VAC
    - ▪ DC 12 24/30 48/60 100/130 200/250 VDC
  - o Charging time: <=4sec
  - o Operating frequency <=3 cycle / mln.
- Electrically operated MCCB shall be equipped with anti pumping function: If opening and closing orders occur simultaneously, the circuit breaker shall remain in the open position.

# 4 Protections requirements

## 4.1 General

- The high-current molded case circuit breakers shall be available in 3-pole or 4-pole (neutral protection) versions. On 4-pole circuit breakers, a 3-position switch shall be provided to set neutral protection to any of the following levels: unprotected neutral (4P3D), half-protected neutral (4P3D+N/2) or fully protected neutral (4P4D).
- The trip units shall not augment overall circuit breaker dimensions
- Trip unit shall be easily interchangeable and easily secured to the MCCB without removing the breaker from the panel
- All electronic components shall withstand temperatures up to 105 °C.
- Electronic and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings
- Protection settings shall apply to all circuit breaker poles
- It shall be possible to adjust protections with a knob without any power supply or when the main is off
- Electronic trip unit shall be fitted with thermal memory
- It shall be possible to equip MCCBs with an auxiliary contact signalizing an electrical fault operated by the trip unit.
- The following monitoring functions shall be integral parts of electronic trip units:
  - o 1 LED for load indication lighted above 105 % of Ir
  - o a test connector shall be installed for checks on electronic and tripping mechanism operation using an external device.

## 4.2 Trip unit protection functions

### 4.2.1 Basic protection (LI) with or without energy measurement

These trip units shall offer

- Long time protection
  - Adjustable Ir threshold settings from 40% to 100 % of the trip unit rating
  - Adjustable tr time delay
- Instantaneous protection
  - Adjustable Isd threshold settings from 1.5xIr to 10xIr

### 4.2.2 Selective protection (LSI) with or without energy measurement

These trip units shall offer

- Long time protection
  - Adjustable Ir threshold settings from 40% to 100 % of the trip unit rating
  - Adjustable tr time delay
- Short time protection

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  - Adjustable Isd threshold settings from 1.5xIr to 10xIr
  - Adjustable tsd time delay
- Instantaneous protection
  - Adjustable Ii threshold settings from 2xIn to 15xIn with an OFF position

### 4.2.3 Selective protection & Ground fault or Earth leakage protection (LSIG) with or without energy measurement

These trip units shall offer

- Long time protection
  - Adjustable Ir threshold settings from 40% to 100 % of the trip unit rating
  - Adjustable tr time delay
- Short time protection
  - Adjustable Isd threshold settings from 1.5xIr to 10xIr
  - Adjustable tsd time delay
- Instantaneous protection
  - Adjustable Ii threshold settings from 2xIn to 15xIn with an OFF position
- Ground fault protection (GF) Or Earth leakage protection (Vigi))
  - Adjustable Ig threshold settings Adjustable IΔn threshold settings
  - Adjustable tg time delay Adjustable tΔn time delay

### 4.2.4 Advanced protection trip unit

In addition to the previous protection functions trip units with Under/Over Voltage, Under/Over Frequency and Reverse Power protection could be proposed.

## 4.3 Trip unit measurement function

If required by the application, the trip unit shall offer measurement (including energy) without additional module whatever the protection type (LI, LSI, LSIG). Available measurements shall be:

- Currents
- Demand Current, Maxim Demand Current
- Voltage, active power, reactive power, power factor,
- Demand Power, Maxim Demand Power
- Energy
- Accuracies of the entire measurement system, including the sensors: shall be
  - Current: 1,5%
  - Voltage: 0.5 %
  - Power and energy: 2%
- Rogowski current transformers shall be used to ensure accurate measurements from low current up to high currents
- For safety reason, protection functions shall be electronically managed independently of measurement function by a dedicated ASIC.
- The measurements shall be displayed on the breaker itself and on a remote system via Modbus communication. In addition to these solutions it shall be possible to connect a remote display.

# 5 Operating & Maintenance

## 5.1 Operating assistance function

- Electronic trip units with measurement and communication capability shall offer operating assistance function:
  - o trips history (Fault type, date and time)
  - o Pre-alarm
  - o Trip and pre-alarm could activate relay output(s)
- Theses functions and indicators shall be available on the display, by communication or setting PC tool.

## 5.2 Maintenance indicators

Electronic trip units with measurement and communication capability shall offer maintenance indicators:

- Operation and trip counters,
- Operating hours counter,
- Load profile

- Theses functions and indicators shall be available by communication or setting PC tool.

 *Specification for Tender*

### 5.3 Commissioning and operating tool

- A test connector shall be installed for checks on electronic and tripping mechanism operation using an external dedicated tool
- A software tool available for all electronic trip unit shall be provided:
  - To visualize and configure trip unit parameters
  - To create and save setting files
  - To display tripping curve
  - To set time and date
  - To display tripping and alarms histories

### 5.4 Alarms (Advanced protection trip units)

- User shall be able to activate alarms based on measurement (I, U, F, Q, Idemand, Pdemand,)
- Alarms shall be time stamped
- Alarms could activate up to 6 relay output(s)
- Theses functions and indicators shall be available by display and/or communication and/or setting PC tool.

## 6 Communication

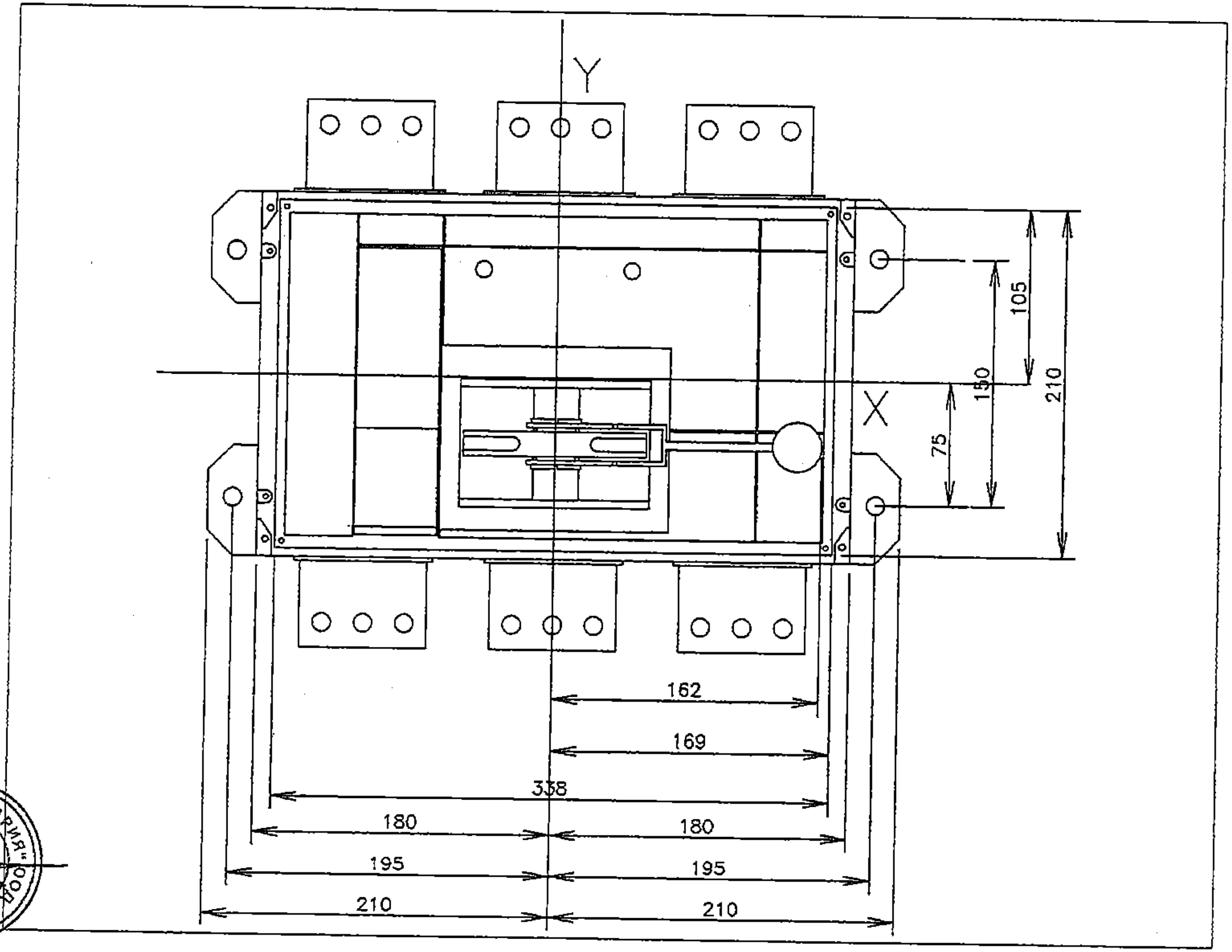
ACB shall be equipped easily with MODBUS communication.

- Whatever the trip unit is:
  the following information shall be accessible:
  - Open / Close position / fault-trip indication (SDE) / Ready to close/ Position in the Chassis (Withdrawable version).

  the following commands shall be possible
  - open / close.
- When trip units with measurement functions are used the following information shall be accessible:
  - instantaneous and demand values, maximeters/minimeters, energy, Current demand and power demand.
  - timestamp trip and alarm histories and event table.
  - Maintenance indicators.

## 7 Environment

- Production site organisation shall be non polluting and certified to comply with ISO 9002 and ISO 14001 standards.
- MCCBs shall be designed according to Eco-design complying with ISO 14062 Especially MCCB's materials shall be of halogen free type
- MCCB shall be designed for easy disassembly and recycling at end of life, and complies with environmental directives RoHS and WEEE.
- The manufacturer shall provide product environmental profile of the MCCB
- The manufacturer shall provide instructions on the removal, dismantling and processing of circuit-breaker materials at the end of service life.

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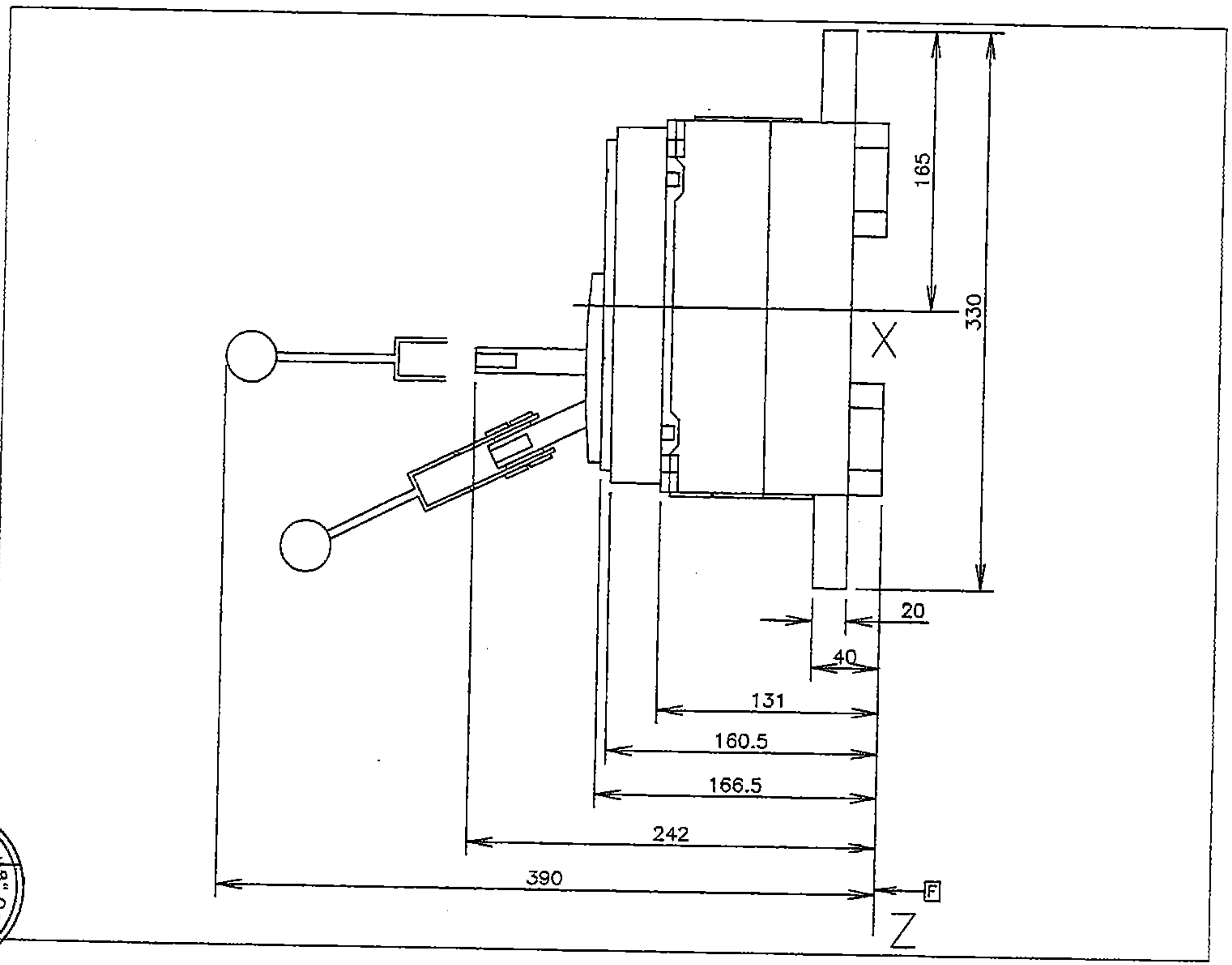
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*Превод от английски език*

**Фирмена бланка на ASEFA**

**Сертификат за съответствие № 147-05ВТ**

**Издаден на:** ШНАЙДЕР ЕЛЕКТРИК ИНДЪСТРИС САС
бул. „Франклин Рузвелт" № 89
92500 РУЕЛ МАЛМЕЗОН
ФРАНЦИЯ

**за апарата:** неподвижен триполюсен или четириполюсен прекъсвач за ниско напрежение референция: Compact NS 630b H, 800 H, 1000 H, 1250 H, 1600 H, с електронен изключвател, (MICROLOGIC 2.0, 5.0, 6.0. 7.0, типове A, P и H)

производител: ШНАЙДЕР ЕЛЕКТРИК СА
търговска марка: МЕРЛИН ГЕРИН

**съгласно стандарт(и):**
IEC 60947-2 (2003-04) ed. 3, раздел II, ал. 8.3.4 и раздел III, ал. 8.3.5

**Номинални характеристики:**
Работен ток (Ie) : 630 A до 1600 A
Работно напрежение (Ue) : 220 V променлив ток до 690 V пром. ток
Честота : 50 Hz - 60 Hz
Напрежение по изолацията (Ui) : 800 V
Издържано от изолацията импулсно напрежение (Uimp): 8 kV
Експлоатационни и пределни мощности при изключване на прекъсвача:

| Ue (V) | Icu (kA) | Ics75% (kA) за In=630 a / 1250 A | Ics50% (kA) за In = 1600A |
|---|---|---|---|
| 220/240, 380/415 | 70 | 52.5 | 35 |
| 440 | 65 | 48.75 | 32.5 |
| 500/525 | 50 | 37.5 | 25 |
| 660/690 | 42 | 31.5 | 21 |

Категория на използване : B
Еталонна температура : 40° C
Приспособление за изолация : да
Експлоатация : непрекъсната

**Свързан документ(и):**
**Протокол(и) от изпитване:** F01.04.19, F01.04.20

„КИМТЕКС-БЪЛГАРИЯ" ООД КИМТЕКС БУРГАС

АГЕНЦИЯ ГРЕГ ООД

Настоящият сертификат се отнася само за пробата, предоставена за типовото изпитване.

Фонтене-о-Роз,
Дата: 22.12.2005 г.

Председател на ASEFA: подпис (*не се чете*)
М. Бренон

Настоящият сертификат за съответствие се размножава само във вид на пълно копие по факс. Сертификат за съответствие ВТ вариант С.

*Долуподписаният, Жасмин Кръстев Кръстев, удостоверявам верността на извършения от мен превод от английски език на български език на приложения документ: Сертификат за съответствие с дата 22.12.2005 г. Преводът се състои от 2 стр.*

*Подпис:*
*Жасмин Кръстев Кръстев*

АГЕНЦИЯ ГРЕЙ ООД СОФИЯ

ВЯРНО С ОРИГИНАЛА

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asefa

# Certificat de conformité / *certificate of conformity* n° 147-05BT

**délivré à / *issued to* :** SCHNEIDER ELECTRIC INDUSTRIES SAS
89 boulevard Franklin Roosevelt
92500 RUEIL MALMAISON
FRANCE

**pour le matériel / *for the apparatus* :** Disjoncteur basse tension tripolaire ou tétrapolaire, fixe / *Low-voltage fixed three- or four-pole circuit-breaker*

référence / *reference* : Compact NS 630b H, 800 H, 1000 H, 1250 H, 1600 H, avec déclencheur électronique/ *with electronic trip unit*, (MICROLOGIC 2.0, 5.0, 6.0, 7.0, types A, P et/*and* H)

constructeur / *manufacturer* : SCHNEIDER ELECTRIC SA
marque commerciale / *trademark* : MERLIN GERIN

## selon le(s) référentiel(s) / *according to standard(s)* :

CEI/IEC 60947-2 (2003-04) ed.3, sequence II, § 8.3.4 et/*and* sequence III, § 8.3.5

## caractéristiques assignées / *rated characteristics* :

Courant d'emploi / *Operational current*, (Ie) : 630 A a/*up to* 1600 A
Tension d'emploi / *Operational voltage*, (Ue) : 220 Vac a/*up to* 690 Vac
Fréquence / *Frequency* : 50 Hz - 60 Hz
Tension d'isolement / *Insulation voltage*, (Ui) : 800 V
Tension de tenue aux chocs / *Impulse withstand voltage*, (Uimp) : 8 kV

Pouvoirs de coupure de service et ultime en court-circuit / *Service and ultimate short-circuit breaking capacities*,

| $U_e$ (V) | $I_{cu}$ (kA) | $I_{cs75\%}$ (kA) pour / for In=630 à / 1250 A | $I_{cs50\%}$ (kA) pour / for In=1600A |
|---|---|---|---|
| 220/240, 380/415 | 70 | 52.5 | 35 |
| 440 | 65 | 48.75 | 32.5 |
| 500/525 | 50 | 37.5 | 25 |
| 660/690 | 42 | 31.5 | 21 |

Catégorie d'utilisation / *Utilization category* : B
Température de référence / *Reference temperature* : 40°C
Appareil apte au sectionnement / *Device suitable for isolation* : oui / *yes*
Service / *Duty* : ininterrompu / *uninterrupted*

## document(s) pris en compte (s) / *relevant document(s)* :

**Rapport (s) d'essai / *Test report (s)* :** F01.04.19, F01.04.20

Ce certificat ne s'applique qu'à l'échantillon soumis à l'essai de type / *This certificate applies only to the sample submitted to the type test.*

Fontenay-aux-Roses,
Le / on : 2005-12-22

Le Président de l'ASEFA / *The chairman of ASEFA*,

M. BRENON



33, av du général leclerc
92260 Fontenay-aux-roses – France
tél. 01 40 95 63 34
fax 01 40 95 88 18
e-mail : asefa@lcie.fr

"КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС

Accréditation n° 5-0037 Portée communiquée sur demande

ВЯРНО С ОРИГИНАЛА

**Test platform accredited**
Under the Nr F01 by :

asefa

**File nr : 31042**

# RECORD OF PROVING TEST n° : F01.04.20

**Issued to :** SCHNEIDER ELECTRIC INDUSTRIES SAS
89, boulevard Franklin Roosevelt
F-92500 RUEIL-MALMAISON FRANCE

**Apparatus tested :** Low-voltage circuit-breaker

reference : Compact NS 630b H , 1600 H
with trip unit MICROLOGIC 5.0A

manufacturer : SCHNEIDER ELECTRIC SA
Trademark : MERLIN GERIN

**Purpose of the test :** Test at the rated ultimate (Icu) short-circuit breaking capacity according to the IEC 60947-2 ed.3 (04/2003) seq.III §8.3.5

**Rated characteristics :**

| | |
|---|---|
| Operational Voltage | 220V to 690V |
| Rated current | 630A to 1600A |
| Rated ultimate short circuit breaking capacity | 220-240V / 70kA |
| | 380-415V / 70kA |
| | 440V / 65kA |
| | 500-525V / 50kA |
| | 660-690V / 42kA |

**Date or period of test :** November 18th 2004 to January 14th 2005

**This record of proving test comprises :** 68 page(s) + 30 appendixe(s)
The results obtained during tests entered in this record of proving test justify the rated characteristics assigned by the Manufacturer as stated above.

**Date of issue :** August 19th 2005

The technical responsible :

Name : E. FERNANDEZ Signature :

*This document results from tests carried out on a sample. It does not prejudge the compliance of the whole manufactured products with the tested specimen.*
*This record of proving test shall only be reproduced in the complete form..*
*COFRAC accreditation is an attestation of the laboratory technical competence within the field of test covered by the accreditation*

Test perfomed by : VOLTA LABORATORY - SCHNEIDER ELECTRIC
2 rue Volta 38050 GRENOBLE Cedex 09

cofrac
ESSAIS
Accreditation
Nr 1-0140
Scope on request

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## Description and characterization of the test object

### Characteristics

**Type of circuit-breaker:** **Compact NS 630bH , 1600 H**

| | |
|---|---|
| Number of poles | 4 |
| Kind of current | a.c. |
| Number of phases | 3 |
| Rated frequency | 50/60 Hz |
| Utilization category | B |
| Reference temperature | 40 °C |
| Suitability for isolation | yes |

Rated and limiting values: (according to test volume)

**Main circuit:**

| | |
|---|---|
| Rated impulse withstand voltage $U_{imp}$ | 8 kV |
| Rated insulation voltage $U_i$ | 800 V |
| Conventional thermal current $I_{th}$ / $I_{the}$ | 630A to 1600A |
| Rated current $I_n$ | 630A to 1600A |
| Rated current in the neutral pole | 630A to 1600A |

Short-circuit characteristics:

| $U_e$/V | $I_{cm}$/kA | $I_{cu}$/kA | $I_{cs75\%}$/kA For In=630 to 1250A | $I_{cs50\%}$/kA For In=1600A | $I_{cw}$/kA | $I_{IT}$/kA |
|---|---|---|---|---|---|---|
| 220/240 | 154 | 70 | 52.5 | 35 | 19,2 | ./. |
| 380/415 | 154 | 70 | 52.5 | 35 | 19,2 | ./. |
| 440 | 143 | 65 | 48.75 | 32,5 | 19,2 | ./. |
| 500/525 | 105 | 50 | 37.5 | 25 | 19,2 | ./. |
| 660/690 | 88.2 | 42 | 31.5 | 21 | 19,2 | ./. |

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**Control circuits:**

**Electrical control circuits:**

| | |
|---|---|
| Kind of current | a.c. or d.c. |
| Rated frequency | 50/60Hz |
| Rated control circuit voltage $U_c$ | MN:24 to 480Vac , 24 to 250Vdc<br>MX:24 to 480Vac , 12 to 250Vdc |
| Rated control supply voltage $U_s$ | ./. V |
| Rated impulse withstand voltage $U_{imp}$ | 8 kV |
| Rated insulation voltage $U_i$ | 690 V |

**Air-supply control circuits:**

| | |
|---|---|
| Rated supply pressure | ./. kPa |
| Limits of pressure | ./. kPA |
| Required volume for each closing operation | ./. $m^3$ |
| Required volume for each opening operation | ./. $m^3$ |

**Auxiliary circuits:**

| | |
|---|---|
| Rated operational voltage $U_e$ | 240 to 690Vac and 24 to 250Vdc |
| Rated impulse withstand voltage $U_{imp}$ | 8 kV |
| Rated insulation voltage $U_i$ | 690 V |
| Rated frequency | 50/60 Hz |
| Rated operational current $I_e$ | according models |
| Number of circuits | according models |
| Number and kind of contact elements | OF/SDE/SD/MN/MX/ |

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**Releases:**

- Shunt release:

| | |
|---|---|
| - Rated control circuit voltage $U_c$ | MX:24 to 480Vac , 12 to 250Vdc |
| - Kind of current | a.c. or d.c. |
| - Rated frequency if a.c. | 50/60 Hz |

- Undervoltage or no-voltage release

| | |
|---|---|
| - Rated control circuit voltage $U_c$ | MN:24 to 480Vac, 24 to 250Vdc |
| - Kind of current | a.c. or d.c. |
| - Rated frequency if a.c. | 50/60 Hz |

- Over-current release:

- Short-circuit release

| | |
|---|---|
| - Instantaneous release | yes |
| - definite time-delay release | yes |
| - Rated current $I_n$ | 630 to 1600 A |
| - Kind of current | a.c. |
| - Rated frequency if a.c. | 50/60 Hz |
| - Current setting (or range of settings) | Isd:1.5 to 10xIr<br>Ii=2 to 15 In |
| - Time setting (or range of settings) | Tsd : 0.1 to 0.4s, on, off |

- Overload release (IEC 60947-1; 2.4.30):

| | |
|---|---|
| - instantaneous release | No |
| - definite time-delay release | No |
| - Inverse time-delay release | No |
| dependent on ambient air temperature | No |
| independent of ambient air temperature | Yes |
| - Reference temperature | 40°C |
| - Rated current $I_n$ | 630 to 1600A |
| - Kind of current | a.c. |
| - Rated frequency if a.c. | 50/60 Hz |
| - Current setting (or range of settings) | 0.4 to 1 In |
| - Time setting (or range of settings) | tr: 0.5 to 24 s |

ИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС

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# TEST SEQUENCE III

**Rated ultimate short-circuit breaking capacity**

Test sequence III comprises the following tests:

Test sequence III comprises the following tests:

| Sample Nb | Type | Test | Ir | Ics Tested | Supply | pages |
|---|---|---|---|---|---|---|
| 31042.05 | NS1600H | Single Ph. | 1600A | 42kA/240V | Upper | 8-14 |
| 31042.06 | NS630bH | Single Ph. | 630Ax0,4 | 42kA/240V | Upper | 15-21 |
| 31042.07 | NS1600H | Single Ph. | 1600A | 39kA/254V | Upper | 22-28 |
| 31042.08 | NS1600H | Single Ph. | 1600A | 25,2kA/398V | Lower | 29-35 |
| 31042.09 | NS1600H | 3 Ph. | 1600A | 70kA/415V | Upper | 36-42 |
| 31042.10 | NS630bH | 3 Ph. | 630Ax0,4 | 70kA/415V | Upper | 43-49 |
| 31042.11 | NS1600H | 3 Ph. | 1600A | 65kA/440V | Upper | 50-56 |
| 31042.12 | NS1600H | 3 Ph. | 1600A | 42kA/690V | Lower | 57-63 |

The MICROLOGIC tripping unit being independent of the temperature, the connections used for testing tripping caracteristics differ from thoses given in the tables of standard
( refer to IEC 60947-2 note 2 of 8.3.5.1 )



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| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 Table 9, 10 and 11 | Cabling characteristics | | | |
| | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | ./. mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22,5 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 3200 A | 3200 A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 220 s |
| | | $Ph_1$ | ≤ 270 s | 226 s |
| | | $Ph_2$ | ≤ 270 s | 220 s |
| | | $Ph_3$ | ≤ 270 s | 221 s |

| ASEFA | Test report No.: F01.04.20<br>Page 9 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.05 |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| 8.3.5.2<br>8.3.6.4<br>8.3.7.6 | **ADDITIONAL SEQUENCE OF SHORT-CIRCUIT OPERATIONS ON FOUR POLE CIRCUIT-BREAKERS** | | | |
| | Test made on the same sample as for the three-pole short-circuit or on a new sample | | same/new | new |
| | Rated operational voltage $U_e$ | | 415 V | |
| | Test voltage | | $U_e/\sqrt{3}$ | 240 V |
| | Recovery voltage | | 1.05 x $U_e/\sqrt{3}$ | 252 V |
| | Rated ultimate short-circuit breaking capacity $I_{cu}$ | | 42 kA | |
| | Rated short-time withstand current $I_{cw}$ | | 19.2 kA | |
| | Short-circuit breaking capacity of the fourth pole (by arrangement) (not less than 60 % of $I_{cu}$ or $I_{cw}$ as applicable) | | | 42 kA |
| Table 11 | Power factor | | 0,25 | 0,25(+0;-0,05) |
| | Frequency | | 50/60 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | | 0.85 x $U_s$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | | ./. ms |
| | Sequence of operation | | O - t - CO | O - t - CO |
| | Circuit diagram | | | Page 66 |
| | Calibration of the test circuit | | Pageform 169 | Next page |
| | Safety area | | Pageform | Page 65 |
| | Installation of the material tested | | Pageform | Page 64 |
| | Energization direction | | Top/Bottom | Top |
| 60947-1<br>Table 9, 10 and 11 | Cabling characteristics | | | |
| | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | | ./. x ./. mm | 100 x 10 mm |
| | Number | | ./. | 1 |
| | Length | supply side | ./. mm | 500 mm |
| | | load side | ./. mm | 0 mm |
| | Tightening torque | | | 50 Nm |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | |
| | Oscillogram | | 20040283-0102<br>20040283-0103 |
| | Applied voltage | | 260 V |
| | Frequency | 50 Hz | 50 Hz |
| | RMS current value<br>at 20 ms | $i_1$<br>$i_2$<br>$i_3$ | 43,7 kA<br>./. kA<br>./. kA |
| | Average RMS. Value | | 43,7 kA |
| | Peak current maximum value | | 87,53 kA |
| | Power factor | | 0,23 |



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| ASEFA | Test report No.: F01.04.20<br>Page 11 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.05 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040283.0104 |
| | Peak current value | $I_1$ | 75,33 kA |
| | Total duration | | 16,15 ms |
| | Recovery voltage (phase to neutral) | $U_{r(1\text{-}N)}$ | 260 V |
| | Ratio between $U_r$ and $U_e$ | $U_r/U_e$ | 1,08 |
| | Joule integral | $I^2t_1$ | 33,15 (kA)$^2$s |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time interval between operations | 3 min | 10 min |
| | **OPERATION "CO"** | | |
| | Oscillogram | | 20040283.0105 |
| | Applied voltage | | 257 V |
| | Peak current value | $I_1$ | 63,41 kA |
| | Total duration | | 22,7 ms |
| | Recovery voltage (phase to neutral) | $U_{r(1\text{-}N)}$ | 256 V |
| | Ratio between $U_r$ and $U_e$ | $U_r/U_e$ | 1,06 |
| | Joule integral | $I^2t_1$ | 25,28 A$^2$s |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |



ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1000 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1000 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =457 V | 457 V |
| 60947-1<br>7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | <1 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |

ДЕХ-БЪЛГАРИЯ" ООД
КИМТЕХ
БУРГАС



ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22,5 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs}$ = $I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 4000 A | 4000 A |
| 8.3.5.4 | Test sequence II ($I_{cs}$ = $I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 133 s |
| | | $Ph_1$ | ≤ 270 s | 126 s |
| | | $Ph_2$ | ≤ ./. s | ./. s |

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|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.06 |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | 185 mm² | 185 mm² |
| and 11 | Bar | | ./. x ./. mm | ./. x ./. mm |
| | Number | | 1 | 1 |
| | Length | | ./. mm | 2000 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 630x0,4=252A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 504 A | 504 A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 213 s |
| | | $Ph_1$ | ≤ 270 s | 235 s |
| | | $Ph_2$ | ≤ 270 s | 2[illegible]7 s |
| | | $Ph_3$ | ≤ 270 s | 2[illegible]8 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 8.3.5.2<br>8.3.6.4<br>8.3.7.6 | **ADDITIONAL SEQUENCE OF SHORT-CIRCUIT OPERATIONS ON FOUR POLE CIRCUIT-BREAKERS** | | |
| | Test made on the same sample as for the three-pole short-circuit or on a new sample | same/new | New |
| | Rated operational voltage $U_e$ | 415 V | |
| | Test voltage | $U_e/\sqrt{3}$ | 240 V |
| | Recovery voltage | 1.05 x $U_e/\sqrt{3}$ | 252 V |
| | Rated ultimate short-circuit breaking capacity $I_{cu}$ | 42 kA | |
| | Rated short-time withstand current $I_{cw}$ | ./. kA | |
| | Short-circuit breaking capacity of the fourth pole (by arrangement) (not less than 60 % of $I_{cu}$ or $I_{cw}$ as applicable) | | ./. kA |
| Table 11 | Power factor | 0.20-0.25 | .... |
| | Frequency | 50 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | 0.85 x $U_s$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | ./. ms |
| | Sequence of operation | O - t - CO | O - t - CO |
| | Circuit diagram | | Page 66 |
| | Calibration of the test circuit | Pageform 169 | Next page |
| | Safety area | Pageform | Page 65 |
| | Installation of the material tested | Pageform | Page 64 |
| | Energization direction | Top/Bottom | Top |
| 60947-1<br>Table 9, 10 and 11 | Cabling characteristics | | |
| | Cable | ./. mm$^2$ | ./. mm$^2$ |
| | Bar | ./. x ./. mm | 100 x 10 mm |
| | Number | ./. | 1 |
| | Length — supply side | ./. mm | 500 mm |
| | Length — load side | ./. mm | 0 mm |
| | Tightening torque | | 50 Nm |

„КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС

ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | |
| | Oscillogram | | 20040283-0103<br>20040283-0102 |
| | Applied voltage | | 260 V |
| | Frequency | 50 Hz | 50 Hz |
| | RMS current value<br>at 20 ms | $i_1$<br>$i_2$<br>$i_3$ | 43.7 kA<br>./. kA<br>./. kA |
| | Average RMS. Value | | 43.7 kA |
| | Peak current maximum value | | 87.53 kA |
| | Power factor | | 0,23 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040283-0106 |
| | Peak current value | $i_1$ | 75.35 kA |
| | Total duration | | 16.4 ms |
| | Recovery voltage (phase to neutral) | $U_{r(1\text{-}N)}$ | 257 V |
| | Ratio between $U_r$ and $U_e$ | $U_r/U_e$ | 1.07 |
| | Joule integral | $Ph_1$ | 33.55 $(kA)^2s$ |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time Interval between operations | 3 min | 4 min |
| | **OPERATION "CO"** | | |
| | Oscillogram | | 20040283-0107 |
| | Applied voltage | | 257 V |
| | Peak current value | $i_1$ | 61.6 kA |
| | Total duration | | 24.6 ms |
| | Recovery voltage (phase to neutral) | $U_{r(1\text{-}N)}$ | 257 V |
| | Ratio between $U_r$ and $U_e$ | $U_r/U_e$ | 1.07 |
| | Joule integral | $Ph_1$ | 27.2 $(kA)^2s$ |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1000 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1000 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =457 V | 457 V |
| 60947-1<br>7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | 5 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | 185 mm$^2$ | 185 mm$^2$ |
| and 11 | Bar | | ./. x ./. mm | ./. x ./. mm |
| | Number | | 1 | 1 |
| | Length | | ./. mm | 2000 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 21,6 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 252 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 630 A | 630 A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | NETRAL | ≤ 270 s | 129 s |
| | | $Ph_1$ | ≤ 270 s | 135 s |
| | | $Ph_2$ | ≤ ./. s | ./. s |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | 500 mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22,6 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 3200 A | 3200 A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 238 s |
| | | $Ph_1$ | ≤ 270 s | 239 s |
| | | $Ph_2$ | ≤ 270 s | 237 s |
| | | $Ph_3$ | ≤ 270 s | 231 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 8.3.5.2<br>8.3.6.4<br>8.3.7.6 | **ADDITIONAL SEQUENCE OF SHORT-CIRCUIT OPERATIONS ON FOUR POLE CIRCUIT-BREAKERS** | | |
| | Test made on the same sample as for the three-pole short-circuit or on a new sample | same/new | New |
| | Rated operational voltage $U_e$ | 440 V | |
| | Test voltage | $U_e/\sqrt{3}$ | 254 V |
| | Recovery voltage | 1.05 x $U_e/\sqrt{3}$ | 267 V |
| | Rated ultimate short-circuit breaking capacity $I_{cu}$ | 39 kA | |
| | Rated short-time withstand current $I_{cw}$ | 19.2 kA | |
| | Short-circuit breaking capacity of the fourth pole (by arrangement) (not less than 60 % of $I_{cu}$ or $I_{cw}$ as applicable) | | 39 kA |
| Table 11 | Power factor | 0.20-0.25 | 0.22 |
| | Frequency | 50 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | 0.85 x $U_s$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | ./. ms |
| | Sequence of operation | O - t - CO | O - t - CO |
| | Circuit diagram | | Page 66 |
| | Calibration of the test circuit | Pageform 169 | Next page |
| | Safety area | Pageform | Page 65 |
| | Installation of the material tested | Pageform | Page 64 |
| | Energization direction | Top/Bottom | Top |
| 60947-1<br>Table 9, 10<br>and 11 | Cabling characteristics | | |
| | Cable | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | ./. x ./. mm | 100 x 10 mm |
| | Number | ./. | 1 |
| | Length supply side | ./. mm | 500 mm |
| | load side | ./. mm | 500 mm |
| | Tightening torque | | 50 Nm |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | |
| | Oscillogram | | 20040283-0108<br>20040283-0113 |
| | Applied voltage | | 277 V |
| | Frequency | 50 Hz | 50 Hz |
| | RMS current value<br>at 20 ms | $i_1$<br>$i_2$<br>$i_3$ | 39.52 kA<br>./. kA<br>./. kA |
| | Average RMS. Value | | 39.52 kA |
| | Peak current maximum value | | 83.05 kA |
| | Power factor | | 0,22 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040283-0116 |
| | Peak current value | $i_1$ | 73 kA |
| | Total duration | | 16.9 ms |
| | Recovery voltage (phase to neutral) | $U_{r(1-N)}$ | 277 V |
| | Ratio between $U_r$ and $U_e$ | $U_r/U_e$ | 1.09 |
| | Joule integral | $I^2t_1$ | 31.42 $(kA)^2s$ |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time interval between operations | 3 min | 3 min |
| | **OPERATION "CO"** | | |
| | Oscillogram | | 20040283-0117 |
| | Applied voltage | | 280 V |
| | Peak current value | $i_1$ | 60.5 kA |
| | Total duration | | 17.9 ms |
| | Recovery voltage (phase to neutral) | $U_{r(1-N)}$ | 276.7 V |
| | Ratio between $U_r$ and $U_e$ | $U_r/U_e$ | 1.08 |
| | Joule integral | $I^2t_1$ | 22.63 $(kA)^2s$ |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1000 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1000 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |



"КИМТЕХ-БЪЛГАРИЯ" ООД

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =484 V | 484 V |
| 60947-1<br>7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | 0.5 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 Table 9, 10 and 11 | Cabling characteristics | | | |
| | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 21.3 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 4000 A | 4000 A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 132 s |
| | | $Ph_1$ | ≤ 270 s | 129 s |
| | | $Ph_2$ | ≤ ./. s | ./. s |
| | | $Ph_3$ | ≤ ./. s | ./. s |



"КИМТЕХ-БЪЛГАРИЯ" ООД
ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22.6 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 3200 A | 3200 A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 235 s |
| | | $Ph_1$ | ≤ 270 s | 219 s |
| | | $Ph_2$ | ≤ 270 s | 223 s |
| | | $Ph_3$ | ≤ 270 s | 223 s |

| **ASEFA** | Test report No.: F01.04.20<br>Page 30 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.08 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 8.3.5.2<br>8.3.6.4<br>8.3.7.6 | **ADDITIONAL SEQUENCE OF SHORT-CIRCUIT OPERATIONS ON FOUR POLE CIRCUIT-BREAKERS** | | |
| | Test made on the same sample as for the three-pole short-circuit or on a new sample | same/new | New |
| | Rated operational voltage $U_e$ | 690 V | |
| | Test voltage | $U_e/\sqrt{3}$ | 398 V |
| | Recovery voltage | 1.05 x $U_e/\sqrt{3}$ | 418 V |
| | Rated ultimate short-circuit breaking capacity $I_{cu}$ | 25,2 kA | |
| | Rated short-time withstand current $I_{cw}$ | 19.2 kA | |
| | Short-circuit breaking capacity of the fourth pole (by arrangement) (not less than 60 % of $I_{cu}$ or $I_{cw}$ as applicable) | | 39 kA |
| Table 11 | Power factor | 0.25 | 0.25(+0,-0,05) |
| | Frequency | 50 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | 0.85 x $U_s$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | ./. ms |
| | Sequence of operation | O - t - CO | O - t - CO |
| | Circuit diagram | | Page 66 |
| | Calibration of the test circuit | Pageform 169 | Next page |
| | Safety area | Pageform | Page 65 |
| | Installation of the material tested | Pageform | Page 64 |
| | Energization direction | Top/Bottom | Top |
| 60947-1<br>Table 9, 10 and 11 | Cabling characteristics | | |
| | Cable | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | ./. x ./. mm | 100 x 10 mm |
| | Number | ./. | 1 |
| | Length supply side | ./. mm | 500 mm |
| | load side | ./. mm | 500 mm |
| | Tightening torque | | 50 Nm |

Test laboratory: F01- GRENOBLE
ASEFA recognised PLATFORM

TRF IEC/EN 60947-2
Ed. 2, form 18

Date August 19th 2005

| Standard and clause | Kind of tests and requirements | | | Test values Results |
| --- | --- | --- | --- | --- |
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | | |
| | Oscillogram | | | 20040283-0119<br>20040283-0122 |
| | Applied voltage | | | 448.56 V |
| | Frequency | 50 Hz | | 50 Hz |
| | RMS current value<br>at 20 ms | | $I_1$<br>$I_2$<br>$I_3$ | 26.46 kA<br>./. kA<br>./. kA |
| | Average RMS. Value | | | 26.46 kA |
| | Peak current maximum value | | | 56.23 kA |
| | Power factor | | | 0,2 |

| ASEFA | Test report No.: F01.04.20<br>Page 32 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.08 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040283.0123 |
| | Peak current value | $I_1$ | 54.67 kA |
| | | $I_2$ | ./. kA |
| | | $I_3$ | ./. kA |
| | Maximum total duration | | 19 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☐ or $U_{r(1-N)}$ ☒ | 432.12 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☐ or $U_{r(2-N)}$ ☐ | ./. V |
| | | $U_{r(3-1)}$ ☐ or $U_{r(3-N)}$ ☐ | ./. V |
| | Average value | $U_{rm}$ | 432.12 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.08 |
| | Joule integral | $Ph_1$ | 19.5 $(kA)^2s$ |
| | | $Ph_2$ | ./. $(kA)^2s$ |
| | | $Ph_3$ | ./. $(kA)^2s$ |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time interval between operations | 3 min | 4 min |
| | **OPERATION "CO1"** | | |
| | Oscillogram | | 20040283.0124 |
| | Applied voltage | | 435.05 V |
| | Peak current value | $I_1$ | 53.75 kA |
| | | $I_2$ | ./. kA |
| | | $I_3$ | ./. kA |
| | Maximum total duration | | 18.05 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☐ or $U_{r(1-N)}$ ☒ | 434.56 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☐ or $U_{r(2-N)}$ ☐ | ./. V |
| | | $U_{r(3-1)}$ ☐ or $U_{r(3-N)}$ ☐ | ./. V |
| | Average value | $U_{rm}$ | 434.56 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.09 |
| | Joule integral | $Ph_1$ | 18.72 $(kA)^2s$ |
| | | $Ph_2$ | ./. $(kA)^2s$ |
| | | $Ph_3$ | ./. $(kA)^2s$ |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1380 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1380 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =759 V | 759 V |
| 60947-1 7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | 0 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 10 mm |
| | Number | | 2 | 1 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 21.3 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 4000 A | 4000 A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 126 s |
| | | Ph1 | ≤ 270 s | 131 s |
| | | Ph2 | ≤ ./. s | ./. s |
| | | Ph3 | ≤ ./. s | ./. s |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 10 mm |
| | Number | | 2 | 1 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22.5 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 3200 A | 3200 A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 237 s |
| | | $Ph_1$ | ≤ 270 s | 228 s |
| | | $Ph_2$ | ≤ 270 s | 221 s |
| | | $Ph_3$ | ≤ 270 s | 235 s |



ООД · БЪЛГАРИЯ · ЕЛКИМТЕХ-БЪЛГАРИЯ

ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| 8.3.5.2 | **RATED ULTIMATE SHORT-CIRCUIT BREAKING CAPACITY** | | | |
| | Utilization category | | B | |
| | Rated operational voltage $U_e$ | | 415 V | |
| | Recovery voltage | | 1.05 x $U_e$ | 435.75 V |
| | Rated ultimate short-circuit breaking capacity | | $I_{cu}$ | 70 kA |
| | Rated short-circuit making capacity | | $I_{cm}$ | 154 kA |
| Table 11 | Power factor | | 0.20 | 0.20 |
| | Frequency | | 50 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | | 0.85 x $U_e$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | | ./. ms |
| | Sequence of operation | | O - t - CO | O - t - CO |
| | Circuit diagram | | | Page 66 |
| | Calibration of the test circuit | | Pageform | Next page |
| | Safety area | | Pageform | Page 65 |
| | Installation of the material tested | | Pageform | Page 64 |
| | Energization direction | | Top/Bottom | Top |
| 8.3.2.1 | Smallest individual enclosure (if applicable) | | | |
| | Type | | | ./. |
| | Kind of material | | | ./. |
| | Inside dimensions | | | |
| | Height | | | ./. mm |
| | Width | | | ./. mm |
| | Depth | | | ./. mm |
| 60947-1 Table 9, 10 and 11 | Cabling characteristics | | | |
| | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | | 100 x 5 mm | 100 x 10 mm |
| | Number | | 2 | 1 |
| | Length | supply side | ./. mm | 350 mm |
| | | load side | ./. mm | 350 mm |
| | Tightening torque | | | 50 Nm |

| **ASEFA** | Test report No.: F01.04.20<br>Page 38 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.09 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | |
| | Oscillogram | | 20040288-0003<br>20040288-0007 |
| | Applied voltage | | 440.17 V |
| | Frequency | 50 Hz | 50 Hz |
| | RMS current value<br>at 20 ms | $i_1$<br>$i_2$<br>$i_3$ | 70.21 kA<br>70.99 kA<br>69.51 kA |
| | Average RMS. Value | | 70.23 kA |
| | Peak current maximum value | | 156.12 kA |
| | Power factor | | 0,17 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040288.0011 |
| | Peak current value | $i_1$ | 123.58 kA |
| | | $i_2$ | 111.73 kA |
| | | $i_3$ | 66.26 kA |
| | Maximum total duration | | 12.8 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 443.07 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 443.15 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 443.16 V |
| | Average value | $U_m$ | 443.13 V |
| | Ratio between $U_m$ and $U_e$ | $U_m/U_e$ | 1.06 |
| | Joule integral | $Ph_1$ | 74.45 $(kA)^2s$ |
| | | $Ph_2$ | 63.58 $(kA)^2s$ |
| | | $Ph_3$ | 18.06 $(kA)^2s$ |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time interval between operations | 3 min | 3 min |
| | **OPERATION "CO1"** | | |
| | Oscillogram | | 20040288.0012 |
| | Applied voltage | | 450.46 V |
| | Peak current value | $i_1$ | 118.6 kA |
| | | $i_2$ | 114.5 kA |
| | | $i_3$ | 65.68 kA |
| | Maximum total duration | | 13.6 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 444.72 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 445.21 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 443.97 V |
| | Average value | $U_m$ | 444.63 V |
| | Ratio between $U_m$ and $U_e$ | $U_m/U_e$ | 1.07 |
| | Joule integral | $Ph_1$ | 67.25 $(kA)^2s$ |
| | | $Ph_2$ | 67.14 $(kA)^2s$ |
| | | $Ph_3$ | 20.07 $(kA)^2s$ |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |

| ASEFA | Test report No.: F01.04.20<br>Page 40 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.09 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1000 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1000 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |



ЕЛКИМТЕХ-БЪЛГАРИЯ ООД * СОФИЯ
ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =457 V | 457 V |
| 60947-1<br>7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | 0.08 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |



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ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 Table 9, 10 and 11 | Cabling characteristics | | | |
| | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 18.4 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 4000 A | 4000 A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 124 s |
| | | $Ph_1$ | ≤ 270 s | 130 s |
| | | $Ph_2$ | ≤ 270 s | 128 s |
| | | $Ph_3$ | ≤ 270 s | 126 s |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | 185 $mm^2$ |
| and 11 | Bar | | 40 x 5 mm | ./. x ./. mm |
| | Number | | 2 | 1 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 630*0.4=252A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 504 A | 504 A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 207 s |
| | | $Ph_1$ | ≤ 270 s | 212 s |
| | | $Ph_2$ | ≤ 270 s | 225 s |
| | | $Ph_3$ | ≤ 270 s | 217 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 8.3.5.2 | **RATED ULTIMATE SHORT-CIRCUIT BREAKING CAPACITY** | | |
| | Utilization category | B | |
| | Rated operational voltage $U_e$ | 415 V | |
| | Recovery voltage | 1.05 x $U_e$ | 435.75 V |
| | Rated ultimate short-circuit breaking capacity | $I_{cu}$ | 70 kA |
| | Rated short-circuit making capacity | $I_{cm}$ | 154 kA |
| Table 11 | Power factor | 0.20 | 0.20(+0,-0,05) |
| | Frequency | 50 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | 0.85 x $U_s$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | ./. ms |
| | Sequence of operation | O - t - CO | O - t - CO |
| | Circuit diagram | | Page 66 |
| | Calibration of the test circuit | Pageform | Next page |
| | Safety area | Pageform | Page 65 |
| | Installation of the material tested | Pageform | Page 64 |
| | Energization direction | Top/Bottom | Top |
| 8.3.2.1 | Smallest individual enclosure (if applicable) | | |
| | Type | | ./. |
| | Kind of material | | ./. |
| | Inside dimensions | | |
| | Height | | ./. mm |
| | Width | | ./. mm |
| | Depth | | ./. mm |
| 60947-1 Table 9, 10 and 11 | Cabling characteristics | | |
| | Cable | ./. mm² | ./. mm² |
| | Bar | 40 x 5 mm | 40 x 5 mm |
| | Number | 2 | 2 |
| | Length supply side | ./. mm | 350 mm |
| | load side | ./. mm | 350 mm |
| | Tightening torque | | 50 Nm |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | |
| | Oscillogram | | 20040288-0003<br>20040288-0007 |
| | Applied voltage | | 440.17 V |
| | Frequency | 50 Hz | 50 Hz |
| | RMS current value<br>at 20 ms | $i_1$<br>$i_2$<br>$i_3$ | 70.21 kA<br>70.99 kA<br>69.51 kA |
| | Average RMS. Value | | 70.23 kA |
| | Peak current maximum value | | 156.12 kA |
| | Power factor | | 0,17 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040288.0013 |
| | Peak current value | $I_1$ | 122.69 kA |
| | | $I_2$ | 114.04 kA |
| | | $I_3$ | 69.83 kA |
| | Maximum total duration | | 13,45 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 443.07 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 443.52 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 443.19 V |
| | Average value | $U_{rm}$ | 443.26 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.06 |
| | Joule integral | $Ph_1$ | 75.29 $(kA)^2s$ |
| | | $Ph_2$ | 67.36 $(kA)^2s$ |
| | | $Ph_3$ | 20.94 $(kA)^2s$ |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time interval between operations | 3 min | 3 min |
| | **OPERATION "CO1"** | | |
| | Oscillogram | | 20040288.0014 |
| | Applied voltage | | 448.34 V |
| | Peak current value | $I_1$ | 70.71 kA |
| | | $I_2$ | 109.66 kA |
| | | $I_3$ | 123.37 kA |
| | Maximum total duration | | 14,4 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 442.94 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 442.13 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 442.98 V |
| | Average value | $U_{rm}$ | 442.68 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.06 |
| | Joule integral | $Ph_1$ | 27.23 $(kA)^2s$ |
| | | $Ph_2$ | 49.66 $(kA)^2s$ |
| | | $Ph_3$ | 79.18 $(kA)^2s$ |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 8.3.5.2 | **RATED ULTIMATE SHORT-CIRCUIT BREAKING CAPACITY** | | |
| | Utilization category | B | |
| | Rated operational voltage $U_e$ | 690 V | |
| | Recovery voltage | 1.05 x $U_e$ | 724.5 V |
| | Rated ultimate short-circuit breaking capacity | $I_{cu}$ | 42 kA |
| | Rated short-circuit making capacity | $I_{cm}$ | 88.2 kA |
| Table 11 | Power factor | 0.25 | 0.25(+0,-0,05) |
| | Frequency | 50 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | 0.85 x $U_s$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | ./. ms |
| | Sequence of operation | O - t - CO | O - t - CO |
| | Circuit diagram | | Page 66 |
| | Calibration of the test circuit | Pageform | Next page |
| | Safety area | Pageform | Page 65 |
| | Installation of the material tested | Pageform | Page 64 |
| | Energization direction | Top/Bottom | Bottom |
| 8.3.2.1 | Smallest individual enclosure (if applicable) | | |
| | Type | | ./. |
| | Kind of material | | ./. |
| | Inside dimensions | | |
| | Height | | ./. mm |
| | Width | | ./. mm |
| | Depth | | ./. mm |
| 60947-1 | Cabling characteristics | | |
| Table 9, 10 | Cable | ./. mm² | ./. mm² |
| and 11 | Bar | 100 x 5 mm | 100 x 10 mm |
| | Number | 2 | 1 |
| | Length supply side | ./. mm | 500 mm |
| | load side | ./. mm | 500 mm |
| | Tightening torque | | 50 Nm |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | |
| | Oscillogram | | 20040283-0141<br>20040283-0150 |
| | Applied voltage | | 735,65 V |
| | Frequency | 50 Hz | 50 Hz |
| | RMS current value<br>at 20 ms | $i_1$<br>$i_2$<br>$i_3$ | 42.00 kA<br>42.32 kA<br>43.26 kA |
| | Average RMS. Value | | 42.49 kA |
| | Peak current maximum value | | 91.48 kA |
| | Power factor | | 0,21 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040283.0161 |
| | Peak current value | $i_1$ | 59.64 kA |
| | | $i_2$ | 71.74 kA |
| | | $i_3$ | 82.66 kA |
| | Maximum total duration | | 21.05 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 732.16 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 720.65 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 735.93 V |
| | Average value | $U_{rm}$ | 729.58 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.05 |
| | Joule integral | $Ph_1$ | 22.48 $(kA)^2s$ |
| | | $Ph_2$ | 27,82 $(kA)^2s$ |
| | | $Ph_3$ | 43.40 $(kA)^2s$ |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time interval between operations | 3 min | 4 min |
| | **OPERATION "CO1"** | | |
| | Oscillogram | | 20040283.0162 |
| | Applied voltage | | 764.24 V |
| | Peak current value | $i_1$ | 77.04 kA |
| | | $i_2$ | 49.95 kA |
| | | $i_3$ | 75.50 kA |
| | Maximum total duration | | 18.4 ms |
| | Recovery voltage | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 736.72 V |
| | (phase to phase or phase to neutral) | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 727.47 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 728.68 V |
| | Average value | $U_{rm}$ | 730.96 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.05 |
| | Joule integral | $Ph_1$ | 36.63 $(kA)^2s$ |
| | | $Ph_2$ | 18.67 $(kA)^2s$ |
| | | $Ph_3$ | 31.43 $(kA)^2s$ |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1380 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1380 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =759 V | 759 V |
| 60947-1<br>7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | 0.5 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |

| **ASEFA** | Test report No.: F01.04.20<br>Page 63 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.12 |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 Table 9, 10 and 11 | Cabling characteristics | | | |
| | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 3000 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 19.9 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 4000 A | 4000 A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 120 s |
| | | $Ph_1$ | ≤ 270 s | 118 s |
| | | $Ph_2$ | ≤ 270 s | 127 s |
| | | $Ph_3$ | ≤ 270 s | 132 s |



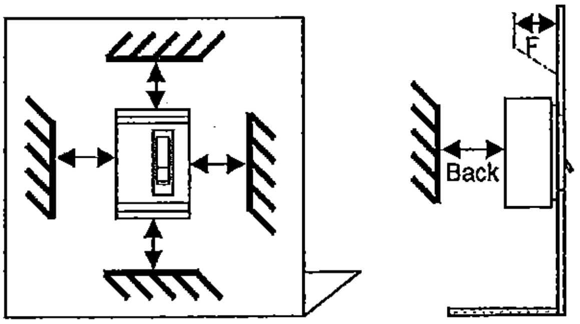
ВЯРНО С ОРИГИНАЛА

## INSTALLATION

The apparatus is set up on a metallic structure, in individual enclosure, fixed on insulated bars. The safety perimeter is materialised by a metallic enclosure ( see next page ) connected to the neutral by a fuse.

The apparatus are operated with an air actuator.

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **SAFETY AREA AND DETECTION OF THE FAULT CURRENT** | | |
| 60947-2 | Characteristics of the metallic screen | | |
| | - structure | woven wire mesh | ./. |
| | | perforated metal | ./. |
| | | expanded metal | Yes |
| | - ratio hole area / total area | 0,45 - 0,65 | ./. |
| | - size of hole | $\leq 30$ mm$^2$ | ./. mm$^2$ |
| | - coating | bare | ./. |
| | | conductive plating | yes |




Top : 120 mm
Left : 10 mm
Right : 10 mm
Bottom : 120 mm
Front : 0 mm
Back : 0 mm

| | | |
|---|---|---|
| | Detection of the fault current | |
| | - prospective fault current in the fusible element circuit | 50 A |
| | - fusible element | |
| | . diameter of copper wire | 0.1 mm |
| | . length | 100 mm |
| | or | |
| | . equivalent fusible element | / |

| ASEFA | Test report No.: F01.04.20<br>Page 47 / 68 |
|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.10 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1000 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1000 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =457 V | 457 V |
| 60947-1<br>7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | 0.05 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | 185 $mm^2$ |
| and 11 | Bar | | 40 x 5 mm | ./. x ./. mm |
| | Number | | 2 | 1 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 20.6 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 630*0.4=252A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs}$ = $I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 630 A | 630 A |
| 8.3.5.4 | Test sequence II ($I_{cs}$ = $I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 131 s |
| | | $Ph_1$ | ≤ 270 s | 136 s |
| | | $Ph_2$ | ≤ 270 s | 127 s |
| | | $Ph_3$ | ≤ 270 s | 127 s |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 3200 A | 3200 A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 228 s |
| | | $Ph_1$ | ≤ 270 s | 204 s |
| | | $Ph_2$ | ≤ 270 s | 215 s |
| | | $Ph_3$ | ≤ 270 s | 226 s |

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|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.11 |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| 8.3.5.2 | **RATED ULTIMATE SHORT-CIRCUIT BREAKING CAPACITY** | | | |
| | Utilization category | | B | |
| | Rated operational voltage $U_e$ | | 440 V | |
| | Recovery voltage | | 1.05 x $U_e$ | 462 V |
| | Rated ultimate short-circuit breaking capacity | | $I_{cu}$ | 65 kA |
| | Rated short-circuit making capacity | | $I_{cm}$ | 143 kA |
| Table 11 | Power factor | | 0.20 | 0.20 |
| | Frequency | | 50 Hz | 50 Hz |
| 8.3.2.1 | Control supply voltage | | 0.85 x $U_s$ ./. V | ./. V |
| 7.2.1.1.3 | Maximum value of the closing time | | | ./. ms |
| | Sequence of operation | | O - t - CO | O - t - CO |
| | Circuit diagram | | | Page 66 |
| | Calibration of the test circuit | | Pageform | Next page |
| | Safety area | | Pageform | Page 65 |
| | Installation of the material tested | | Pageform | Page 64 |
| | Energization direction | | Top/Bottom | Top |
| 8.3.2.1 | Smallest individual enclosure (if applicable) | | | |
| | Type | | | ./. |
| | Kind of material | | | ./. |
| | Inside dimensions | | | |
| | Height | | | ./. mm |
| | Width | | | ./. mm |
| | Depth | | | ./. mm |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. mm$^2$ | ./. mm$^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 10 mm |
| | Number | | 2 | 1 |
| | Length | supply side | ./. mm | 350 mm |
| | | load side | ./. mm | 350 mm |
| | Tightening torque | | | 50 Nm |



ВЯРНО С ОРИГИНАЛА

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| 60947-1<br>8.3.4.1.5 | **CALIBRATION OF THE TEST CRCUIT** | | |
| | Oscillogram | | 20040288-0015<br>20040288-0018 |
| | Applied voltage | | 474.23 V |
| | Frequency | 50 Hz | 50 Hz |
| | RMS current value<br>at 20 ms | $I_1$<br>$I_2$<br>$I_3$ | 66.54 kA<br>66.80 kA<br>64.32 kA |
| | Average RMS. Value | | 65.89 kA |
| | Peak current maximum value | | 139.08 kA |
| | Power factor | | 0,17 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **OPERATION "O"** | | |
| | Oscillogram | | 20040288.0019 |
| | Peak current value | $i_1$ | 113.30 kA |
| | | $i_2$ | 100.34 kA |
| | | $i_3$ | 73.62 kA |
| | Maximum total duration | | 14.5 ms |
| | Recovery voltage (phase to phase or phase to neutral) | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 466.08 V |
| | | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 466.46 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 466.07 V |
| | Average value | $U_{rm}$ | 466.21 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.05 |
| | Joule integral | $Ph_1$ | 65.85 $(kA)^2s$ |
| | | $Ph_2$ | 51.57 $(kA)^2s$ |
| | | $Ph_3$ | 20.68 $(kA)^2s$ |
| | Melting of the fusible element | Yes/No | No |
| | Holes in the PE-sheet (if applicable) | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |
| | Time interval between operations | 3 min | 3 min |
| | **OPERATION "CO1"** | | |
| | Oscillogram | | 20040288.0020 |
| | Applied voltage | | 474.53 V |
| | Peak current value | $i_1$ | 109.61 kA |
| | | $i_2$ | 97.03 kA |
| | | $i_3$ | 77.15 kA |
| | Maximum total duration | | 20.25 ms |
| | Recovery voltage (phase to phase or phase to neutral) | $U_{r(1-2)}$ ☒ or $U_{r(1-N)}$ ☐ | 468.37 V |
| | | $U_{r(2-3)}$ ☒ or $U_{r(2-N)}$ ☐ | 468.39 V |
| | | $U_{r(3-1)}$ ☒ or $U_{r(3-N)}$ ☐ | 468.21 V |
| | Average value | $U_{rm}$ | 468.32 V |
| | Ratio between $U_{rm}$ and $U_e$ | $U_{rm}/U_e$ | 1.06 |
| | Joule integral | $Ph_1$ | 59.66 $(kA)^2s$ |
| | | $Ph_2$ | 47.00 $(kA)^2s$ |
| | | $Ph_3$ | 22.24 $(kA)^2s$ |
| 7.2.1.1.3 | Closing operation time | | ./. ms |
| | Melting of the fusible element | Yes/No | No |
| | Cracks observed | Yes/No | No |
| | if Yes | | Page ./. |

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|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.11 |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1000 V | |
| 8.3.3.6 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1000 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF DIELECTRIC WITHSTAND** | | |
| | Test voltage | | |
| | 2 x $U_e$, min. 1000 V | 1000 V | |
| 8.3.3.5 | Test sequence I | | |
| 8.3.4.3 | Test sequence II | | |
| 8.3.5.3 | Test sequence III | | 1000 V |
| 8.3.6.5 | Test sequence IV | | |
| 8.3.7.3 | Test sequence V, stage 1 | | |
| 8.3.7.7 | Test sequence V, stage 2 | | |
| 8.3.8.5 | Combined test sequence | | |
| B.10.3.1 | Test sequence B.II | | |
| A.5 | Verification of discrimination | | |
| A.6.3 | Verification of back-up protection | | |
| C.3 | Individual pole short-circuit test sequence | | |
| H.3 | Test sequence for circuit-breakers for IT-systems | | |
| 8.3.3.2.2 a) | Application of the test voltage<br>-Main circuit of the circuit-breaker<br>-Isolating contacts of the withdrawable unit (if applicable) | | |
| | Test duration | 5 s | 5 s |

| Standard and clause | Kind of tests and requirements | | Test values Results |
|---|---|---|---|
| | **VERIFICATION OF LEAKAGE CURRENT** | | |
| | **For circuit-breakers suitable for isolation having an operational voltage $U_e$ greater than 50 V.** | | |
| 8.3.3.2 | **- Main circuit of the circuit-breaker**<br>**- Isolating contacts of a withdrawable unit (if applicable)** | | |
| | Test voltage | 1.1 x $U_e$ =484 V | 484 V |
| 60947-1<br>7.2.7 | Application of the test voltage | | |
| | **Leakage current** | | |
| 8.3.3.2 | Test sequence I (in new condition) | ≤ 0.5 mA | ./. mA |
| 8.3.3.5 | Test sequence I (after overload performance) | ≤ 2 mA | ./. mA |
| 8.3.4.3 | Test sequence II | ≤ 2 mA | ./. mA |
| 8.3.5.3 | Test sequence III | ≤ 6 mA | 0.5 mA |
| 8.3.6.5 | Test sequence IV | ≤ 2 mA | ./. mA |
| 8.3.7.3 | Test sequence V, stage 1 | ≤ 2 mA | ./. mA |
| 8.3.7.7 | Test sequence V, stage 2 | ≤ 6 mA | ./. mA |
| 8.3.8.5 | Combined test sequence | ≤ 2 mA | ./. mA |
| C.3 | Individual pole short-circuit test sequence $I_{su}$ | ≤ 6 mA | ./. mA |
| H.3 | Individual pole short-circuit test sequence $I_{IT}$ | ≤ 6 mA | ./. mA |

| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 18.4 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | ./. A | ./. A |
| 8.3.5.1 | Test sequence II ($I_{cs} = I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | 4000 A | 4000 A |
| 8.3.5.4 | Test sequence II ($I_{cs} = I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 137 s |
| | | $Ph_1$ | ≤ 270 s | 136 s |
| | | $Ph_2$ | ≤ 270 s | 132 s |
| | | $Ph_3$ | ≤ 270 s | 134 s |

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|---|---|
| Type test according to: IEC 60947-2<br>Test sequence III | Type: NS630bH to 1600H<br>Sample 31042.12 |

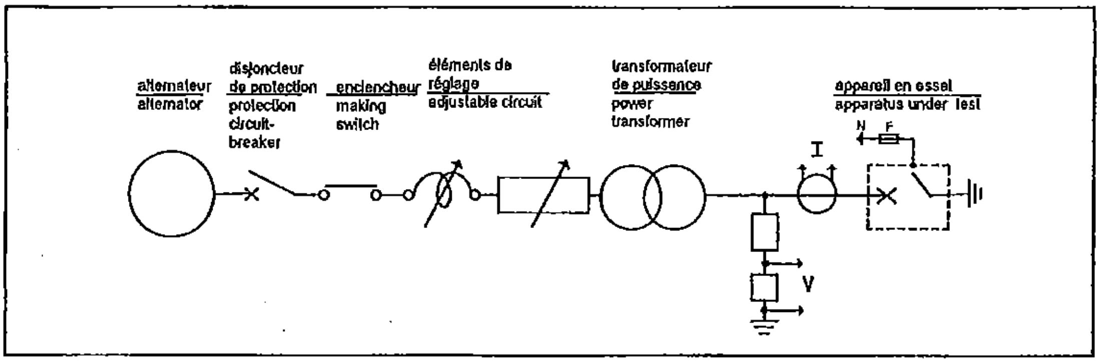
| Standard and clause | Kind of tests and requirements | | | Test values Results |
|---|---|---|---|---|
| | **VERIFICATION OF OVERLOAD RELEASES ON EACH POLE SEPARATELY** | | | |
| 60947-1 | Cabling characteristics | | | |
| Table 9, 10 | Cable | | ./. $mm^2$ | ./. $mm^2$ |
| and 11 | Bar | | 100 x 5 mm | 100 x 5 mm |
| | Number | | 2 | 2 |
| | Length | | ./. mm | 500 mm |
| | Tightening torque | | | 50 Nm |
| | Reference temperature | | 40 °C ± 2 °C | |
| | Ambient temperature | | | 22.5 °C |
| | Correction factor (k = 1 for releases independent of ambient temperature) | | k | 1 |
| | Current setting value | | $I_n$ | 1600 A |
| | **Test current** | | | |
| | either k x 2.0 x $I_n$ | | 3200 A | 3200 A |
| 8.3.5.1 | Test sequence II ($I_{cs}$ = $I_{cu}$) | before 8.3.4.1 | | |
| 8.3.5.1 | Test sequence III | before 8.3.5.2 | | |
| 8.3.6.1 | Test sequence IV | before 8.3.6.2 | | |
| 8.3.6.6 | Test sequence IV | after 8.3.6.5 | | |
| 8.3.7.4 | Test sequence V | before 8.3.7.5 | | |
| 8.3.8.1 | Combined test sequence | before 8.3.8.2 | | |
| A.5 | Verification of discrimination | before 8.3.5.2 | | |
| A.6.3 | Verification of back-up protection | before 8.3.5.2 | | |
| | or k x 2.5 x $I_n$ | | ./. A | ./. A |
| 8.3.5.4 | Test sequence II ($I_{cs}$ = $I_{cu}$) | after 8.3.4.5 | | |
| 8.3.5.4 | Test sequence III | after 8.3.5.3 | | |
| 8.3.7.8 | Test sequence V | after 8.3.7.7 | | |
| 8.3.8.7 | Combined test sequence | after 8.3.8.6 | | |
| A.5 | Verification of discrimination | after 8.3.5.3 | | |
| A.6.3 | Verification of back-up protection | after 8.3.5.3 | | |
| C.4 | Individual pole short-circuit test sequence | | | |
| H.4 | Test sequence for circuit-breakers for IT-systems | | | |
| | Tripping time (for twice the value of current setting on single pole) | | | |
| | | Neutral | ≤ 270 s | 223 s |
| | | $Ph_1$ | ≤ 270 s | 230 s |
| | | $Ph_2$ | ≤ 270 s | 222 s |
| | | $Ph_3$ | ≤ 270 s | 22[illegible] s |



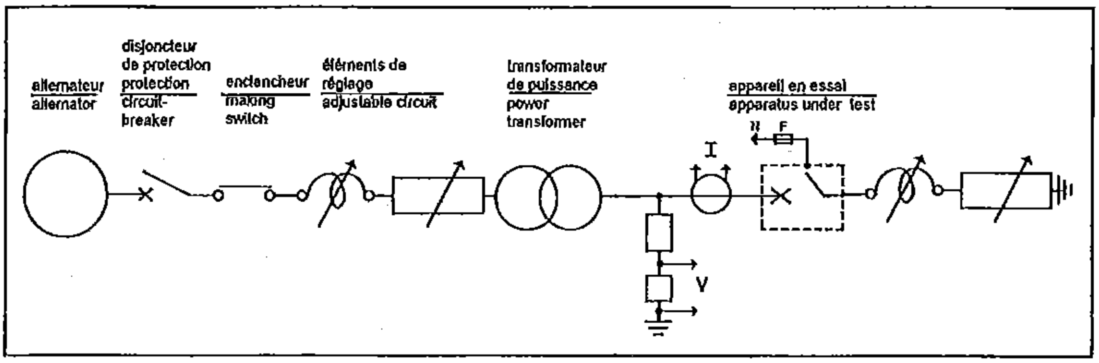
„КИМТЕХ-БЪЛГАРИЯ" ООД • БУРГАС

## DIAGRAM OF THE TEST CIRCUIT

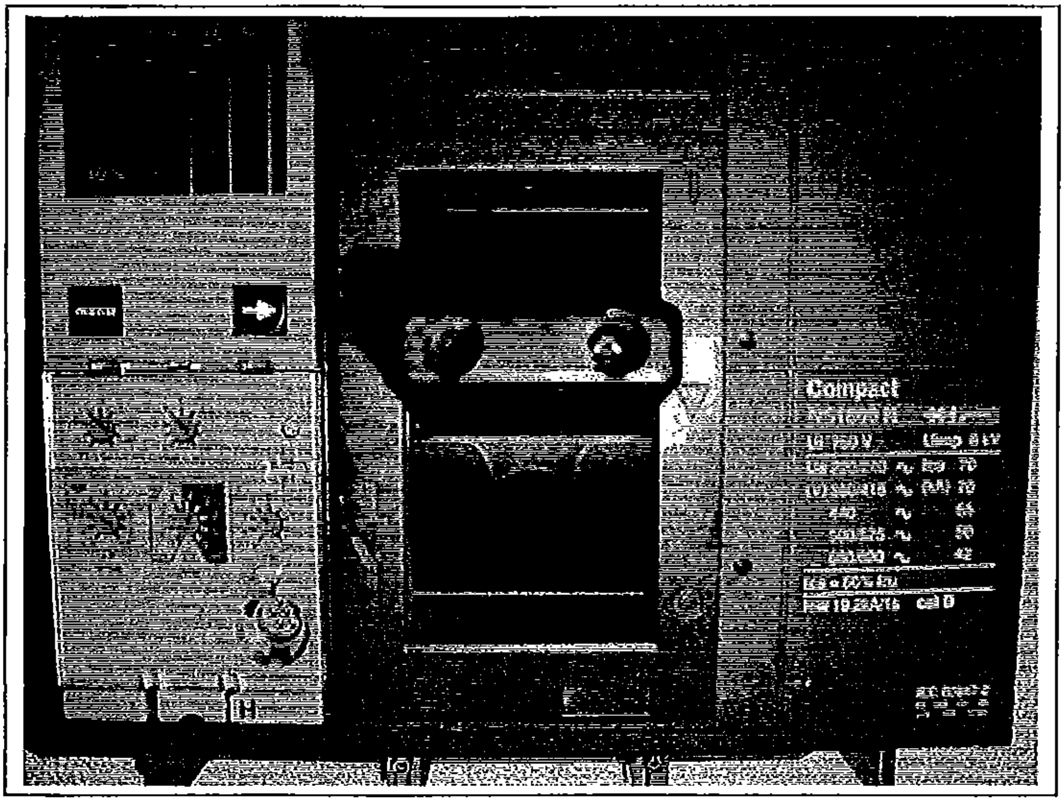
### TEST OF RATED ULTIMATE SHORT-CIRCUIT BREAKING CAPACITY




### VERIFICATION OF OPERATIONAL CAPABILITY



**PHOTOGRAPHIE OF THE ASSEMBLY**



## APPENDIXES

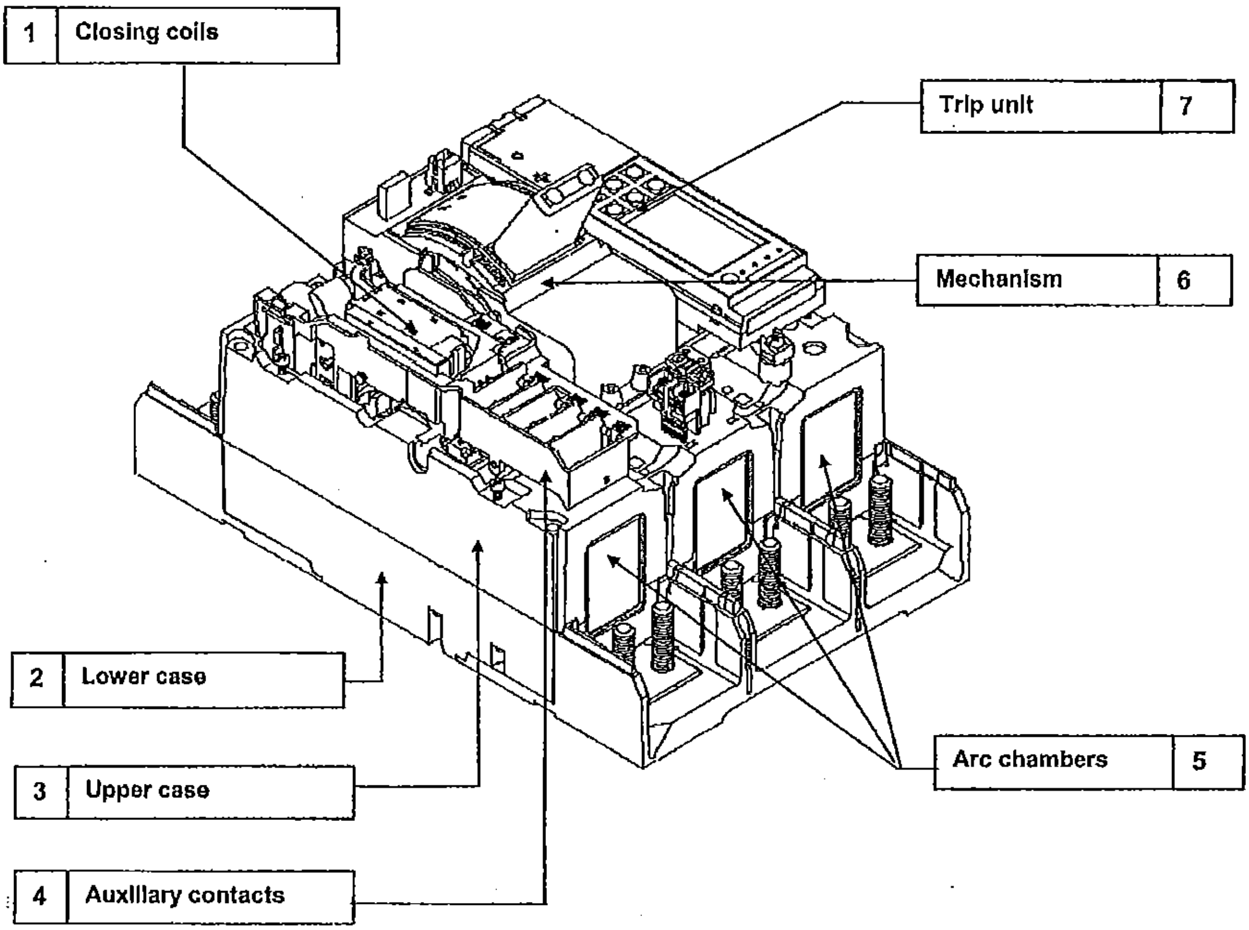
### *APPARATUS CHARACTERISTICS*

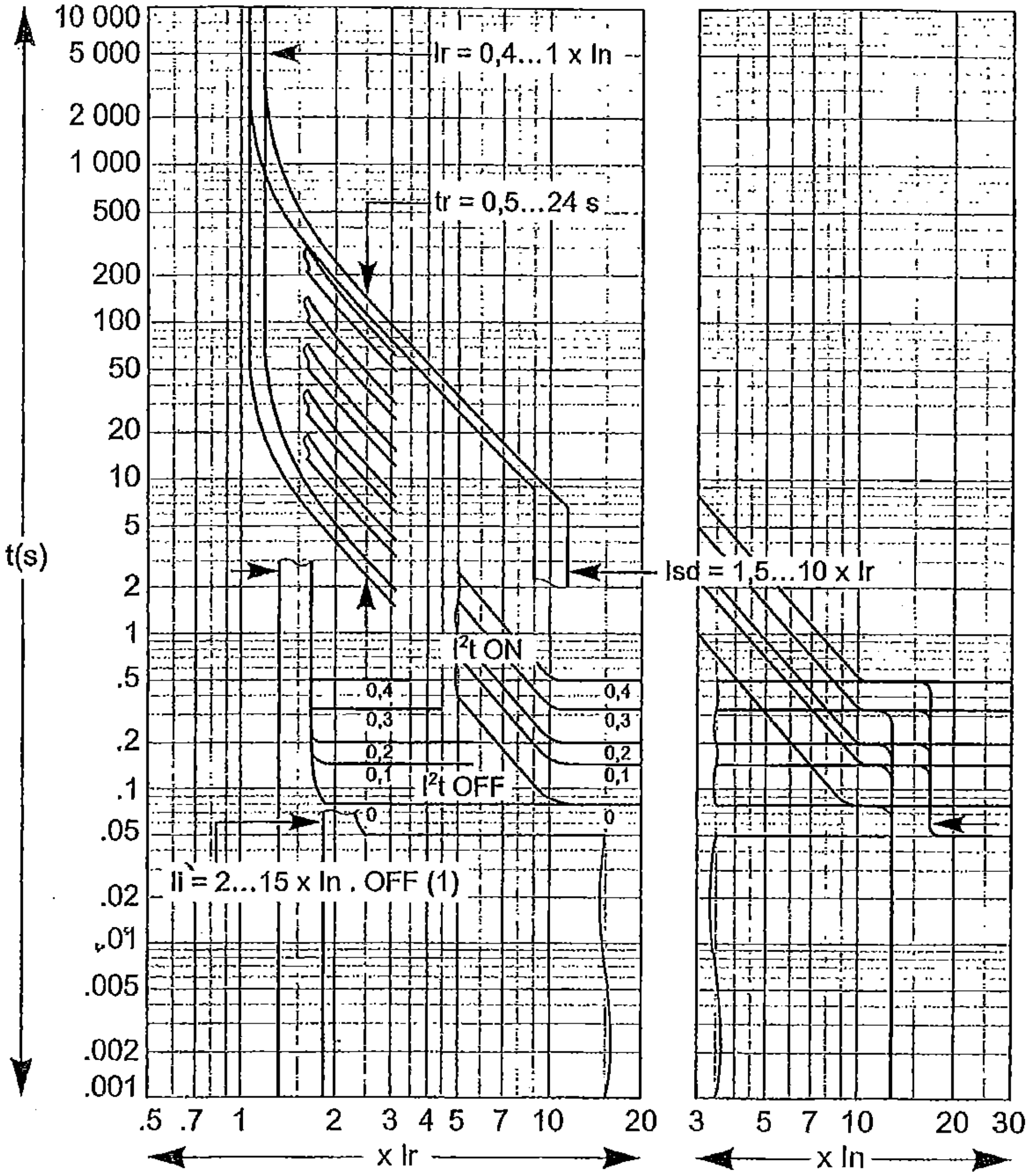
| | |
|---|---|
| General view circuit-breaker | GHD 1189100 indice B |
| Tripping curve Micrologic 5.0A | 51156273AA 1/1 |

### *OSCILLOGRAMS*

| | |
|---|---|
| Calibration voltage | 20040283 – 0102 |
| Calibration current | 20040283 – 0103 |
| ASEFA 31 042.05 Opening | 20040283 – 0104 |
| ASEFA 31 042.05 Closing/Opening 1 | 20040283 – 0105 |
| ASEFA 31 042.06 Opening | 20040283 – 0106 |
| ASEFA 31 042.06 Closing/Opening 1 | 20040283 – 0107 |
| Calibration voltage | 20040283 – 0108 |
| Calibration current | 20040283 – 0113 |
| ASEFA 31 042.07 Opening | 20040283 – 0116 |
| ASEFA 31 042.07 Closing/Opening 1 | 20040283 – 0117 |
| Calibration voltage | 20040283 – 0119 |
| Calibration current | 20040283 – 0122 |
| ASEFA 31 042.08 Opening | 20040283 – 0123 |
| ASEFA 31 042.08 Closing/Opening 1 | 20040283 – 0124 |
| Calibration voltage | 20040288 – 0003 |
| Calibration current | 20040288 – 0007 |
| ASEFA 31 042.09 Opening | 20040288 – 0011 |
| ASEFA 31 042.09 Closing/Opening 1 | 20040288 – 0012 |
| ASEFA 31 042.10 Opening | 20040288 – 0013 |
| ASEFA 31 042.10 Closing/Opening 1 | 20040288 – 0014 |
| Calibration voltage | 20040288 – 0015 |
| Calibration current | 20040288 – 0018 |
| ASEFA 31 042.11 Opening | 20040288 – 0019 |
| ASEFA 31 042.11 Closing/Opening 1 | 20040288 – 0020 |
| Calibration voltage | 20040283 – 0141 |
| Calibration current | 20040283 – 0150 |
| ASEFA 31 042.12 Opening | 20040283 – 0161 |
| ASEFA 31 042.12 Closing/Opening 1 | 20040283 – 0162 |

## GENERAL VIEW - FIGURE 1






OFF (1)

| In (A) | 800 | 2000 | 4000 | 5000 | 6300 |
|---|---|---|---|---|---|
| N1 | 42 kA | | | | |
| H1 | 65 kA | | 100 kA | | |
| H2 | 82 kA | | [illegible] kA | | |
| H3 | | 65 kA | | | |
| L1 | 37 kA | | | | |

| Ind / Rev | Date / Date | Modification / Modification | Nom/Name | Visa | Nom/Name | Visa | Archiv./ Microfil. |
|---|---|---|---|---|---|---|---|
| 02 | 09/06/99 | Rajout des crans 0 à 0,4 | JOUBERT | | GRELIER | | |
| | | | Préparé/Issued by | | Préparé/Issued by | | |

Projet / Projet: Compact NS630b à NS1600

Dossier / Folder:

Code diff. / Distrib. code

GROUPE SCHNEIDER

Unité / Département: DBTP

DISJONCTEUR FIXE ET DEBROCHABLE

Courbe de déclenchement pour déclencheurs Micrologic 5.0 , 6.0 , 7.0

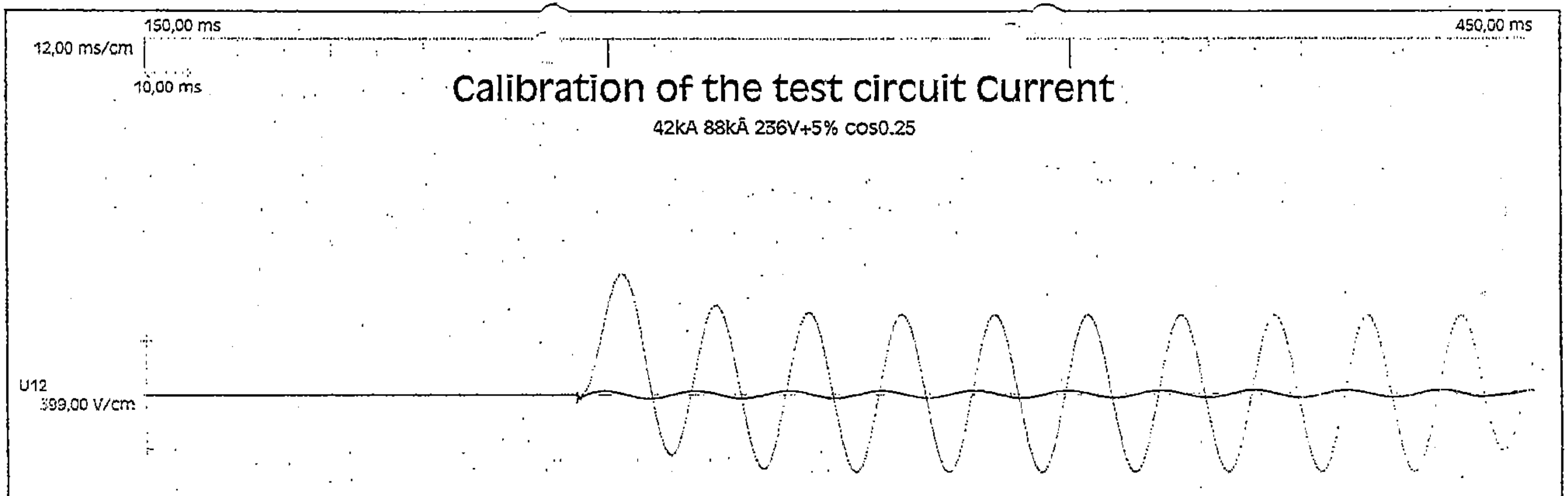
5 1 1 5 6 2 7 4 A A

Ind/Rev: 01

Folio/Sheet: 1/1

# Calibration of the test circuit Current

42kA 88kÂ 236V+5% cos0.25




"КИМТЕХ-БЪЛГАРИЯ" ООД · БУРГАС · КИМТЕХ

ВЯРНО С ОРИГИНАЛА

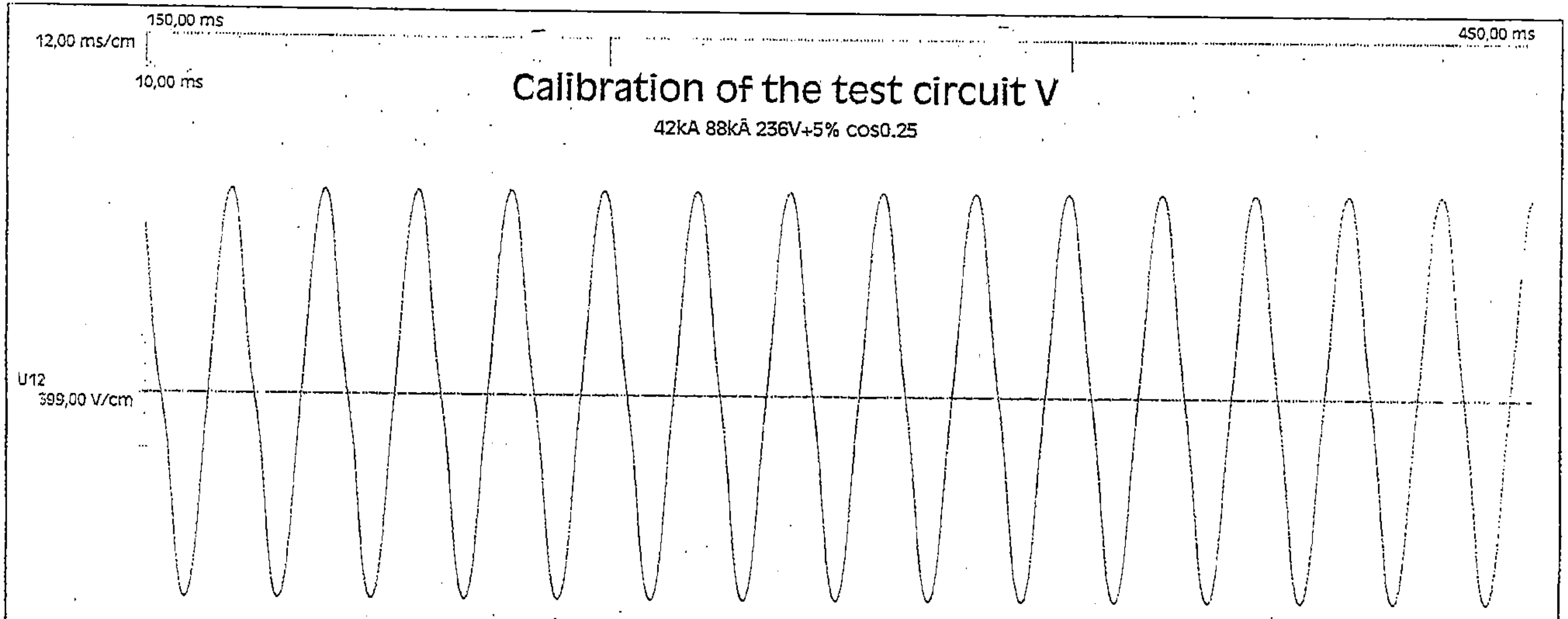
F01 20040283 - 0102

CATIE V.1.5.3.129 page 001

Effectué le 06/12/2004 17:12:28
Edité le 06/12/2004 17:33:53

# Calibration of the test circuit V

42kA 88kÃ 236V+5% cos0.25

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ВЯРНО С ОРИГИНАЛА

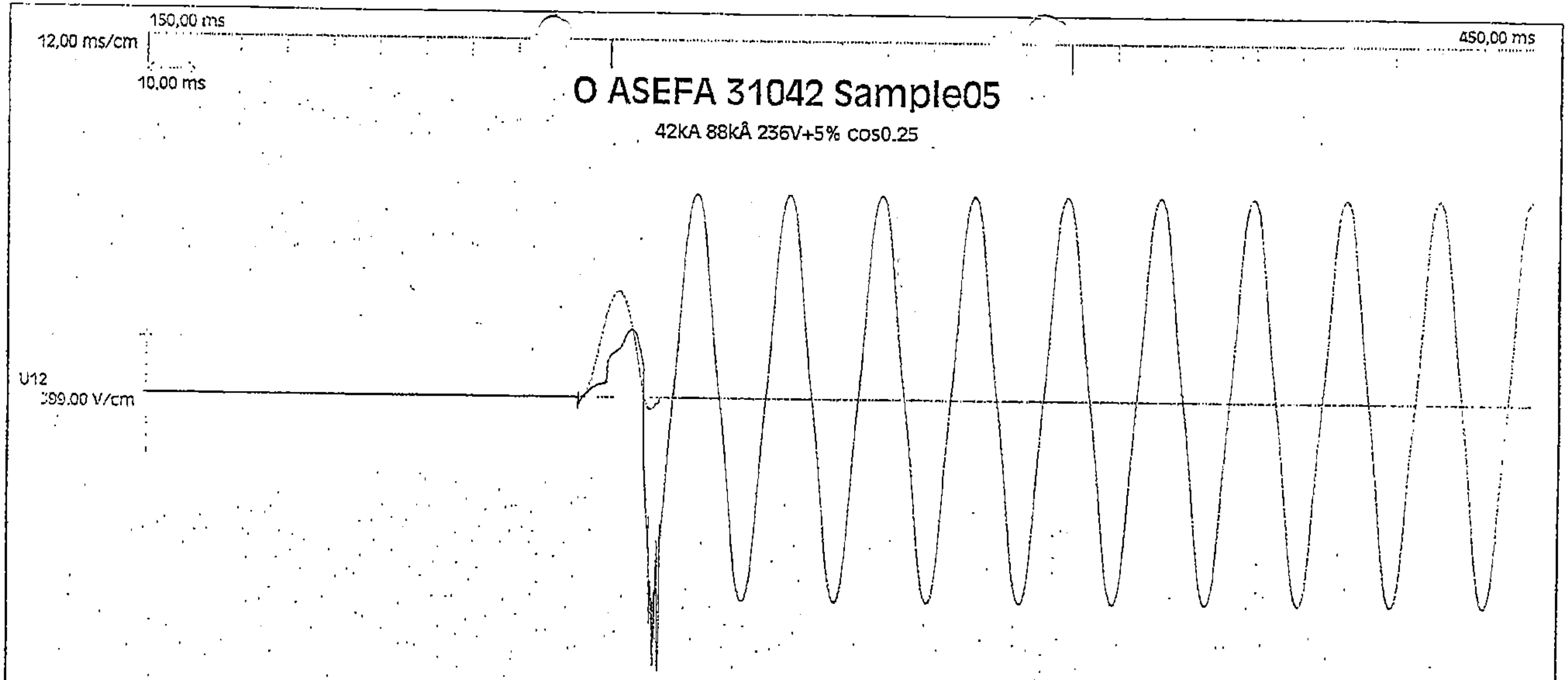
CATIE V.1.5.3.129 page 001

F01 20040283 - 0103

Effectué le 06/12/2004 17:28:35
Edité le 06/12/2004 17:32:59

# O ASEFA 31042 Sample05

42kA 88kÂ 236V+5% cos0.25




F01 20040283 - 0104

CATIE V.1.5.3.129 page 001

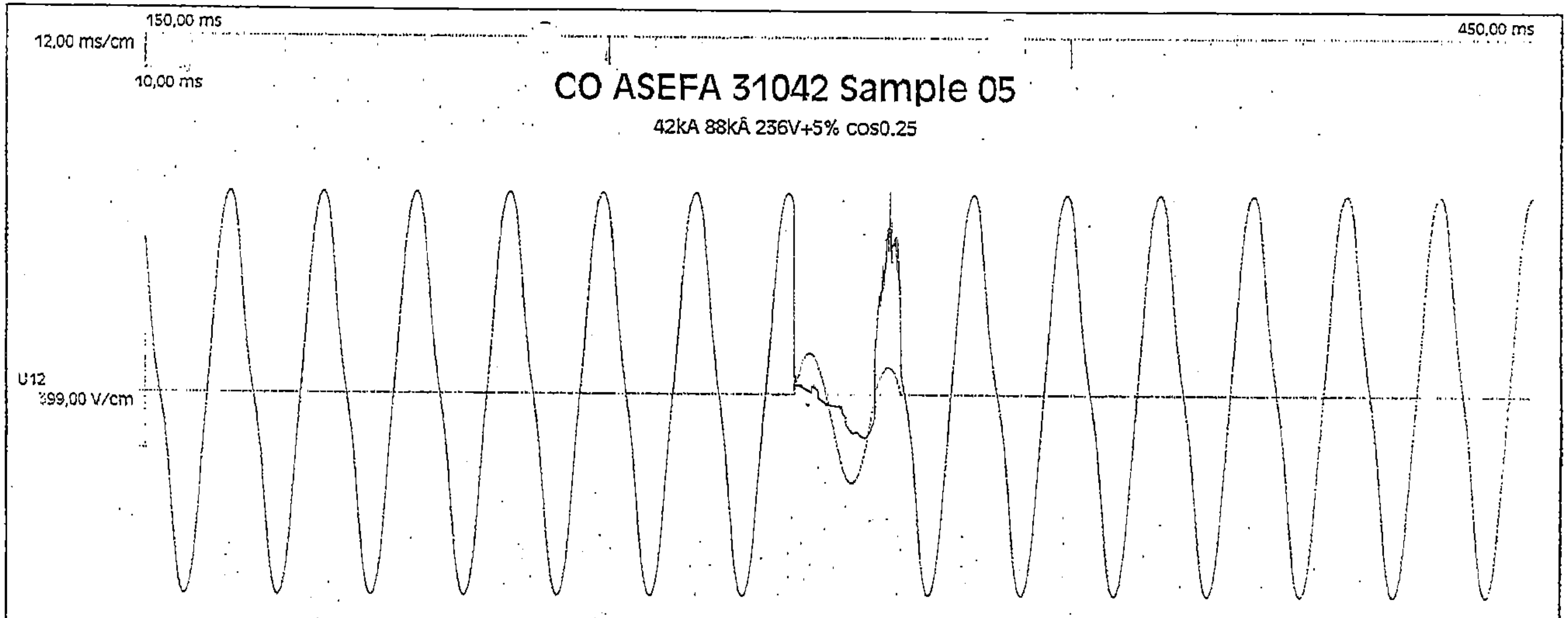
Effectué le 06/12/2004 17:53:48
Edité le 06/12/2004 18:10:37

"...БЪЛГАРИЯ" ООД ...МТЕХ БУРГАС

ВЯРНО С ОРИГИНАЛА

# CO ASEFA 31042 Sample 05

42kA 88kÂ 236V+5% cos0.25




КИМТЕХ ООД

ВЯРНО С ОРИГИНАЛА

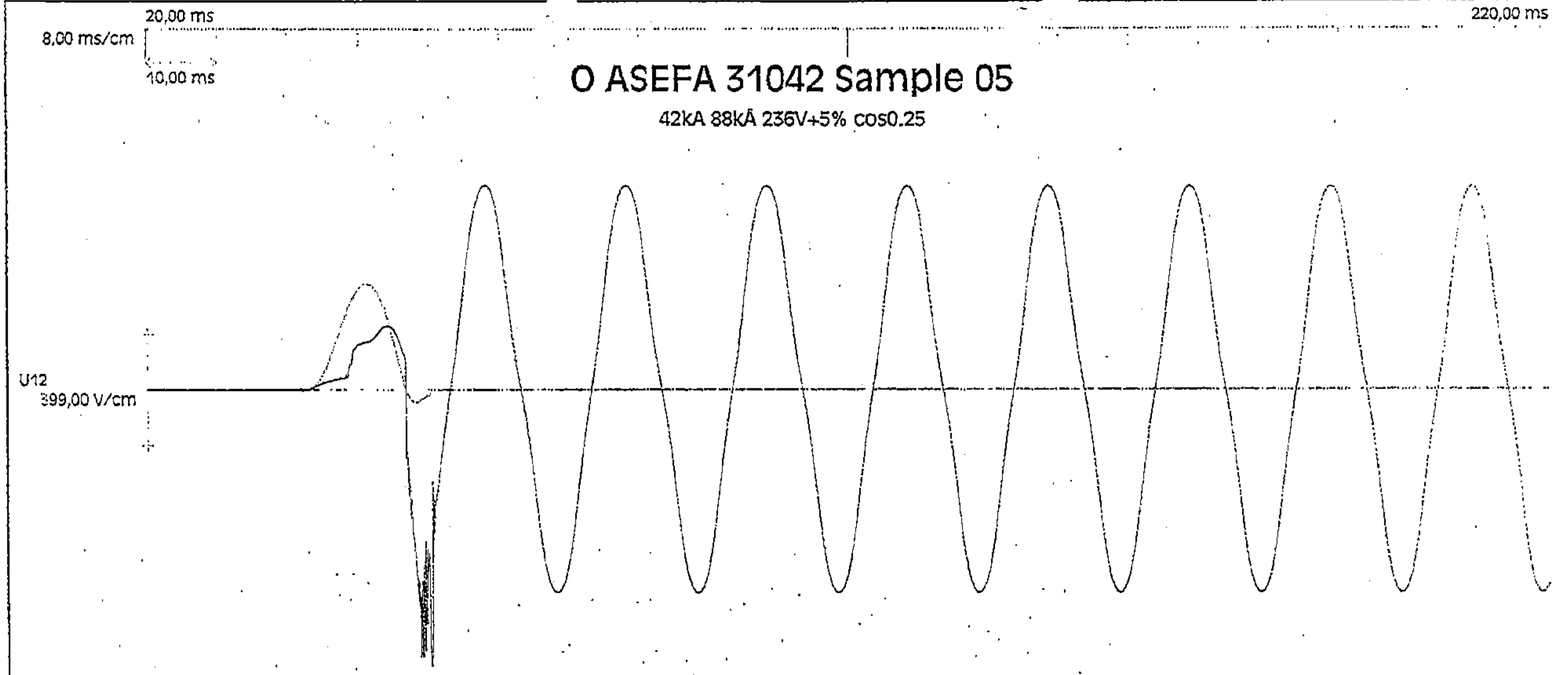
CATIE V.1

F01 20040283 - 0105

Effectué le 06/12/2004 18:03:36
Edité le 06/12/2004 18:09:46

# O ASEFA 31042 Sample 05

42kA 88kÂ 236V+5% cos0.25





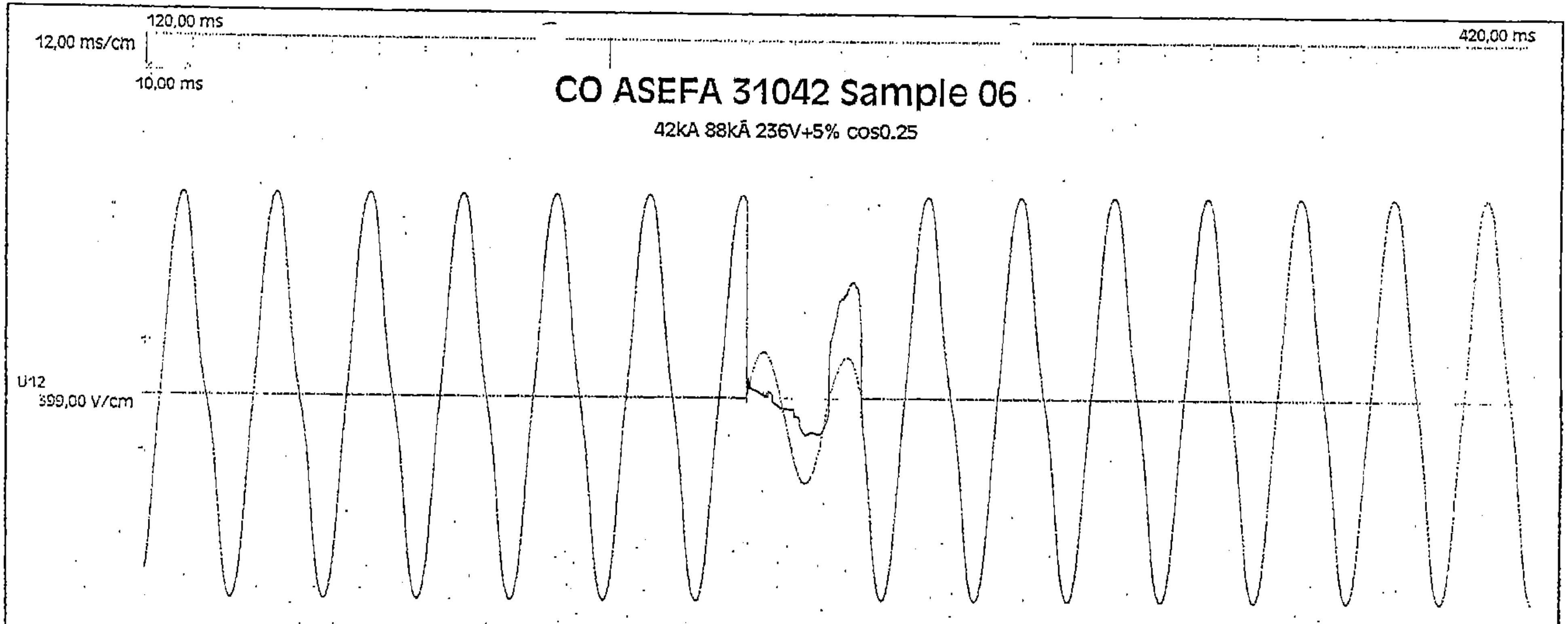

F01 20040283 - 0106



Effectué le 06/12/2004 19:07:47
Edité le 06/12/2004 19:12:55

# CO ASEFA 31042 Sample 06

42kA 88kÂ 236V+5% cos0.25




КИМТЕХ-БЪЛГАРИЯ ООД БУРГАС КИМТЕХ

ВЯРНО С ОРИГИНАЛА

CATIE V.1.5.5.129 page.doi

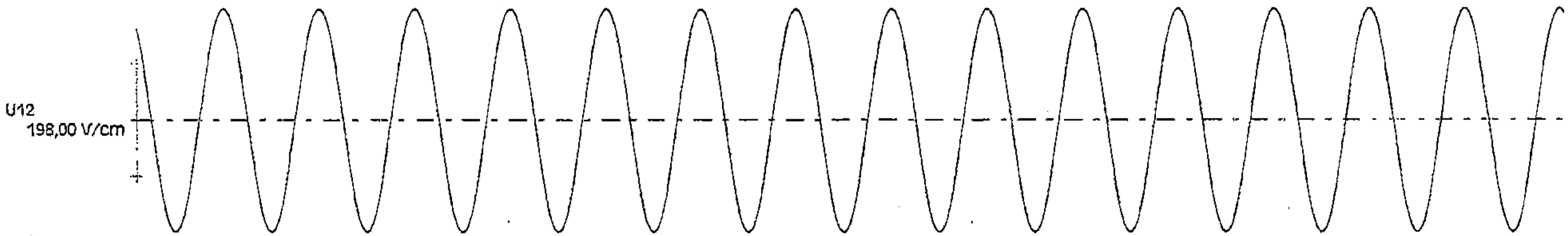
F01 20040283 - 0107

Effectué le 06/12/2004 19:11:09
Edité le 06/12/2004 19:12:06

12,00 ms/cm 100,00 ms 10,00 ms 400,00 ms

# Calibr. test circuit Voltage

cir mono: 39kA 82kÂ 254V+5% cos0.25





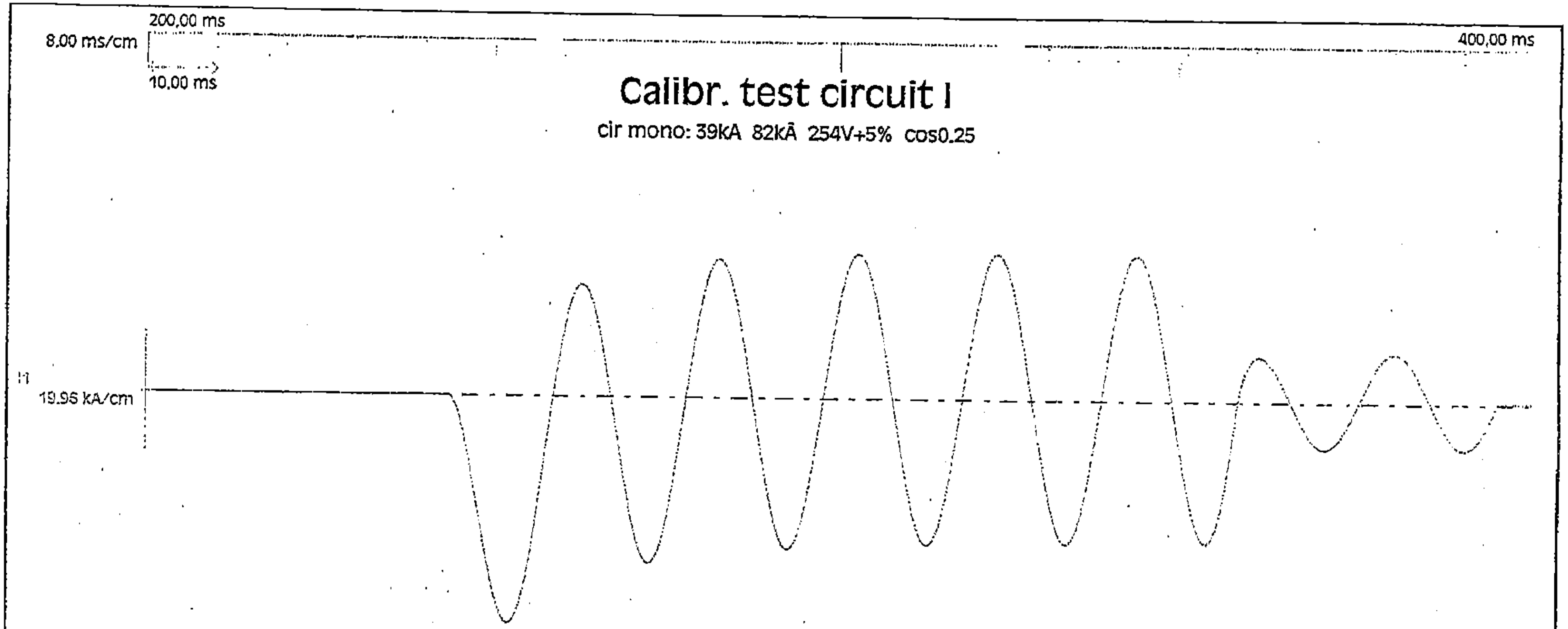

F01 20040283 - 0108

CATIE V.1.5.3.129 page 001

Effectué le 07/12/2004 07:59:18
Edité le 18/08/2005 11:17:08

# Calibr. test circuit I

cir mono: 39kA 82kÂ 254V+5% cos0.25






CATIE V.1.5.3.129 page 001

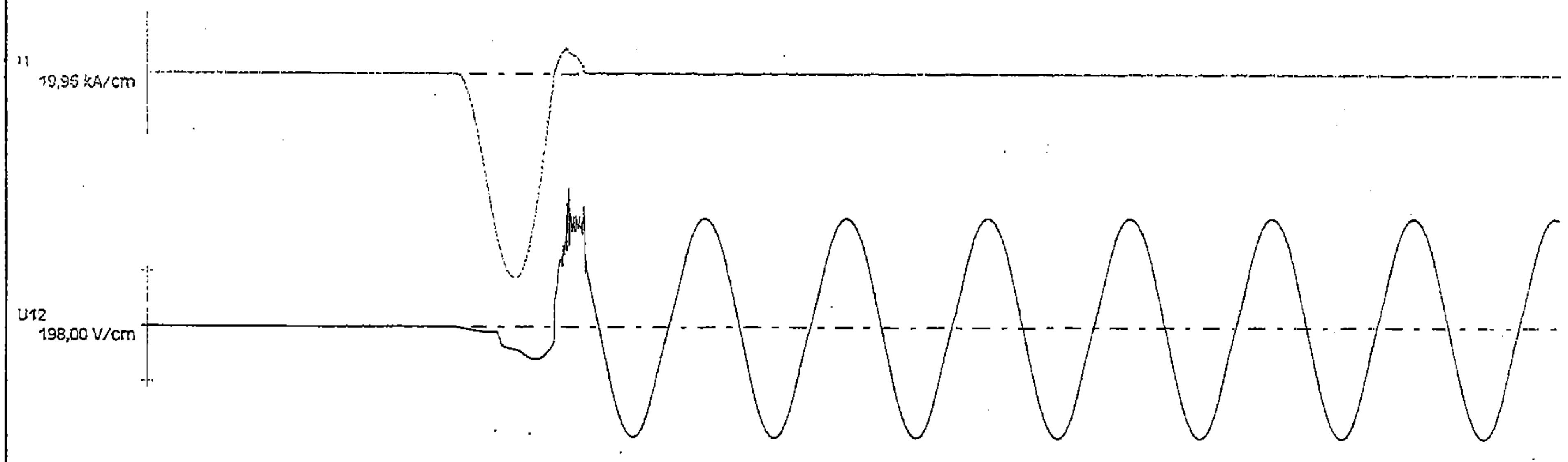
F01 20040283 - 0113

Effectué le 07/12/2004 08:47:42
Edité le 18/08/2005 11:18:12

8,00 ms/cm 200,00 ms 10,00 ms 400,00 ms

# O ASEFA : N° 31042 sample N ° 7

clr mono: 39kA 82kÂ 254V+5% cos0.25






F01 20040283 - 0116

V.1.5.3.129 page 001

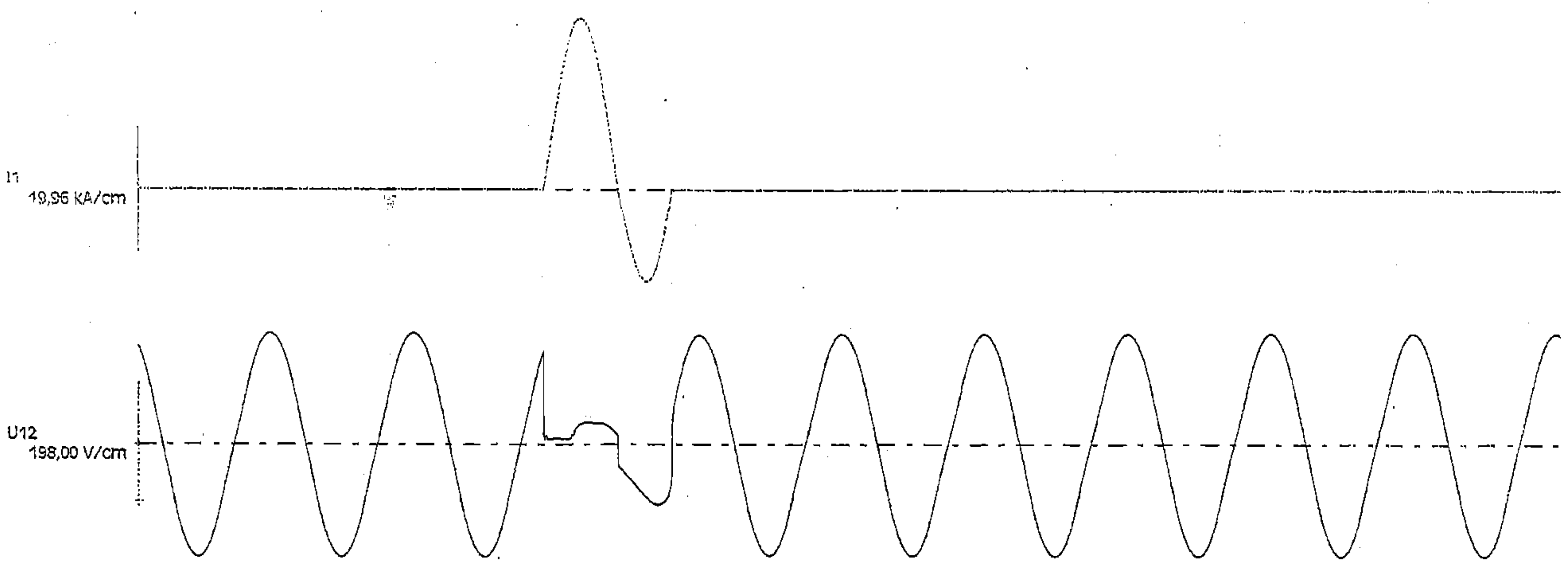


Effectué le 07/12/2004 09:08:11
Edité le 18/08/2005 11:18:34

8,00 ms/cm 200,00 ms 10,00 ms 400,00 ms

# CO ASEFA : N° 31042 sample N ° 7

cir mono: 39kA 82kÂ 254V+5% cos0.25




„КИМТЕХ-БЪЛГАРИЯ" ООД БУРГАС КИМТЕХ

ВЯРНО С ОРИГИНАЛА

CATIE V.15.3.129 page 001

F01 20040283 - 0117

Effectué le 07/12/2004 09:10:47
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