Instructions for assembly, operation and maintenance of the switchboards type AR and AE.

1. Basic characteristic

Switchboard AR is a steel-sheet free standing enclosure, type AE is a steel sheet wall mount enclosure. Both types are designed for installation of low voltage electrical accessories up to 1000V for indoor use. In case of outdoor placement of the switchboards, inform the producer, so that he can offer you a special configuration (i.e. stainless sheet). The construction of the enclosure protects your electric accessories from dust and water due to certified protection up to IP55 and mechanical resistance IK08.

Every enclosure is made from perforated and bent profiles customized to individual requirements which enables us to meet non-standard customer requirements. The surface finish is made with standard epoxy-polyester powder coating RAL7035 or other, based on customer's choice.

Load-bearing capacity of the switchboard is up to max. 300 kg, depending on its size. The enclosure can be equipped with electric outfit up to 4000 A, equipment for process control systems, protective elements and other electric accessories.

!!! WARNING !!! Observe the instructions for storage, maintenance and operation of the switchboards to avoid possible harm to property or human health.

2. Switchboard packing

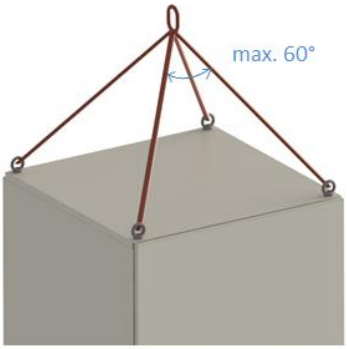
The switchboard can be delivered in standard and seaworthy packing or packing required by a customer.

- Standard packing – the switchboards are packed by the producer into a plastic shrink wrap with paper/plastic protection of corners and door accessory.
- Seaworthy packing – the switchboards are anchored on a pallet, wrapped in hermetic PE foil. The mechanical resistance is then procured by a wooden packing.
- Every package includes production documentation, individual test certificate, declaration of conformity. The production documentation, if possible, is placed inside the enclosure in a pocket. If agreed otherwise it is handed over in an electronic form.

- During the take-over always check the packing for possible defects and before manipulation check the switchboard itself for possible damages as well as all integral parts of the packing (all the transported pieces according to the packing list) including necessary documentation
- Switchboard warranty doesn't apply to damages caused during transport, by inappropriate manipulation or damages caused by inappropriate storage in unsuitable conditions.

3. Switchboard handling

- While handling and transporting the switchboard to a place of destination it is necessary to secure it against motion and to prevent possible damages on the electric outfit and the switchboard itself.
- It is inadmissible to pile or pack individual pieces on top of each another without separated packaging.
- Handling outfitted switchboards requires highly cautious manipulation, especially for the ones without side panels which ensure the firmness and compactness of the switchboard. It is prohibited to move under the transported switchboard in case it is transferred with the use of a crane or other machines.
- The switchboard can be handled and transferred by the lifting lugs (max. 2 joined fields) or carried on a truck. While transferring the switchboards it is necessary to abide by safety precautions and to fix the switchboard safely. Heavier switchboards can be transferred by a crane only when equipped with load-bearing accessory designed for transferring the switchboards.



- The producer strongly recommends to use the lifting lugs.

- If a truck is used to handle and transfer the switchboard, it is necessary to dismantle the front and rear stand panels. The producer strictly recommends at least two workers to handle the switchboard to secure the stability of the transferred unit.

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4. Switchboard storage

- The switchboards can be stored in dry, dust-free spaces where they are save from mechanical damage. Storing the switchboards in damp spaces or unfinished buildings is inadmissible.
- The recommended temperature for storing is in the region of -20°C – 60°C. The storing temperature must be adapted to the span of the electric accessories fitted in the enclosure with regard to their parameters.
- The producer recommends to store and place the heavier switchboards on a stable and firm floor.

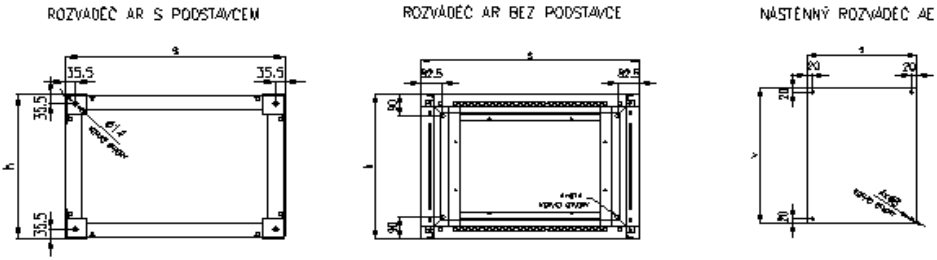
5. Assembly and installation

- The switchboards can be assembled in the spaces, which are designed for the purposes of assembly of certain types of switchboards and their specific use.
- Free standing switchboards of more fields must be assembled on a firm ground or on a metal load-bearing frame so that the

individual fields are not deformed and joints overstrained by joining the panels to the fields.

- Before the installation itself it is necessary to make holes for mechanical fixation of the enclosures. The individual distances of the anchor holes are visible in the picture hereinafter.

- Wall mount switchboards are attached to a wall, they may be attached to the constructions with the sufficient bearing capacity.



- To achieve the required IP protection (ingress protection), the producer recommends to have the work of joining the panels into the fields done by the producer and its qualified workforce on the spot.

- During assembly of the switchboard with fitted el. accessories and their joining into the fields the panels will be connected mechanically and electronically and the voltage free parts will be connected to the switchboard terminal marked according to ČSN regulation. All the mechanical parts must be tightened according to the torque stated in the table hereinafter.

Used bolting	Minimum torque Nm
M4	3,5 Nm
M5	7 Nm
M6	13 Nm
M8	28 Nm
M10	50 Nm
M12	75 Nm

- Torque is subject to the type of the accessory (terminals, circuit breakers, contactors).The torque can also be defined in their own manuals.

- Electro-installations should be carried out solely by a person qualified according to regulation 50/78Sb and its relevant paragraph for certain type of work.

- Connection is made by joining conductors/cables of the defined section into inlet-outlet terminals.
- The cooper bars are bolted with special screws which are part of the switchboard pack. Before connecting them, it is necessary to check the contact surface of the bars, to clean any impurities and to apply conductive jelly. A torque wrench must be used to tighten the bolts according to the torque stated in the table hereinafter.

Used bolting	Minimum torque Nm
M8	22,5 Nm
M10	24 Nm
M12	40 Nm
M16	60 Nm

- All the other conductors and cables have to be connected according to their technical specification and their covering documentation. Cables can be connected either from the top (through cable inlets), or from the bottom of the switchboard. The switchboard AR is equipped with a cable holder in its lower part to fix the cables.
- Possible claims shall not be accepted as a consequence of intervention into the construction of the switchboard, wrong assembly, installation or operation of the switchboard in the conditions which are in contradiction with the purposes the switchboard was designed for. .

6. Commissioning

- Those who are not qualified and authorized by the chief operator shall be banned from manipulation or any work on the electrical equipment. The safety precautions for operation and work on electrical equipment are determined by the regulation ČSN EN 61140 ed.2 and a file of regulations ČSN 33 2000 as amended.
- Before commissioning it is necessary to carry out an overhaul of the complete electrical equipment in compliance with the ČSN regulations as amended. It is especially important to clean any impurities on and inside the switchboard. Remove dust,

objects which are not related to its operation. Make sure, all the bolts and other joints are tightened and the installation is made correctly without visible defects or backlogs.

- Before the first switch-on make sure the panel is not damp or damaged.
- !!!WARNING!!! Inside the switchboard there can be circuits which will remain under voltage even if the main switch is off ! Such circuits are marked with a label or the conductors are joined together in orange colour:

- The switchboard is switched on by the main circuit breaker or by the main switch which is usually marked with a label called main switch:

- The switchboard is under no voltage in case the main circuit breaker / switch is off, or when we press the safety button placed on the door of the switchboard.
- !!!WARNING!! Input terminals of the switchboard are under voltage even if the main swich if off, it is essential NOT to touch them.

7. Switchboard maintenance

- The operator must be acquainted with the electrical equipment and its function. The operator is allowed to touch only those parts of the el. equipment which are designed for touching and he should have unlimited access to those parts. In case of damage of the el. equipment or malfunction, which could endanger health and safety of the workers, the worker who comes across such state of things has to take measures immediately to stop or to prevent an accident, health risk, fire, or any other danger.

- Preventative professional and qualified maintenance has to be secured by the workers with the minimum qualification according to the directive ČÚBP No.50/78 Sb., §5. Work on electrical equipment can be done by the workers with minimum qualification such as the worker with a higher qualification for independent work according to the directive ČÚBP No.50/78 Sb., §6 or by a worker with a higher qualification for management of operation of el. equipment according to the directive ČÚBP č.50/78 Sb., §7.
- Repairs, cleaning works and other works inside the switchboard can be performed only if the switchboard is without voltage and professionally secured. It is inadmissible to leave the switchboard open without supervision, to leave any objects inside, to remove any covers of the outfit under voltage, and to change fuses for other ones of different ones of a higher value. It is essential to procure the switchboard door with a cautionary label.
- It is necessary to keep a logbook of all the revisions and maintenance with the record of malfunctions procured by a name of the person who detected them.
- Electrical equipment is subject to a regular inspection. The producer reserves the right not to accept a claim of malfunction caused by inexpert interventions into electric

accessories inside the switchboard and intervention in the enclosure construction itself.

Interval	Description of maintenance and control
1 year	Revision of paint surface damage. In case of paint damage, correct the paint and prevent corrosion.
1 year	Revision of sealing and its maintenance using a curing agent for rubber.
1 year	Revision and oiling of all mechanical parts (hinges, locks...).
1 year	Revision of the switchboard outfit – joints, joint busbars, conductors, protective terminals and earthing.
1 year	Revision of the inside space of the switchboard. Cleaning of impurities.
1 year	Revision and testing of all trigistors, fuses and protective elements (it is carried out by a testing button or activated manually).
1 year	Revision and testing of all control and signalization elements.
1 year	Revision and state of the accessory feeding.

- The revision and maintenance intervals in the table are recommended by the producer. They can be adjusted to local conditions, environment and local regulations. The switchboard electrical outfit in dusty environments requires higher frequency of cleaning and revision. The operator of the electrical equipment has to have his own logbook of maintenance and operation of the electric equipment. The intervals are subject to the relevant regulations.
- Paint abrasion must be corrected by the synthetic surface paint of shade RAL 7035. Before its application impurities and grease must be removed. In case of deeper scratches into the base metal, it is necessary to clean the spot thoroughly and to apply base anticorrosive paint before application of the finishing paint.
- When the sealing is revised visually and by sense of touch. It mustn't stick out. If it does, it should be fixed by a special glue Terokal 2444 or Chemopren. In case of mechanical damage of the sealing, it must be removed and replaced by a new one. To slow down its aging we apply the agent WD40-Specialist Silicone Lubricant on the surface of the sealing.
- For oiling of the mobile parts of the switchboard it is recommended to use the plastic lubricant Mogul A4.
- The revision of the outfit of the switchboard is done visually. The state of joint burdened power circuit conductors should be inspected with the use of thermovision to detect insufficient joints. A smell of overheated insulation can also indicate a defective state. Standard power circuit conductors are inspected randomly by a torque wrench.
- Dust on the outfit and surface of the switchboard should be vacuum cleaned with the use of an adapter with a long-hair brush. No other means is recommended such as the use of a compressor, because it could spread the dust all over the switchboard as well as inside its outfit. Parts without voltage (door, side panels, covers) can be cleaned with a damp cloth.

- Correct function of the breakers is inspected by switching the equipment off and on manually, without burden. Smooth transition and correct sound indicates correct function. The equipment furnished with a test button is inspected by using the test button.
- If the switchboard is furnished with a compulsory ventilation, it is necessary to clean the ventilator filters and the outlet air grating regularly to prevent the ventilation system from breakdowns or from overheating the switchboard electric outfit. The producer recommends cleaning the ventilator filters as well as the grating every 6 month (depending on the environment). The filter can be cleaned with warm water (max.40°C) adding common cleaning agents. The filter can be vacuum cleaned or cleaned by a compressor, however, if the filter is damaged it must be replaced immediately.

8. Instructions for disposal

- When phased out, the switchboard has to be handed over to a specialist company that shall pursue the subsequent recycling. Instructions for the reverse collection of electrical and electronic equipment are stated by the directive No. 352/2005 Sb., of instruction for disposal of Waste Electrical and Electronic Equipment (WEEE) and further conditions for disposal and financing of WEEE (directive of recovery and recycling of WEEE).

9. Other provisions

- If the switchboard is furnished with an instrument for indirect metering of current (panel ammeter or multi-functional ammeter), the applied metering current transformers are, for safety reasons, short-circuited by a short-circuit clamp or by a short-circuit terminal. After installation of the switchboard and its commissioning it is necessary to remove the short-circuit jumper wire and to disconnect the wires.
- If the switchboard is equipped with any bushing outlets the sealing must be procured with an appropriate extra - seal after all cables are connected. The same applies to the bottom of

the switchboard and possible bushing, which also needs to be extra-sealed to comply with the declared sealing.

- If the switchboard is configurated as fireproof it is necessary to seal the bushing with a fireproof seal of the same level of fire resistance.

10. Warranty terms

- For the delivered equipment we provide a contractually stipulated guaranty which comes into effect on the day of signature of the hand-over protocol by the end user (hand-over of a product/goods). The warranty is subject to the observance of the terms stated herein.
- A new warranty period applies to the parts or components which are replaced. A warranty period shall be extended by the lengths of the time for which the equipment is phased out due to a claim.
- The warranty terms are bound by the fulfilment of the following terms:
- A customer shall observe all the terms stated in this user manual.
- Installation / assembly will be carried out by the producer or a specialized company.
- Commissioning and phase-in will be done by the producer or by a specialized company, ideally certified by the producer.
- Regular preventative maintenance (prophylactic inspection) will be carried out in the scope and terms defined by the producer.
- The producer under no circumstances takes on the liability for damages and malfunctions caused by incorrect use, inappropriate installation, inconvenient temperature in the environment, dust, corrosives or operation out of technically specified scope.

- The producer is not responsible for the following subsequent damages:
- Any motiveless interventions into the equipment.
- In case the damage is caused by inexpert operation or manipulation carried out by persons without the required qualification, i.e. in contradiction with this manual.
- The switchboard warranty does not apply to protective components (fuses) or to the parts with ordinary wear-out.

Acknowledgement

Dear Customer. We highly appreciate the trust you have expressed by purchasing our product. We believe you will be satisfied with our products and related services. In case of any questions or requests feel free to contact us:

Producer:

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EQUANS Czech Republic, 2022