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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Particular requirements for source switching equipment (SSE)

Exigences particulières relatives au matériel de commutation de source (SSE)



IEC 62991:2022-12(en-fr)



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INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PARTICULAR REQUIREMENTS FOR SOURCE SWITCHING EQUIPMENT (SSE)

FOREWORD

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IEC 62991 has been prepared by subcommittee 23K: Electrical Energy Efficiency products, of IEC technical committee 23: Electrical accessories. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
23K/78/FDIS	23K/79/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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INTRODUCTION

The optimization of electrical energy usage can be facilitated by appropriate design and installation considerations. An electrical installation can provide the required level of service and safety for the lowest level of electrical consumption.

This is considered by designers as a general requirement of their design procedures to establish the best use of electrical energy.

The optimization of the use of electricity is based on energy efficiency management taking into consideration the price of electricity, electrical consumption of the loads and real-time adaptation, as described in Figure 1, which is reproduced from IEC 60364-8-1:2019, Figure 1.

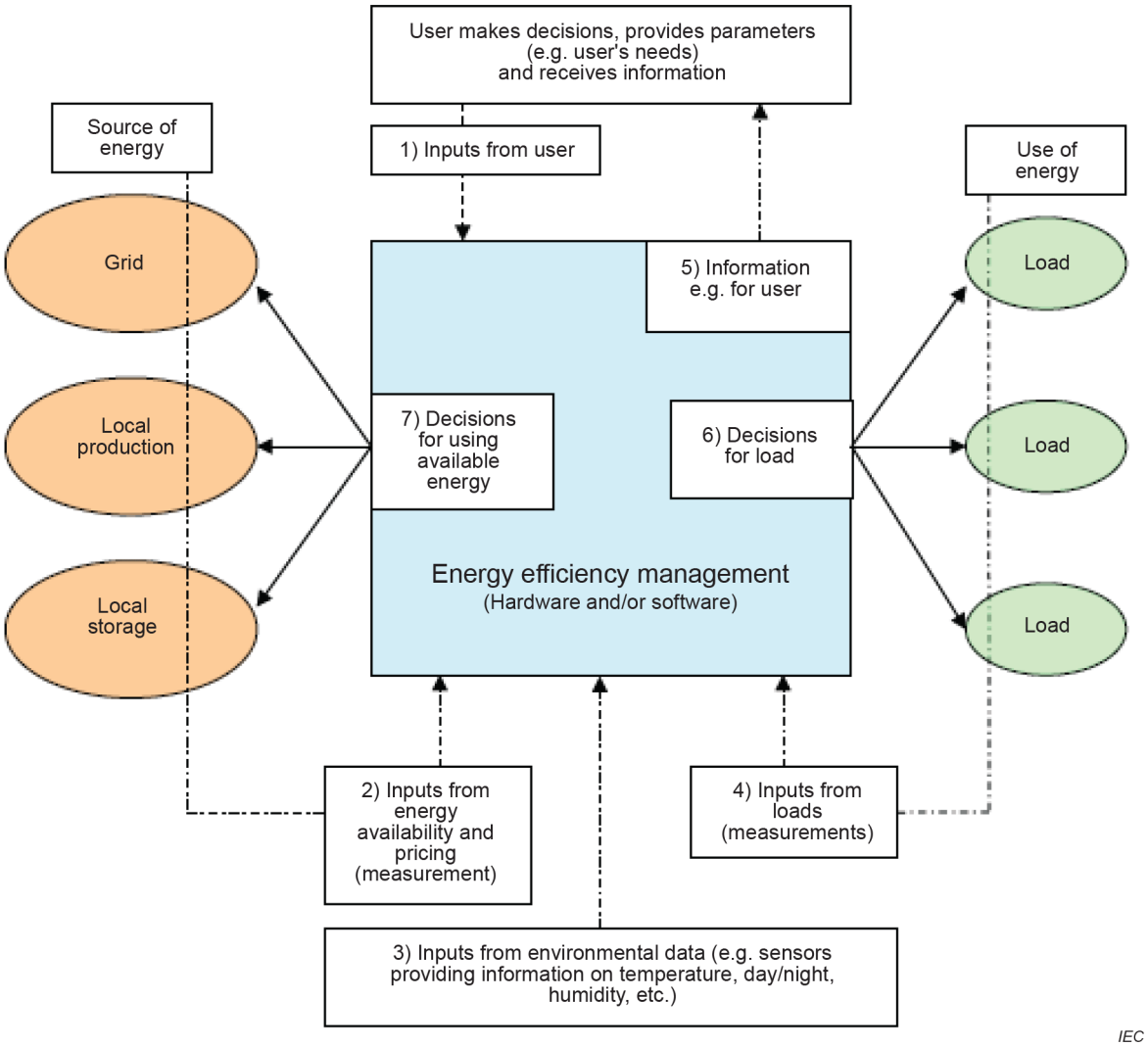


Figure 1 – Energy efficiency management system (EEMS)

This document applies to source switching equipment (SSE), for household and similar uses (see Figure 2).

SSE is intended:

– to make transparent to the end-user the use of energy sources, taking into account local generation or storage;
– to optimize the electrical energy originating either from the grid or from other local sources/storage.

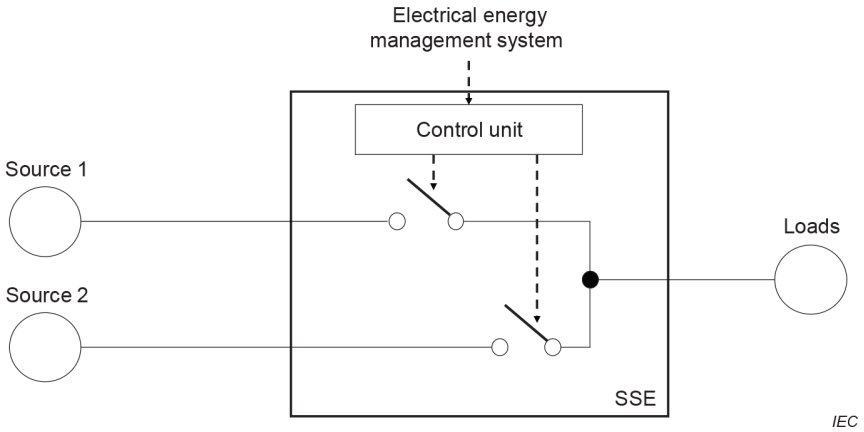


Figure 2 – Principle of management of two sources with source switching equipment (SSE)

NOTE Examples of use of SSE are given Annex A.

As defined by IEC 60364-8-82:2022, the main operating modes of SSE are:

– direct feeding mode: corresponding to the normal source (supply from the grid). Storage units can supply current-using-equipment or be charged by the grid or local power supplies;
– island mode: loads supplied by local energy sources and storage units, disconnected from the grid;
– reverse feeding mode: corresponding to the supply of the grid. Storage units can supply current-using-equipment and/or the grid or be charged by local power supplies.

Transfer from/to the direct feeding mode to island mode and vice versa can be achieved by the operation of the SSE which can be either directly controlled (manually or remotely) or automatically controlled.

Operation of SSE is to occur in safe conditions as described in IEC 60364-8-82:2022.

This document does not cover communication aspects such as protocols and interoperability nor data security or other related aspects.

SSE switching operations are based on similar principles as transfer switching equipment (TSE). For applications with higher currents, for example, for industrial applications, the reader may refer to IEC 60947-6-1.

PARTICULAR REQUIREMENTS FOR SOURCE SWITCHING EQUIPMENT (SSE)

1 Scope

This International Standard applies to source switching equipment, hereafter referred to as SSE, for household and similar uses, primarily intended to be used for energy efficiency (EE) purposes with local production and/or storage of energy.

SSE is intended to be installed in low voltage prosumer electrical installations (PEI) to deliver the electrical energy:

– either to current-using equipment (direct feeding mode or island mode);

– or to the grid (reverse feeding mode).

SSE is intended to select and/or combine two power sources (e.g. selected from among grid, local power source, storage units) within an electrical energy management system (EEMS). SSE can also be used for backup supply.

NOTE 1 "Switching device for islanding" (SDFI) function is under consideration as additional requirements can be necessary. See also Figure 4 of IEC 60364-8-82:2022.

SSE is part of the fixed electrical installation.

This document applies to SSE for operation in AC single or multiphase main circuits with rated voltages not exceeding 440 V AC, frequencies of 50 Hz, 60 Hz or 50/60 Hz and rated currents not exceeding 125 A (40 A for screwless terminals). They are intended to be used in installations with prospective short circuit currents not exceeding 25 000 A. DC operations are not covered by this edition and are kept under consideration for a future revision of this document.

According to this document, SSE can be operated:

– manually (M-SSE), or

– remotely (R-SSE), or

– automatically (A-SSE), or

– a combination of the above methods of operation, e.g. manual and remote.

SSE is used to select two sources sequentially. SSE able to run two (or more) sources in parallel are not covered by this edition and are kept under consideration for a future revision of this product standard.

SSE can be operated with interlocks and/or synchronization.

NOTE 2 In some countries, it is not permitted to have synchronization of local sources with the grid for particular grid conditions, e.g. when fluctuations of the grid voltage or frequency are outside the tolerance limits.

SSE is constructed either as combined SSE (C-SSE, based on dedicated products such as circuit breakers, switches or contactors) or non-combined SSE (NC-SSE).

According to this document, C-SSE is based on switching units of the same type.

SSE is intended for use in circuits where protection against electrical shock and over-current is provided according to installation rules for low voltage electrical installations, unless the SSE already contains such protective function.

SSE is normally installed by instructed persons (IEC 60050-195:2021, 195-04-02) or skilled persons (IEC 60050-195:2021, 195-04-01). SSE is normally used by ordinary persons (IEC 60005-195:2021, 195-04-03) and does not require maintenance.

The requirements of this document apply for standard environmental conditions. They are applicable to SSE intended for use in an environment with pollution degree 2 and overvoltage categories III according to IEC 60664-1:2020. SSE has at least a degree of protection IP 20 according to IEC 60529. Additional requirements can be necessary for devices used in locations having more severe environmental conditions.

SSE does not, by its nature, provide an isolation function nor the overcurrent protection. However, isolation and overcurrent protection functions as covered by relevant product standards can be provided by combined SSE.

This document does not apply to transfer switching equipment (TSE) intended to be used by skilled persons, as covered by IEC 60947-6-1:2021.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

IEC 60127-1, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*

IEC 60212, *Standard conditions for use prior to and during the testing of solid electrical insulating materials*

IEC 60228, *Conductors of insulated cables*

IEC 60317-0-1:2013, *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*

IEC 60364-8-82:2022, *Low voltage electrical installations – Part 8-82: Functional aspects – Prosumer's low-voltage electrical installations*

IEC 60384-14:2013, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*
IEC 60384-14:2013/AMD1:2016

IEC 60417, *Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60669 (all parts), *Switches for household and similar fixed-electrical installations*

IEC 60695-2-10, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60898-1, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 1: Circuit-breakers for a.c. operation*

IEC 60898-2, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 2: Circuit-breakers for AC and DC operation*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61095:2009, *Electromechanical contactors for household and similar purposes*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*

IEC 62873-3-1, *Residual current operated circuit-breakers for household and similar use – Part 3-1: Particular requirements for devices with screwless-type terminals for external copper conductors*

IEC 62873-3-3, *Residual current operated circuit-breakers for household and similar use – Part 3-3: Specific requirements for devices with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors*

CISPR 14-1:2020, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

ISO 306, *Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1 General definitions

3.1.1
electrical energy efficiency
EEE
system approach for optimizing the efficiency of electricity usage

Note 1 to entry: Energy efficiency improvement measures take into account the following considerations:

– both the consumption (kWh) and the price of electricity;

– technology;

– environmental impact.

[SOURCE: IEC 60364-8-1:2019, 3.1.7]

3.1.2
electrical energy management system
EEMS
system monitoring, operating, controlling and managing energy resources and loads of the installations

[SOURCE: IEC 60364-8-1:2019, 3.2.1]

3.1.3
operating mode
operation of an installation with respect to the different sources of electrical energy and to energy flow

[SOURCE: IEC 60364-8-82:2022, 82.3.9]

3.1.4
direct feeding mode
operating mode in which the distribution network supplies the PEI

Note 1 to entry: Local storage units can supply current-using equipment or be charged by local power supplies and/or the distribution system.

[SOURCE: IEC 60364-8-82:2022, 82.3.10]

3.1.5
reverse feeding mode
operating mode in which the PEI supplies the distribution network

Note 1 to entry: Local storage units can supply current-using equipment and/or the distribution system or be charged by local power supplies.

[SOURCE: IEC 60364-8-82:2022, 82.3.11]

3.1.6
operating sequence
<of the A-SSE> automatic transfer of a load from one source to another in the event of a monitored source deviation and/or other predefined conditions

Note 1 to entry: Transfer may be with or without a predetermined time delay and may include an OFF position.

[SOURCE: IEC 60947-6-1:2021, 3.4.1, modified – Adding the domain, replacing "supply" by "source" and note 1 by a new note.]

3.1.7
monitored source deviation
variation in the measured power source characteristics that exceeds predetermined limits

EXAMPLE Abnormal changes in voltage or frequency of the power source are source deviations.

Note 1 to entry: This definition applies only for A-SSE.

[SOURCE: IEC 60947-6-1:2021, 3.4.2, modified – Replacing "supply" by "source" and "ATSE" by "A-SSE" in the note.]

3.1.8
voltage source deviation
change in voltage level from the nominal voltage of the monitored source

[SOURCE: IEC 60947-6-1:2021, 3.4.3, modified – Replacing "supply" by "source" in the term and definition.]

3.1.9
frequency source deviation
change in frequency from the nominal operating frequency of the monitored source

[SOURCE: IEC 60947-6-1:2021, 3.4.4, modified – Replacing "supply" by "source" in the term and definition.]

3.1.10
contact transfer time
time measured from the mechanical opening of all poles from one set of main contacts from one source to the mechanical closing of any pole of a second set of main contacts to another source, with any adjustable time-delay set to the minimum value

[SOURCE: IEC 60947-6-1:2021, 3.4.5, modified – Replacing "power supply" by "source" and removal of Note 1.]

3.1.11
OFF-time
time measured during transfer from the instant of final arc extinction, under the conditions producing the longest arcing time, in all poles, to the closing of main contacts on another supply

3.1.12
switching position
position of the main contacts defining whether the load terminals are connected to source 1 or source 2 terminals, or not connected

Note 1 to entry: In this document, the term "switching position" has been replaced by "position".

[SOURCE: IEC 60947-6-1:2021, 3.5.1, modified – Replacing "source I or source II" by "source 1 or source 2".]

3.1.13
position I
contact position of the equipment when the load terminals are connected to source 1 terminals

[SOURCE: IEC 60947-6-1:2021, 3.5.2, modified – Replacing "source I" by "source 1".]

3.1.14
position II
contact position of the equipment when the load terminals are connected to source 2 terminals

[SOURCE: IEC 60947-6-1:2021, 3.5.3, modified – Replacing "source II" by "source 2".]

3.1.15
OFF position
stable contact position of rest of the equipment when the load terminals are connected to neither source 1 nor source 2 terminals

Note 1 to entry: The OFF position may also be marked as the O position.

[SOURCE: IEC 60947-6-1 2021, 3.5.4, modified – Replacing "source I or source II" by "source 1 or source 2".]

3.1.16
interlock
system to prevent simultaneous connection of two different power sources

Note 1 to entry: The interlock may be based on electrical or mechanical means, or both.

Note 2 to entry: Mechanical interlocking prevents the closed position of switching devices from being simultaneously achieved under all conditions. The state of two mechanisms being mutually dependent prevents the change of switching position of operation of one mechanism depending on the switching position (hereafter "position") of operation of the other mechanism.

Note 3 to entry: Electrical interlocking prevents, among other functions, the closing commands from being sent to both switching devices simultaneously under all conditions.

3.1.17
synchronization
electrical system intentionally allowing the connection of two different power sources in parallel

3.1.18
open transition
break before make transfer operation that intentionally breaks the load current from one source for a period of time prior to making it to the other source

Note 1 to entry: SSE with open transition may operate with a time delay e.g. for power backup application.

[SOURCE: IEC 60947-6-1:2021, 3.4.7, modified – Adding the note.]

3.1.19
closed transition
make before break transfer operation that intentionally makes the load current of a second synchronized source for a short period of time before breaking it from the first source

[SOURCE: IEC 60947-6-1:2021, 3.4.9]

3.1.20
utilization category
<for a switching device or fuse> combination of specified requirements related to the condition in which the switching device or the fuse fulfils its purpose, selected to represent a characteristic group of practical applications

Note 1 to entry: The specified requirements may concern e.g. the values of making capacities (if applicable), breaking capacities and other characteristics, the associated circuits and the relevant conditions of use and behaviour.

[SOURCE: IEC 60050-441:1984, 441-17-19]

3.1.21
recovery voltage
voltage which appears across the terminals of a pole of a switching device or a fuse after the breaking of the current

Note 1 to entry: This voltage may be considered in two successive intervals of time, one during which a transient voltage exists, followed by a second one during which the power-frequency voltage or the steady-state recovery voltage alone exists.

Note 2 to entry: This definition applies to a single-pole device. For a multipole device the recovery voltage is the phase-to-phase voltage across the supply terminals of the device.

[SOURCE: IEC 60050-441:1984, 441-17-25, modified – Addition of Note 2.]

3.1.22
operating cycle
<of a mechanical switching device> succession of operations from one position to another and back to the first position through all other positions, if any

[SOURCE: IEC 60050-441:1984, 441-16-02]

3.1.23
operating sequence
<of a mechanical switching device> succession of specified operations with specified time intervals

[SOURCE: IEC 60050-441:1984, 441-16-03]

3.1.24
manual control
control of an operation by human intervention via the use of operating means

[SOURCE: IEC 60050-441:1984, 441-16-04, modified – by adding "via the use of operating means".]

3.1.25
automatic control
control of an operation without human intervention, in response to the occurrence of predetermined conditions

[SOURCE: IEC 60050-441:1984, 441-16-05]

3.1.26
local control
control of an operation at a point on or adjacent to the controlled device

[SOURCE: IEC 60050-441:1984, 441-16-06, modified – by removing the term "switching" from the definition.]

3.1.27
remote control
control of an operation via the use of operating means at a point distant from the controlled device

[SOURCE: IEC 60050-441:1984, 441-16-07, modified – by adding "via the use of operating means " and removing the term "switching".]

3.1.28
source switching equipment
SSE
equipment able to select (power) sources when certain conditions are met or following human intervention

Note 1 to entry: For example, SSE for back-up applications may contain one or more switching devices and all associated control means for disconnecting load circuits from one source and reconnecting them to another source when certain conditions are met.

Note 2 to entry: For example, SSE for grid connected PEI defined in IEC 60364-8-82:2022 may contain one or more switching devices and associated control means for switching load circuits from one normal source to another source, when certain conditions are met, maintaining the loads always energized.

3.1.29
combined SSE
C-SSE
SSE based on the association of switching devices complying with the IEC 60669 series, and with IEC 60898-1 or IEC 60898-2, or with IEC 61095, and with its associated control means for managing the switching operation(s) of the SSE

Note 1 to entry: Combined SSE may be based on individual devices or on devices mechanically assembled together in a dedicated unit (e.g. two switches assembled together, two switches assembled together with the control unit or parts of the control unit). In the case of assembled devices, assembling may be done by the manufacturer or on site (e.g. by the installer or the panel builder).

Note 2 to entry: For SSE based on switching devices where certain tests are already covered by other product standards, it is not necessary to repeat those tests.

3.1.30
non-combined SSE
NC-SSE
SSE specifically designed by the manufacturer, with all intended switching means including the associated control means for managing the switching operation(s) of the SSE, but not based on the association of devices complying with the IEC 60669 series, nor with IEC 60898-1, IEC 60898-2 or IEC 61095

Note 1 to entry: NC-SSE may be based on individual devices or not, e.g. SSE with a remote-control unit or with a SSE controller.

Note 2 to entry: NC-SSE is not supposed to provide overcurrent protection except if it is declared to also comply with IEC 60898-1 or IEC 60898-2.

3.1.31
manually operated SSE
M-SSE
SSE operated manually and non-electrically

[SOURCE: IEC 60947-6-1:2021, 3.3.2, modified – the term and abbreviated term have been adapted to apply to the specific case of SSE.]

3.1.32
remotely operated SSE
R-SSE
SSE that is electrically operated and not self-acting

Note 1 to entry: R-SSE can have a feature for local and/or manual operation.

Note 2 to entry: Remote control means may include operating means for manual control (e.g. push-buttons, rotary switches, etc.) and additional features such as remote signalling, etc. They may be located within the same enclosure or not, and controls may be transmitted via any kind of media (wire or wireless).

[SOURCE: IEC 60947-6-1:2021, 3.3.3, modified – the term, abbreviated term and definition have been adapted to apply to the specific case of SSE, and Note 2 added.]

3.1.33
automatically operated SSE
A-SSE
self-acting SSE, including all necessary sensing inputs, monitoring, and control logic means for switching operation(s)

Note 1 to entry: A-SSE can have a feature for local and/or remote and/or manual operation.

Note 2 to entry: Automatic control means may be located within the same enclosure or not, and controls may be transmitted via any kind of media (wire or wireless).

[SOURCE: IEC 60947-6-1:2021, 3.3.4, modified – replacing the term "automatic transfer switching equipment" by "automatically operated SSE" and the abbreviated term "ATSE" by "A-SSE", referring to SSE in the definition, and adding Note 2.]

3.1.34
switching unit
<of the SSE> all part(s) intended for selecting the sources to supply the load circuits

Note 1 to entry: A switching unit may be based on a single device (e.g. NC-SSE), on multiple devices mechanically assembled together in a single switching unit (e.g. C-SSE), on dedicated switches embedded together with the control unit in a single device (e.g. the SSE itself), etc.

3.1.35
control unit
<of the SSE> all part(s) intended for managing the operation(s) of the switching unit of the SSE, including the operating means or HMI unit

Note 1 to entry: Depending on the type of SSE, the control unit may include different features such as manual operating means, sensing, interlock, synchronization, control of settings, etc. For the purposes of this document, control means do not include means intended for purposes other than controls, e.g. local or remote signalling.

Note 2 to entry: The control unit may be an integral part of the SSE, a standalone unit (to be associated to R-SSE or A-SSE) or a dedicated unit which may be part of a broader system (e.g. an energy efficiency management system). The control unit may be based on the use of mechanical means or electric means or both.

Note 3 to entry: Standalone SSE control units (device) and SSE dedicated control unit (device) may be also named SSE control device, SSE controller, etc.

Note 4 to entry: The control unit may be based on the use of devices covered by their own standards, insofar as such devices are used for the purposes specified.

3.1.36
main circuit
<of the SSE> all conductive parts of the switching unit included in the circuit which is designed to switch the power sources and to supply the loads

[SOURCE: IEC 60898-1:2015, 3.2.4, modified – replacing "circuit-breaker" by "SSE" in the domain, "circuit-breaker" by "switching unit" and "close and open" by "switch the power sources and to supply the loads" in the definition.]

3.1.37
control circuit
<of the SSE> all conductive parts of the SSE control unit (other than the paths of the main circuit) intended for managing the operation(s) of the switching unit of the SSE

Note 1 to entry: For the purposes of this document, the control circuit does not include means intended for purposes other than controls, e.g. local or remote signalling.

[SOURCE: IEC 60898-1:2015, 3.2.5, modified – to fit with the switching function of the SSE and adding Note 1.]

3.1.38
control contact
<of the SSE> contact included in a control circuit of the SSE for managing the operation(s) of the switching unit remotely

Note 1 to entry: SSE may be provided without control contacts.

[SOURCE: IEC 60898-1:2015, 3.3.3, modified – to fit with the switching function of the SSE and adding Note 1.]

3.1.39
backup
action to connect a local source to replace the main power supply to keep the continuity of service

3.1.40
island mode
operating mode in which the PEI is disconnected from the distribution network

Note 1 to entry: An island mode can be either the result of the action of automatic protections or the result of a deliberate action.

Note 2 to entry: Islanding is the action of disconnecting a PEI from the distribution system.

[SOURCE: IEC 60364-8-82:2022, 82.3.13, modified – Note 2 to entry has been added.]

3.1.41
prosumer's electrical installation
PEI
low-voltage electrical installation connected or not to a distribution network able to operate:

– with local power supplies, and/or

– with local storage units,

and that monitors and controls the energy from the connected sources delivering it to:

– current-using equipment, and/or

– local storage units, and/or

– distribution network

[SOURCE: IEC 60364-8-82:2022, 82.3.7]

3.1.42
rated control circuit supply voltage
U_s
rated voltage applied to energize the power supply terminals of the control circuit

[SOURCE: IEC 60947-1:2020, 3.7.66]

3.1.43
rated control circuit supply current
I_s
rated current applied to energize the power supply terminals of the control circuit

3.1.44
terminal
conductive part of a device, provided for re-usable electrical connection to external circuits

[SOURCE: IEC 60898-1:2015, 3.3.12]

3.1.45
screw-type terminal
terminal for the connection and subsequent disconnection of a conductor or the interconnection of two or more conductors, capable of being dismantled, the connection being made, directly or indirectly, by means of screws or nuts of any kind

[SOURCE: IEC 60898-1:2015, 3.3.12.1]

3.1.46
clamping unit
part or parts of a terminal necessary for the mechanical clamping and the electrical connection of the conductor(s)

[SOURCE: IEC 60669-1:2017, 3.4]

3.1.47
screw terminal
terminal in which the conductor is clamped under the head of one or more screws and where the clamping pressure can be applied directly by the head of the screw or through an intermediate part, such as a washer, a clamping plate or an anti-spread device

[SOURCE: IEC 60050-442:1998, 442-06-08]

3.1.48
stud terminal
screw-type terminal in which the conductor is clamped under a nut

Note 1 to entry: The clamping pressure can be applied directly by a suitably shaped nut or through an intermediate part, such as a washer, a clamping plate or an anti-spread device.

[SOURCE: IEC 60050-442:1998, 442-06-23]

3.1.49
lug terminal
screw-type terminal or stud terminal, designed for clamping a cable lug or bar directly or indirectly by means of a screw or nut

[SOURCE: IEC 60050-442:1998, 442-06-16, modified – "or stud terminal" added.]

3.1.50
screwless terminal
connecting device for the connection and subsequent disconnection of a rigid (solid or stranded) or flexible conductor or the interconnection of two conductors capable of being dismantled, the connection being made, directly or indirectly, by means of springs, parts of angled, eccentric or conical form, etc., without special preparation of the conductor concerned, other than removal of insulation

[SOURCE: IEC 60669-1:2017, 3.6, modified – "screwless-type terminal" replaced by "screwless terminal" in the term, and the word "terminal" has been replaced by "connecting device" in the definition.]

3.1.51
screwless-type terminal
terminal for the connection and subsequent disconnection obtained directly or indirectly by means of springs, wedges or the like

[SOURCE: IEC 60898-1:2015, J.3.2, modified – Note 1 to entry has been deleted.]

3.1.52
tapping screw
screw manufactured from a material having a greater resistance to deformation when applied by rotary insertion to a hole in a material having a lesser resistance to deformation

Note 1 to entry: The screw is made with a tapered thread, the taper being applied to the core diameter of the thread at the end section of the screw.

Note 2 to entry: The thread produced by application of the screw is formed securely only after sufficient revolutions have been made to exceed the number of threads on the tapered section.

[SOURCE: IEC 60898-1:2015, 3.3.13]

3.1.53
thread-cutting screw
screw having an interrupted thread which, by screwing in, makes a thread by removing material from the cavity

[SOURCE: IEC 60669-1:2017, 3.8, modified – Note 1 to entry has been deleted.]

3.1.54
pollution
<of an electrical system> any condition of foreign matter, solid, liquid or gaseous (ionized gases), that can affect dielectric strength or surface resistivity

[SOURCE: IEC 60664-1:2020, 3.1.24]

3.1.55
pollution degree
number characterizing the expected pollution of the micro-environment

Note 1 to entry: The pollution degree to which equipment is exposed may be different from that of the macro environment where the equipment is located because of protection offered by means such as an enclosure or internal heating to prevent absorption or condensation of moisture.

[SOURCE: IEC 60664-1:2020, 3.1.25, modified – Note 1 to entry has been added.]

3.1.56
switched neutral pole
pole only intended to switch the neutral, and not intended to have a short-circuit capacity

[SOURCE: IEC 60898-1:2015, 3.2.7.3]

3.1.57
actuating member
part which is pulled, pushed, turned or otherwise moved to cause an operation of the SSE

[SOURCE: IEC 60050-442:1998, 442-04-14, modified – The word "switch" has been replaced by "SSE" in the definition.]

3.1.58
electrical energy storage system
EES system
EESS
grid-connected installation with defined electrical boundaries, comprising at least one electrical energy storage, which extracts electrical energy from an electric power system, stores this energy internally in some manner and injects electrical energy into an electrical power system and which includes civil engineering works, energy conversion equipment and related ancillary equipment

Note 1 to entry: The EES system is controlled and coordinated to provide services to the electric power system operators or to the electric power system users.

Note 2 to entry: In some cases, an EES system may require an additional energy source (non-electrical) during its discharge, providing more energy to the electric power system than the energy it stored (compressed air energy storage is a typical example where additional thermal energy is required).

Note 3 to entry: "electric power system" is defined in IEC 60050-601:1985, 601-01-01.

[SOURCE: IEC 62933-1:2018, 3.2]

3.1.59
prosumer
<of electricity> entity or party which can be both a producer and a consumer of electrical energy

[SOURCE: IEC 60364-8-82:2022, 82.3.6]

3.1.60
connected mode
operating mode in which the PEI is connected to the distribution network

EXAMPLE Direct feeding mode, reverse feeding mode or no feeding mode (i.e. without any energy exchange between the PEI and the distribution network).

[SOURCE: IEC 60364-8-82:2022, 82.3.12]

3.1.61
extra-low voltage
ELV
voltage not exceeding the maximum value of the prospective touch voltage which is permitted to be maintained indefinitely under specified conditions of external influences

[SOURCE: IEC 61140:2016, 3.26]

3.1.62
SELV
SELV system
electric system in which the voltage cannot exceed the value of extra-low voltage:

– under normal conditions and
– under single fault conditions, including earth faults in other electric circuits

Note 1 to entry: SELV is the abbreviation for safety extra-low voltage.

[SOURCE: IEC 60050-195:2021, 195-06-28, modified – The term "SELV" has been added.]

3.1.63
PELV
PELV system
electric system in which the voltage cannot exceed the value of extra-low voltage:

– under normal conditions and
– under single fault conditions, except earth faults in other electric circuits

Note 1 to entry: PELV is the abbreviation for protective extra-low voltage.

[SOURCE: IEC 60050-195:2021, 195-06-29, modified – The term "PELV" has been added.]

3.2 Additional definitions for NC-SSE and SSE control units (controllers) of C-SSE

3.2.1
rated conditional short-circuit current
I_{nc}
value of prospective current, stated by the manufacturer, which the SSE, protected by a short-circuit protective device (SCPD) specified by the manufacturer, can withstand satisfactorily for the operating time of this device under specified conditions of use and behaviour

[SOURCE: IEC 60898-1:2015, 3.5.14.9, modified – replacing "the equipment" by "the SSE", "the test conditions in the relevant product standard" by "specified conditions of use and behaviour", and adding "(SCPD)".]

3.2.2
rated current
I_n
value of current, assigned to the SSE (or part of the SSE) by the manufacturer, which the device can carry in uninterrupted duty

3.2.3
rated frequency
<of SSE> value of power frequency assigned by the manufacturer for which the SSE is designed

Note 1 to entry: The same device may be assigned a number of rated frequencies.

3.2.4
rated making and breaking capacity
I_m
RMS value of the AC component of prospective current, assigned by the manufacturer, which the SSE can make, carry or break under specified conditions

3.2.5
rated impulse withstand voltage
U_{imp}
value of the impulse withstand voltage assigned by the manufacturer to the equipment or to a part of it, characterizing the specified withstand capability of its insulation against transient overvoltages

[SOURCE: IEC 60664-1:2020, 3.1.19]

3.2.6
rated insulation voltage
U_i
value of voltage, assigned by the manufacturer, to which dielectric test voltages and creepage distances are referred

3.2.7
rated voltage
value of voltage assigned by the manufacturer to which its performance is referred

Note 1 to entry: The same SSE may have different rated voltages.

3.2.8
rated operational voltage
U_e
value of voltage assigned by the manufacturer to which its performance (in particular the short circuit performance) is referred

3.2.9
isolation
isolating function
function intended to cut off the supply from all or a discrete section of the installation by separating the installation from every source of electrical energy for reasons of safety

[SOURCE: IEC 60898-1:2015, 3.6.10]

3.3 Additional definitions dedicated to C-SSE

For combined SSE, the following terms and definitions apply in addition to the terms and definitions of the relevant standards.

3.3.1
class SW-SSE
combined SSE capable of making, carrying, and breaking currents under normal circuit conditions including operating overload conditions, and withstanding short-circuit currents

Note 1 to entry: Such combined SSE is based upon switches according to the IEC 60669 series.

[SOURCE: IEC 60947-6-1:2021, 3.3.6, modified – The term "Class PC TSE" has been replaced with "class SW-SSE", and in the definition "transfer switch equipment based on mechanical switching devices, that do not need electrical power to hold the main contacts open or closed and" has been replaced by "combined SSE", removing "making and" and the notes by a new note.]

3.3.2
class CB-SSE
combined SSE capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short-circuit

Note 1 to entry: Such combined SSE is based upon circuit breakers according to IEC 60898-1 or IEC 60898-2.

[SOURCE: IEC 60898-1:2015, 3.1.4, modified – The term "circuit-breaker" has been replaced with "class CB-SSE", and in the definition, "mechanical switching device" has been replaced by "combined SSE", removing "automatically" and adding the note.]

3.3.3
class CT-SSE
combined SSE based on mechanical switching devices having only one position of rest, operating otherwise than by hand, and capable of making, carrying and breaking currents under normal circuit conditions including operating overload conditions, but not breaking short-circuit currents

Note 1 to entry: Such combined SSE is based upon contactors according to IEC 61095:2009.

[SOURCE: IEC 60947-6-1:2021, 3.3.8, modified – The term "Class CC TSE" has been replaced with "class CT-SSE", in the definition, "transfer switch equipment" has been replaced by "combined SSE", "but not breaking short-circuit currents" has been added and both notes replaced by a new note.]

4 Classification

4.1 According to the method of operation

– Manually operated SSE: M-SSE;
– Remotely operated SSE: R-SSE;
– Automatically operated SSE: A-SSE;
– A combination of the above methods.

4.2 According to the construction

a) Combined SSE (C-SSE)
   – SW-SSE: SSE based on switches complying with the IEC 60669 series;
   – CB-SSE: SSE based on circuit-breakers complying with IEC 60898-1 or IEC 60898-2;
   – CT-SSE: SSE based on contactors complying with IEC 61095:2009;
   – SSE based on different switching devices: Under consideration.
b) Non-combined SSE (NC-SSE)