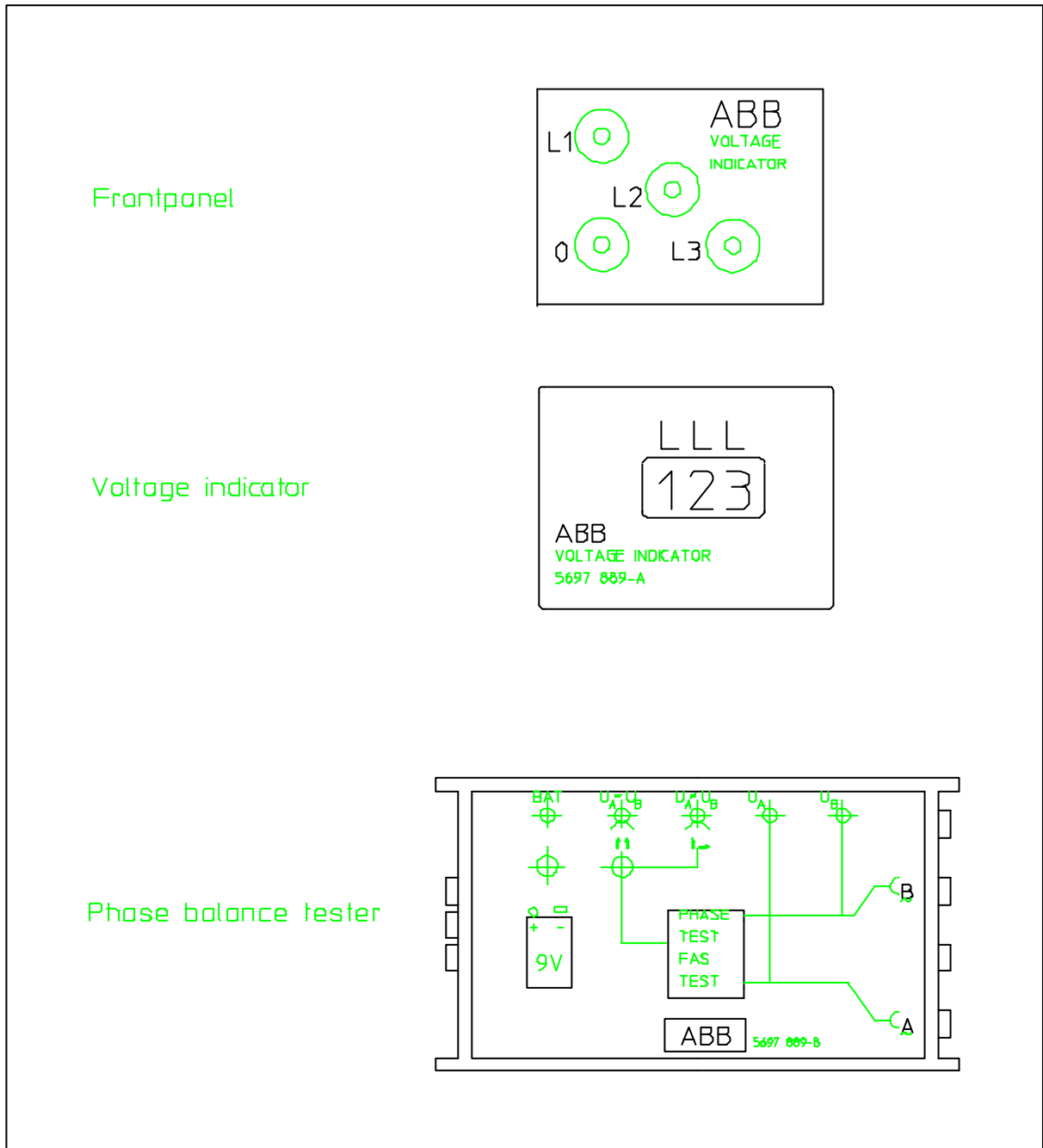


SYSTEM FOR VOLTAGE INDICATION AND PHASE BALANCE TEST FOR SAFELINK & SD SWITCHGEARS



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1. VOLTAGE INDICATION

1.1 INTRODUCTION

There is always some operational risk when earthing switchgear. To minimise this risk, earthing is performed with a mechanically interlocked earth switch with full fault making capacity. In addition to this, switchgear can include a system for voltage indication on each phase of the cable bushing.

1.2 SYSTEM DESCRIPTION

The voltage indicating system consists of:

- * Three cable bushings, with built-in capacitive screens (one per phase) for voltage indication.
- * One cable stem consisting of three shielded cables (one per phase), for transmission of the measured voltage from the insulators to the front panel.
- * One front panel with sockets for the voltage indicator.
- * One voltage indicator with display to indicate voltage on the three phases.

1.3 TECHNICAL DATA

The maximum short-circuit current from front panel at rated voltage 12kV is 45 μ A.
The maximum open circuit voltage at rated voltage 12kV is ≤ 50 V.

The screen capacitance is very low, approx. 23pF.
Cable capacitance is approx. 60pF at rated voltage 12kV.

1.4 OPERATION

Plug in the voltage indicator in the front panel.
If the display show 1, 2 or 3 the related phases are live (the voltage to neutral is ≥ 350 V at rated voltage 12kV).

2. PHASE BALANCE TEST

2.1 INTRODUCTION

Before closing a new incoming feeder in live switchgear it can be important to check that the cables are connected to the right phases by testing the phase balance between the two systems. Therefore SafeLink/SD offers a system for phase balance test.

With the phase balance tester you can also check the function of the voltage indicator (see chapter 3).

There is also a possibility to test the phase balance tester itself (see chapter 3).

Notice that this system should not be used for synchronization.

2.2 SYSTEM DESCRIPTION

The phase balance tester is an electronic unit, for phase balance test between a known and an unknown phase, that uses the same system as the voltage indicator i.e. the cable bushings (with the built-in capacitive screen), the cable stem and the front panel.

| Article nr. | Description | Rated voltage kV |
|-------------|----------------------|---------------------|
| 5697 889-B | Phase balance tester | 3.6 - 12 |

2.3 TECHNICAL DATA

The phase balance tester can be used with the front panel, 12 kV.
Phase position is indicated at operating voltage ≥ 3 kV in the cubicle.

Phase balance is indicated if the phase displacement is less than 40 degrees.

Unloaded output voltage from output side marked TEST OF VOLTAGE IND. is a square wave with peak-peak voltage 9 V. Loaded output voltage is a square wave with peak-peak voltage 0.6 V.

2.4 OPERATION

Switch on the battery-switch marked with a battery symbol. If the battery is OK the green LED marked BAT should blink.

On the right side of the phase balance tester there are two inputs (signal ~ and earth 0) marked A and two inputs (signal ~ and earth 0) marked B.

Plug in on A one phase and earth from one front panel e.g. L1 and 0 from the front panel for the busbar, and on B the related phase and earth from another front panel e.g. L1 and 0 from the front panel on the incoming cubicle. Use cables with 4 mm banana pin.

Two yellow LEDs marked U_A and U_B indicates (blinks) if there is enough measuring voltage into the phase balance tester (corresponds to ≥ 3 kV operating voltage in the switchgear cubicle). If those two LEDs are blinking, the phase balance test is made. The result is indicated by a green or a red LED.

If the green LED marked $U_A=U_B$ is blinking, there is phase balance between the two incoming cables.

If the red LED marked $U_A \neq U_B$ is blinking, there is not phase balance between the two incoming cables.

WARNING: On the input side (right side) marked A and B on the phase balance tester, you may only plug in cables from the front panels or from the output side (left side) of the phase balance tester marked TEST OF VOLTAGE IND. Otherwise there is a risk that the tester will be damaged.

3. TEST OF VOLTAGE INDICATOR & SELF-TEST

3.1 TEST OF VOLTAGE INDICATOR

On the output side (left side) of the phase balance tester there are outputs marked TEST OF VOLTAGE IND. for test of the voltage indicator.

Plug in the voltage indicator and switch on the battery-switch.

If the voltage indicator is OK you should see 123 on the display. If there is nothing on the display or if one digit is missing the voltage indicator is probably defect.

3.2 TESTING THE PHASE BALANCE TESTER (SELF-TEST)

To test the phase balance tester use cables (4 mm banana pin) to connect the output side marked TEST OF VOLTAGE IND. with the input side marked A and B. See picture 1.

To test the indication of phase balance do as follows:

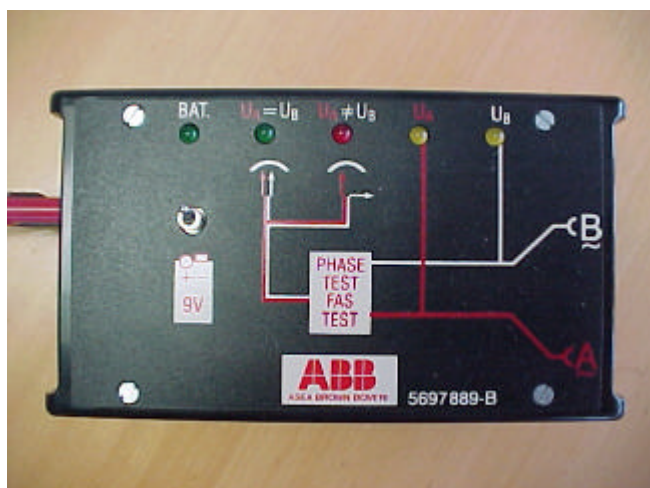
- Connect a cable between one of the outputs marked 0° and the signal \sim input marked A.
- Connect a cable between the other output marked 0° and the signal \sim input marked B.
- Switch on the battery switch.

If everything is OK the LEDs marked U_A , U_B and $U_A=U_B$ (phase balance) should blink.

To test the indication of phase opposition you do as for phase balance test (above), except that you move one of the plugs on the output side marked 0° to the output marked 180° .

If everything is OK the LEDs marked U_A , U_B and $U_A \neq U_B$ (phase opposition) should blink.

5. PICTURES



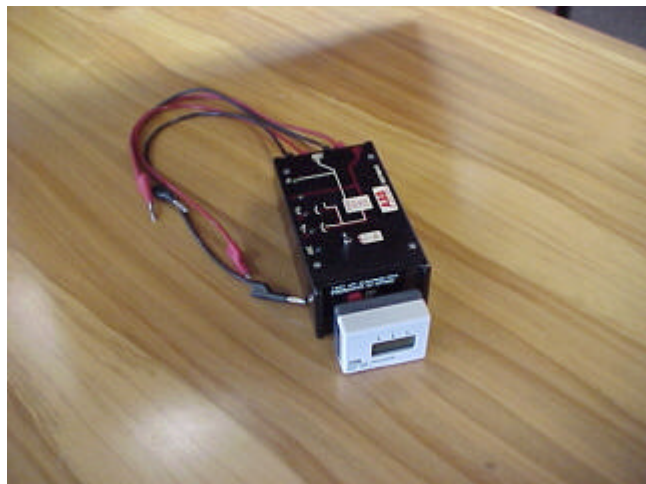
Picture 1



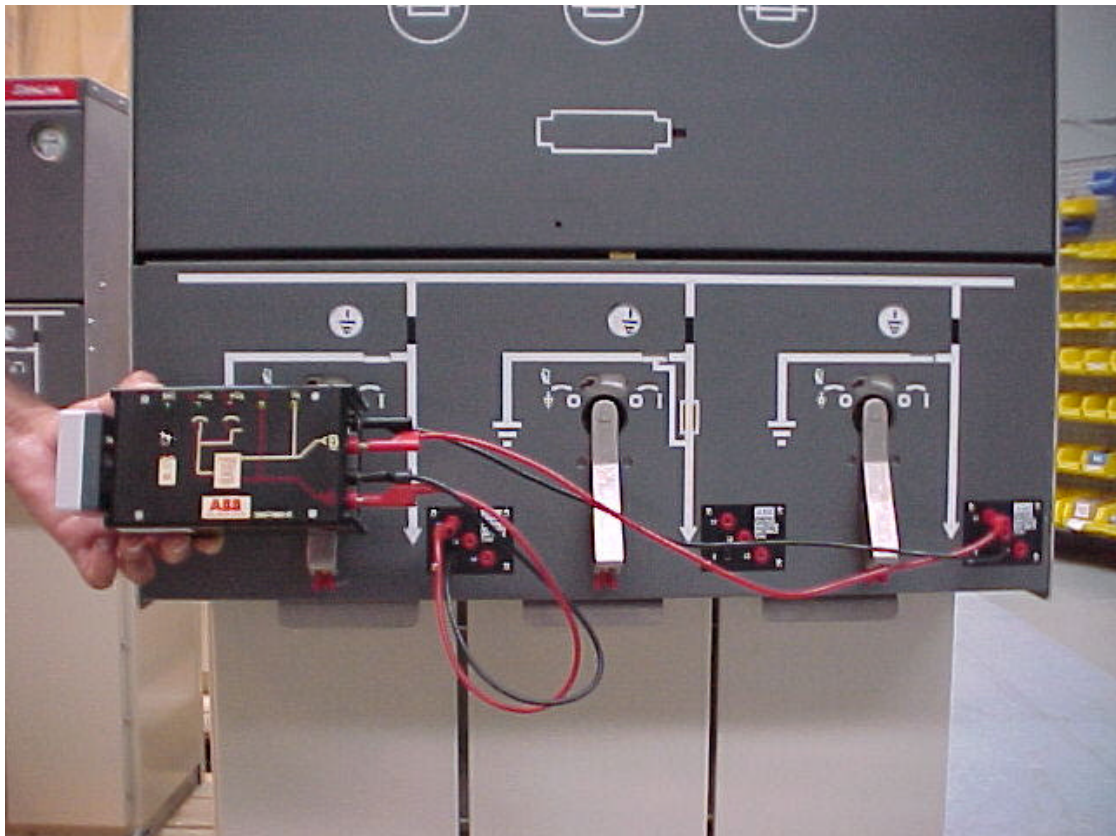
Picture 2



Picture 3



Picture 4



Picture 5