

WR SERIES

**GEARLESS PERMANENT SYNCHRONOUS
TRACTION MACHINE OPERATION MANUAL**

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Contents

GEARLESS TRACTION MACHINES	1
OPERATING INSTRUCTIONS	2
1. General safety instructions	3
2. Machine Type Code	4
4. Product description	4
4.1 Application situation	4
4.2 Main structure of the machine	5
5. Transport and storage	5
6. Installation	6
6.1 General	6
6.2 Degree of protection	6
6.3 Ambient conditions	7
7. Electrical connection	7
7.1 General	7
7.2 Motor connection / Winding protection/Earthing Connctcion	8
7.3 Earthing	9
7.4 Short-circuiting	9
8. Operation and maintenance	10
8.1 General	10
8.2 Maintenance intervals	10
8.3 Repairs	10
8.4 Lubricating instructions	11
8.5 Emergency evacuation	11
9. Encoder	12
9.1 General	12
9.2 Installation of Encoder	12
10. Appendix 1 brake installation instructions	13
10.1 Structure and principle	13
10.2 Duty ratio	13
10.3 Installation	13
10.4 Maintenance	14
11. Troubleshooting	14

1. General safety instructions

Only qualified personnel are allowed to perform any planning, transportation, installation, operation or maintenance work. The personnel must be trained for this job and must be familiar with the installation, assembly, commissioning and operation of the product. Sufficient knowledge in lift construction is essential.

The regulations concerning operation, maintenance and inspection in accordance with the applicable safety regulations in lift construction such as EN 81 "Safety rules for the construction and installation of lifts", Part 1:"Electric lifts" and other relevant regulations shall be strictly observed.

The operator is responsible for the proper installation of the machine with regard to safety requirements as well as for its inspection and maintenance as specified in the applicable regulations. No liability can be assumed for any damage caused by improper handling or any other acts which are not in conformity with these operating instructions and thus deter from the qualities of the product.

In this manual, the following symbols are used to mark warning and important notes. These symbols must be observed.



(Danger) means that death or serious injury to persons or serious damage to property will occur unless the appropriate precautions are taken.



(Warning) means that death or serious injury to persons or serious damage to property may occur unless the appropriate precautions are taken.



(Caution) means that injuries to persons or damage to property may occur unless the appropriate precautions are taken.

The three-phase traction machine are intended for use in an enclosed, lockable machine room to which only qualified personnel and personnel authorized by the client have access qualifications.



(Danger) The instructions given in this manual or any other instructions supplied must always be observed to avoid dangers or damage.

- Check the proper functioning of the motor and the brake after installing the machine.
- Any adjustment and repair may only be carried out by the manufacturer or an authorized repair agency, unauthorized opening and tampering may lead to injuries to persons and property.
- The rope traction conditions should be checked according to EN 81.1 Clause 9.3 at site after installing the machine in the lift it serves.
- If the product is installed in a system to perform the function of ascending car overspeed protection, the whole system should comply with EU Directive of 95/16/EC (Lift Directive) an
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- d relevant EU standard of EN 81-1.

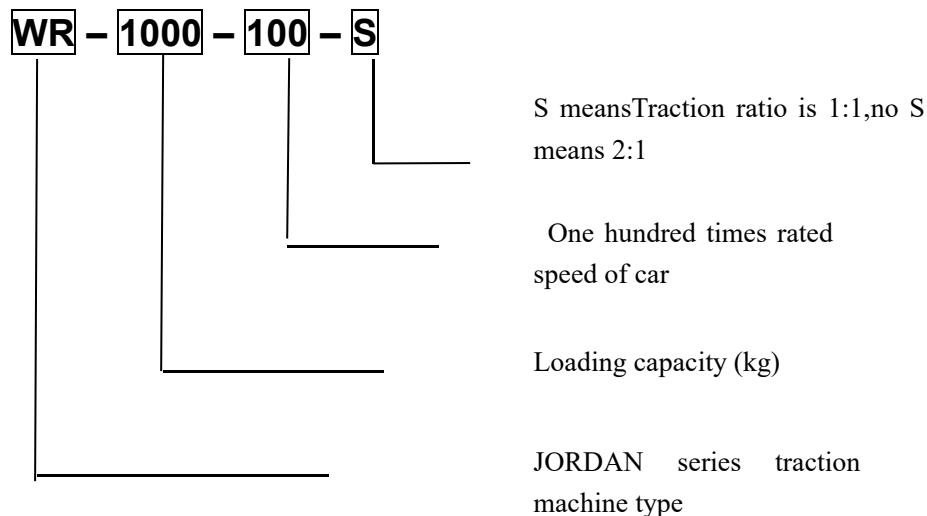


(Warning) The machines are not designed for direct connection to the three-phase system but are to be operated via a driver.

- Direct connection to the system may destroy the motor.
- High surface temperatures may occur on the external parts of the machine. Therefore no temperature-sensitive parts may contact these parts or be attached to them. Protection against accidental contact should be provided, if required.
- The twin shoe brake is designed only as a holding brake for a limited number of emergency braking operations. It must not be used as a working brake.
- The proper ability of the brake system should be tested after installing the machine to the lift it serves and after it's adjustment every time. (According to EN 81.1 Clause 12.4.2.1)
- High voltages occur at the terminal connections during the operation of synchronous motors.
- The machine is used in the location where 380V/460V power can supply.

2. Machine Type Code

The code of traction machine is composed of 4 parts:



4. Product description

4.1 Application situation

The machine is used as inverter drive only, and it's forbidden to be used in areas with a high danger of explosion. Customers should install the machine only in a close machine room and observe the relevant safety precautions.

4.2 Main structure of the machine

Jordan series traction machines have been developed in line with the trend towards gearless lifts based on our experience in drive construction. The compact flat-type gearless traction machines are distinguished by their high efficiency, extremely low noise and the excellent operating characteristics of the three-phase synchronous motor.



(Warning) All of our gearless traction machines are designed solely for use with a driver.

Owing to the driver supply, the starting currents of the motors are low, which makes it possible to install in lift systems even in case of weak power systems.

The synchronous motor has been designed for various rated torques, based on several overall widths, It can also be supplied for several rated speeds, which can then be further adapted to individual customer requirements.

The traction machine is consisted of one motor, one sheave, one brake and one encoder.

The frame carries the stator core, against its inner surface, and envelops the core to form an enclosure. The magnet ring is consisted of 16 poles, which rotates within this enclosure. The magnet ring is centered on and fastened to the rotor to transmit the motor torque. The traction sheave has a frictional and positive connection to the rotor. It is optimized for different groove dimensions and carries the rotor brake drum for the external opposed brake.

The rotor with its shaft is arranged in the frame. It is carried in a sturdy main bearing and in a locating bearing at the other end. The sheave shaft is optimally designed for the high loads to be carried and has high fatigue strength.

The electrical connection of the motor is in the terminal box where the temperature sensor is also connected.

The brake system comprises a twin shoe brake with a centrally arranged brake machine. The brake system is connected to the supply voltage through a control unit which is included in the scope of supply. The electrical connection is made in the control cabinet. The terminals for the brake monitoring contacts are accommodated in a separate terminal box on the brake.

The brake can be released manually, if required, by operating the manual release lever. The braking torque can be adjusted to the specific needs, if necessary, by adjusting the two brake springs.

The two ropes slip-off guards are used to prevent the ropes dap from the sheave groove.

5. Transport and storage

The traction machines leave the factory in a perfect condition after being tested. Make a visual check for any external damage immediately upon their arrival on site. If any damage has been occurred during transport, make a notice of claim in the presence of the forwarder. If necessary, do not put these machines into operation.



(Warning) the eyebolts are designed for the specified machine weight. Suspension of additional loads is not permitted.

• Store the machines only in closed, dry, dust-free, well-ventilated and vibration-free room.

• Storage time should not exceed 6 months. If exceeded, you should inspect the machine before installation.

• No liability is assumed for any damage resulting from improper handling of the machine.

• Transportation and storage temperature required: $-25^{\circ}\text{C}\sim 55^{\circ}\text{C}$. And the duration of 24hours on 70°C is permissible.

Discharging and Suspending:

• Make sure the carton is undamaged before opening. Check the nameplate and traction machine to confirm if it is the right machine.

• Check the packing list first to make sure if all the components are ready after opening the cartoon, whether the machine is damaged, eroding or not.

• Traction machine must be structural-integrity installed, disassemble installation is forbidden.

• Make sure rope hook clasps the ring on the machine before suspending, keep steady and no crash during suspending.

• The carrying capacity of the rope for uprising the Traction Machine must be $\geq 3000\text{Kg}$. The Rope for uprising the traction machine should be hooked screw.

6. Installation

6.1 General



(Warning) Check the base frame or foundation loads by calculation before installing the machine. The frame should be rigid enough to accommodate the bending and torsion forces over the whole load range, Place the machine on a plane surface with a permissible deviation from planeness not exceeding 0.1mm.



(Danger) Fasten the machine on the frame with four M24 bolts of strength class 12.9(bolt tightening torque $880\text{ N}\cdot\text{m}$)

Traction machines are generally provided with rope slip-off guards. After putting the ropes in place, adjust them so that the distance between the rope and the rope slip-off guard does not exceed 1.5mm.

6.2 Degree of protection

Traction machines are designed with degree of protection IP 40, Make sure that the cable entries to the terminal boxes are sealed properly when making the electrical installation.

6.3 Ambient conditions

The following ambient conditions must be ensured on site:

- Altitude: max.1000 m
- Ambient temperature: 0°C~40°C
- The deviation between voltage fluctuation and rated voltage does not exceed $\pm 10\%$
- There is no corrosive and flammable gas in environment.
- There are no lubricant and others on the surface of steel wire rope
- The angle of rope on the traction sheave between car side and counterweight side must meet regulation 9.3.1.b in EN 81-1.
- Maximum relative humidity:85% at 20°C(no moisture condensation)

Install the machine make sure ventilation is not obstructed. Sufficient heat dissipation by convection and radiation must be ensured. Connect any separate fans carefully. Make sure do not allow the outlet air or air from adjacent units to be blown in again directly. In the case of using three-phase fans, check the direction of rotation corresponds with the arrow on the fan. The torque and power values indicated in the nameplate can apply to the above ambient temperatures and altitudes.

7. Electrical connection

7.1 General

Make the electrical connection after having installed the motor. Have this done by a qualified electrician.

Before starting any work on the machines, and particularly before opening any covers of active parts, make sure that the motor or system has been properly isolated. This also refers to any additional or auxiliary circuits.



(Danger) The “5 safety rules” to be applied:

- Disconnect the traction machine from the power supply.
- Lock it against unintentional restarting.
- Verify the safe isolation from power supply
- Earth and short (with voltages above 1,000V)
- Protect or cover adjacent live parts.

Connect the machine so that a permanent electrical connection is ensured. There must be no foreign bodies, dirt or moisture in the terminal box. Seal the cable entry holes after connection.



(Warning) The insulation system of the motors is designed so that they can be connected to a converter with a maximum DC link voltage $U_{link\ max}$ up to maximum 700 Volt.

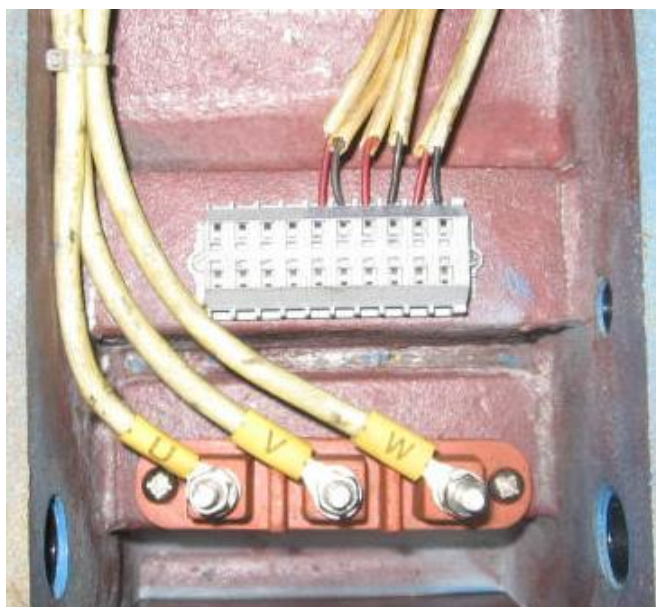
Note: $U_{link\ max}$ is the maximum value of the DC link voltage which is only transient

and approximately equivalent to the inception voltage of the braking chopper or of the energy recovery unit. The maximum permissible rate of voltage rise (dU/dt) at the motor terminals may be maximum $1.3kV/\mu s$ (in accordance with the specifications of VDE 0530 T1, Supplementary sheet2). The over voltage at the motor terminals must not exceed $1.3kV$. It may be necessary to use motor current filters or reactors to achieve these values.

7.2 Motor connection / Winding protection/Earthing Connecction

The electrical connection of the motor and the winding monitoring devices is made in the terminal box on the machine. The junction of the machine, thermistor and limit switch are in the junction box. The extension line of the encoder is connected with the transducer. The connection wire of the brake is in its own connection box. The connection terminal in the junction box specify as follows.

U	V	W	T ₁	T ₂
power connection			Temperature protection	



(Terminal box for motor connection)

i (Caution):

The motor cable must be shielded. Make sure that the cable shield contacts the frame over a large area at both ends.

The motor phase U, V and W must be connected correctly to the corresponding phase of the inverter; they must not be interchanged.

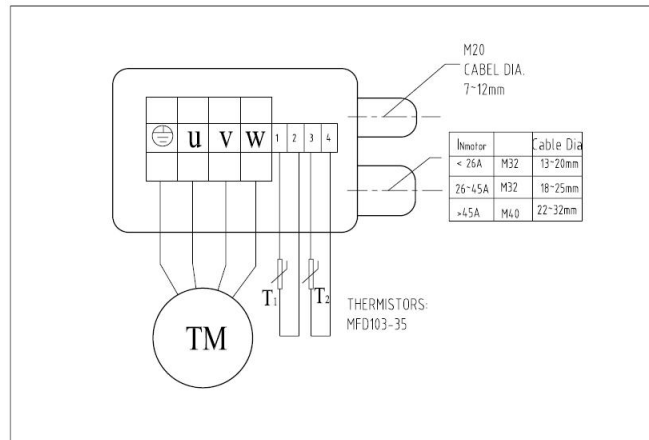
The electric connection of brake is attached in brake box.

The currents specified under the machine date for the series WR refer to duty type S3-40%. This must be taken into account when selecting the cable cross-section required. The continuous I_{r.m.s.} value required for the selected cable is approximated from:

$$I_{r.m.s(cable)} \approx I_{N(motor, S3-40\%)} / 1.58$$

The following table gives the recommended values for the current-carrying capacity of PVC cables at a maximum ambient temperature of 40°C:

Motor connection diagram:



NTC-thermistor



(Caution): The thermocouples installed in the winding such as NTC thermistor detectors and thermostatic switches must be evaluated in the control system or frequency converter to protect the motor from overtemperature. The operating voltage of the NTC thermistors is not allowed to exceed 15VDC.

7.3 Earthing

For safety reasons, it is very important that the motor should be properly and carefully earthed.



(Warning) Use the earthing screw provided in the housing! In addition, connect the protective or earthing conductor in the terminal box.

When using shielded power cables, make sure the cable shield metal contacts the motor frame over a large area. This is achieved, for example, by special cable glands provided for shield contact.

7.4 Short-circuiting

The motor terminals of the synchronous lift machines, type WR, can not be short-circuited, if required, which can brake faster. However, this is only permissible at speed of less than rated speed of the motor.

8. Operation and maintenance

8.1 General

The regulations concerning operation, maintenance and inspection in accordance with the applicable safety regulations in lift construction such as EN 81 "Safety rules for the construction and installation of lifts", part 1: "Electric lifts", the "Technical rules for lifts" (TRA 200) and other relevant regulations shall be strictly observed.

The operator is responsible for the proper installation of the motor with regard to safety requirements as well as for its inspection and maintenance as specified in the applicable regulations.

The proper maintenance of gearless lift machines requires adequately trained specialist personnel and specialized devices and tools.

8.2 Maintenance intervals

Maintenance is normally limited to the following:

- Check the traction sheave.
- Check the radial shaft sealing rings (no grease should penetrate from the rings, especially at the ND end as it could contaminate the neighboring brake surfaces).
- Inspect and service the emergency twin brake.
- Clean the machine surface.



(Warning) The lift operator is responsible for regular checks of the brake safety components and the traction sheave, and must include these components in his visual inspection schedules.

The maintenance activities listed in the following table are recommended to be performed:

Table 8-1: Maintenance Tasks

Task	Interval
Check the thickness of the brake linings	Every six months
Check the bearing noise	Every six months
Check the brake	Every six months
Check the traction sheave for wear	Every six months
Check the traction sheave for tight seating	Every six months
Check the electrical cables	Every six months
Check the rope slip-off guard	Every six months

8.3 Repairs

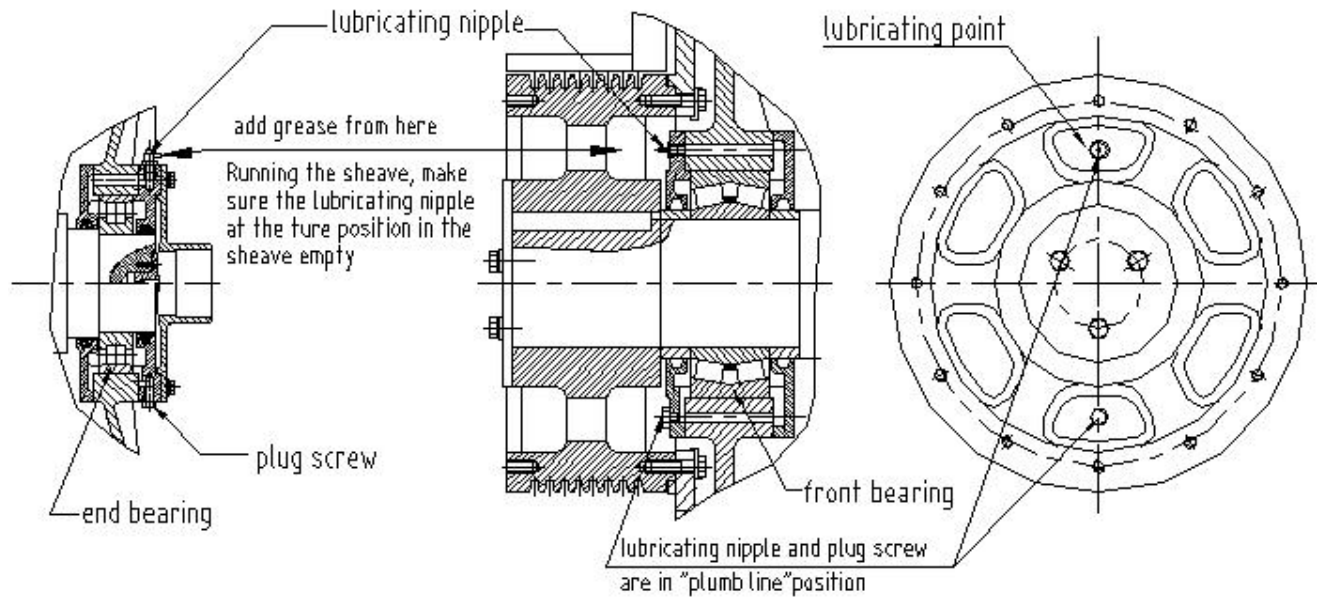
Repairs other than those described in these operating instructions are not to be carried out by the lift fitter/maintenance technician for liability reasons.

8.4 Lubricating instructions

The two roller bearings have been filled with a quantity of grease at the factory which sufficient for nominal service life of the machine.

No regreasing is required or recommended under normal service conditions.

Note: (1) In special cases, e.g. under extreme conditions (max. utilization of permissible axial forces at max. nominal speeds), the regreasing device provided can be used. For this purpose, screw the grease nipple which is in a “plumb line” position (view on traction sheave) into the regreasing hole which is located near the rotor centre (see picture below).




(2) Before doing this, remove the plug screw M10 × 1 which protects the regreasing hole. Use 3# lithium (soap) grease. The refilled grease should exert only slight pressure on the grease column.

(3) Therefore use only a small quantity, max. 120g. we recommend “parking” the grease nipple back in its hole and closing the regreasing hole after regreasing.

(4) Add the grease once every year.

Attention: Please dispose of used grease in a manner that is compatible with the environment. We suggest you take it in a sealed container to your local service station or recycling center for reclamation. Do not throw it in the trash or pour it on the ground.

8.5 Emergency evacuation

 (Warning) The lift design engineer must always provide UPS for an electric return motion control (please note EN 81-1/12.5.2).


Should a failure occur with the car at rest, the machine can be moved with the drive connected to the mains or to an uninterruptible power supply (UPS). These brakes must be released electrically either from the mains or using a UPS.

9. Encoder

9.1 General

The traction machine is equipped with an encoder (ECN1313) from Heidenhain. It is connected via a 15-pole signal plug connector, which is fit to the measure system.

We recommend the use of an appropriate cable set to connect the measuring system to the converter system. Cable sets can be supplied as accessories.

 (Warning) The measuring system of ECN1313 in the traction machines is fit to the recommended driver. Do not change the driver model privately as this may make it impossible to use the motor.

In the measuring system there is a label showing the “offset angle” determined by the factory. This value depends on the driver.



9.2 Installation of Encoder

The cone on the axle of the Encoder is connected with rotor shaft by bolt. Detailed steps as follows: 1. Open the back-cover of the Encoder;

2. Put shaft collar into;

3. Connect by the bolt.

NOTE: The bolt must be tightened to prevent speed encoder error. Tighten the small bolt of speed Encoder by hexangular spanner sufficiently to eliminate vibrations.

4. After confirmation, insert the wire of speed encoder into the interface;

5. Put the ferrule on the cover of the cover plate;

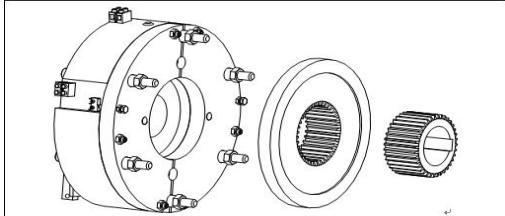
6. Cover it and twist the bolt.

NOTE: Contact ferrule and cover plate closely, or else it may cause disturbance.

10. Appendix 1 brake installation instructions

10.1 Structure and principle

The DSZ brakes consist of magnet body, armature, friction disk and hand-release parts. The brake is released electromagnetically and applies brake torque by compression springs. When the coil of magnet body is energized, the armature is drawn to the magnet body by the electromagnetic force, and the brake torque on the friction disk is disengaged. When the coil is de-energized, the electromagnetic force disappeared and the springs push the armature against the friction disk.

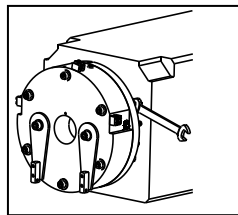
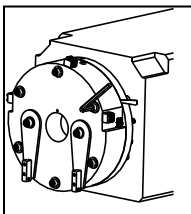
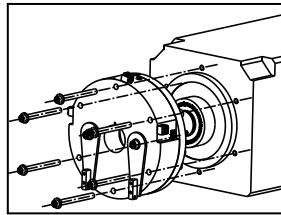
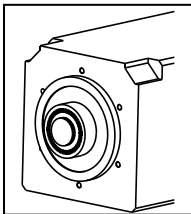


10.2 Duty ratio

S5-40% 240F/h

10.3 Installation

- Mounting the hub on the shaft.
- Mounting the friction disk on the hub.
- Keep the friction surface free of oil and grease.
- Screw the brake on the mounting face with screws.
- Tighten the screws evenly, and check the air gap(0.2~0.3mm) near the bolts by thickness gauge.



10.4 Maintenance

The brake must be checked and readjusted at regular intervals and if necessary be replaced.

- Check the air gap and adjust if necessary.
- Check the friction lining condition and replace if necessary.

Tighten the mounting screws if necessary.

11. Troubleshooting



(Warning): If there are problems about the machine, only qualified personnel can do the troubleshooting work. The personnel must be trained for this job and must be familiar with the machine. No liability can be assumed for any damage caused by improper troubleshooting.

Fault	Possible cause	key
The inverter prints: PG fault	<ul style="list-style-type: none">• The setting of encoder parameters is wrong or the connection fault	<ul style="list-style-type: none">• Inspect the connection of encoder cable and set the parameters right.
Brake does not release	<ul style="list-style-type: none">• Incorrect voltage on the rectifier• Air gap too large (worn rotor)• Interrupted coil	<ul style="list-style-type: none">• Apply correct voltage• Replace rotor• Replace brake
Delayed engagement of brake on emergency OFF	<ul style="list-style-type: none">• Brake is switched AC-side	<ul style="list-style-type: none">• Switch DC-side
Braking system engages with delay	<ul style="list-style-type: none">• Coil voltage too high• Switch-off time too short with AC side switching	<ul style="list-style-type: none">• Check supply voltage to coil• Control with DC side switching of the overexcitation rectifier.

Outline Drawing

