LV SWITCHBOARDS
up to 1000V

Assembly, operation, and maintenance instructions

Switchboard cabinets, type STS, STL (cubicle-type ASSEMBLY)

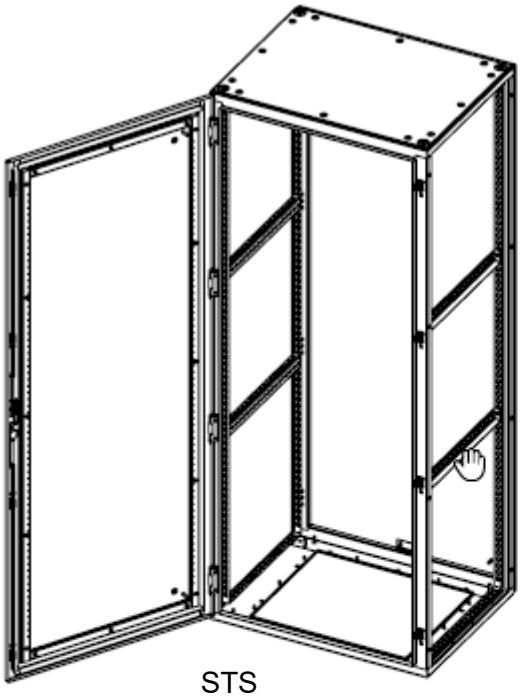
CONTENTS:

1. Switchboard structure

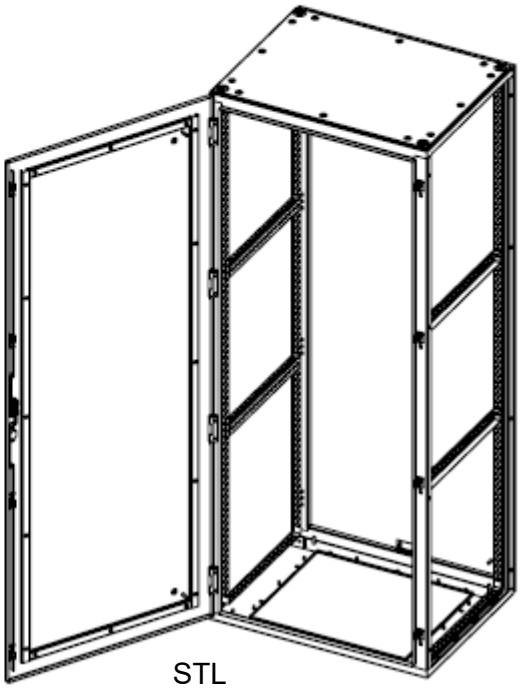
The switchboard frame consists of a welded structure. Internal parts such as mounting frames, supports, and brackets are made of galvanized sheet metal and are not further surface treated.

Transport parts with one or two sections are assembled in the production plant. The assembly of switchboards from transport parts is carried out at the construction site by the assembly organization.

Outer sections are always fitted with side covers. Other covers, panels, and doors are supplied according to customer requirements. Panels and covers are fastened with screws, doors are hinged and equipped with a split lock with central closing at four points for single-leaf doors and at three points for double-leaf doors.



STS



STL

The bottom of the switchboard (**bottom**) is fitted in accordance with production documentation. If the bottom is uncovered, it is necessary to cover the bottom in order to maintain the required enclosure of the switchboard. The bottom is covered at the construction site, after assembly and the connection of cables, by the assembly organization. The switchboard bottom can be covered at the production plant at the customer's request.

In cases when busbars are installed in the fields, they are provided **with a cover** against accidental contact according to ČSN EN 50274 (idt EN 50274:2002/Cor.:2009-07).

2. Markings

As standard, switchboard fields are **numbered** from the front side, from left to right in ascending order. For double-sided switchboards, this number is supplemented by the letter A – front and the letter B – back (unless the project specifies otherwise).

Each switchboard is marked with a **data plate** according to ČSN (EN, IEC, HD) standards, placed on the inside of the door of the first field to the opposite corner of the lock.

3. Basic technical data

The supplied switchboards **comply** with the technical specification provided by the customer for individual orders. The voltage system of the individual switchboards supplied complies with the order and with ČSN 33 2000-1 ed. 2 (idt HD 60364-1:2008, mod IEC 60364-1:2005).

All **basic data** about the specific switchboard supplied are given in the production documentation **on the drawing** – front view and summary data table for the characteristics of interface and basic parameters of the switchboard (switchboard type, enclosure, dimensions, coating, voltage system, current, insulation voltage, protection, environment, any other data).

4. Description of the equipment

Individual switchboards are assembled in accordance with project documentation. The **arrangement of apparatus** in the sections is done in such a way that it is possible to connect both supply and outlet wires; the direction of supplies is along the upper or lower wall according to a specific requirement.

Switchboards are supplied with basic IP40 or IP55 **enclosure** (according to the specification), after opening the door IP00 or IP20.

Capacitor banks are fitted with a control regulator. Individual branches are fitted with protection, a switching element, in the case of protected compensation with chokes and own capacitor with discharge resistors.

5. Equipment, controls

Full **specification** of the apparatus used is given in the production documentation of individual switchboards, in the diagrams of individual sections.

6. Important functions

Great emphasis is placed primarily on the **proper functioning** of the protective circuits, so as to ensure their faultless operation, and thus the safety of the operator. The proper function of the protective circuits is tested at the production plant. It is recommended to repeat the test before putting the switchboard into operation.

7. Mode settings

The **selectivity** of individual circuits must be tested and adjusted before switchboards are put into operation by the assembly organization.

Setting the **current values** on protection elements (if they have this setting) must be carried out by the assembly organization according to specific needs.

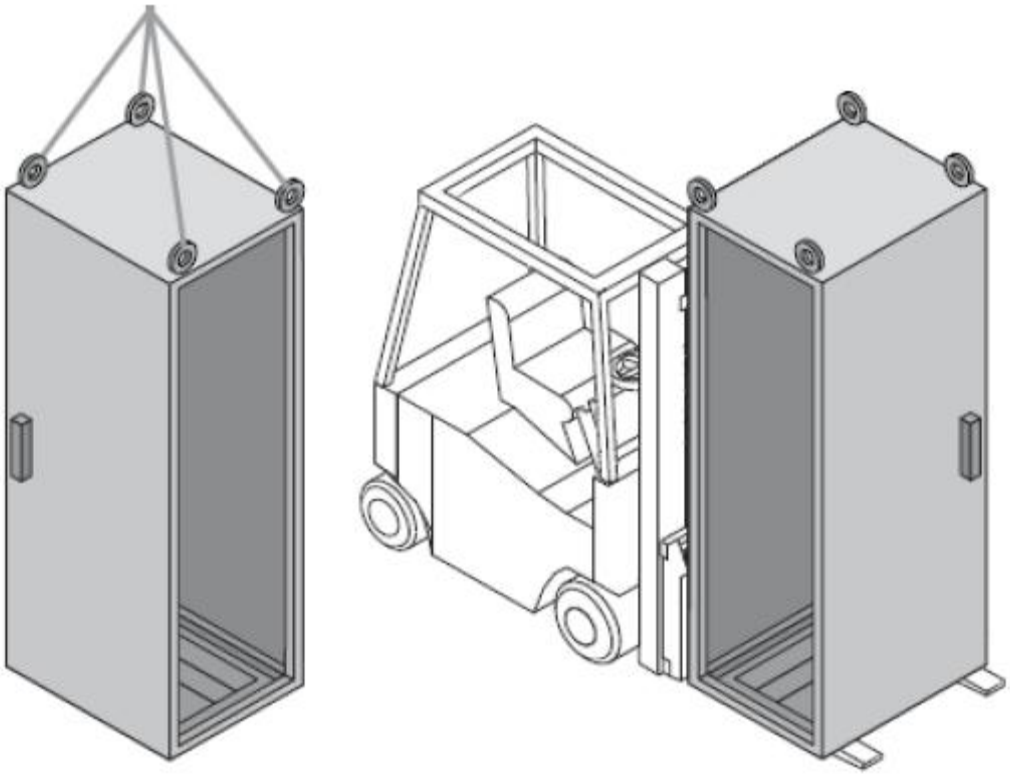
With **compensation switchboards**, it is necessary to set the reactive power regulator value according to the operator's requirement before putting into operation. Attention must be paid to the instructions in the enclosed manuals when setting the regulator.

All specified settings, or others, must be verified in test operation and, if necessary, the required corrections must be made.

8. Packaging, transportation, storage

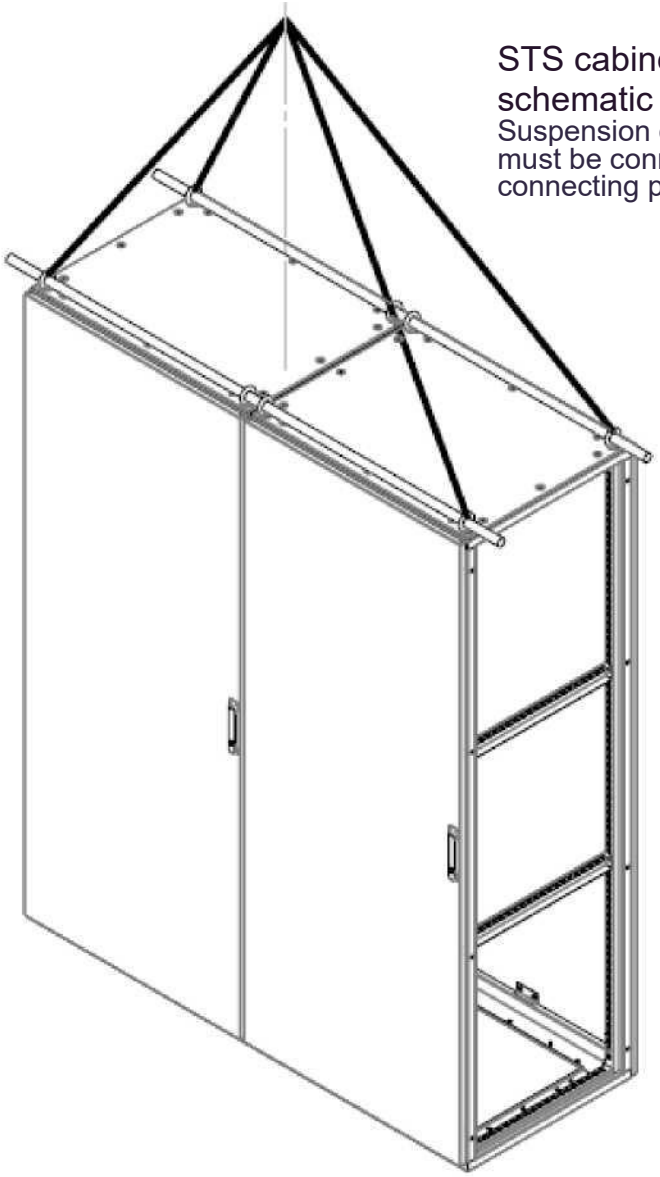
Switchboards are packaged in transparent PVC film. This method of packaging does not provide protection against the elements. Transport by truck and rail must always be under a tarpaulin. Overseas packaging, or other packaging requirements, can be arranged by agreement.

Unloading from a truck can be done either by crane (**four-point suspension required**) or forklift truck.



TRANSPORTING CABINETS

STS and STL cabinets are fitted with pre-pressed openings for lifting eyes. Lifting eyes can be ordered extra. If it is not possible to transport the cabinet with lifting eyes, then we recommend a forklift or pallet truck.

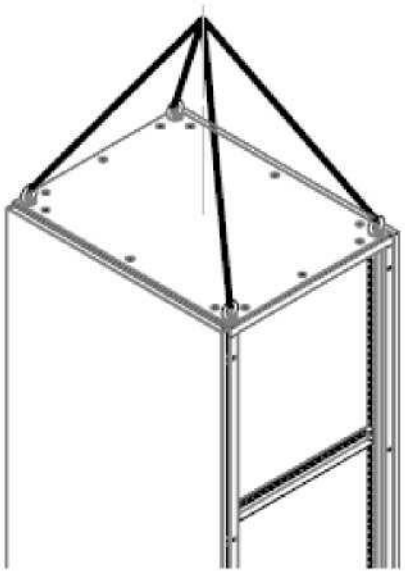


STS cabinet with lifting eyes - schematic illustration of suspension

Suspension of two cabinets - the cabinets must be connected using side recesses or connecting parts.

STS cabinet with lifting eyes - schematic illustration of suspension

The recommended load capacity of the cabinet when filled is 300 kg; with maximum caution, it is possible to transport cabinets when filled up to a maximum of 500 kg.



The device may only be placed on a flat surface.

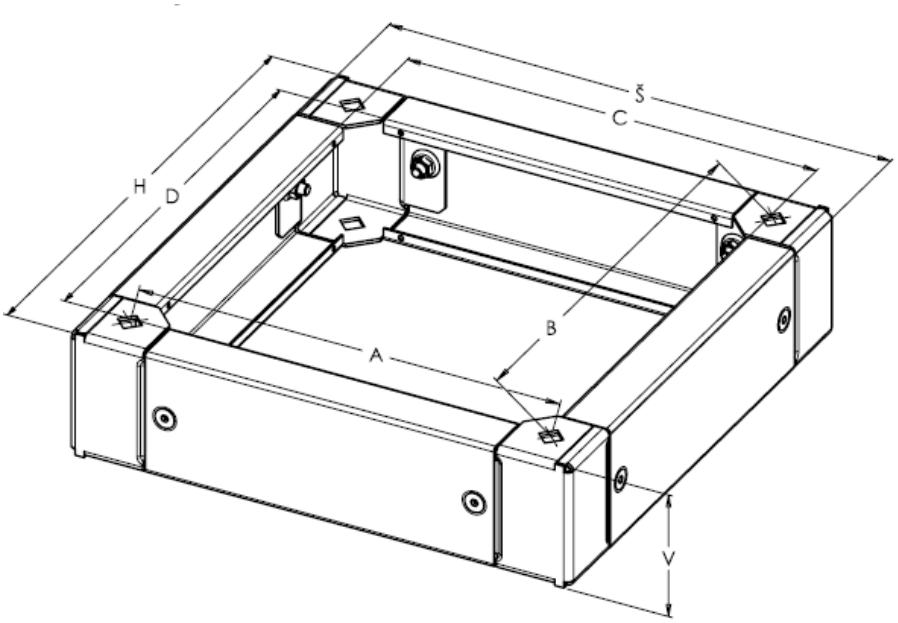
Land transport can be carried out by forklift truck, using lifting equipment and transport equipment, using roundwood. Switchboards may only be transported in an **upright position**. It is also necessary to avoid tilting and moving the cabinets when transporting and setting in place.

Switchboards must be stored in dry, dust-free areas, without the risk of accidental physical damage. Temperature -10°C to +35°C, relative humidity up to 80% at 21°C. It is unacceptable to store switchboards in areas which have not been dried and whose construction is incomplete.

9. Assembly of switchboards

Switchboards are installed in places whose construction has been completed and which are dry and clean. To ensure proper installation on the floor, avoid deformation of transport units, and facilitate assembly, it is recommended to attach the switchboard to a steel frame embedded in a concrete screed. We recommend that the steel frame is made of a "U5" profile with a horizontal tolerance of 1 mm/1 m in length. **Steel frame not included.**

The switchboard is anchored to the base frame by means of screws after setting in place.



Cabinet anchor hole spacing in mm			
W (width)	A	D (Depth)	B
400	336	300	236
600	536	400	336
800	736	500	436
1000	936	600	536
1200	1136	700	636
		800	736
		1000	936

Assembly of the switchboard from transport units is carried out according to production documentation (front view drawing).

Each transport unit is marked with a white weight label on the back cover, for double-sided switchboards on the side.

Transport units are connected with **fastening material**, which is in the **wrapping for each switchboard** (separate or in the supply section). List of fastening material and tightening torques – see tables on p. 10/14, 11/14.

For **connecting the belts (busbars)**, there must be a flat washer (up to a connection thickness of <20 mm) and a spring washer (from a connection thickness of ≥20 mm) under the bolt head, and a flat washer and a spring washer under the nut (pressure washers may also be used instead of a flat washer and a spring washer). The mutual contact surfaces of the belts must be cleaned of dirt and preserved with contact petroleum jelly before joining (not included).

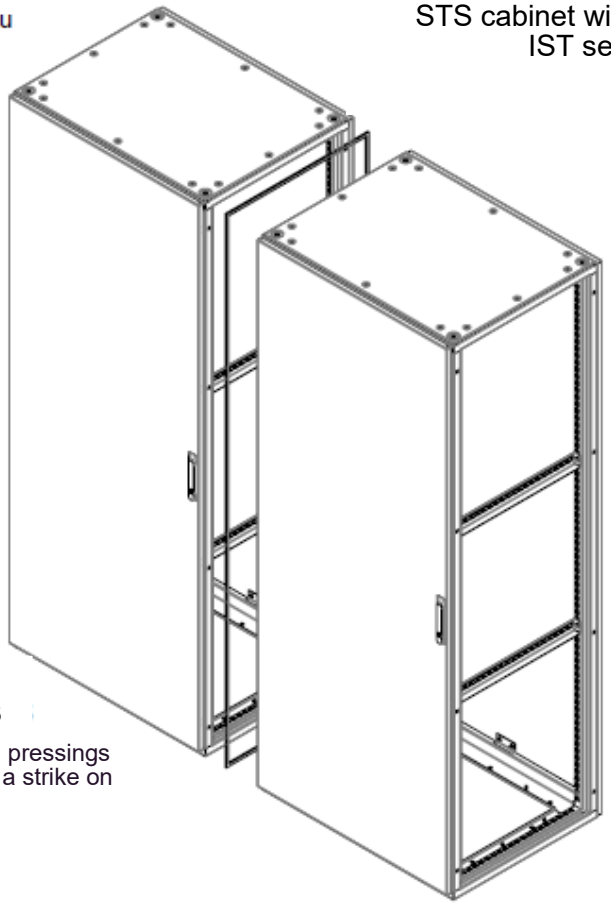
After gluing the seals**, STS-type frames are joined** at eight points (six points) – a clamp for in-line arrangement of type SS8 (SD6, MS2).

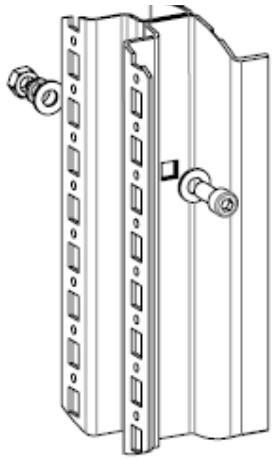
CONNECTING CABINETS

STS and STL cabinets can be assembled side-by-side into a line. They can be connected in the following ways. To connect cabinets in IP 55 enclosure, it is necessary to attach IST self-adhesive rubber seal between each cabinet frame; this is ordered separately

Sealing procedure - self-adhesive 10x5 seal is applied to a degreased surface as shown in the following figure (do not use degreasers that interfere with the komaxit powder coating surface - nitro thinner, acetone, perchlorethylene, etc.). Do not stretch out the seal; instead, distribute according to the size of the glued surface. The second cabinet is connected in one of the following ways.

STS cabinet with IST seal

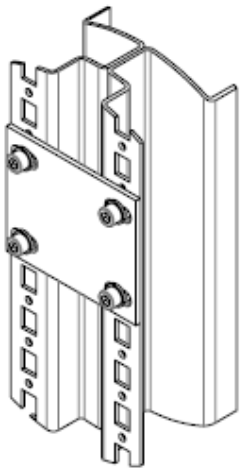




Connecting cabinets - connecting set SS8

The sides of the cabinet frame are fitted with raised pressings (8), and these must be removed using an axe, with a strike on the bridge.

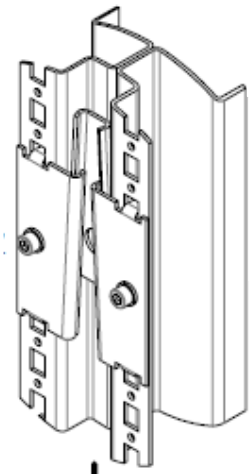
screw M8x20, DIN 912
washer ∅8,4, DIN 125
washer ∅8, DIN 7980
Nut M8, DIN 934



Connecting cabinets - connecting part SDG

The connecting part SDG (6) is used to connect and reinforce the cabinet before transportation in six places (at the top, at the bottom, and in the middle - at the front and back); supplied either without or with fastening material.

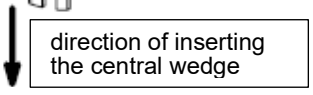
screw M8x16, DIN 912
washer ∅8.4, DIN 125
washer ∅8. DIN 7980
flange nut MS



Connecting cabinets - assembly connector MS2

The assembly connector is used in places that are hard to access. Side wedges are installed on the frames of the cabinets, and the cabinets are connected by inserting the central wedge.

screw M6x12, DIN 912
washer ∅5.4, DIN 125
washer ø6. DIN 7980
flange nut M6



Screws must be tightened to tightening torque – see table on p. 11/14.

INVENTORY OF PACKAGE MATERIAL FOR THE CONNECTION OF TWO TRANSPORT UNITS

BUSBAR SYSTEM

	DIMENSIONS	SCREW WITH FLAT WASHER AND SPRING WASHER	SCREW WITH PRESSURE WASHER	Pcs
L1, L2, L3:	1 x 30/10	M10 x 45	M10 x 40	6
	1 x 40/10	M12 x 45	M12 x 40	6
	1 x 80/10	M12 x 45	M12 x 40	12
	1 x 100/10	M12 x 45	M12 x 40	12
	2 x 80/10	M12 x 70	M12 x 60	12
	2 x 100/10	M12 x 70	M12 x 60	12
	3 x 80/10	M12 x 90	M12 x 80	12
	3 x 100/10	M12 x 90	M12 x 80	12
PEN, N, PE	1 x 30/5	M10 x 40	M10 x 30	2
	1 x 30/10	M10 x 45	M10 x 40	2
	1 x 40/10	M12 x 45	M12 x 40	2
	1 x 50/10	M12 x 45	M12 x 40	2
	1 x 60/10	M12 x 45	M12 x 40	2
	1 x 80/10	M12 x 45	M12 x 40	4

JOINING FRAMES

Coupling for in-line arrangement SS8 (or SD6, or MS2)⇥-⇥1 Pack

When connecting multiple transport units, the numbers are multiplied.

TIGHTENING TORQUES FOR CONNECTION SCREWS WITH HEXAGONAL HEAD

SCREW	**METAL - METAL** [Nm]	**Cu BELTS** [Nm]
M5	2.5	4.5
M6	5	8
M8	10	20
M10	20	40
M12	35	70
M16	70	90

The tightening torques of apparatus are given by the apparatus manufacturer.

The width of corridors and access areas must be adequate to perform work, operation, provide access in the event of emergencies and emergency evacuation, and for the transport of equipment (for example, as specified in ČSN 33 2000-7-729, mod IEC 60364-7-729:2007, idt HD60364-7-729:2009).

After connecting the transport units, the disconnected circuits are reconnected. The protective terminals of the transport units are connected. **All screw connections must be properly tightened.**

When connecting external cabling to the switchboard, it is necessary to pay attention to its correct fastening and arrangement when leading it into the switchboard, and to carry out its routing and formation in the switchboard in such a way as not to prevent access to PEN, PE, N buses, which must be freely accessible for subsequent inspections and checks of the connection points of this external cabling on these buses.

Before putting into operation, the switchboard must undergo tests in accordance with ČSN (EN, IEC, HD) and this manual.

10. Operation and maintenance

The safe operation of the switchboard demands that its running, operation, and maintenance will be governed by **valid standards and regulations** (including the regulations of the suppliers of individual pieces of apparatus). Persons entrusted with operation and maintenance must be provably familiar with such standards and regulations, in particular with ČSN EN 50110-1 ed. 3 (EN 50110-1:2013).

Switchboards **may not** be accessed and handled by **unauthorized persons**.

The qualification of switchboard operators is given by ČSN EN 50110-1 ed. 3 (EN 50110-1:2013) and the design of the enclosure of the switchboard (the enclosure of the switchboard is indicated as a whole, and after opening the door). If there are other requirements for operator qualification at the place of use, these must be entered in the on-site operating regulations. In **no case may** qualifications be **lower** than those for which the supplied switchboard was ordered and manufactured.

Switchboards may only be operated with the **door closed** (if part of the switchboard).

11. Inspections

Switchboards must be **regularly inspected and revised**. In particular, the individual connections of the main and control circuits. Particular attention must be paid to protective circuits.
A **visual inspection** must be carried out after one week of operation. **Further inspections** according to the maintenance plan compiled in accordance with applicable regulations.

The manufacturer of the switchboard recommends carrying out a **thermal imaging inspection at least once a year and an inspection of connections once every 4 years**, unless the manufacturer of built-in equipment recommends more frequent inspections. Other inspection dates are specified in the operator's internal regulations.

In the case of compensation switchboards, there is an impact load on the power connections, so it is recommended to check force-fit connections before putting the switchboard into operation, and then once a year.

The inspection must also include a visual check of the condition of individual pieces of apparatus, and possibly the need to clean the interior of the switchboard. The interior must be cleaned during an inspection.

In the case of long-term, continuous operation, perform regular **measurements** and recording of the surface **temperature** of the circuit-breaker enclosure in places above contact switches.

During inspections, it is necessary to turn **switching elements** that have been **in one state** for a long time on and off several times in order to break the possible oxidation layer on the contacts. Detected defects must be removed in a timely and professional manner.

12. Service inspections

It is recommended that **service inspections** and checks of the function of circuit-breaking and protection elements (circuit breakers, motor starters, guards, etc.) are carried out by a qualified service technician.
Service inspections can also be ordered from the manufacturer.

13. Maintenance plan

The operator is obliged to compile a **maintenance plan**, with which the responsible employees must be provably familiar within their scope of activity.

A **maintenance log** must be kept about the inspections carried out, maintenance, switching off the circuit-breaking and protection elements during short circuits and overcurrent, the operator switching off the circuit-breaking and protection elements, and the replacement of fuses and apparatus; all these data are recorded in the log. Upon request, these records are provided to the switchboard manufacturer or component supplier.

These inspections do not replace the plan of regular inspections of individual switchboards compiled by the operator.

14. Surroundings

The basic characteristics of the supplied switchboards are in line with ČSN 33 2000-5-51 ed. 3 (idt HD 60364-5-51:2009/A11:2013, mod IEC 60364-5-51:2005) AA4, meaning that the operating **temperature of ambient air** must not exceed 40°C, the average temperature for 24 hours 35°C. The working conditions of the switchboard according to ČSN EN 61439-1 ed.3, Article 7.1.2 (IEC 61439-1:2020), correspond to the degree of pollution specified in the production documentation.

15. Circuit breaker shutdown

When the circuit is **switched off** by a fuse or circuit-breaking and protective element, it is necessary to find out the cause and remove it; only then can it be switched on again. The same must be done in cases when overvoltage is detected. Checks must be carried out on the contacts of the circuit-breaking and protection elements that switched off an overcurrent, or a short circuit.

16. Reserves

Reserves that are installed in individual switchboards according to the project can be used in the values with which they are installed. In accordance with point 17 of these instructions, they **may not** be replaced by apparatus with larger values.

17. Defective apparatus

Defective apparatus must be replaced by faultless apparatus (new or repaired by the apparatus manufacturer) of the same parameters.

18. Interruption of operation, shutting down the switchboard

When **shutting down** the switchboard, it is necessary to undertake an overall inspection before putting it back into operation (the condition of individual pieces of apparatus, their settings, the condition of connections, in particular protective circuits, etc.).

In the event of a **short-term interruption** of operation (e.g. when removing a fault), it is possible to switch on again after checking the work done and the integrity of the protective circuits.

19. Prohibited handling

Apparatus may not be **added** to switchboards, or defective apparatus **repaired**, in particular fuses and circuit-breaking and protection elements. Replacement with new apparatus or repair by the apparatus manufacturer is permitted.

Used apparatus **may not be replaced by apparatus with larger values**.
Switchboards may not be operated in conditions other than those for which they are intended (different voltage and current values, ambient temperature, different environment with regard to enclosure, physical damage).
If the switchboard is live, it is prohibited to handle (in particular) metal or wet objects inside.

For access to switchboards, ČSN 33 2000-4-41 ed.3 (eqv HD 60364–4–41:2007, mod IEC 60364–4–41:2005) applies to provide protection against electric shock.

20. Switchboard accessories

1 DOPPELBART 5 mm key to the strut closure (the key is located on the upper eyelet of the right outer section of the switchboard).

Operation and maintenance manuals for built-in components, to which these manuals are supplied by the manufacturer of these components as standard, i.e. for protections, frequency converters, power circuit breakers, contactors, etc.

Screw package, for switchboards with more than one transport unit.