



ELEKTROTEKNİK

BUSBAR TRUNKING SYSTEMS

GENERAL INSTRUCTIONS INSTALLATION AND OPERATION MANUAL

PART 1

PREPARING FOR INSTALLATION

Do not unpack the Busbar system before it is delivered to the installation site. Description of the equipment is given on the label of each equipment on the dispatch packaging. After the packaging is opened, you will see that each component has a label corresponding to the artwork number. Check each busbar component for possible damage. If any components are damaged, contact the factory. Make sure that the joint surfaces are clean and dry. Since the joint surfaces are tinned, no protective chemicals are required. Check if the joint insulators on the joint parts are cracked or damaged. Test all busbar components with phase-to-phase and phase-to-neutral megger to prevent faulty installation and ensure insulation integrity. During the megger test, no load or energy should be applied to the busbars. The minimum value should be 100 meg ohms for each component. If one of the components is below this value, contact the factory.

PART 2

PHASE SEQUENCE

The five-conductor type busbar phase sequence is N, L3, L2, L1, PE from top to bottom. The four-conductor type busbar phase sequence is N, L3, L2, L1 from top to bottom.

PART 3

EXTERNAL WALL TRANSITIONS

A wall flange is used to close the gap between the wall and the busbar when the external busbar passes through the exterior of a building.

NOTE: It is recommended to start the installation from the head (panel module, transformer module or feeder box). The opposite ends may not coincide when installation is started from the center of the line.

It is recommended that the gap through which the busbar will pass are 2.5 cm more than the busbar case section.

It is recommended that the gaps are 102 mm from the wall, 152 mm from the ceiling when busbar is installed horizontally, 152 mm from the wall, 102 mm from the ceiling when installed vertically and 152 mm when installed as a vertical shaft.

WARNING:

After the busbar has been installed, check that the bolts on joints are 80 mm using a torque switch.

Test the busbar line with megger before power is applied. During the test, no load or power should be applied to busbar.

PART 4

TRANSPORT

This guide related to transport includes points to be considered to prevent injuries or damage to equipment during transport, as well as sections related to moving parts and fittings.

4.1. Pay particular attention to the transport instructions given to you by the manufacturer, especially on busbar equipment.

4.2. Busbars must be carefully transported; the equipment inside must be transported in consideration of the small pieces as well as the panels located beside them. Busbar should not be dismantled, bent and/or folded and should be transported as supplied in a flat position.

4.3. Busbars should not be transported holding the ends of busbar lengths.

4.4. Busbars are delivered in packaging with some instructions supplied during loading. Packaging should be opened after these instructions are carefully read.

4.5. If the busbar lengths is to be stored before installation, packaging must be kept on the busbar.

4.6. The weight of the busbar parts and fittings must be taken into consideration when choosing the handling equipment to be used.

4.7. Transport cars can be used for busbar transportation.

4.8. Forklift is a convenient way to transport busbars. Loads must be carefully balanced.

4.9. Manual or automatic platform ladders and lifts can be used.

PART 5

STORAGE

5.1. Busbars which are not installed and powered must be stored in a dry, clean and place with stable temperature level without humidity. A place with sufficient air circulation and without dirt, water, rust should be preferred.

5.2. Storing busbars outdoors is not recommended. Even if they must be stored, they must be covered to prevent contact with air and dirt. Electric heater should be used to prevent moisture.

5.3. External type busbars are not durable in outdoor weather conditions unless they are not installed. Internal type busbar storage conditions must be considered.

PART 6

INSTALLATION

6.1. GENERAL

6.1.1. Do not install the busbar below the specified values for wall and roof gaps to ensure original installation and prevent any fault during installation. Busbars are installed as mentioned in the DTM catalog.

6.1.2. Follow the manufacturer's installation instructions and DTM Catalog information.

6.1.3. To protect the busbar system from short circuit, Phase-to-phase. Phase-to-neutral and Phase-to-earth insulation resistance tests should be performed at 1000V. Measured values are inversely proportional to the busbar line length and the number of busbars used per phase. Measurements also vary depending on the humidity in the environment. If the measurement is less than 1 Mohm / 30Mt, contact the vendor.

6.2. 6.2. OPENING THE PACKAGING

6.2.1. Cut the areas with "safety" mark carefully using tape cutters.

6.2.2. Cutters used to unpack should be made of wood to prevent scratching.

6.2.3. Separate the support blocks used for loading.

6.3. PULLING UP AND LIFTING (See also Part 4)

- 6.3.1. If the crane is to be used in the busbar installation, nylon stretch should be used and the weight should be distributed evenly. If a cable is used, Busbar's body should be protected against damage by tensioning devices.
- 6.3.2. If a truck or similar tool is to be used, it should be set to suitably position the busbar in the proper position.
- 6.3.3. Busbars should not be dragged on the ground.
- 6.3.4. When vertical busbars are being installed, it is more convenient to suspend the busbar down the floor where it should be installed.

6.4. SUSPENSION AND SUPPORTING

- 6.4.1. For a safe installation and proper suspension, install the busbar system with suitable hangers.

6.4.2. Horizontal Assembly

Busbar line should be between 1,5Mt-3Mt. in horizontal installation. Hangers should be installed so as not to sway the busbar line. Tap-off units to be connected to the busbars should be supported, if possible, using the building structure.

6.4.3. Vertical Assembly

Stance and the service position of the busbars installed vertically are important. Floor support distances should be taken into account. Common support area should be used by taking the advice of the manufacturer. If there is no support, the distances between holes must be 492 cm. Heavy small compartments, panels, bus plugs must be supported separately using building structures.

6.4.4. Expansion Units

Expansion units should be used at transition points in the buildings built with joints. This provides expansion in building's horizontal movements. It is recommended to use these expansion units with 40 mt intervals on some steep lines or on very long lines.

- 6.4.5. Busbar lines must be aligned vertically or horizontally before the bolts on the joint points are tightened.

6.5. JOINT INSTALLATION

- 6.5.1. It should be checked that all contact surfaces are clean and free from dirt.
- 6.5.2. The joints are installed by shifting the busbar lengths according to the phase sequence.
- 6.5.3. If possible, joint tensioners can be used.
- 6.5.4. Observe the vendor's instructions. Joint bolts should be tightened at the specified torque.
- 6.5.5. Keep the busbars properly closed during installation. Keep away from moisture and all kinds of dirt.

6.6. GROUNDING

- 6.6.1. The outer frame of the busbar system serves as grounding tool. However, attention should be paid to the joints between busbars and the system should be carefully connected to the grounding line.

6.7. INSTALLING THE PLUG IN DEVICES

- 6.7.1. Follow manufacturer's instructions.
- 6.7.2. Allow proper gap for busbar installation to ensure easy moving and operating of devices.
- 6.7.3. All of the plug-ins do not need to be closed. It is sufficient to close required parts.
- 6.7.4. All covers and plug-in devices should be in the off position when mounting and moving.

6.8. PROTECTION AGAINST HUMIDITY, DIRT AND WATER

- 6.8.1. Busbars must be protected from heat, moisture, dirt and liquids.
- 6.8.2. Some conditions causing dirt:

Construction Residues

- 6.8.2.1. Moisture level on the ground
- 6.8.2.2. Leaky Chimneys
- 6.8.2.3. Pipes - Safe spots must be chosen especially against leaking pipes
- 6.8.2.4. Drizzle - Busbars installed on the inner surface must be kept away from drizzles.
- 6.8.2.5. Snow
- 6.8.2.6. Cross Barriers

Heat differences occur in the places where busbars are distributed over the walls and inside the walls which result in moisture. Internal cross barriers are used for protection.

Please follow the vendor's instructions in places where the busbar is outside the wall.

6.9. SUMMARY

- 6.9.1. Review assembly drawings.
- 6.9.2. Check material dispatch ticket
- 6.9.3. Define and check each component before installation.
- 6.9.4. Follow instructions.
- 6.9.5. Follow manufacturer's indoor and outdoor installation instructions.
- 6.9.6. Perform assembly protection tests before installation.
- 6.9.7. Perform daily protection tests.
- 6.9.8. Identify problems that water resources can cause and avoid these.

PART 7

Steps to be taken before powering.

WARNING: DANGEROUS VOLTAGE IN ELECTRICAL EQUIPMENT CAN CAUSE PERSONAL INJURIES. INSTALLATION OF EQUIPMENTS MUST BE PERFORMED IN OFF POSITION UNLESS OTHERWISE INSTRUCTED. ALWAYS FOLLOW YOUR VENDOR'S WARNING AND INSTRUCTIONS

- 7.1. Check all joints again. Check vendor's instructions.

- 7.2. Check that the covers and plug-ins are also in the off position
- 7.3. For mounting resistance test, tester must be set to 1000 volts and system setting must be free from short circuits and away from the ground.
- 7.4. Ensure that the transformer and switchboards and others are identical before reconnecting the system phase settings to the busbar phase settings.

PART 8

ENERGY EQUIPMENT

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- 8.1. If the equipment is to be operated for the first time, an electricity specialist must be available. If the check-up procedure is not followed and/ or the system is installed incorrectly, major damage can occur when the power switch is on.
- 8.2. Equipment should not be powered before running. Before all floors are powered from the busbar, off button must be pressed.
- 8.3. First the main devices and then the others must be powered.

PART 9

MAINTENANCE

9.1. EXTERNAL BUSBARS

- 9.1.1. External busbars must be inspected every year.
- 9.1.2. Information on all electrical connections, temperature and loading settings should be obtained.

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WARNING: BUSBARS DAMAGED BY WATER AND MOISTURE CAUSES PERSONAL INJURIES. PART 6.8 AND 6.9 SHOULD BE READ AND INSTALLATION RESISTANTS SHOULD BE CHECKED.

FOLLOW DTM TECHNICAL PUBLICATIONS APPLICATIONS FOR SAFE AND APPLIED WORKS.

ATTENTION: Hydrocarbon propellant spray and Hydrocarbon-based spray can damage plastic parts. Consult with your busbar manufacturer before use.

- 9.1.3. Switch off the busbar power switches.
- 9.1.4. Cleaning with a brush will be enough if there is a rust-dirt preventive circulation system is available. A proper vacuum cleaner can also be used. Rust should be prevented at joints and equipment
- 9.1.5. Check installation resistance.

9.2. INTERNAL BUSBARS

- 9.2.1. Internal busbars must be inspected every year.

- 9.2.2. Information on all electrical connections, temperature and loading settings should be obtained.

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ATTENTION: Hydrocarbon propellant spray and Hydrocarbon-based spray can damage plastic parts. Consult with your busbar vendor before use.

- 9.2.3. Disconnect the busbar.
- 9.2.4. Check moisture-free environments where there are no water flows.
 - 9.2.4.1. Mount the junction boxes in dry, non-humid areas. See Part 6.8
- 9.2.5. Carefully check the visible electrical connections and terminals.

9.4. FINAL TEST

- 9.4.1. Infrared monitoring of the electrical connections between the required connections can be made after the necessary tests and maintenances have been carried out, if desired.

PART 10

SUITABLE BUSBAR LOADS

10.1. BUSBAR WITH AND WITHOUT OVERCURRENT PROTECTION

- 10.1.1. Full current load must not exceed the amount of current written on busbar

10.2. BUSBARS

- 10.2.1. Load current must not exceed 80% of the total phase current. Consult with your vendor for more detailed information.

PART 11

OPERATING CONDITIONS

11.1. NORMAL OPERATING CONDITIONS

- 11.1.1. Suitable operating conditions for busbars:
 - a) a) Ambient temperature values should be between -30°C and 55°C for panels and busbars.
 - b) Ambient temperature for plug-in units, short circuit breakers, electromagnetic and manual motor controls must be 0°C to +55°C.
 - c) Altitude should not exceed 2000 meters.

11.1.2. Voltage Loss (General)

11.2. ABNORMAL OPERATING CONDITIONS

- 11.2.1. Once the busbars are installed in the locations to be used, operate the busbars with the ambient temperature above 55°C (122°F) according to your vendor's recommendation. If it is installed, follow the table below:

AMBIENT TEMPERATURE	NO. OF FLOORS
40°C	1.00
45°C	0.95
50°C	0.90
55°C	0.85
60°C	0.80
65°C	0.74
70°C	0.67

- 11.2.2. The minimum ambient temperature for applications must comply with the values given in 11.1.1a and 11.1.1b or this is valid in places higher than 2000 meters.
- 11.2.3. Unless stated otherwise, do not place busbars in areas where rusty and damp working conditions with unusual rocking or vibrating are present.