

SAFETY EQUIPMENT

Design of DEHNcap Voltage Detecting Systems

VOLTAGE DETECTING SYSTEMS

Metal encapsulated switchgear installations, normally SF6 gas-insulated, have become widely accepted in the field of switchgear construction. Testing for safe isolation from supply voltages in these types of installations according to IEC/EN 61243-1 (DIN VDE 0682 Part 411) can often not be performed with conventional voltage detectors. For this reason, capacitive voltage detecting systems have been developed in compliance with IEC/EN 61243-5 (DIN VDE 0682 Part 415) for verifying safe isolation from supply voltages on all poles at work locations according to DIN VDE 0105 Part 100.

Verifying safe isolation from supply voltages may only be performed by a qualified electrician or electrotechnically instructed person.

Our range of products of capacitive voltage detecting systems consists of:

- Coupling units (K): DEHNcap/M...
- Indicators (A): DEHNcap/...

Coupling units, fixed parts of installations

Coupling units are components of a pluggable voltage detecting system fixed in switchgear installations. Coupling units consist of a coupling capacitance (2), connecting cable (3), voltage-limiting device (4), measuring circuit (5) and measuring point (6).

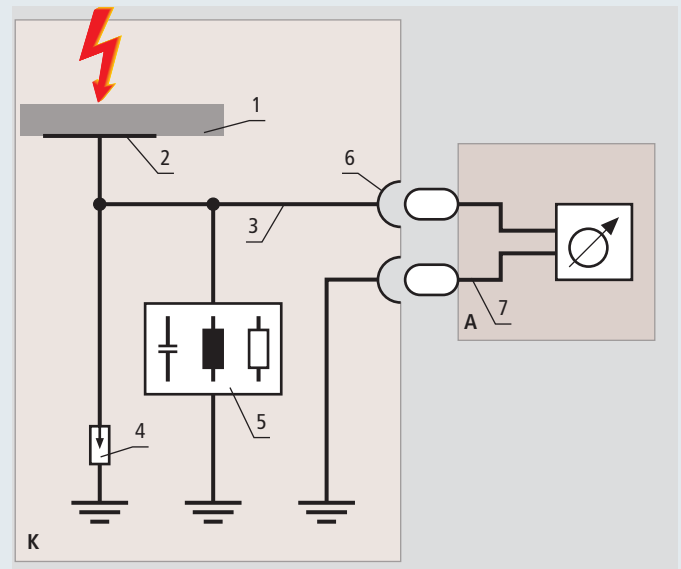
The coordinated components, capacitive divider insulator and interface module type DEHNcap/M, constitute one complete coupling unit. The capacitive divider insulator consists of the coupling capacitance while the voltage-limiting device, measuring circuit and measuring point are integrated in the DEHNcap/M interface module.

The DEHNcap/M interface module is designed for three-phase a.c. systems with reference to its threshold values.

If an equipment contains e.g. a bushing and a measuring transformer or another divider insulator contains the coupling capacitance, the coupling unit can be connected to the DEHNcap/MDS interface module with universal coupling electrode connection. Both the DEHNcap/M and DEHNcap/MDS interface modules are available as HR and LRM systems.

Response voltage, clear indication

In order to obtain a clear indication, the coupling units have to be designed in such a way that the indicator indicates "voltage present" in case of a line-to earth voltage of max. 45% of the nominal voltage. No indication may appear for a line-to-earth voltage of less than 10% of the rated voltage. These limit values apply to any type of voltage detecting system (HR, LRM system). This means that an interface voltages of 90 V for HR systems and 5 V for LRM systems must be reached within the above mentioned limits.



Capacitive voltage detecting system for high-voltage installations – Basic circuit diagram

K DEHNcap/M... coupling unit

A DEHNcap/... indicator

- 1 Live part of the high-voltage installation
- 2 Coupling capacitance (coupling electrode with coupling dielectric)
- 3 Connecting cable
- 4 Voltage-limiting device
- 5 Measuring circuit
- 6 Measuring point
- 7 Connecting cable

Nominal voltage and rated voltage

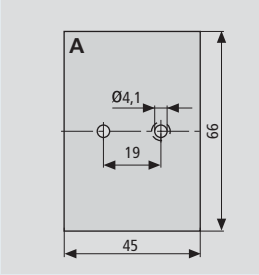
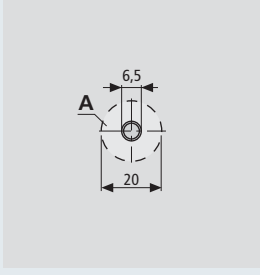
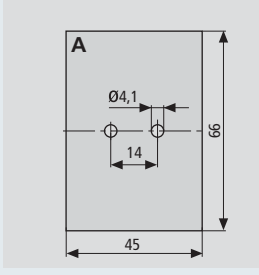
Coupling units according to EN/IEC 61243-5 (DIN VDE 0682 Part 415) are preferably installed into medium-voltage switchgear installations according to DIN VDE 0670 Part 6 or EN/IEC 62271-200 (DIN VDE 0671 Part 200). However, these standards specify different voltage values. EN/IEC 61243-5 (DIN VDE 0682 Part 415) for capacitive voltage detecting systems defines the voltage as nominal voltage. DIN VDE 0670 Part 6 for medium-voltage switchgear installations, however, defines the voltage as rated voltage.

EN/IEC 61243-5 (DIN VDE 0682 Part 415)	Nominal voltage	6 kV	10 kV	20 kV	30 kV
DIN VDE 0670 Part 6	Rated voltage	7.2 kV	12 kV	24 kV	36 kV
EN/IEC 62271-200 (DIN VDE 0671 Part 200)					

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Electrical and mechanical requirements for the interfaces of pluggable HR, LR and LRM voltage detecting systems

System description		HR High resistance	LR Low resistance	LRM Low resistance, modified
Input impedance of the indicator	X_C	36 M Ω	2 M Ω	2 M Ω
Electrical response conditions of the interface	I	2.5 μ A	2.5 μ A	2.5 μ A
Electrical response conditions of the interface	U	90 V	5 V	5 V
Socket arrangement and minimum tooling border A for indicator or plug				
Plug arrangement		