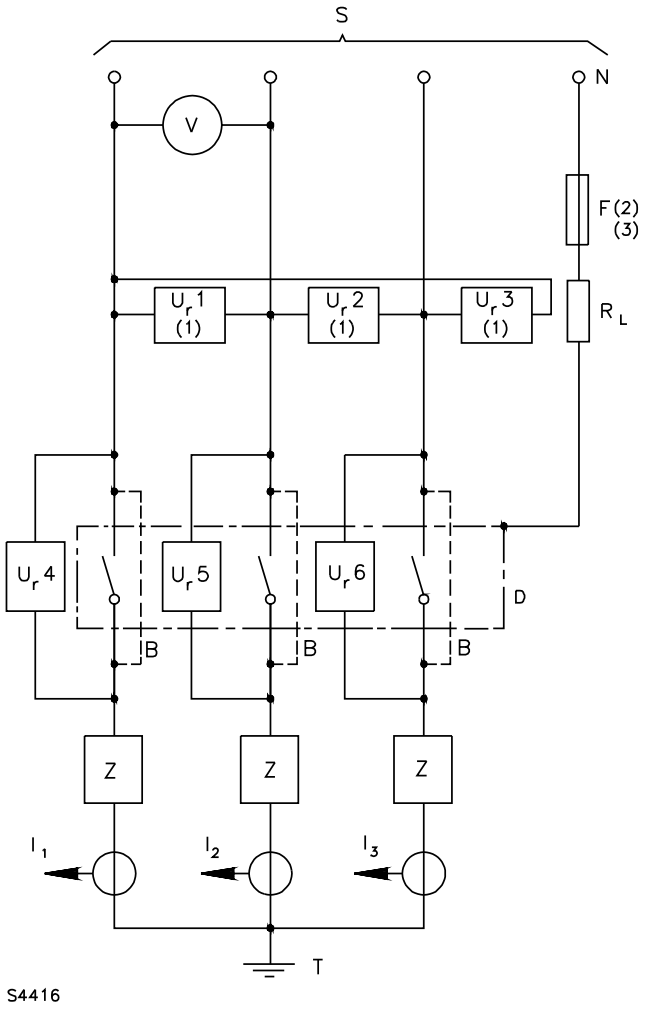
Figure 5 – Diagram of the test circuit for the verification of making and breaking capacities of a three-pole equipment

(see 8.3.3.5.2)



S	=	Supply
U_r1, U_r2, U_r3, U_r4, U_r5, U_r6	=	Voltage sensors
V	=	Voltage measuring device
N	=	Neutral of supply (or artificial neutral)
F	=	Fusible element (8.3.3.5.2, item g))
Z	=	Load circuit (see figure 8)
R_L	=	Fault current limiting resistor
D	=	Equipment under test (including connecting cables) NOTE – Outline includes metallic screen or enclosure.
B	=	Temporary connections for calibration
I_1, I_2, I_3,	=	Current sensors
T	=	Earth – One earthing point only (load side or supply side)

NOTE 1 – U_r1, U_r2 and U_r3 may, alternatively, be connected between phase and neutral.

NOTE 2 – In the case of equipment intended for use in phase-earthed systems or if this diagram is used for the test of the neutral and adjacent poles of a 4-pole equipment, F shall be connected to one phase of the supply.

In the case of d.c., F shall be connected to the negative of the supply.

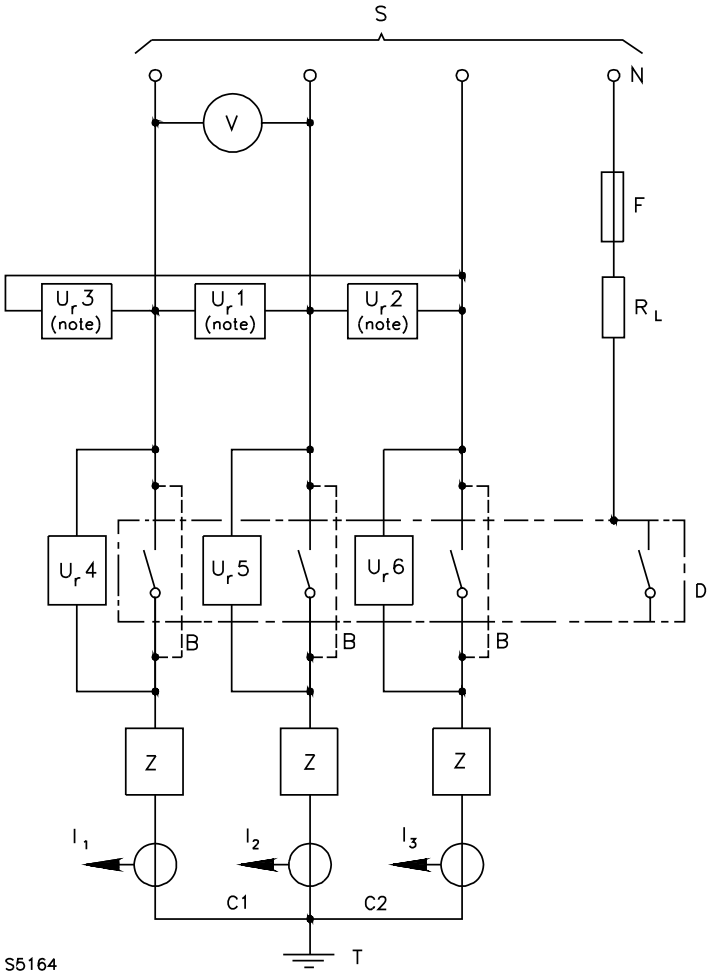
NOTE 3 – In the USA and Canada, F shall be connected

– to one phase of the supply for equipment marked with a single value of U_e;

– to the neutral for equipment marked with a twin voltage (see note to 5.2).

Figure 6 – Diagram of the test circuit for the verification of making and breaking capacities of a four-pole equipment

(see 8.3.3.5.2)



S	=	Supply
U_r1, U_r2, U_r3, U_r4, U_r5, U_r6	=	Voltage sensors
V	=	Voltage measuring device
N	=	Neutral of supply (or artificial neutral)
F	=	Fusible element (8.3.3.5.2, item g)
Z	=	Load circuit (see figure 8)
R_L	=	Fault current limiting resistor
D	=	Equipment under test (including connecting cables) NOTE – Outline includes metallic screen or enclosure.
B	=	Temporary connections for calibration
I_1, I_2, I_3	=	Current sensors
T	=	Earth – One earthing point only (load side or supply side)

NOTE – U_r1, U_r2 and U_r3 may, alternatively, be connected between phase and neutral.

Figure 7 – Schematic illustration of the recovery voltage across contacts of the first phase to clear under ideal conditions

(see 8.3.3.5.2, item e))

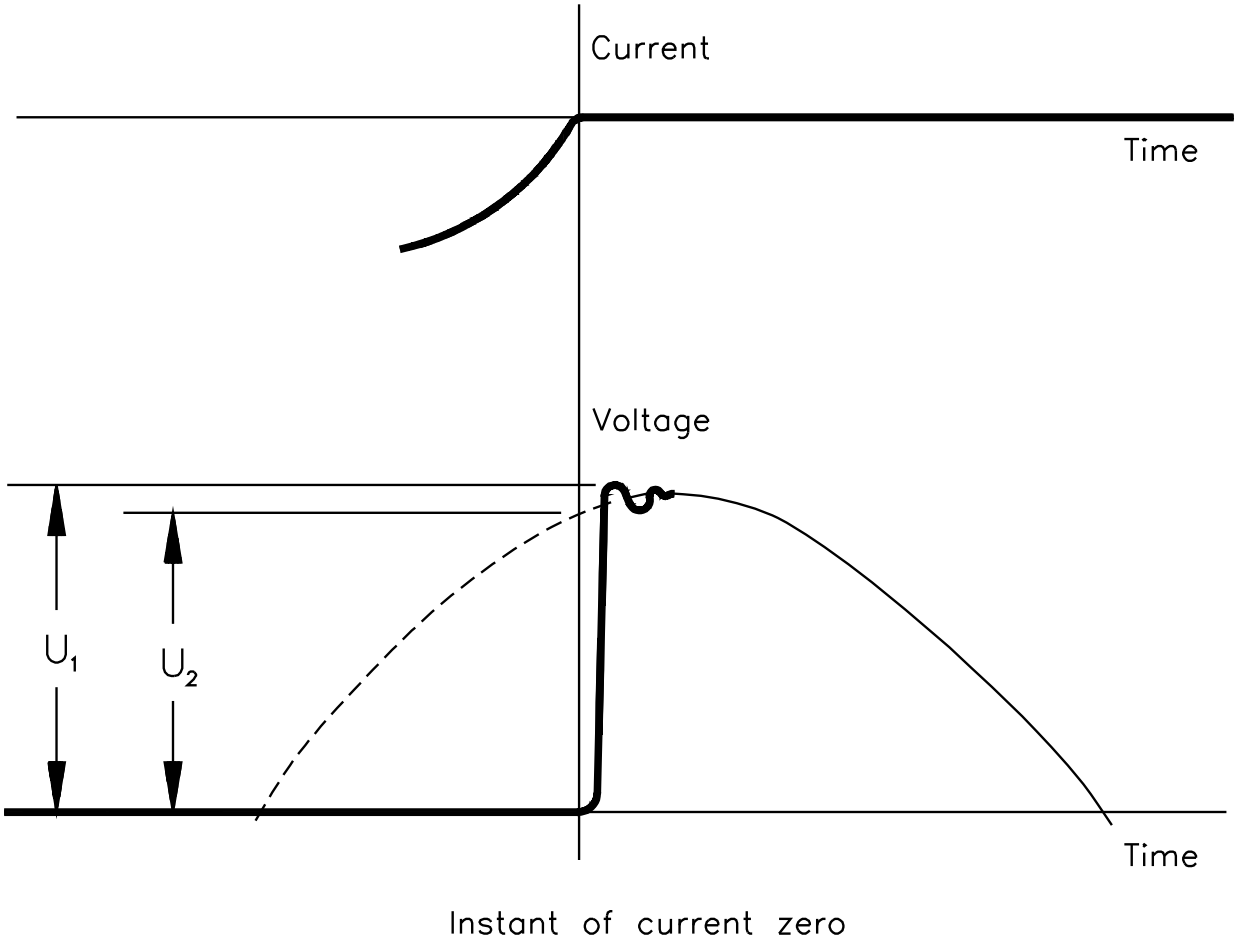
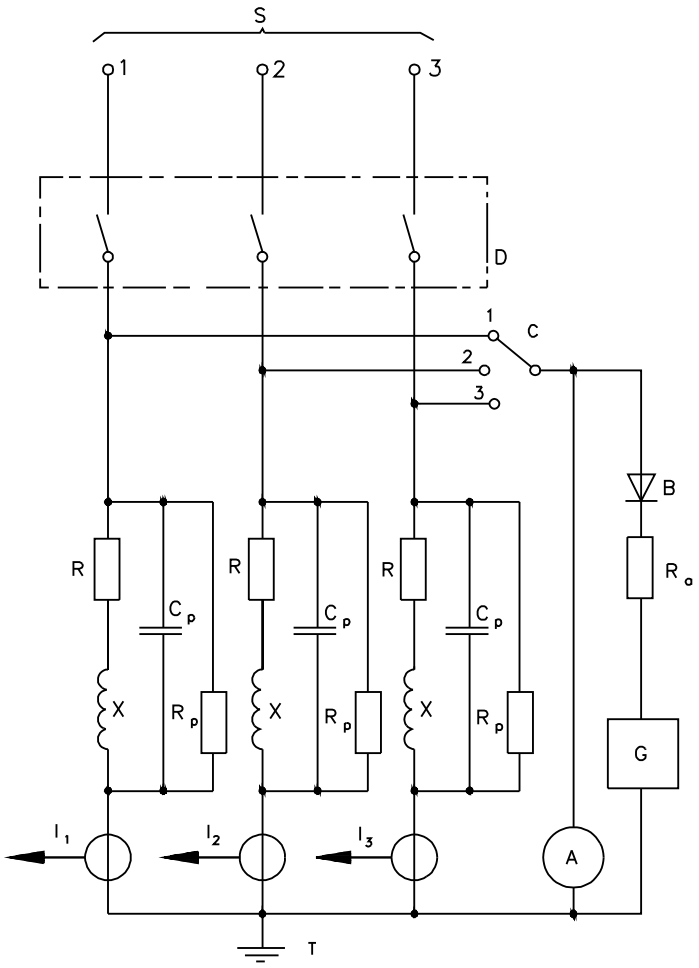


Figure 8a – Diagram of a load circuit adjustment method: load star-point earthed



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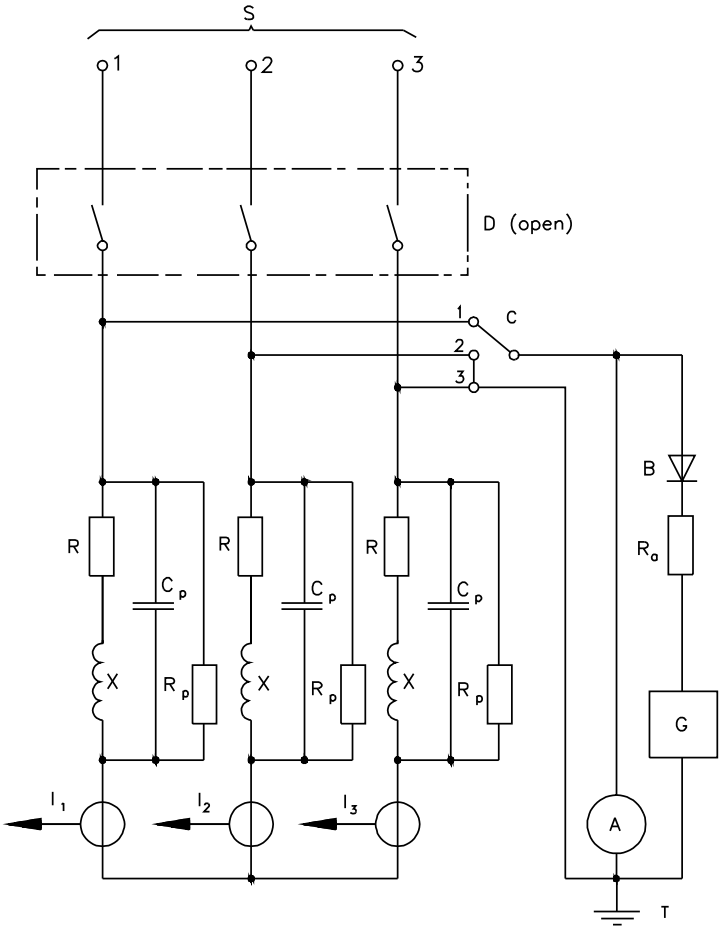
S	=	Supply
D	=	Equipment under test
C	=	Phase adjustment selector switch
B	=	Diode
A	=	Recorder
R_a	=	Resistor
G	=	High–frequency generator
R	=	Load circuit resistor
X	=	Load circuit reactor (8.3.3.5.2, item d))
R_p	=	Resistor in parallel
C_p	=	Capacitor in parallel
I_1, I_2, I_3	=	Current sensors

The relative positions of the high-frequency generator G and the diode shall be as shown. No other point of the circuit than the one indicated on the figure shall be earthed.

Figure 8b – Diagram of a load circuit adjustment method: supply star-point earthed



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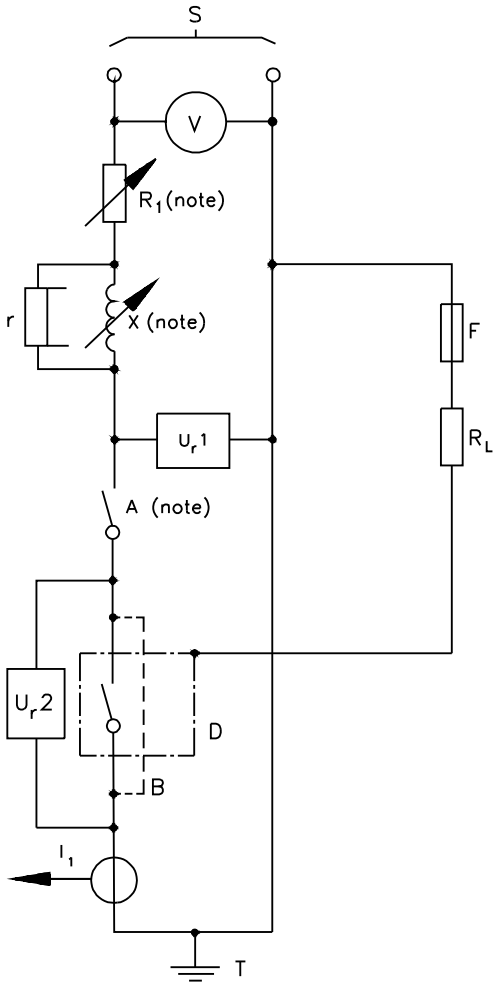
S = Supply
D = Equipment under test
C = Phase adjustment selector switch
B = Diode
A = Recorder
R_a = Resistor
G = High–frequency generator
R = Load circuit resistor
X = Load circuit reactor (8.3.3.5.2d))
R_p = Resistor in parallel
C_p = Capacitor in parallel
I_1, I_2, I_3 = Current sensors

The relative positions of the high-frequency generator G and the diode shall be as shown. No other point of the circuit than the one indicated on the figure shall be earthed.

In this figure, as an example 1, 2 and 3 are represented in the position corresponding to the adjustment of phase 1 (the first phase to clear) in series with phases 2 and 3 connected in parallel.

Figure 9 – Diagram of the test circuit for the verification of short-circuit making and breaking capacities of a single-pole equipment on single-phase a.c. or on d.c.

(see 8.3.4.1.2)

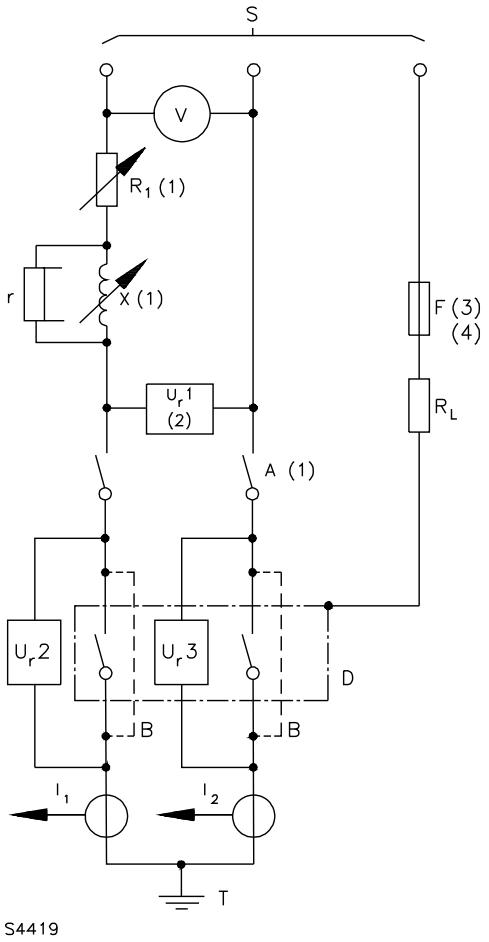


S	=	Supply
U_r1, U_r2	=	Voltage sensors
V	=	Voltage measuring device
A	=	Closing device
R_1	=	Adjustable resistor
F	=	Fusible element (8.3.4.1.2, item d))
X	=	Adjustable reactor
R_L	=	Fault current limiting resistor
D	=	Equipment under test (including connecting cables) NOTE – Outline includes metallic screen or enclosure.
B	=	Temporary connections for calibration
I_1	=	Current sensor
T	=	Earth – One earthing point only (load side or supply side)
r	=	Shunt resistor (8.3.4.1.2, item b))

NOTE – Adjustable loads X and R_1 may be located either on the high-voltage side or on the low-voltage side of the supply circuit, the closing device A being located on the low-voltage side.

Figure 10 – Diagram of the test circuit for the verification of short-circuit making and breaking capacities of a two-pole equipment on single-phase a.c. or on d.c.

(see 8.3.4.1.2)



S	=	Supply
U_r1, U_r2, U_r3	=	Voltage sensors
V	=	Voltage measuring device
A	=	Closing device
R_1	=	Adjustable resistor
N	=	Neutral of supply (or artificial neutral)
F	=	Fusible element (8.3.4.1.2, item d))
X	=	Adjustable reactor
R_L	=	Fault current limiting resistor
D	=	Equipment under test (including connecting cables) NOTE – Outline includes metallic screen or enclosure.
B	=	Temporary connections for calibration
I_1, I_2	=	Current sensors
T	=	Earth – One earthing point only (load side or supply side)
r	=	Shunt resistor (8.3.4.1.2, item b))

NOTE 1 – Adjustable loads X and R_1 may be located either on the high-voltage side or on the low-voltage side of the supply circuit, the closing device A being located on the low-voltage side.

NOTE 2 – U_r1 may, alternatively, be connected between phase and neutral.

NOTE 3 – In the case of equipment intended for use in phase-earthed systems or if this diagram is used for the test of the neutral and adjacent pole of a four-pole equipment, F shall be connected to one phase of the supply.

In the case of d.c., F shall be connected to the negative of the supply.

NOTE 4 – In the USA and Canada, F shall be connected

– to one phase of the supply for equipment marked with a single value of U_e;

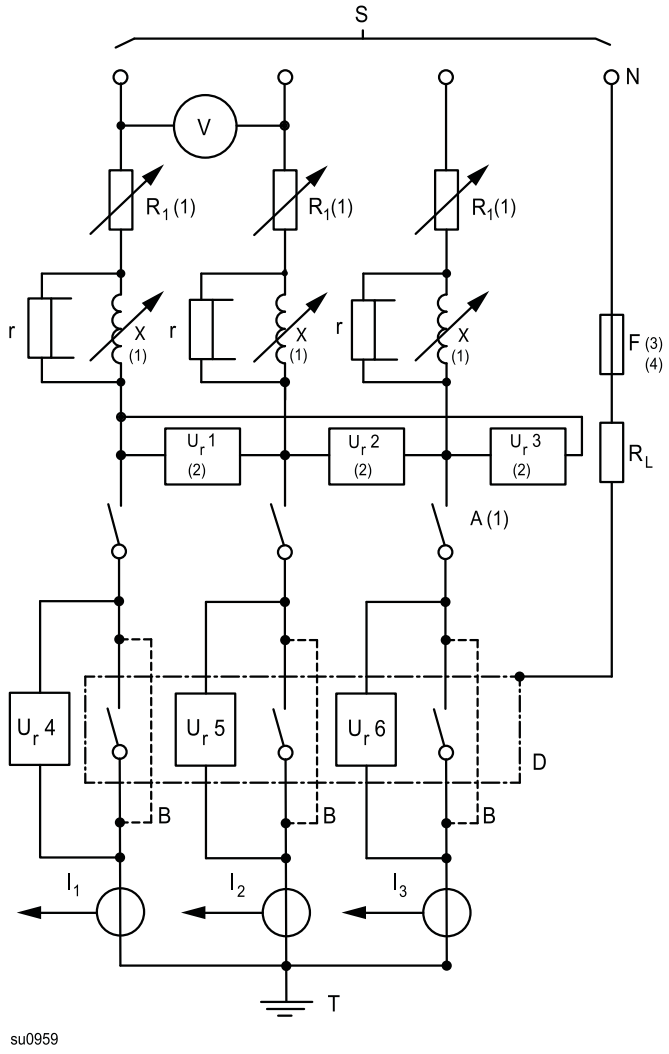
– to the neutral for equipment marked with a twin voltage of U_e (see note to 5.2).

Figure 10DV D2 *Modification of Note in Figure 10:*

For devices not marked "break all lines" only a single pole of "D" is to be connected between the supply and the load. The other pole of the test device is to be connected to neutral.

Figure 11 – Diagram of the test circuit for the verification of short-circuit making and breaking capacities of a three-pole equipment

(see 8.3.4.1.2)



S	=	Supply
U_r1, U_r2, U_r3, U_r4, U_r5, U_r6	=	Voltage sensors
V	=	Voltage measuring device
A	=	Closing Device
R_1	=	Adjustable resistor
N	=	Neutral of supply (or artificial neutral)
F	=	Fusible element (8.3.4.1.2, item d))
X	=	Adjustable reactors
R_L	=	Fault current limiting resistor
D	=	Equipment under test (including connecting cables) NOTE - Outline includes metalic screen or enclosure.
B	=	Temporary connections for calibration
I_1, I_2, I_3	=	Current sensors
T	=	Earth - One earthing point only (load side or supply side)
r	=	Shunt resistor (8.3.4.1.2, item b))

NOTE 1 – Adjustable loads X and R_1 may be located either on the high-voltage side or on the low-voltage side of the supply circuit, the closing device A being located on the low-voltage side.

NOTE 2 – U_r1, U_r2, U_r3 may, alternatively, be connected between phase and neutral.

NOTE 3 – In the case of equipment intended for use in phase-earthed systems or if this diagram is used for the test of the neutral and adjacent pole of a four-pole equipment F, shall be connected to one phase of the supply.

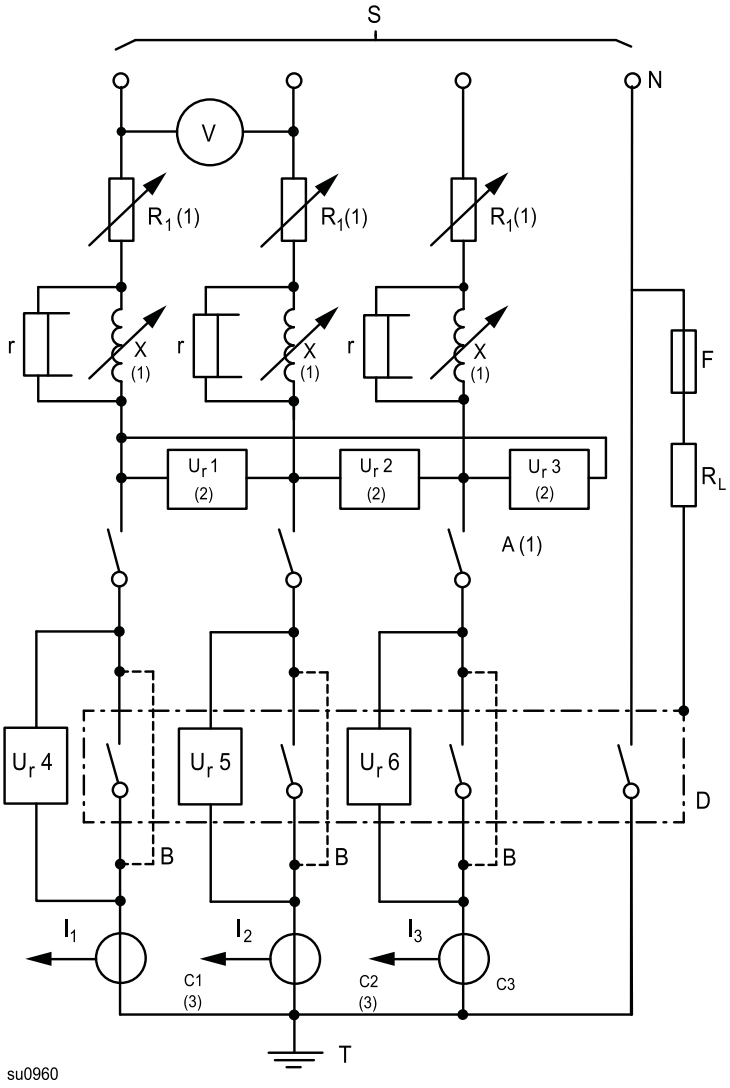
NOTE 4 – In the USA and Canada, F shall be connected

– to one phase of the supply for equipment marked with a single value of U_e;

– to the neutral for equipment marked with a twin voltage of U_e (see note to 5.2).

Figure 12 – Diagram of the test circuit for the verification of short-circuit making and breaking capacities of a four-pole equipment

(see 8.3.4.1.2)



S	=	Supply
$U_r 1$, $U_r 2$, $U_r 3$, $U_r 4$, $U_r 5$, $U_r 6$	=	Voltage sensors
V	=	Voltage measuring device
R_1	=	Adjustable resistor
N	=	Neutral of supply
F	=	Fusible element (8.3.4.1.2, item d))
X	=	Adjustable reactors
R_L	=	Fault current limiting resistor
A	=	Closing device
D	=	Equipment under test (including connecting cables) NOTE - Outline includes metallic screen or enclosure.
B	=	Temporary connections for calibration
I_1, I_2, I_3	=	Current sensors
T	=	Earth - One earthing point only (load side or supply side)
r	=	Shunt resistor (8.3.4.1.2, item b))

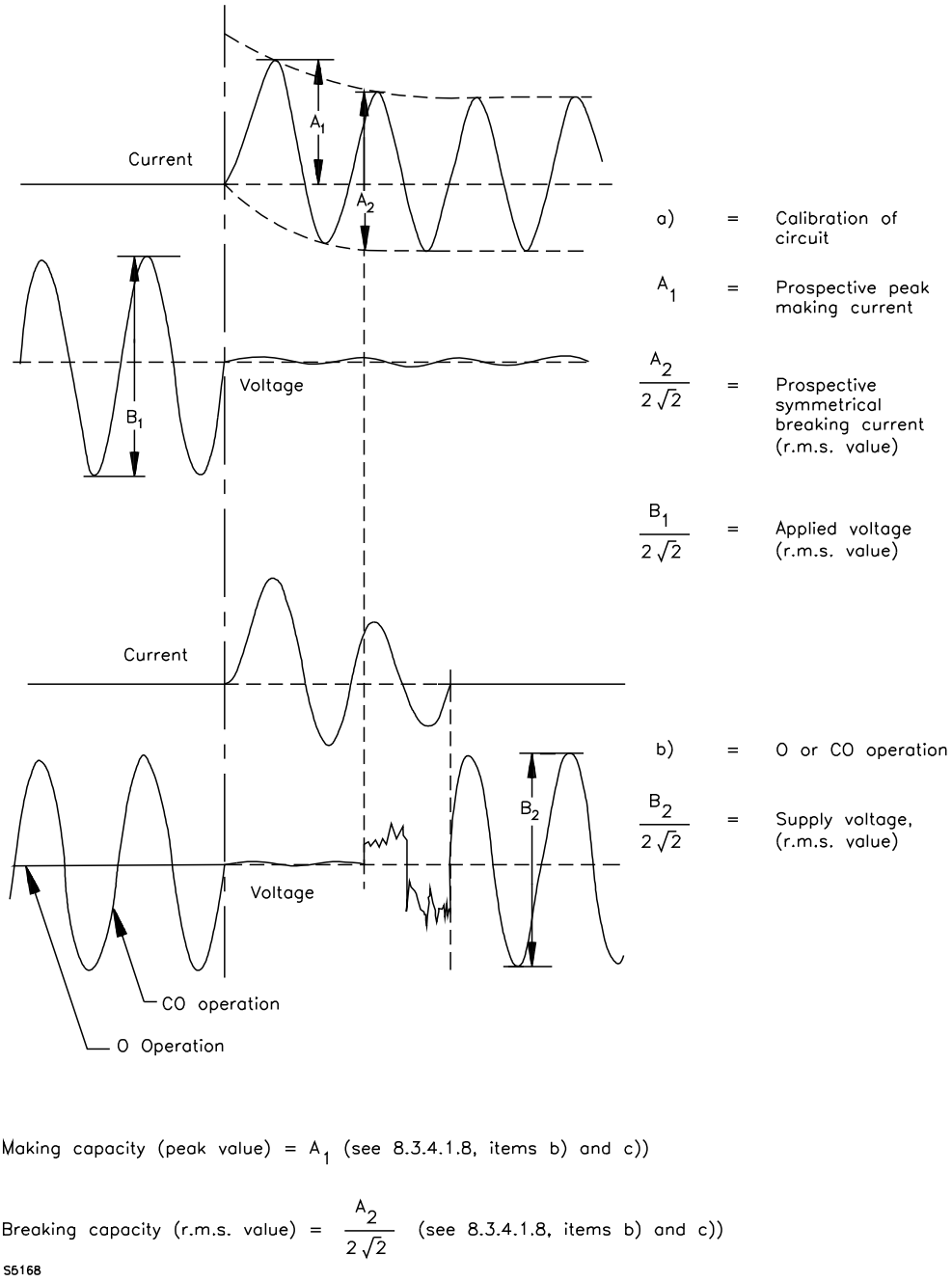
NOTE 1 – Adjustable loads X and R_1 may be located either on the high-voltage side or on the low-voltage side of the supply circuit, the closing device A being located on the low-voltage side.

NOTE 2 – U_r1, U_r2, U_r3 may, alternatively, be connected between phase and neutral.

NOTE 3 – If an additional test is required between the neutral and the adjacent pole, the connections C1 and C2 are omitted.

Figure 13 – Example of short-circuit making and breaking test record in the case of a single-pole equipment on single-phase a.c.

(see 8.3.4.1.8)



Making capacity (peak value) = A_1 (see 8.3.4.1.8, items b) and c))

Breaking capacity (r.m.s. value) = $\frac{A_2}{2\sqrt{2}}$ (see 8.3.4.1.8, items b) and c))

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NOTE 1 – The amplitude of the voltage trace, after initiation of the test current, varies according to the relative positions of the closing device, the adjustable impedances, the voltage sensors and according to the test circuit diagram.

NOTE 2 – It is assumed that the instant of making is the same for calibration and test.