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1. General information

1.1. Specifications on the selection of equipment

- All built-in devices at least IP2x (finger touch-safe)
- All equipment with CE mark
- Only use self-extinguishing materials (e.g. cables)



1.2. Specifications on the selection of switchgear assemblies

- Use of switchgear assembly pursuant to DIN EN 61439
- The contractor must obtain information on the local conditions and coordinate the assembly and installation with the client.
- The points to be agreed between the manufacturer of the switchgear assembly and the user according to LV_GP_01-1 Checklist according to EN 61439-2 Annex BB (Annex) apply.
- For the selection and erection of the switchgear assembly, the requirements of DIN EN 61439 including the required design and part certificate apply.

1.3. Applicable directives, laws, ordinances and standards

- Machinery Directive 2006/42/EC, including CE marking, conformity assessment, risk assessment and documentation
- Low Voltage Directive 2006/95/EC, including CE marking, conformity assessment and documentation
- EMC Directive 2004/108/EC
- Product Safety Act (ProdSG)
- Electromagnetic Compatibility Act (EMVG)
- 1st and 9th Ordinance on the ProdSG
- DIN EN ISO 12100-1/-2 and DIN EN ISO 14121-1 or DIN EN ISO 12100:2010-03
- DIN EN ISO 13850
- DIN EN ISO 13855
- DIN EN ISO 13857
- DIN EN 61439-1/-2
- DIN EN 61346
- DIN EN 60529
- IEC 60364 all parts (corresponds to DIN VDE 0100)

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2. Electrical supply

- Unless defined otherwise, the mains connection shall be provided by the client.
- The following parameters must be defined during the planning process: rated voltage, electrical system, feed in diameter, rated current, surge current of the supply network if applicable, lead into the switchgear assembly.
- The switch cabinet input must in principle be designed for network type TN-S. The separation of the PEN conductor into PE conductor and N conductor shall be done at the interface to the supply network, i.e. the outgoing feeder panel of the LVMD (low voltage main distribution).
- The phase sequence for all low-voltage systems is: L1-L2-L3 (clockwise rotating field). The assignment of the wire colours to potentials is the following: Brown: L1, black: L2, grey: L3, blue: N, green/yellow: PE

3. Wiring

3.1. Lines



- Wiring must be implemented in accordance with DIN VDE 0298 Part 4 depending on the current-carrying capacity and the upstream overload protection devices.
- Built-in device connections are established using wire end ferrules with collars.
- Wire colours:

Voltage type	Wire colour	Colour labelling
Main current 230/400V ~/-	black	BK
Neutral conductor N	light blue	BU
Protective conductor PEN/PE	green-yellow	GNYE
Control voltage 230V	red	RD
Control voltage N	red	RD
Control voltage 24V DC	dark blue	BU
Control voltage 60V DC	purple	VT
Low voltage 24-60V AC	grey	GY
External voltage	orange	OG
Measuring signal	white	WH
GLT/DDC	brown	BN

3.2. Busbars

- Plain copper busbars must be laid according to their current-carrying capacity, whereby an ambient temperature of 35° Celsius should be assumed. The assembly must be done with insulated support brackets to protect against arc faults
- All busbars, including behind field covers, must be fully covered or wrapped to protect against accidental contact.
- The specifications for leakage paths according to DIN VDE 0110 Part 1 apply

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3.3. Line connections

- If more than two lines are connected to one circuit breaker, then a connector module must be made from copper bars.
- Connection points must be equipped with rivet nuts on the rear, and only steel screws with washers and lock washers must be used for cable lug connections.
- Connection components to live conductors must be secured against accidental contact.
- The connection points of the neutral and protective conductor in the outgoing feeders to the busbars must also be equipped with rivet nuts. The assignment of N and PE connections is made by direct assignment to the outgoing block.

3.4. Distribution components

- Circuit breakers are designed according to DIN VDE 0636 for lamp circuits with 10A and for outlet circuits with 16A trip characteristics.
- The circuit breaker is wired using preconfigured busbars, bars may not be shortened. Extra outlets must be covered with protection caps.
- For outlet circuits, residual current circuit breakers (type A) with a rated residual current of 30 mA must be used.
- If appliances are connected to a circuit, which have high levels of direct current component in the event of a fault, a residual current circuit breaker sensitive to universal current must always be used. For installations with frequency inverters, lift controllers, trace heating, photovoltaics and loading stations, a type B RCD must generally be used.
- The circuit outlets must be led to tension clamp terminal blocks, whereby all outlets must be successively assigned to neutral conductor (blue) and protective conductor (green-yellow) terminals. Control lines must be integrated in the relevant circuit terminal block. For improved examination of the insulation and loop resistance, the neutral conductor terminals must be designed as disconnect terminals.
- All series terminals must be provided with terminal numbers on the side facing the viewer. The numbering of series terminals is done in accordance with the numbering of the fuse elements, these must also generally be identical to the circuit numbering.

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3.5. Identification

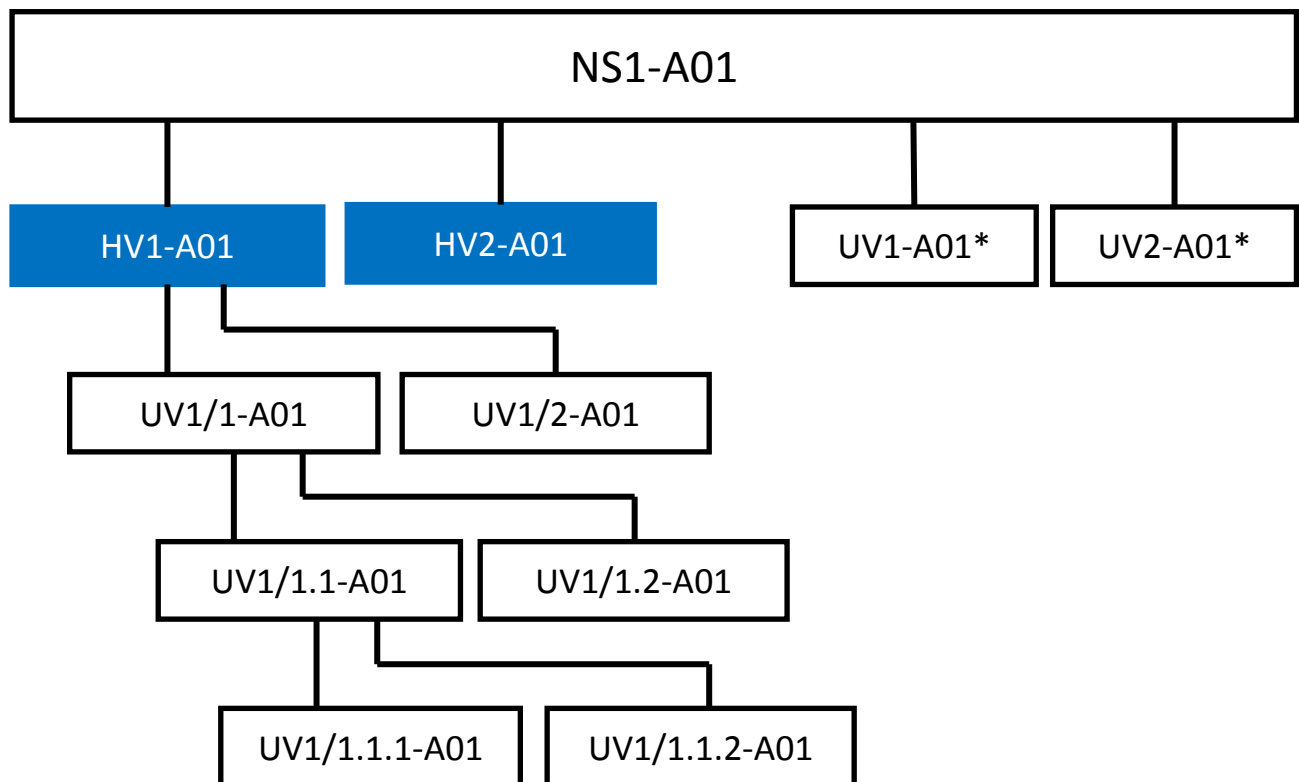
3.5.1. Device tags

The labels may be affixed to the device itself and may not be lost when changing devices.

Labelling must be permanent and affixed in such a way that it is visible when the device is installed. The labelling must be repeated on hoods and cover plates. All devices outside installation spaces must be marked with engraved, embossed or etched labels.

These labels may not be affixed with glue.

3.5.2. Name Textural of power distribution equipment



* Machinery and equipment which are supplied directly from an NS-station.

NS-Station (NS) (low voltage station = 400V), main distribution board (HV) and machine connections (UV) **get the building name corresponding to their location.**

Receive distributions under the designation of the building supplied main distribution board, even if they are in another building.

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3.5.3. Marking of electrical distribution boards

All distribution are accordingly outside with signs to characterize the preceding Name Textural

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Format 250x100mm

main-distribution-board (HV): White text on a blue background
sub-distribution-board (UV) : Black text on a white background
emergency power distribution board: White text on a red background

HV1-A13

UV4/2-B01

NotUV3/1-D13

In the field of supply continues each distribution to be marked with a sign with information on lead:

Format 120x50mm, black letters on a white background


If any are specified earlier names of the manifold in the second row.

HV1-A04
ehem. Verteiler Sonderschmelze
Von NS1-A04 Feld 3 Abg 12
2x NYY 3x150/95mm²

Furthermore, all distributors with a W08 Warning "Beware of dangerous electrical voltage "according to BGV A8 identify



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3.5.3 Marking of safety lighting

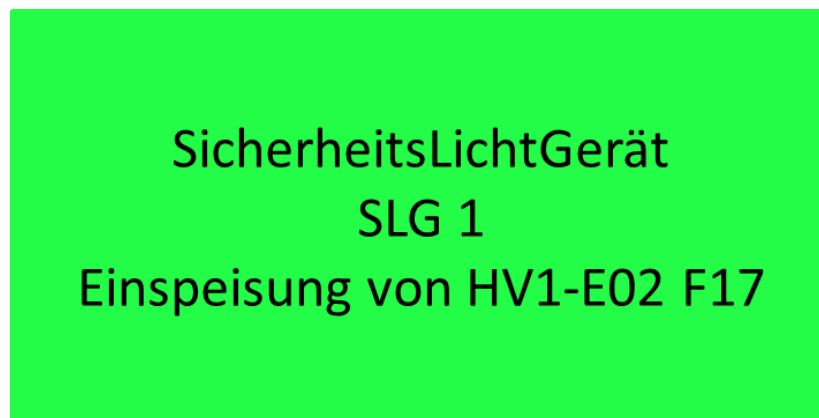
1.) Safety light unit

Schild 120mmx60mm, light green with black text

Zeile 1: heading „SicherheitsLichtGerät“

Zeile 2: Notes „SLG 1“ or networked devices z.B. „SLG M (Master)“

Zeile 3: supply „feeding von HV1-E02 F17“



2.) Lamps on SLG

Label round, diameter 40mm,
light green with black text

Line 1: Name of the supplying
Safety light unit "SLG 1"

Line 2: luminaire circuit and continuous
Number of light 'F01 / 1'



3.) Lamps on emergency power

Label round, diameter 40mm, red with white text

Line 1: Name of the supplying emergency power distribution
"NotUV 1/1.4"

Line 2: Circuit and serial number of the light "F17 / 8"



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3.5.4. Installations

Sockets, light switches and other installation equipment is generally to label with distribution name and circuit number of the supplying distribution. The lettering is readable carry out and durably.

Examples:



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4. Documentation



Test specification: DIN VDE 0100-600 (IEC 60364-6), DIN VDE 0660-600-1,-2 (DIN EN 61439-1, -2), DIN VDE 0040-1, EN 61082-1

- Labelling
 - Cable labelling according to method R (e.g. W23-1) or CR (e.g. A1/X1:2) (VDE 0040-4)
 - Equipment identification according to DIN EN 61346
 - Labelling power supply outside under main switch and inside on the terminal block with entry point
(station, block, field or distribution, outlet or fuse, cable type)

The following documents must be provided in three copies on paper and 1x on data carriers in a format editable by the client (*.doc; *.xls; *.dwg, except protocols or certificates):



- Operating manual in German
- Functional description,
- Plans and drawings (DIN VDE 0040-1) according to the type of service to be provided such as function diagrams, overview diagrams, current flow diagrams, terminal diagrams, wiring diagrams, construction diagrams, layout diagrams, equipotential bonding diagrams, cable route diagrams, site plan, earthing diagram ...
- According to DIN VDE 0100-510, circuit diagrams must include
 - Type and cross section of conductors,
 - Length of the circuits,
 - Type and rating of protective equipment
 - Rated current or adjustment value of the protective device,
 - expected short circuit currents and short circuit breaking capability and information on connected appliances, origin of lines and feeders.
- Parts lists
- Replacement/wear parts lists
- Manuals for erection, commissioning, operation and maintenance
- Maintenance instructions, regulations, protocols
- Data sheets, component descriptions, technical documentation according to DIN VDE 0660-600 point 6.2.1
- Design certificate pursuant to DIN EN 61439-1 of the original manufacturer of the switchgear assembly
 - Incl. maximum excess temperature certificate for switchgear assemblies
- Part certificate pursuant to DIN EN 61439-1 of the manufacturer of the switchgear assembly
- Instructions for recycling and disposal
- Specialist company declaration
- Protocols with measured values from the initial inspection pursuant to DIN VDE 0100-600
- Mathematical proof of the design of protection devices (e.g. 24V circuits, or for cables larger than 25 mm²)
- Factory certificates, acceptance protocols, inspection protocols
- Settings of protective equipment

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- CE declaration of conformity according the Low Voltage Directive 2006/95/EC Annex III
- Certificate of competence of the inspector according to TRBS 1203
- Proof of instruction / briefing of operating and support staff
- VIN plate outside, clearly legible and permanent
 - Company name and full address of the machine designation,
 - CE marking
 - Series or type designation, serial number if applicable,
- Further information on VIN plate or in the circuit diagrams
 - Standard
 - Current / frequency
 - Measurement operating voltage
 - Measurement insulation voltage
 - Measurement voltage of auxiliary circuits
 - Thresholds for function (e.g. I_{max}, U_{min}, U_{max})
 - Short circuiting strength
 - Protection type
 - Protection class
 - Year of construction
 - Operation and surrounding conditions
 - Ambient temperature limits
 - Relative humidity
 - Degree of pollution
 - Any special operating conditions
 - Mains system
 - Dimensions, weight

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5. Inspection

Inspection according to DIN VDE 0100-600 (IEC 60364-6) is to be conducted by a competent electrically skilled person and documented with the measurement values

The inspection comprises the following measures:

- Visual inspection according to DIN VDE 0100-600 point 6.1.2.3 a) – m)
- Measurement of conductivity of protective conductor and live lines
- Measurement of insulation resistance
- Measurement of fault loop impedance
- When using RCDs:
 - Measurement of breaking current
 - Measurement of cut-off time
 - Measurement of the loop impedance between L and N (due to identical cross-section of N and PE)
 - Measurement of consistency of the protective conductor
 - Measurement of contact voltage
- Test of voltage polarity (upon request)
- Test of phase rotation (clockwise rotating field)
- Functional test of switch component combinations, safety installations (RCDs)
- Test of max. voltage drop < 4%

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