

Black box concept

IEC 61439 defines which points the manufacturer and the user of a switchgear and controlgear assembly have to define. The switchgear and controlgear assembly is viewed as a so-called "black box", whose interfaces to the environment are defined in the following 4 areas:

Setup and ambient conditions

- Existing power system (TN-C, TN-C-S, TN-S, TT, IT)
- Pollution degree
- Interior and/or outdoor installation
- Stationary or mobile switchgear and controlgear assembly
- Degree of protection (IP)
- Electromagnetic compatibility (EMC)
- Special operating conditions (e.g. extreme thermal, atmospheric and climatic influences, etc.)
- Exterior type of construction (open/closed type of construction, panel type, cabinet type, etc.)
- Protection against mechanical influences (IK code)
- Type of structure (inserts or removable parts)
- Total mass and, if necessary, component masses (transport)
- Dimensions and condition of installation (freestanding, wall-mounted, placed in a row, etc.)

Power supply

- Rated voltage of the switchgear and controlgear assembly U_n
- Rated frequency f_n
- Rated operating voltage U_e
- Measure for protection against electric shock (class of protection)
- Rated current of the switchgear and controlgear assembly I_{nA}
- Rated impulse withstand voltage U_{imp}
- Rated peak withstand current I_{pk}
- Rated short-time withstand current I_{cw}
- Conditional rated short-circuit current I_{cc}
- Number and kind of incoming cables (single- or multiple-conductor cable, cross-section,

conductor material, connection type)

Circuit and loads

- Rated insulation voltage U_i
- Rated current of the circuit I_{nC}
- Rated design load factor RDF

Operation and maintenance

- Intended operating personnel (skilled personnel, laypersons)
- Device operation (e.g. behind the door, from the outside, etc.)
- Door locking (toggle, handle, with or without lock, etc.)

Implementation of the defined interfaces is the manufacturer's responsibility.

Installation and ambient conditions

