ABB INDUSTRIAL DRIVES

ACS880-607 1-phase brake units

Hardware manual

ACS880-607 1-phase brake units

Hardware manual

3AUA0000102559 Rev C
EN
Original instructions
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Introduction to the manual

Contents of this chapter

This chapter gives basic information on the manual.

Applicability

The manual is applicable to ACS880-607 1-phase brake units that form a part of an ACS880 multidrive system.

Safety instructions

Obey all safety instructions of the drive.

- Read the **complete safety instructions** before you install, commission, use or service the drive. The complete safety instructions are given in ACS880 multidrives cabinets and modules safety instructions (3AUA0000102301 [English]).
- Read the warnings of the software function before you take the function in use or change its default parameter settings. Read the warnings of the parameter before you change its default setting. Refer to the firmware manual.

Target audience

This manual is intended for people who plan the installation, install, commission, and do maintenance work on the drive, or create instructions for the end user of the drive concerning the installation and maintenance of the drive.

Read the manual before you do work on the drive. You are expected to know the fundamentals of electricity, wiring, electrical components, and electrical schematic symbols.

Related documents

You can find manuals on the Internet. See below for the relevant code/link. For more documentation, go to www.abb.com/drives/documents.

	Manuals for ACS880 multidrives cabinets

Use of component designations

Some device names in the manual include the component designation in brackets (for example, [Q20]). This will help you to identify the components in the circuit diagrams of the drive.

Terms and abbreviations

Term/ Abbreviation	Description
Brake chopper	Conducts the surplus energy from the intermediate circuit of the drive to the brake resistor when necessary. The chopper operates when the DC link voltage exceeds a certain maximum limit. The voltage rise is typically caused by deceleration (braking) of a high inertia motor.
Brake resistor	Dissipates the drive surplus braking energy conducted by the brake chopper to heat
Brake unit	Brake chopper modules and the necessary auxiliary equipment, such as control electronics, fusing and cabling
Cubicle	One section of a cabinet-installed drive. A cubicle is typically behind a door of its own.
DC link	DC circuit between rectifier and inverter
Drive	Frequency converter for controlling AC motors
EMC	Electromagnetic compatibility
Intermediate circuit	DC circuit between rectifier and inverter
Inverter	Converts direct current and voltage to alternating current and voltage.
Multidrive	Drive for controlling several motors which are typically coupled to the same machinery. Includes one supply unit, and one or several inverter units.
NBRA	Series of optional brake chopper modules
NBRC	Brake chopper control board
Parameter	In the drive control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive. In some (for example fieldbus) contexts, a value that can be accessed as an object. For example, variable, constant, or signal.
Rectifier	Converts alternating current and voltage to direct current and voltage
SAFUR	Series of brake resistors

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Operation principle and hardware description

Contents of this chapter

This chapter describes the operation principle and construction of the brake unit.

Product overview

ACS880-607 is an air-cooled cabinet-installed brake unit, which forms a part of an ACS880 multidrive system. As standard, it includes brake chopper(s). Brake resistors are available as an option (+D151).

Operation principle

The brake chopper handles the extra energy generated by motor during a quick deceleration. The extra energy increases the drive DC link voltage. The chopper connects the brake resistor to the DC link whenever the voltage is higher than the operation limit of the chopper. Energy consumption by the resistor losses lowers the voltage until it is below the limit at which the chopper stops.

Chopper voltage selection

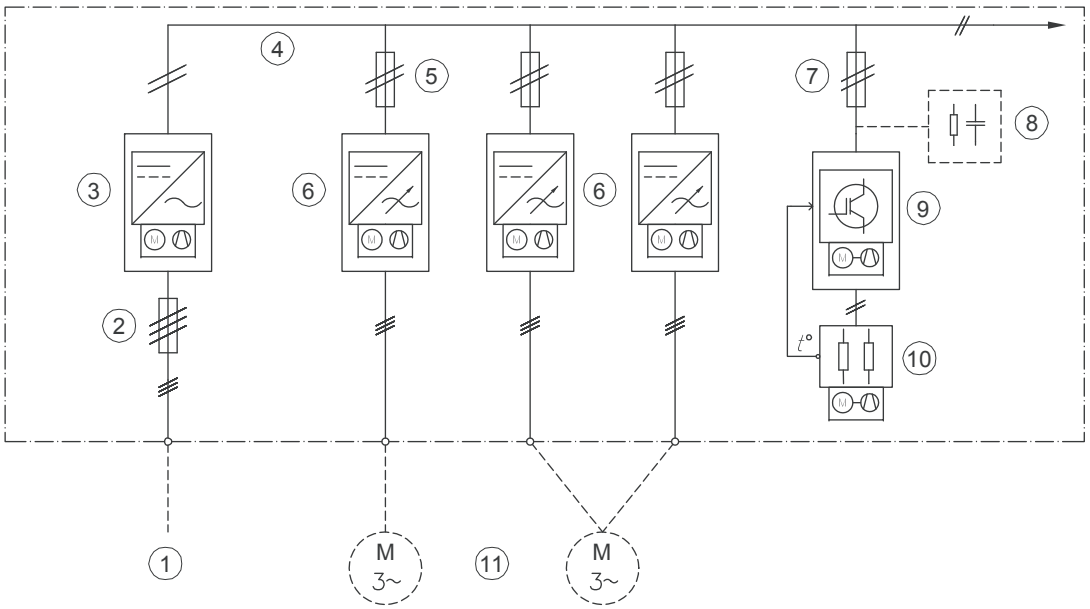
The brake chopper starts operating when the drive DC link voltage exceeds the "on" limit (Ubr_on). The brake chopper stops operating when voltage goes below the "off" limit (Ubr_off). Voltage limits depend on the position of voltage selection jumper, refer to Selecting the voltage (page 28).

When to use resistor braking

Resistor braking is necessary for high capacity braking of the motor and machinery if a regenerative drive cannot be used.

Single-line diagram of the drive system

The diagram below shows a typical common DC link drive system.

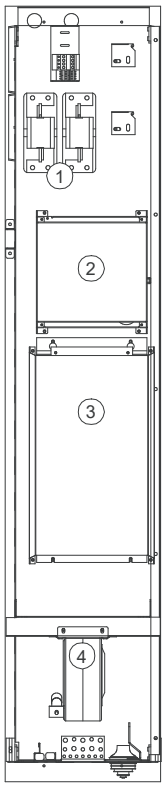


1	AC supply
2	Input (AC) fuses
3	Supply unit
4	DC link
5	Inverter DC fuses
6	Inverter units. In this example, one of the units consists of two inverter modules connected in parallel.
7	Brake chopper DC fuses
8	Attenuator. Suppresses voltage spikes at chopper input.
9	Brake chopper module
10	Brake resistors
11	Motors

Layout

Brake chopper cubicle

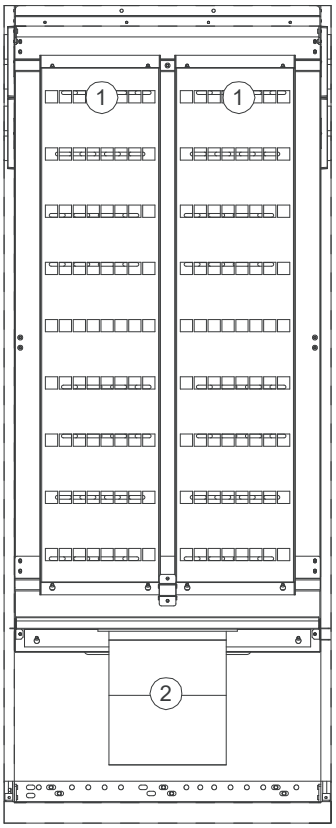
The figure below shows the components of the brake chopper cubicle with the door open and the shrouds removed.



1	DC fuses	3	Brake chopper module
2	Attenuator	4	Brake chopper cooling fan

Brake resistor cubicle

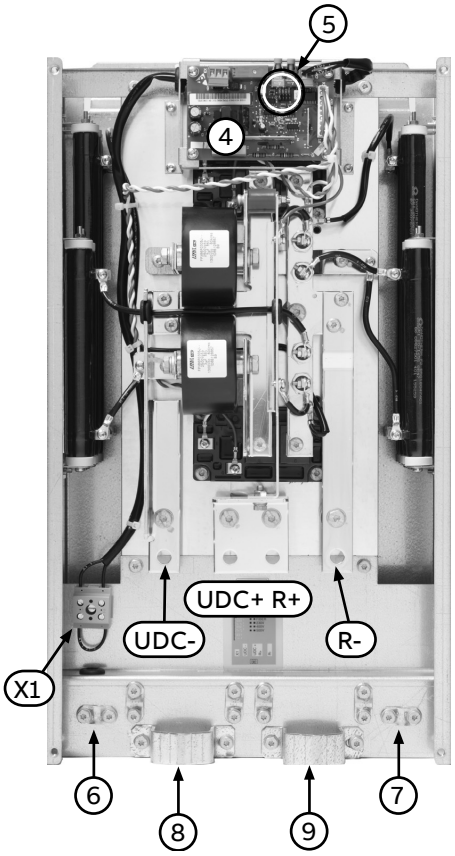
The figure below shows the components of the brake resistor cubicle with the door open and the shrouds removed.



1	Brake resistor	2	Brake resistor cooling fan

Brake chopper module

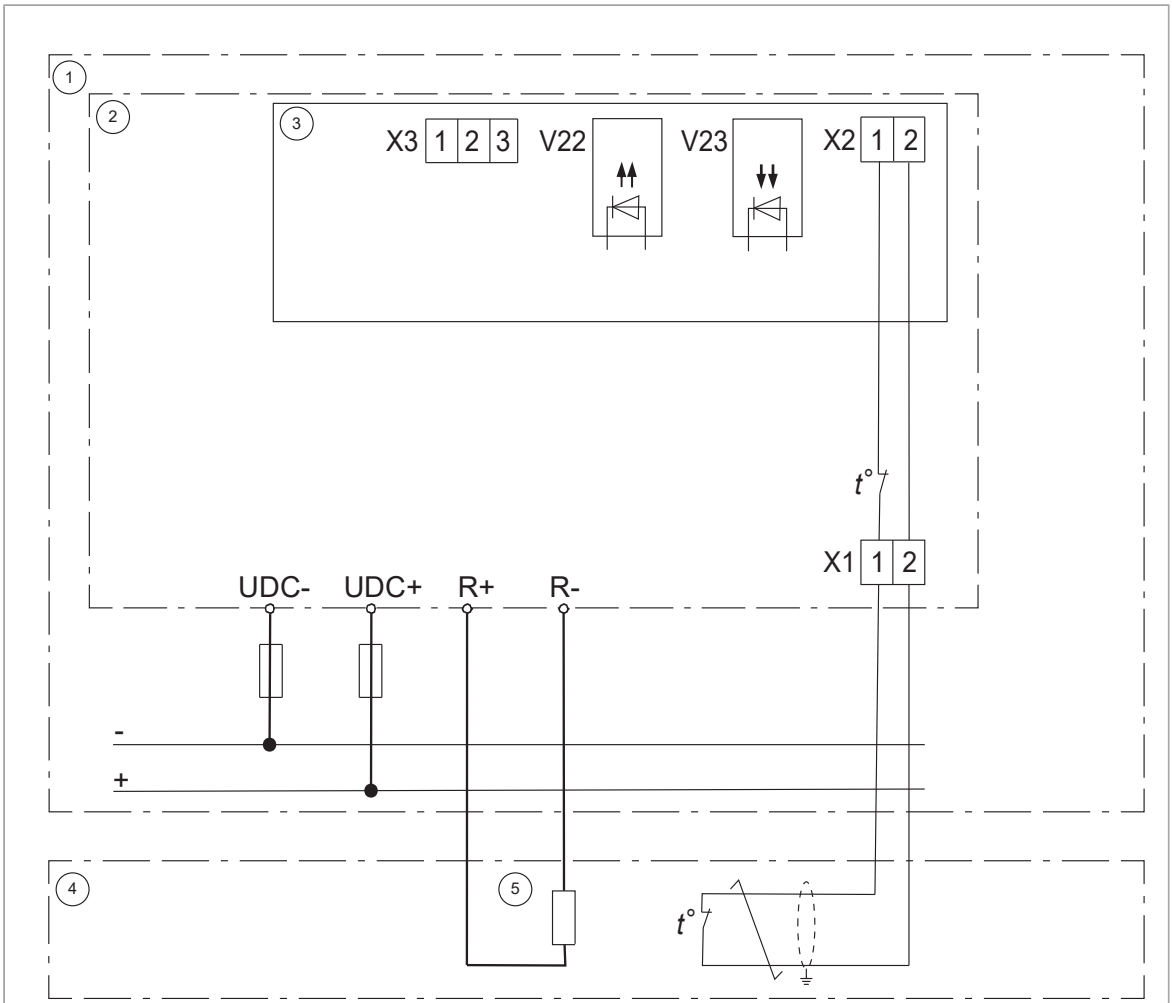
The components of the brake chopper module are shown below.



1	Fastening points on back plate (two at the top, two at the bottom)	8	Clamp for drive cable
2	Front cover fastening screws	9	Clamp for resistor cable
3	Front cover	X1	Enable input terminal block
4	Chopper control board (NBRC) with control terminals	UDC-	Power connection terminals
5	Voltage selection jumper	UDC+	
6	PE (protective earth) clamp	R+	
7	Grounding clamp	R-	

Overview of power and control connections

The diagram below shows the power and control connections of the brake unit.



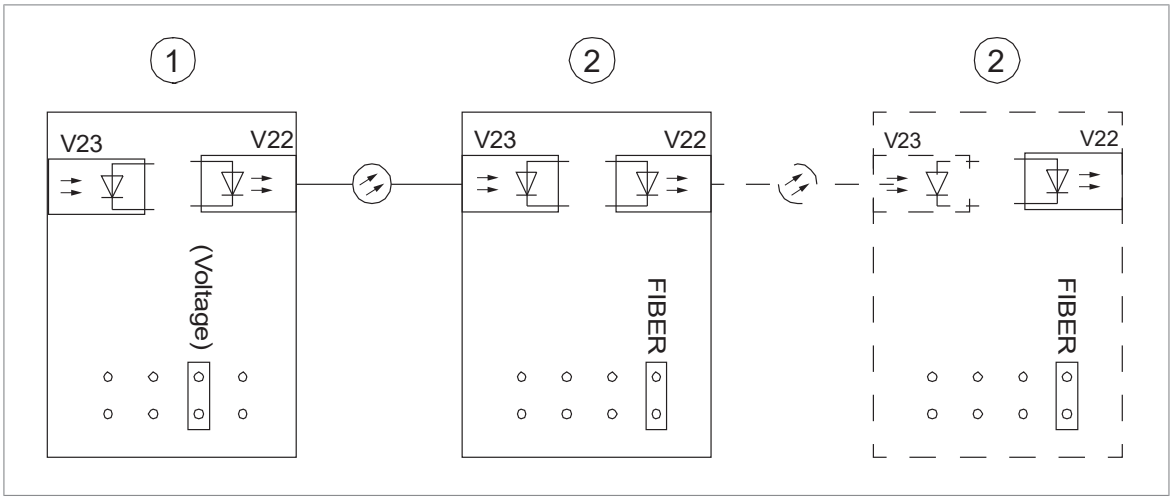
1	Brake chopper cubicle
2	Brake chopper module
3	Brake chopper control board (NBRC)
4	Brake resistor cubicle
5	Brake resistors
X1, X2	Chopper enable inputs
X3	Fault indication relay output.
V22	Fiber optic cable connection: Chopper control signal to another chopper (Transmitter)
V23	Fiber optic cable connection: Chopper control signal from another chopper (Receiver) (not connected as standard)

Controlling the brake chopper from an external control location

The brake chopper can be controlled from an external control location via a fiber optic link (terminals V22 and V23 on the chopper control board). Using the link, it is possible to synchronize several brake choppers.

Master-follower connection

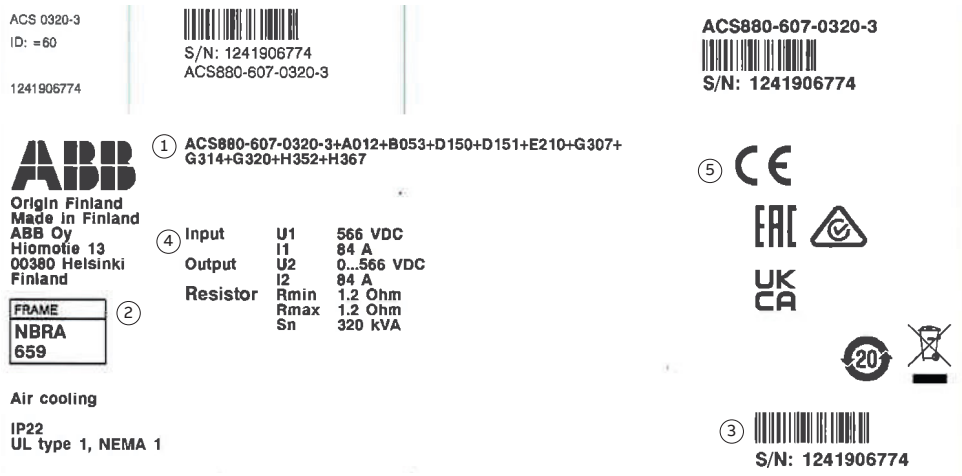
When several brake choppers are in use, the first chopper in the chain acts as the master for the other choppers. The voltage selection jumper of the master (1) is set to the appropriate voltage at the factory, while the followers (2) are set to FIBER.



Type designation labels

Brake unit type designation label

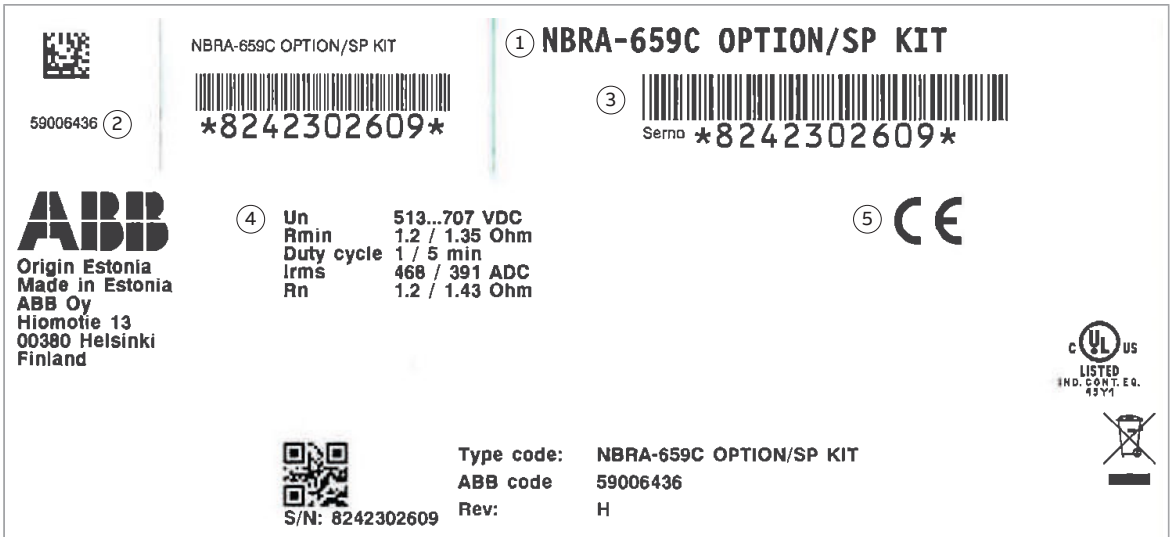
Each brake unit is equipped with a type designation label. An example label is shown below.



1	Type designation
2	Frame size
3	Serial number • The first digit of the serial number refers to the manufacturing plant. • The next four digits refer to the unit's manufacturing year and week, respectively. • The remaining digits complete the serial number so that there are no two units or modules with the same number.
4	Ratings
5	Valid markings

Brake chopper module type designation label

Each brake chopper module is equipped with a type designation label. An example label is shown below.



1	Type designation
2	Brake chopper module order code
3	Serial number • The first digit of the serial number refers to the manufacturing plant. • The next four digits refer to the unit's manufacturing year and week respectively. • The remaining digits complete the serial number so that there are no two units or modules with the same number.
4	Ratings
5	Valid markings

Brake unit type designation key

The type designation contains information on the specifications and configuration of the brake unit. The first digits express the basic configuration. The optional selections are given thereafter, separated by plus signs.

Basic code

This table describes the fields of the basic code.

Code	Description
ACS880	Product series.
607	Construction. 607 = cabinet-installed brake unit.
xxxx	Size. See the ratings table.
7	Input voltage. 3 = 566 V DC, 5 = 566/679/707 V DC, 7 = 742/849/976 V DC.

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Mechanical installation

Contents of this chapter

This chapter describes the mechanical installation of the brake units.

Brake unit

The ACS880 multidrive - the brake unit as one part of the complete drive - is transported in sections. Refer to ACS880 multidrive cabinets mechanical installation instructions (3AUA0000101764 [English]).

User-defined brake resistors

Obey the brake resistor manufacturer’s instructions.

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Planning the electrical installation

Contents of this chapter

This chapter contains instructions on selecting, placing and protecting the brake circuit components and cables.

Limitation of liability

The installation must always be designed and made according to applicable local laws and regulations. ABB does not assume any liability whatsoever for any installation which breaches the local laws and/or other regulations. Furthermore, if the recommendations given by ABB are not followed, the drive may experience problems that the warranty does not cover.

Generic guidelines

Refer to ACS880 multidrives cabinets and modules electrical planning instructions (3AUA0000102324 [English]) for the generic guidelines for planning the electrical installation (selecting cables, routing cables, etc.) of multidrives cabinets and modules.

Brake units with factory-installed brake resistors (option +D151)

The brake unit is an operational unit after the shipping splits are joined. No customer setting or wiring is required.

Brake units with user-defined brake resistors

Selecting the brake resistor

WARNING!
ABB is not responsible for user resistor selection or protection of the resistor.

Select the resistor according to the resistor specification given in the technical data. In addition, consider the following:

- Each output of the brake chopper module must feed a resistor of its own. There is one output in the 1-phase brake chopper module.
- The resistance (*R*) of the brake resistor must be equal to or above the value specified. Never use resistance values below the specified value.
- The brake resistor must withstand the specified brake cycles.
- The ventilation of the space/room in which the brake resistor is located must meet the air flow amounts specified.
- The resistor must be equipped with a thermal switch (temperature sensor).

WARNING!
Make sure that the isolation level and protection of the switch are sufficient. The switch is at the intermediate circuit potential. This voltage is extremely dangerous. The normally closed switch/contact should always be properly isolated (test voltage over 2.5 kV) and shrouded against contact. The same requirements are valid for the connection cable.

Selecting the resistor thermal switch

WARNING!
Make sure that the isolation level and protection of the switch are sufficient. The switch is at the intermediate circuit potential. This voltage is extremely dangerous. The normally closed switch/contact should always be properly isolated (test voltage over 2.5 kV) and shrouded against contact. The same requirements are valid for the connection cable.

Selecting and routing the brake resistor cables

Selecting the brake resistor cables

- Select cables that are compliant with the ABB brake resistor cable specification. Refer to technical data.
- Make sure that the resistor cable is not longer than 50 m (164 ft). Longer cables increase the inductance in the circuit and may cause drive or chopper fault trips, or other malfunctions. If you need longer cables, consult ABB.

Minimizing electromagnetic interference

Make sure that the installation is compliant with the EMC requirements. Obey these rules in order to minimize electromagnetic interference caused by the rapid voltage and current changes in the resistor cables:

- Shield the brake resistor cable. Use shielded cable or a metallic enclosure. If you use unshielded single-core cables, route them inside a cabinet that efficiently suppresses the radiated emissions.
- Install the cables away from other cable routes.
- Avoid long parallel runs with other cables. The minimum parallel cabling separation distance is 0.3 meters (1 ft).
- Cross the other cables at 90° angles.
- Keep the cable as short as possible in order to minimize the radiated emissions and stress on the brake chopper. The longer the cable the greater the radiated emissions, inductive load and voltage peaks over the IGBT semiconductors of the brake chopper.

Selecting the installation location for the brake resistors

Protect the open (IP00) brake resistors against contact. Install the brake resistor in a place where it cools effectively. Arrange the cooling of the resistor so that:

- no danger of overheating is caused to the resistor or nearby materials, and
- the temperature of the space that the resistor is in does not go above the allowed maximum value.

WARNING!
The materials near the brake resistor must be non-flammable. The surface temperature of the resistor is high. Airflow from the resistor can have a high temperature. If the exhaust vents connect to a ventilation system, make sure that the material withstands high temperatures. Protect the resistor against contact.

Selecting the resistor thermal switch circuit cable

Make sure that the cable in the resistor thermal switch circuit meets the following requirements:

- shielded cable
- rated operating voltage between a core and ground > 750 (U_0)
- insulation test voltage > 2.5 kV
- jacket material for at least 90 °C (194 °F). Take into account further requirements due to resistor construction and temperature.

Protecting the system against thermal overload

The brake chopper protects itself and the resistor cables against thermal overload. Make sure that the resistor assembly is equipped with a thermal switch, which is wired to disable the chopper (and/or switch off the supply to the drive) in case of overtemperature.

Operation principle

If the resistor overheats, the thermal switch opens and interrupts the chopper control unit input signal, disabling the chopper. In addition, the control unit relay output either opens the drive main contactor/breaker or gives a fault indication to the overriding control system, which takes care of the protection.

Protecting the system against short-circuits

The brake unit is equipped with fuses as standard.

The fuses protect the brake chopper, the brake resistor and the brake circuit cables in a short-circuit situation.

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Electrical installation

Contents of this chapter

This chapter describes the electrical installation of the brake unit. Obey the instructions with:

- user-defined brake resistors
- brake resistors that are separate from the basic line-up.

A brake unit with factory-installed brake resistors in the basic line-up is an operational unit after the shipping splits are joined. No customer setting or wiring is required.

Electrical safety precautions

These electrical safety precautions are for all persons who do work on the drive, motor cable or motor.

This procedure gives information on how to de-energize the drive and make it safe to do work on it. The procedure does not include all possible drive configurations. Each drive is made to order. Always refer to the circuit diagrams of the drive delivery.

WARNING!
Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do electrical installation or maintenance work. Do these steps before you do installation or maintenance work.

1. Prepare for the work.
   - Make sure that you have a work order.
   - Do an on-site risk assessment or job hazard analysis.
   - Make sure that you have the correct tools available.
   - Make sure that the workers are qualified.

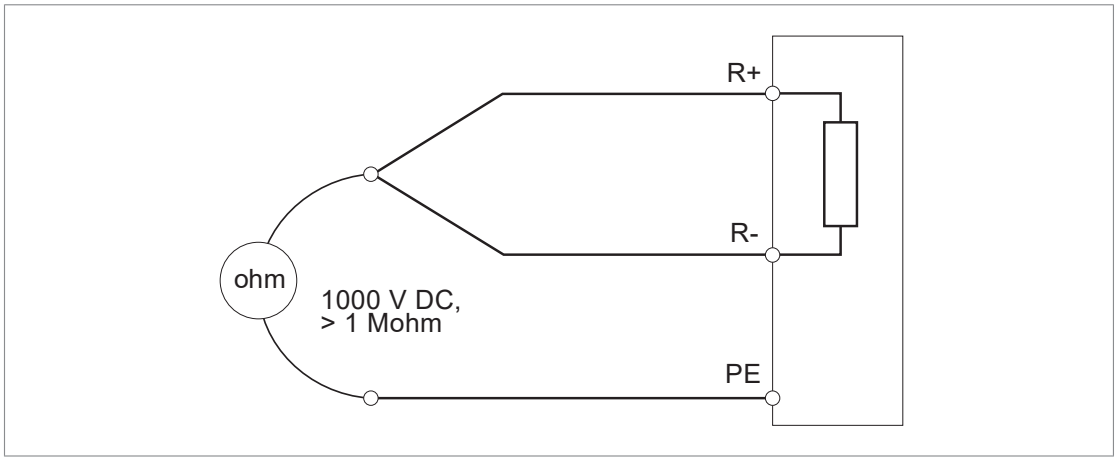
- Select the correct personal protective equipment (PPE).
- Stop the drive and motor(s).

2. Clearly identify the work location and equipment.
3. Disconnect all possible voltage sources. Make sure that connection is not possible. Lock out and tag out.
   - If the drive is equipped with a DC/DC converter unit or a DC feeder unit: Open the disconnecting device of the energy storage connected to the unit. The disconnecting device is outside the drive cabinet. Then open the DC switch-disconnector ([Q11], option +F286 or +F290) of the unit.
   - Open the main disconnecting device of the drive.
   - Open the charging switch if it is present.
   - Open the disconnector of the supply transformer. (The main disconnecting device in the drive cabinet does not disconnect the voltage from the AC input power busbars of the drive cabinet.)
   - Open the auxiliary voltage switch-disconnector (if it is present), and all other possible disconnecting devices that isolate the drive from dangerous voltage sources.
   - If there is a permanent magnet motor connected to the drive, disconnect the motor from the drive with a safety switch or by other means.
   - Open the main isolating device of the drive.
   - Disconnect all dangerous external voltages from the control circuits.
   - After you disconnect power from the drive, wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
4. Protect other energized parts in the work location against contact and take special precautions when close to bare conductors.
5. Measure that the installation is de-energized. Use a high-quality voltage tester. If the measurement requires that you remove shrouding or other cabinet structures, obey the local laws and regulations applicable to live electrical work. This includes, but is not limited to, electric shock and arc protection.
   - Before and after you measure the installation, verify the operation of the voltage tester on a known voltage source.
   - Make sure that the voltage between the input power terminals of the drive (L1, L2, L3) and the grounding (PE) busbar is zero.
   - Make sure that the voltage between the output power terminals of the drive (U, V, W) and the grounding (PE) busbar is zero.
     Important! Repeat the measurement with the DC voltage setting of the voltage tester. Measure between each phase and ground. There is a risk of dangerous DC voltage charging due to leakage capacitances of the motor circuit. This voltage can remain charged for a long time after the drive power-off. The measurement discharges the voltage.
   - Make sure that the voltage between the drive DC busbars and the grounding (PE) busbar is zero.
   - If the drive is equipped with a DC/DC converter unit or a DC feeder unit: Make sure that the voltage between the energy storage terminals of the unit (ES+ and ES-) and the grounding (PE) busbar is zero.
6. Install temporary grounding as required by the local regulations.
7. Ask for a permit to work from the person that is responsible for the electrical installation work.

Measuring the insulation resistance of the brake resistor circuit

WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do electrical installation, commissioning or maintenance work.

1. Stop the drive and do the steps in section Electrical safety precautions (page 25) before you start the work.
2. Make sure that the resistor cable is connected to the resistor and disconnected from the drive output terminals.
3. At the drive end, connect the R+ and R- conductors of the resistor cable together. Measure the insulation resistance between the conductors and the PE conductor with a measuring voltage of 1000 V DC. The insulation resistance must be more than 1 Mohm.



Selecting the voltage

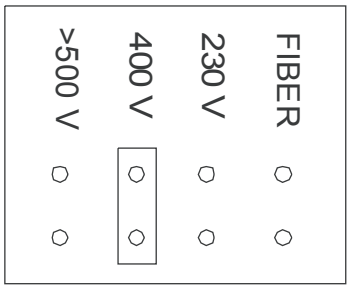
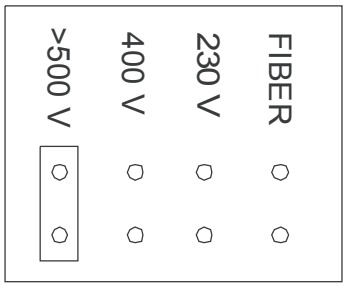
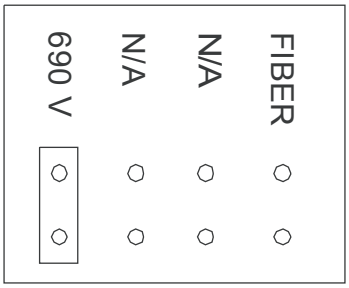
The voltage is preset, according to the drive supply voltage, at the factory for each brake chopper. On the field, you need to adjust the voltage setting only if a brake chopper is changed.

NBRA-658 and NBRA-659 brake choppers have an NBRC-51 brake chopper control unit, and can be used with 400 or 500 V drive nominal supply. NBRA-669 has an NBRC-61 brake chopper control unit, and can be used only with 690 V drive nominal supply.

WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning, or maintenance work.

To adjust the setting:

1. Stop the drive and do the steps in section Electrical safety precautions (page 25) before you start the work.
2. Remove the chopper front panel by undoing the four screws at the top and bottom of the panel.
3. Set the voltage selection jumper on the chopper control board to the appropriate voltage as shown below.

• Drive supply voltage 380…415 V • Brake chopper control unit NBRC-51 • Ubr_on 674 V, Ubr_off 660 V	
• Drive supply voltage 440…500 V • Brake chopper control unit NBRC-51 • Ubr_on 811 V, Ubr_off 795 V	
• Drive supply voltage 525…690 V • Brake chopper control unit NBRC-61 • Ubr_on 1120 V, Ubr_off 1096 V	

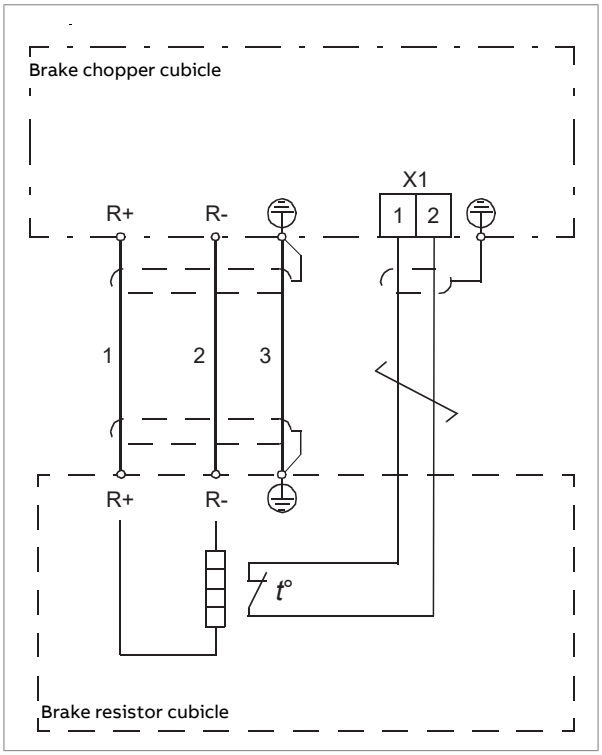
Note: If you have parallel choppers which are synchronized through the fiber optic link (master-follower connection):

- select the voltage in the master chopper only
- set the voltage jumper to FIBER in the follower choppers.

WARNING!
An incorrect jumper setting or missing jumper can cause brake chopper malfunctioning or damage to the chopper or resistor.

Connecting the brake resistor cables and thermal switch

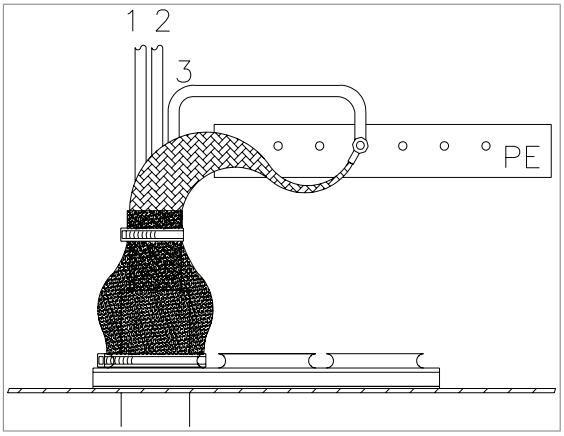
Connection diagram



Connection procedure

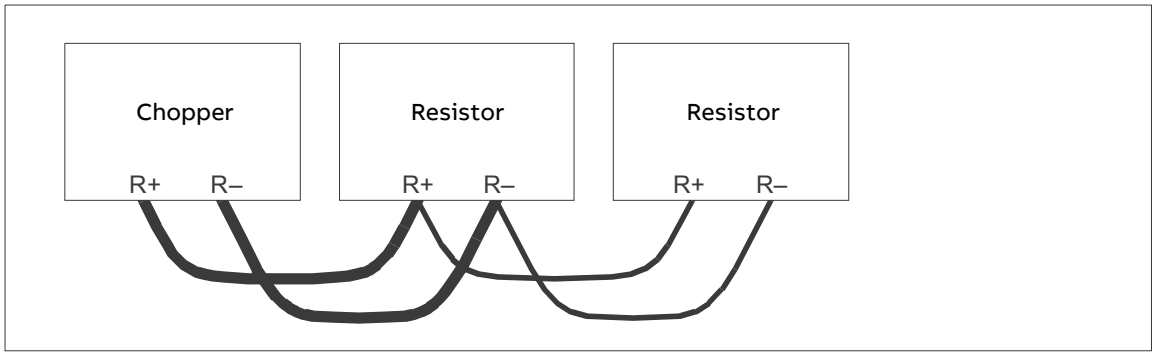
WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning, or maintenance work.

1. Stop the drive and do the steps in section Electrical safety precautions (page 25) before you start the work.
2. Connect the resistor cable and the thermal switch as shown in the connection diagram above. Note the connection of the third conductor and the cable shield. See also the circuit diagrams delivered with the unit.



3. Connect the power cables of parallel brake resistors as shown below.

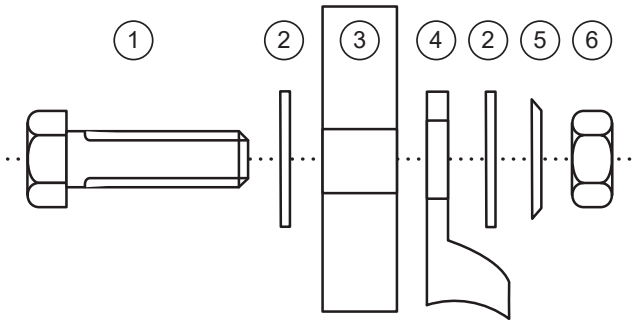
   Note: The cable between the chopper and the first resistor must be able to carry the entire braking power. Provide adequate support for the cables below the chopper and resistor units.



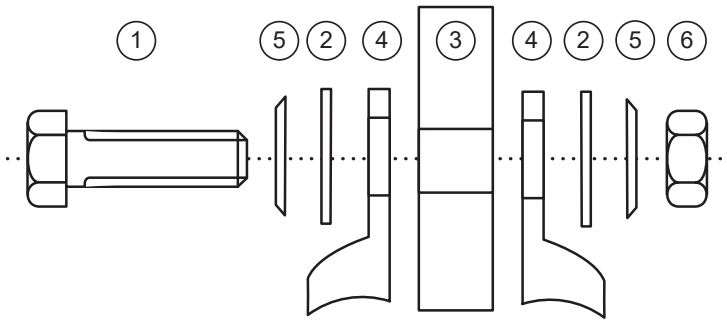
Use of fasteners in cable lug connections

Use the bolts, nuts and washers delivered with the drive. Install all the fasteners in the correct order. See the figure below. Tighten the cable lug to the torque specified for the connection.

Cable lug on one side of the busbar



Cable lugs on both sides of the busbar



1	Bolt	4	Cable lug
2	Plain washer	5	Spring washer
3	Busbar	6	Nut

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Installation checklist

Contents of this chapter

This chapter contains a checklist for the mechanical and electrical installation of the drive.

Checklist

WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do electrical installation, commissioning or maintenance work.

WARNING!
Do the steps in section Electrical safety precautions (page 25) before you start the work.

Examine the mechanical and electrical installation of the drive before start-up. Do the tasks in the checklist together with a second person.

Make sure that ...	☑
The ambient operating conditions meet the drive ambient conditions specification and enclosure rating (IP code).	☐
The supply voltage matches the nominal input voltage of the drive. Refer to the type designation label.	☐
The insulation resistance of the input power cable, motor cable and motor is measured according to local regulations and the manuals of the drive.	☐
The drive cabinet is attached to the floor, and if necessary due to vibration etc, also by its top to the wall or roof.	☐

Make sure that ...	☑
The cooling air can flow freely in and out of the drive.	☐
If the drive is connected to a network other than a symmetrically grounded TN-S system: You have done all the required modifications (for example, you may need to disconnect the EMC filter or ground-to-phase varistor) Refer to the electrical installation instructions in the supply unit manual.	☐
There is an adequately sized protective earth (ground) conductor(s) between the drive and the switchboard, the conductor is connected to correct terminal, and the terminal is tightened to the correct torque. Grounding has also been measured according to the regulations.	☐
If the drive is equipped with a DC/DC-converter unit: There is an adequately sized protective earth (ground) conductor between the energy storage and the DC/DC-converter, the conductor is connected to the correct terminal, and the terminal is tightened to the correct torque. Proper grounding has also been measured according to the regulations.	☐
If the drive is equipped with a DC/DC-converter unit: The energy storage cable is connected to the correct terminals of the DC/DC-converter and energy storage, and the terminals are tightened to the correct torque.	☐
If the drive is equipped with a DC/DC-converter unit: The energy storage is equipped with fuses for protecting the energy storage cable in a cable short-circuit situation.	☐
If the drive is equipped with a DC/DC-converter unit: The energy storage is equipped with a disconnecting device.	☐
The input power cable is connected to the correct terminals, the phase order is correct, and the terminals are tightened to the correct torque.	☐
There is an adequately sized protective earth (ground) conductor between the motor and the drive. The conductor is connected to the correct terminal, and the terminal is tightened to the correct torque. Grounding has also been measured according to the regulations.	☐
The motor cable is connected to the correct terminals, the phase order is correct, and the terminals are tightened to the correct torque.	☐
The motor cable is routed away from other cables.	☐
No power factor compensation capacitors are connected to the motor cable.	☐
If an external brake resistor is connected to the drive: There is an adequately sized protective earth (ground) conductor between the brake resistor and the drive, and the conductor is connected to the correct terminal, and the terminals are tightened to the correct torque. Grounding has also been measured according to the regulations.	☐
If an external brake resistor is connected to the drive: The brake resistor cable is connected to the correct terminals, and the terminals are tightened to the correct torque.	☐
If an external brake resistor is connected to the drive: The brake resistor cable is routed away from other cables.	☐
The control cables are connected to the correct terminals, and the terminals are tightened to the correct torque.	☐
The voltage setting of the auxiliary voltage transformers (if any) is correct. Refer to the electrical installation instructions.	☐
If a drive bypass connection will be used: The direct-on-line contactor of the motor and the drive output contactor are either mechanically and/or electrically interlocked, that is, they cannot be closed at the same time. A thermal overload device must be used for protection when bypassing the drive. Refer to local codes and regulations.	☐
There are no tools, foreign objects or dust from drilling inside the drive.	☐
The area in front of the drive is clean: the drive cooling fan cannot draw any dust or dirt inside.	☐
The terminal box cover of the motor is in place. Cabinet shrouds are in place and doors are closed.	☐
The motor and the driven equipment are ready for power-up.	☐

7

Start-up

Contents of this chapter

This chapter contains the start-up procedure of the brake unit.

ABB recommends that you connect a commissioning PC tool (DriveComposer) to the inverter unit that will be used to test the braking. By using the tool, you can set up the parameters and monitor the drive during the test.

Start-up procedure

Tasks	☑
Safety	
WARNING! Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning, or maintenance work. **WARNING!** Make sure that the disconnector of the supply transformer is locked to open position, i.e., no voltage is, or can be, connected to drive inadvertently. Check also by measuring that there is no voltage connected. **Note:** Some brake resistors are coated with oil film for protection. The protective oil will burn off when the brake resistor is used for the first time. Make sure that there is proper ventilation.	
Powering up the drive DC bus and starting up the inverters	
Make sure that all cabinet doors are closed.	☐
Close the disconnector of the supply transformer.	☐
Start the supply unit. See the procedure in the supply unit hardware manual. When started, the supply unit charges the capacitors of all inverters and brake units connected to the DC bus.	☐

Tasks	☑
Start-up the inverter units. See the procedure in the inverter unit hardware manual.	☐
Deactivate the overvoltage controllers of all inverter units (parameter 30.30 Overvoltage control in the primary control program).	☐
Operational tests	
Make sure that the stop mode of the motor to be decelerated is ramp stop (parameter 21.03 Stop mode in the primary control program) and set the deceleration time according to the drive control mode in parameter group 23, 26 or 28. Use a relatively long deceleration time at first.	☐
Start the drive and increase the rotation speed of the high-inertia machinery that will generate power to the drive intermediate circuit when it is decelerated. Use a low speed at first.	☐
Give a stop command to the inverter running the motor. Make sure that the brake chopper evokes and operates during the deceleration of the motor. Monitor the DC voltage level in the inverter unit with Drive Composer PC tool during the braking. The DC voltage level during the braking indicates the brake unit operation: **Successful braking:** DC voltage level is less than 1.2 · 1.35 · U1max[1)] **Unsuccessful braking:** DC voltage level exceeds 1.21 · 1.35 · U1max[1)] and inverter trips on overvoltage. Refer to chapter Fault tracing (page 37).	☐
Repeat the stop sequence a few times with higher rotation speeds and shorter deceleration times.	☐

1) U1max value is:

415 V when the drive supply voltage is 380…415 V AC

500 V when the drive supply voltage is 440…500 V AC

690 V DC when the drive supply voltage is 525…690 V AC

8

Fault tracing

Contents of this chapter

This chapter describes the fault tracing possibilities of the brake unit.

Fault indications

A fault in the resistor braking circuit prevents fast motor deceleration, and may cause the drive to trip on a fault.

If a fault is detected by the chopper control board, the brake chopper disconnects the brake resistor from the intermediate circuit, and the chopper fault indication relay output is de-energized.

Depending on the application, the relay output either opens the drive main circuit breaker or gives a fault indication to the overriding control system. See the circuit diagrams delivered with the unit.

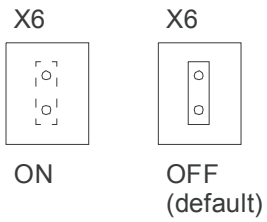
Fault indication/Fault	Cause	Remedy
Fault indication relay output switches off the main power or gives a fault indication to an overriding control system.	Chopper or resistor overheated.	Check connections. Let equipment cool.
	No enable input received by chopper control board.	Check that enable input is on.
	Short circuit in resistor or power cables.	Check power cables and resistor.
	Chopper control board failure. Chopper damaged; it is not able to disconnect resistor from intermediate circuit.	Contact local ABB representative.

Fault indication/Fault	Cause	Remedy
Chopper does not function.	Chopper voltage setting too high. Inverter overvoltage control is on.	Check voltage setting. Check parameters of all inverters. [1)] Check that enable input is on.
Chopper starts to function at too low a DC voltage.	Chopper voltage setting too low.	Check voltage setting.
Inverter trips on fault 3210 DC link overvoltage.	Chopper voltage setting is too high.	Check voltage setting. Check parameters of all inverters. [1)]
Brake resistor or chopper overheats.	The maximum brake cycle exceeded or resistor cooling insufficient.	Check duty cycle and resistor cooling.
	Chopper voltage setting incorrect or jumper missing.	Ensure that voltage setting is correct and jumper is properly in place.

1) Refer to Start-up (page 35) for the parameters to check.

NRED voltage reducer selection for NBRA-669

The NRED voltage reducer can be used to protect the NBRC-61 chopper control board from overvoltage peaks. Jumper X6 on the chopper control board defines if the NRED voltage reducer is used. By default, the NRED voltage reducer is used and the jumper is set to OFF (recommended).



Note: When the jumper is set to ON, the NRED voltage reducer is not used. You must use this setting if the chopper control board is replaced with a newer version and the brake chopper does not include the NRED voltage reducer board. If you replace the chopper control board, see the manual for the replacement chopper control board for information on NRED voltage reducer.

9

Maintenance

Contents of this chapter

This chapter describes the maintenance of a brake unit.

Maintenance intervals

The tables show the maintenance tasks that can be done by the end user. For the ABB Service offering, contact your local ABB Service representative (new.abb.com/contact-centers).

Description of symbols

Action	Description
I	Inspection (visual inspection and maintenance action if needed)
P	Performance of on/off-site work (commissioning, tests, measurements or other work)
R	Replacement

Recommended maintenance intervals after start-up

Maintenance task/object	Years from start-up													
	0	1	2	3	4	5	6	7	8	9	10	11	12	...
Cooling fan														
Cooling fans (chopper and resistor)										R				
Inspections														
Checking tightness of cable and busbar terminals. Tightening if needed.		I	I	I	I	I	I	I	I	I	I	I	I	I
Checking ambient conditions (dustiness, corrosion, temperature)		I	I	I	I	I	I	I	I	I	I	I	I	I

Note:

- The maintenance and component replacement intervals are based on the assumption that the equipment operates within the specified ratings and ambient conditions. ABB recommends annual drive inspections to ensure the highest reliability and optimum performance.
- Long-term operation near the specified maximum ratings or ambient conditions may require shorter maintenance intervals for certain components. Contact your local ABB Service representative for additional maintenance recommendations.

Cleaning the interior of the cabinet

WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do electrical installation, commissioning or maintenance work.

WARNING!
Use an antistatic wrist strap and a vacuum cleaner with an antistatic hose and nozzle. A normal vacuum cleaner creates static discharges which can cause damage to circuit boards.

1. Stop the drive and do the steps in section Electrical safety precautions (page 25) before you start the work.
2. Open the cabinet door.
3. Clean the interior of the cabinet. Use a vacuum cleaner and a soft brush.
4. Clean the air inlets of the fans and air outlets of the modules (top).
5. Clean the air inlet gratings (if any) on the door.
6. Close the door.

10

Technical data

Contents of this chapter

This chapter contains the technical specifications of the brake unit, for example, the ratings, sizes and technical requirements, provisions for fulfilling the requirements for CE and other markings.

Ratings

Brake chopper only

These brake units are not equipped with brake resistors or fans. The resistors must be selected according to the specifications and installed by the user.

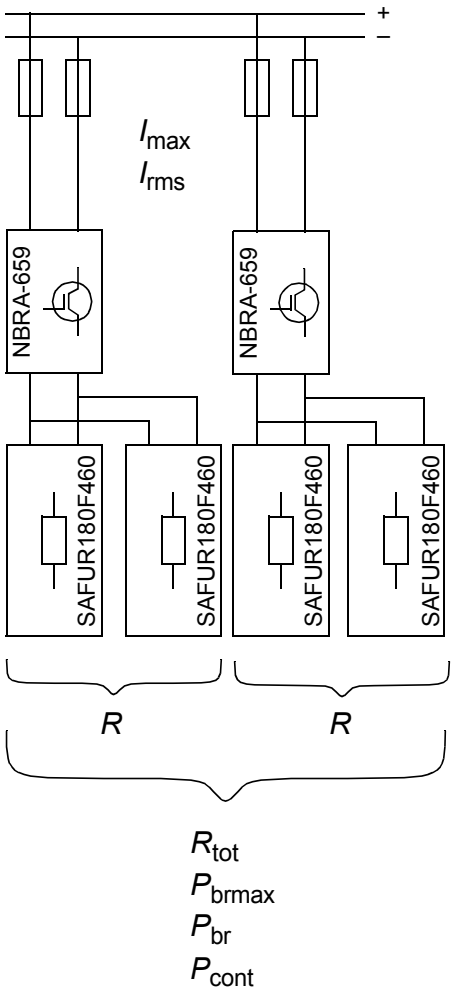
ACS880-607-...	Module type	P_{brmax} kW	R_{tot} ohm	I_{max} A	I_{rms} A	P_{cont} kW	Duty cycle (1 min / 5 min)		Duty cycle (10 s / 60 s)	
							P_{br} kW	I_{rms} A	P_{br} kW	I_{rms} A
U_N = 400 V (Range 380…415 V)										
0320-3	NBRA-659	353	1.20	545	149	96	303	468	353	545
0640-3	2×NBRA-659	706	0.60	1090	298	192	606	936	706	1090
0960-3	3×NBRA-659	1058	0.40	1635	447	288	909	1404	1059	1635
1280-3	4×NBRA-659	1411	0.30	2180	596	384	1212	1872	1412	2180
1600-3	5×NBRA-659	1764	0.24	2725	745	480	1515	2340	1765	2725
1920-3	6×NBRA-659	2117	0.20	3270	894	576	1818	2808	2118	3270
U_N = 500 V (Range 380…500 V)										
0400-5	NBRA-659	403	1.43	571	136	109	317	391	403	498
0800-5	2 × NBRA-659	806	0.72	1142	272	218	634	782	806	996
1200-5	3 × NBRA-659	1208	0.48	1713	408	327	951	1173	1209	1494
1600-5	4 × NBRA-659	1611	0.36	2284	544	436	1268	1564	1612	1992
2000-5	5 × NBRA-659	2014	0.29	2855	680	545	1585	1955	2015	2490
2400-5	6 × NBRA-659	2417	0.24	3426	816	654	1902	2346	2418	2988
U_N = 690 V (Range 525…690 V)										
0400-7	NBRA-669	404	2.72	414	107	119	298	267	404	361
0800-7	2 × NBRA-669	807	1.36	828	214	238	596	534	808	722
1200-7	3 × NBRA-669	1211	0.91	1242	321	357	894	801	1212	1083
1600-7	4 × NBRA-669	1615	0.68	1656	428	476	1192	1068	1616	1444
2000-7	5 × NBRA-669	2019	0.54	2070	535	595	1490	1335	2020	1805
2400-7	6 × NBRA-669	2422	0.45	2484	642	714	1788	1602	2424	2166

Brake chopper with factory-installed brake resistors (option +D151)

ACS880-607-...	Module type	Resistors	P_{brmax} kW	R_{tot} ohm	I_{max} A	I_{rms} A	P_{brcont} kW	Duty cycle (1 min / 5 min)		Duty cycle (10 s / 60 s)		E_R kJ
		Type						P_{br} kW	I_{rms} A	P_{br} kW	I_{rms} A	
U_N = 400 V (Range 380…415 V)												
0320-3	NBRA-659	2 × SAFUR 180F460/K160	353	1.20	545	84	54	167	444	287	444	12000
0640-3	2 × NBRA-659	2 × (2 × SAFUR 180F460/K160)	706	0.60	1090	168	108	333	514	575	888	24000
0960-3	3 × NBRA-659	3 × (2 × SAFUR 180F460/K160)	1058	0.40	1635	252	162	500	771	862	1332	36000
1280-3	4 × NBRA-659	4 × (2 × SAFUR 180F460/K160)	1411	0.30	2180	336	216	667	1028	1150	1776	48000
1600-3	5 × NBRA-659	5 × (2 × SAFUR 180F460/K160)	1764	0.24	2725	420	270	833	1285	1437	2220	60000
1920-3	6 × NBRA-659	6 × (2 × SAFUR 180F460/K160)	2117	0.20	3270	504	324	1000	1542	1724	2664	72000
U_N = 500 V (Range 380…500 V)												
0400-5	NBRA-659	2 × SAFUR 200F500/K160	403	1.35	605	67	54	167	206	287	355	10800
0800-5	2 × NBRA-659	2 × (2 × SAFUR 200F500/K160)	806	0.68	1210	134	108	333	412	575	710	21600
1200-5	3 × NBRA-659	3 × (2 × SAFUR 200F500/K160)	1208	0.45	1815	201	162	500	618	862	1065	32400
1600-5	4 × NBRA-659	4 × (2 × SAFUR 200F500/K160)	1611	0.34	2420	268	216	667	824	1150	1420	43200
2000-5	5 × NBRA-659	5 × (2 × SAFUR 200F500/K160)	2014	0.27	3025	335	270	833	1030	1437	1775	54000
2400-5	6 × NBRA-659	6 × (2 × SAFUR 200F500/K160)	2417	0.23	3630	402	324	1000	1236	1724	2130	64800
U_N = 690 V (Range 525…690 V)												
0400-7	NBRA-669	2 × SAFUR 200F500/K160)	404	1.35	835	97	54	167	149	287	257	10800
0800-7	2 × NBRA-669	2 × (2 × SAFUR 200F500/K160))	807	0.68	1670	194	108	333	298	575	514	21600
1200-7	3 × NBRA-669	3 × (2 × SAFUR 200F500/K160))	1211	0.45	2505	291	162	500	447	862	771	32400
1600-7	4 × NBRA-669	4 × (2 × SAFUR 200F500/K160))	1615	0.34	3340	388	216	667	596	1150	1028	43200
2000-7	5 × NBRA-669	5 × (2 × SAFUR 200F500/K160))	2019	0.27	4175	485	270	833	745	1437	1285	54000
2400-7	6 × NBRA-669	6 × (2 × SAFUR 200F500/K160))	2422	0.23	5010	582	324	1000	894	1724	1542	64800

Definitions

Example: ACS880-607-0640-3

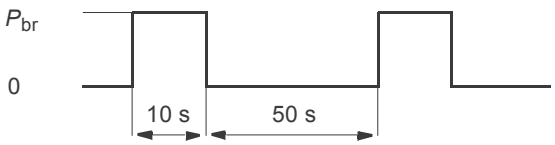


Brake unit

E_R	Energy pulse that all the resistors of the unit put together will withstand (400 s duty cycle). This energy will heat the resistor elements from 40°C to the maximum allowable temperature.
I_{max}	Maximum peak current of the whole brake unit
P_{brcont}	Maximum continuous power rating
P_{brmax}	Maximum short-term (1 min every 10 mins) braking power
R	Resistance of specified resistors (per chopper module). This is also the minimum allowed resistance for the resistor assembly.
R_{tot}	Total brake resistor resistance of the whole brake unit

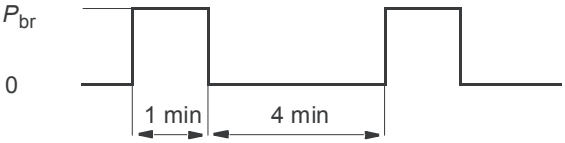
Duty cycle (10 s / 60 s)

I_{rms}	Total rms current during a period of 10 seconds with braking power P_{br}
P_{br}	Maximum braking power, allowed for 10 seconds every 60 seconds

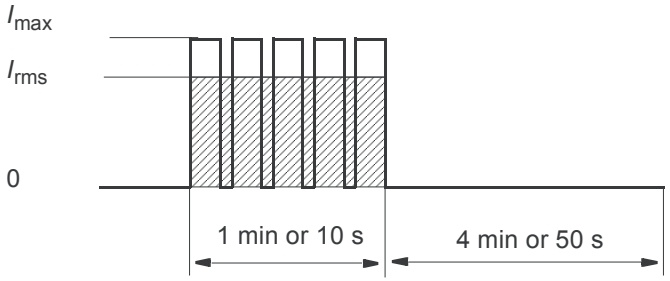


Duty cycle (1 min / 5 min)

I_{rms}	Total rms current during a period of 1 minute with braking power P_{br}
P_{br}	Maximum braking power, allowed for 1 minute every 5 minutes



Brake current wave form



DC fuses

ACS880-607-...	Fuse type	Qty	U_N V	I_N A
U_N = 400 V (Range 380…415 V)				
0320-3	170M5146	2	1250	630
0640-3	170M5146	4	1250	630
0960-3	170M5146	6	1250	630
1280-3	170M5146	8	1250	630
1600-3	170M5146	10	1250	630
1920-3	170M5146	12	1250	630
U_N = 500 V (Range 380…500 V)				
0400-5	170M5146	2	1250	630
0800-5	170M5146	4	1250	630
1200-5	170M5146	6	1250	630
1600-5	170M5146	8	1250	630
2000-5	170M5146	10	1250	630
2400-5	170M5146	12	1250	630
U_N = 690 V (Range 525…690 V)				
0400-7	170M5146	2	1250	630
0800-7	170M5146	4	1250	630
1200-7	170M5146	6	1250	630
1600-7	170M5146	8	1250	630
2000-7	170M5146	10	1250	630
2400-7	170M5146	12	1250	630

Dimensions, weights and free space requirements

Brake chopper only

ACS880-607-...	Height		Width		Depth		Weight	
	mm	in.	mm	in.	mm	in.	kg	lb
U_N = 400 V (Range 380…415 V)								
0320-3	2130	83.86	400	15.75	600	23.62	110	242
0640-3	2130	83.86	800	31.50	600	23.62	220	484
0960-3	2130	83.86	1200	47.24	600	23.62	330	726
1280-3	2130	83.86	1600	62.99	600	23.62	440	968
1600-3	2130	83.86	2000	78.74	600	23.62	550	1210
1920-3	2130	83.86	2400	94.49	600	23.62	660	1452
U_N = 500 V (Range 380…500 V)								
0400-5	2130	83.86	400	15.75	600	23.62	110	242
0800-5	2130	83.86	800	31.50	600	23.62	220	484
1200-5	2130	83.86	1200	47.24	600	23.62	330	726
1600-5	2130	83.86	1600	62.99	600	23.62	440	968

ACS880-607-...	Height		Width		Depth		Weight	
	mm	in.	mm	in.	mm	in.	kg	lb
2000-5	2130	83.86	2000	78.74	600	23.62	550	1210
2400-5	2130	83.86	2400	94.49	600	23.62	660	1452
U_N = 690 V								
0400-7	2130	83.86	400	15.75	600	23.62	110	242
0800-7	2130	83.86	800	31.50	600	23.62	220	484
1200-7	2130	83.86	1200	47.24	600	23.62	330	726
1600-7	2130	83.86	1600	62.99	600	23.62	440	968
2000-7	2130	83.86	2000	78.74	600	23.62	550	1210
2400-7	2130	83.86	2400	94.49	600	23.62	660	1452

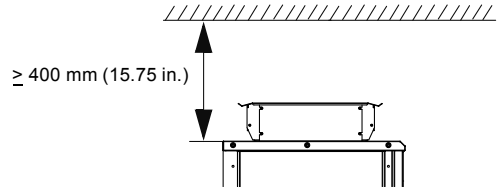
Brake chopper with factory-installed brake resistors (option +D151)

ACS880-607-...	Height		Width		Depth		Weight	
	mm	in.	mm	in.	mm	in.	kg	lb
U_N = 400 V (Range 380…415 V)								
0320-3	2130	83.86	1200	47.24	600	23.62	340	748
0640-3	2130	83.86	2400	94.49	600	23.62	680	1496
0960-3	2130	83.86	3600	141.73	600	23.62	1020	2244
1280-3	2130	83.86	4800[1)]	188.98[1)]	600	23.62	1360	2992
1600-3	2130	83.86	6000[1)]	236.22[1)]	600	23.62	1700	3740
1920-3	2130	83.86	7200[1)]	283.46[1)]	600	23.62	2040	4488
U_N = 500 V (Range 380…500 V)								
0400-5	2130	83.86	1200	47.24	600	23.62	340	748
0800-5	2130	83.86	2400	94.49	600	23.62	680	1496
1200-5	2130	83.86	3600	141.73	600	23.62	1020	2244
1600-5	2130	83.86	4800[1)]	188.98[1)]	600	23.62	1360	2992
2000-5	2130	83.86	6000[1)]	236.22[1)]	600	23.62	1700	3740
2400-5	2130	83.86	7200[1)]	283.46[1)]	600	23.62	2040	4488
U_N = 690 V								
0400-7	2130	83.86	1200	47.24	600	23.62	340	748
0800-7	2130	83.86	2400	94.49	600	23.62	680	1496
1200-7	2130	83.86	3600	141.73	600	23.62	1020	2244
1600-7	2130	83.86	4800[1)]	188.98[1)]	600	23.62	1360	2992
2000-7	2130	83.86	6000[1)]	236.22[1)]	600	23.62	1700	3740
2400-7	2130	83.86	7200[1)]	283.46[1)]	600	23.62	2040	4488

[1)] An additional 200 mm junction section is needed.

Free space requirements

The values are as required by cooling, maintenance and/or operation of the pressure relief (if present). Also obey the general mechanical installation instructions.

Front		Sides		Above	
mm	in	mm	in	mm	in
1500	59	0	0	400 Measured from the base plate of the cabinet top. 	15.75

Losses, cooling data and noise

The heat loss of brake chopper is one percent of the braking power.

ACS880-607	Module type	Brake chopper module only			With specified resistors (option +D151)		
		Air flow		Noise	Air flow		Noise
		m³/h	ft³/min	dB(A)	m³/h	ft³/min	dB(A)
U_N = 400 V (Range 380…415 V)							
0320-3	NBRA-659C	660	389	64	2500	1470	66
0640-3	2 × NBRA-659C	1320	777	67	5000	2940	69
0960-3	3 × NBRA-659C	1980	1166	68	7500	4410	70
1280-3	4 × NBRA-659C	2640	1554	69	10000	5890	71
1600-3	5 × NBRA-659C	3300	1943	70	12500	7360	72
1920-3	6 × NBRA-659C	3960	2331	71	15000	8830	73
U_N = 500 V (Range 380…500 V)							
0400-5	NBRA-659C	660	389	64	2500	1470	66
0800-5	2 × NBRA-659C	1320	777	67	5000	2940	69
1200-5	3 × NBRA-659C	1980	1166	68	7500	4410	70
1600-5	4 × NBRA-659C	2640	1554	69	10000	5890	71
2000-5	5 × NBRA-659C	3300	1943	70	12500	7360	72
2400-5	6 × NBRA-669C	3930	2331	71	15000	8830	73
U_N = 690 V (Range 525…690 V)							
0400-7	NBRA-669C	660	389	64	2500	1470	66
0800-7	2 × NBRA-669C	1320	777	67	5000	2940	69
1200-7	3 × NBRA-669C	1980	1166	68	7500	4410	70
1600-7	4 × NBRA-669C	2640	1554	69	10000	5890	71
2000-7	5 × NBRA-669C	3300	1943	70	12500	7360	72
2400-7	6 × NBRA-669C	3960	2331	71	15000	8830	73

Typical power cable sizes

The tables below give the current carrying capacity (I_{Lmax}) and typical size for copper and aluminum cables with PVC or XLPE insulation. A correction factor K = 0.70 is used. Time const. is the temperature time constant of the cable.

The cable sizing is based on a maximum of 9 cables installed side by side on a ladder type cable tray, with three trays on top of each other (with 30 cm of space between the trays), and an ambient temperature of 30 °C (IEC 60364-5-52).

Conductor cross-section (copper)		PVC insulation Conductor temperature 70°		XLPE insulation Conductor temperature 90°		Typical dimensions of copper cable	
mm²	AWG / kcmil	I_{Lmax} (A)	Time const. (s)	I_{Lmax} (A)	Time const. (s)	Size	ø [mm]
1.5	16	13	85	16	67	3 × 1.5 + 1.5	13
2.5	12	18	121	23	88	3 × 2.5 + 2.5	14
4	12	24	175	30	133	3 × 4 + 4	16
6	10	30	251	38	186	3 × 6 + 6	18
10	8	42	359	53	268	3 × 10 + 10	21
16	6	56	514	70	391	3 × 16 + 16	23
25	4	71	791	89	598	3 × 25 + 16	24
35	1	88	1000	110	760	3 × 35 + 16	26
50	1/0	107	1308	134	990	3 × 50 + 25	29
70	2/0	137	1613	171	1230	3 × 70 + 35	32
95	4/0	167	2046	209	1551	3 × 95 + 50	38
120	250	193	2441	241	1859	3 × 120 + 70	41
150	300	223	2820	279	2139	3 × 150 + 70	44
185	400	255	3329	319	2525	3 × 185 + 95	50
240	500	301	4073	376	3099	3 × 240 + 120	55
300	600	348	4779	435	3636	3 × 300 + 150	58

Conductor cross-section (aluminum)		PVC insulation Conductor temperature 70°		XLPE insulation Conductor temperature 90°		Typical dimensions of aluminum cable	
mm²	AWG / kcmil	I_{Lmax} (A)	Time const. (s)	I_{Lmax} (A)	Time const. (s)	Size	ø [mm]
35	1	67	736	84	669	3 × 35 + 10 Cu	26
50	1/0	82	959	102	874	3 × 50 + 15 Cu	29
70	2/0	105	1182	131	1079	3 × 70 + 21 Cu	32
95	4/0	128	1492	159	1376	3 × 95 + 29 Cu	38
120	250	148	1776	184	1637	3 × 120 + 41 Cu	41
150	300	171	2042	213	1881	3 × 150 + 41 Cu	44
185	400	196	2422	243	2237	3 × 185 + 57 Cu	49
240	500	231	2967	286	2740	3 × 240 + 72 Cu	54
300	600	267	3478	330	3229	3 × 300 + 88 Cu	58

Terminal and lead-through data for the resistor cable for brake units with user-defined brake resistors

ACS880-607-...	R+, R-, grounding terminals			
	Number of holes	Hole diameter mm	Screw	Tightening torque N·m
U_N = 400 V (Range 380…415 V)				
0320-3	1	11	M10	35
0640-3	2	11	2×M10	35
0960-3	3	11	3×M10	35
1280-3	4	11	4×M10	35
1600-3	5	11	5×M10	35
1920-3	6	11	6×M10	35
U_N = 500 V (Range 380…500 V)				
0400-5	1	11	M10	35
0800-5	2	11	2×M10	35
1200-5	3	11	3×M10	35
1600-5	4	11	4×M10	35
2000-5	5	11	5×M10	35
2400-5	6	11	6×M10	35
U_N = 690 V (Range 525…690 V)				
0400-7	1	11	M10	35
0800-7	2	11	2×M10	35
1200-7	3	11	3×M10	35
1600-7	4	11	4×M10	35
2000-7	5	11	5×M10	35
2400-7	6	11	6×M10	35

The number of holes in the lead-through plate for the resistor cables is

- *n* × 3 × Ø60 mm (2.36”)

where n = 1…6 parallel-connected brake chopper modules.

Resistor cable sizes

ACS880-607-...	Resistor cable (Cu)* Multicore mm²
U_N = 400 V (Range 380…415 V)	
0320-3	3×95+50
0640-3	2×(3×95+50)
0960-3	3×(3×95+50)
*Size of the cable between the brake chopper and the first resistor which carries the entire braking power.	

ACS880-607-...	Resistor cable (Cu)* Multicore mm²
1280-3	4×(3×95+50)
1600-3	5×(3×95+50)
1920-3	6×(3×95+50)
U_N = 500 V (Range 380…500 V)	
0400-5	3×95+50
0800-5	2×(3×95+50)
1200-5	3×(3×95+50)
1600-5	4×(3×95+50)
2000-5	5×(3×95+50)
2400-5	6×(3×95+50)
U_N = 690 V (Range 525…690 V)	
0400-7	3×95+50
0800-7	2×(3×95+50)
1200-7	3×(3×95+50)
1600-7	4×(3×95+50)
2000-7	5×(3×95+50)
2400-7	6×(3×95+50)
*Size of the cable between the brake chopper and the first resistor which carries the entire braking power.	

Maximum cable length

The maximum cable length of the resistor cable(s) is 50 m (164 ft).

Maximum resistor circuit inductance

The maximum resistor circuit inductance for brake choppers is 30 uH.

Protection classes

Degrees of protection (IEC/EN 60529)	IP22 (standard), IP42 (option +B054), IP54 (option +B055)
Enclosure types (UL50)	UL Type 1 (standard), UL Type 1 (option +B054), UL Type 12 (Standard). For indoor use only.
Arcing class (IEC TR 61641)	B – ASSEMBLY providing personnel and ASSEMBLY protection under arcing conditions. Tested at the following voltage with an arcing current of 65 kA for 300 milliseconds: • 400 V units (indicated by "-4" in drive type): 420 V • 500 V units (indicated by "-5" in drive type): 550 V • 690 V units (indicated by "-7" in drive type): 760 V
Overvoltage category (IEC/EN 60664-1)	III, except for auxiliary power connections (fan, control, heating, lighting etc) which are category II.
Protective class (IEC/EN 61800-5-1)	I

Energy efficiency data (ecodesign)

Energy efficiency data is not provided for the drive/unit. Multidrives and multidrive modules are not in the scope of the EU ecodesign requirements (Regulation EU/2019/1781) or the UK ecodesign requirements (Regulation SI 2021 No. 745).

Ambient conditions

Environmental limits for the drive are given below. The drive is to be used in a heated, indoor, controlled environment.

	Operation installed for stationary use	**Storage in the protective package**	**Transportation in the protective package**
Installation site altitude	0…2000 m (0…6562 ft) above sea level. For altitudes over 2000 m, contact ABB. Output derated above 1000 m (3281 ft).	-	-
Air temperature	0 … +40 °C (+32 … +104 °F). No condensation allowed. Output derated in the range +40 … +50 °C (+104 … +122 °F).	-40 … +70 °C (-40 … +158 °F)	-40 … +70 °C (-40 … +158 °F)
Air temperature	0 … +50 °C (+32 … +122 °F) without derating. No condensation allowed.	-40 … +70 °C (-40 … +158 °F)	-40 … +70 °C (-40 … +158 °F)
Relative humidity	Max. 95%	Max. 95%	Max. 95%
	No condensation allowed. Maximum allowed relative humidity is 60% in the presence of corrosive gases.		

	Operation installed for stationary use	Storage in the protective package	Transportation in the protective package
Contamination	IEC/EN 60721-3-3:2002 Chemical gases: Class 3C2 Solid particles: Class 3S2 (3S1 with IP20). No conductive dust allowed.	IEC 60721-3-1:1997 Chemical gases: Class 1C2 Solid particles: Class 1S3 (packing must support this, otherwise 1S2)	IEC 60721-3-2:1997 Chemical gases: Class 2C2 Solid particles: Class 2S2
Pollution degree IEC/EN 60664-1	2		
Vibration IEC/EN 61800-5-1 IEC 60068-2-6:2007, EN 60068-2-6:2008	IEC/EN 60721-3-3:2002 10…57 Hz: max. 0.075 mm amplitude 57…150 Hz: 1 *g*	IEC/EN 60721-3-1:1997 10…57 Hz: max. 0.075 mm amplitude 57…150 Hz: 1 *g*	IEC/EN 60721-3-2:1997 2…9 Hz: max. 3.5 mm amplitude 9…200 Hz: 10 m/s^2 (32.8 ft/s^2)
Shock IEC 60068-2-27:2008, EN 60068-2-27:2009	Not allowed	With packing max. 100 m/s^2 (328 ft/s^2) 11 ms	With packing max. 100 m/s^2 (328 ft/s^2) 11 ms

Colors

RAL Classic 7035, RAL Classic 9017.

Materials

Refer to ACS880 cabinet-installed drives and multidrive modules recycling instructions and environmental information (3AXD50000153909 [EN]).

Standards and markings

Refer to ACS880 multidrive cabinets and modules electrical planning instructions (3AUA0000102324 [English]).

Disclaimers

Generic disclaimer

The manufacturer shall have no obligation with respect to any product which (i) has been improperly repaired or altered; (ii) has been subjected to misuse, negligence or accident; (iii) has been used in a manner contrary to the manufacturer’s instructions; or (iv) has failed as a result of ordinary wear and tear.

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface

against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

11. Example circuit diagrams

Contents of this chapter

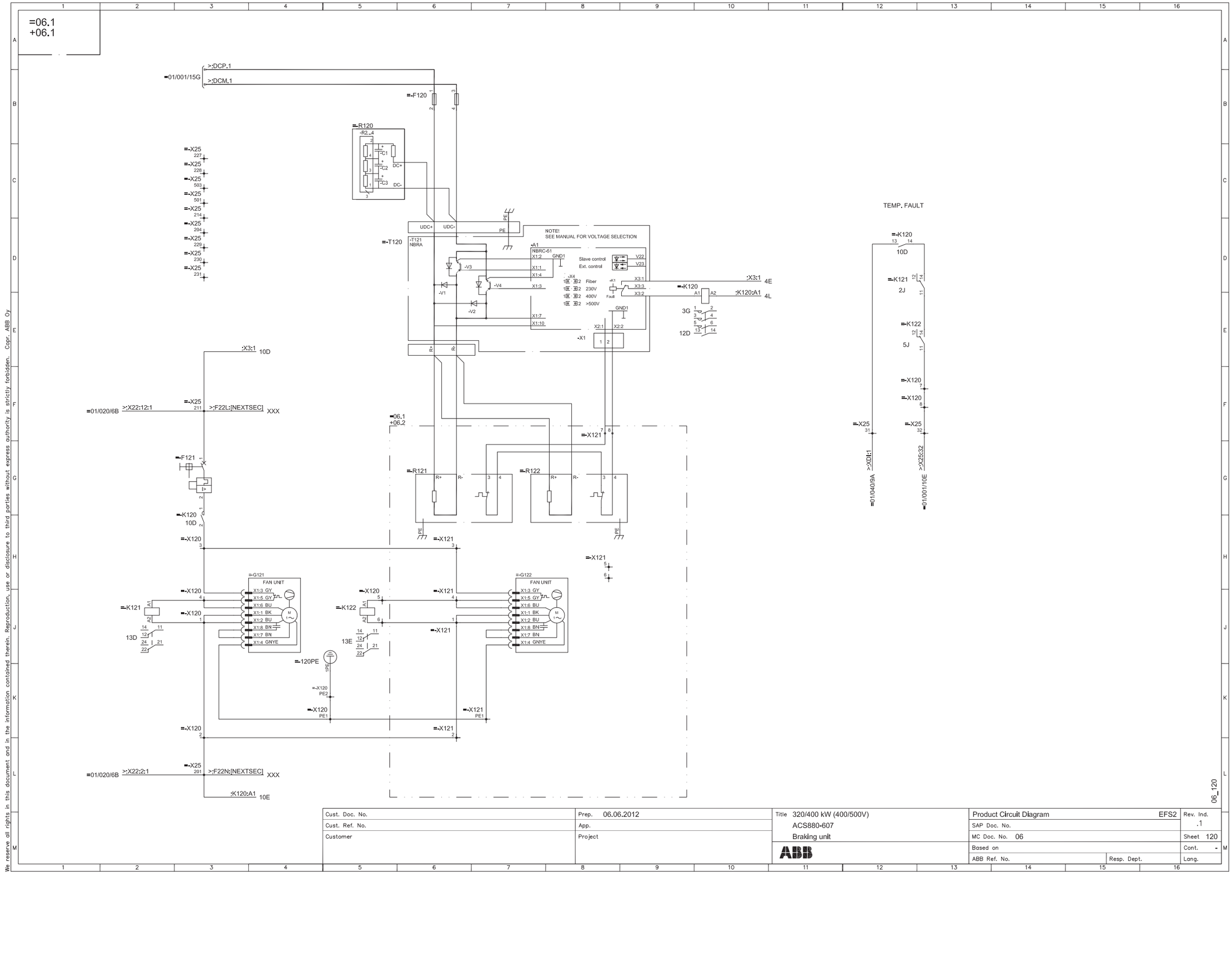
This chapter contains example circuit diagrams of a brake unit.

In an installation with parallel-connected brake chopper modules, one chopper acts as the master for the others. The switching of the follower chopper(s) is controlled by the master via a fiber optic link.

With minor modifications, the basic connections are also valid if there are no factory installed brake resistors. The corresponding resistor connections are to be done by the user.

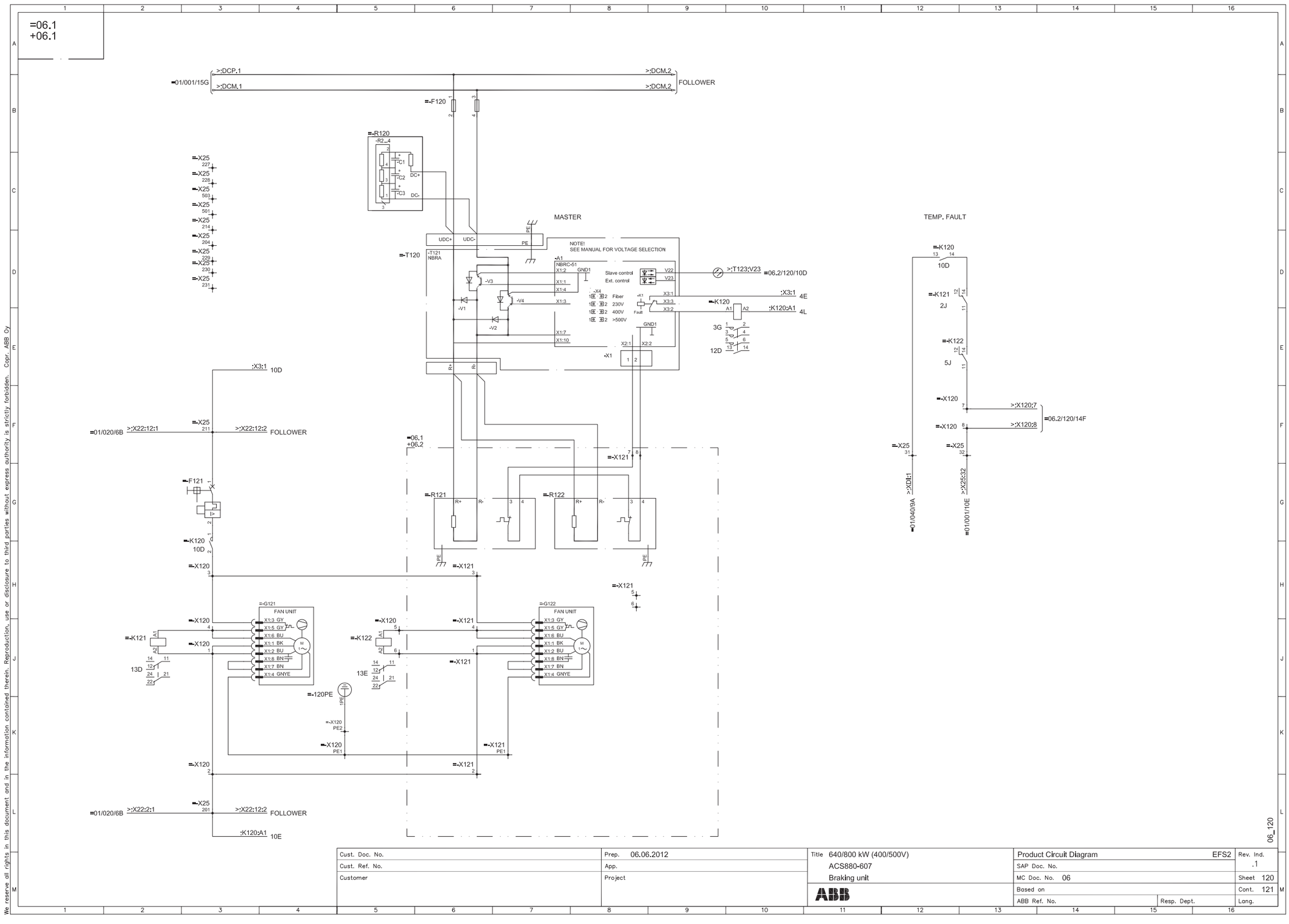
Note: The actual configuration can differ from this basic configuration. See the drawings included in the delivery.

Brake unit with one brake chopper module



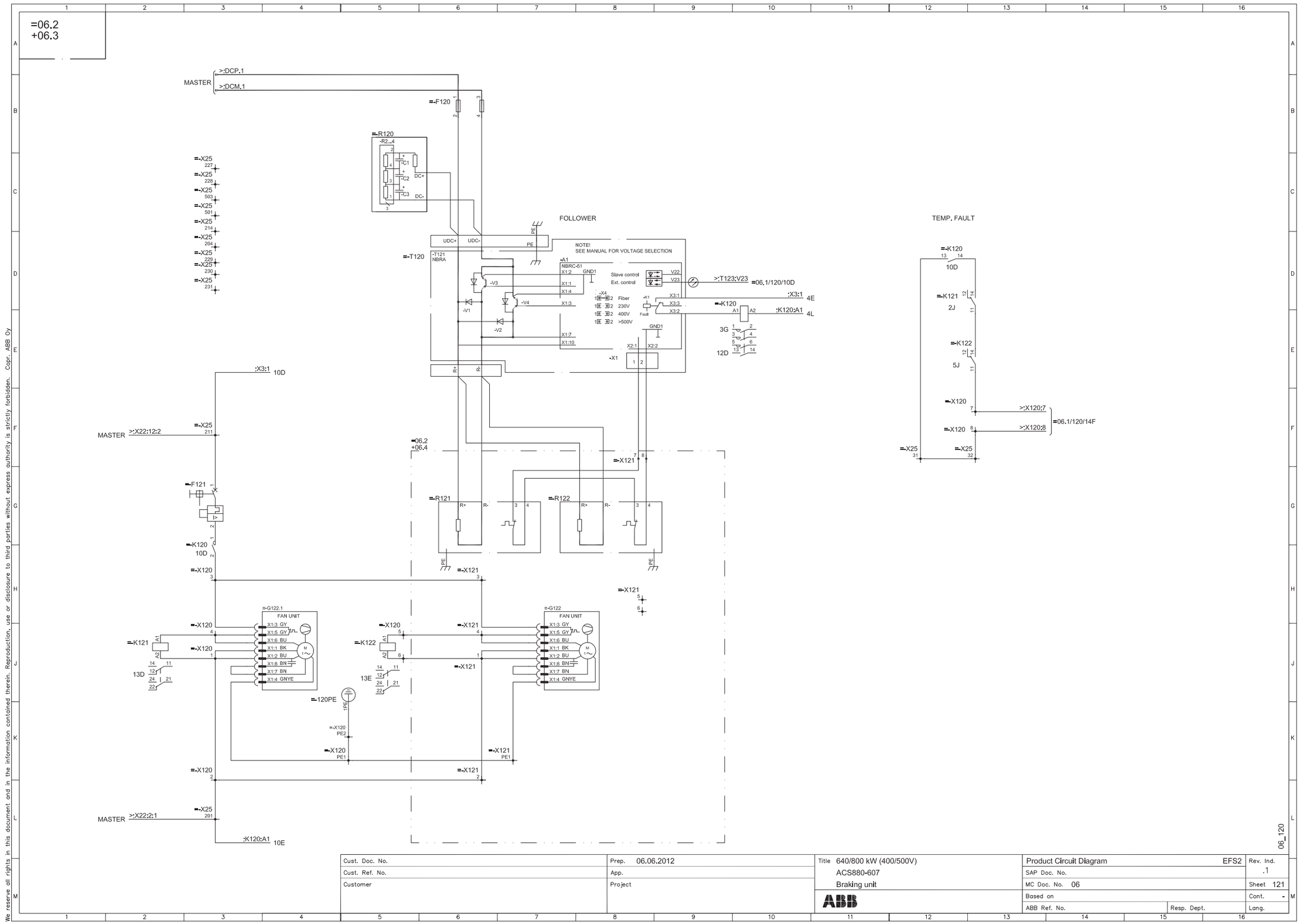
Cust. Doc. No.	Prep. 06.06.2012	Title 320/400 kW (400/500V) ACS880-607 Braking unit	Product Circuit Diagram EFS2	Rev. Ind. .1
Cust. Ref. No.	App.		SAP Doc. No.	
Customer	Project	ABB	MC Doc. No. 06	Sheet 120
			Based on	Cont. -
			ABB Ref. No.	Resp. Dept. / Lang.

Brake unit with two brake chopper modules – Master



Cust. Doc. No.	Prep. 06.06.2012	Title 640/800 kW (400/500V)	Product Circuit Diagram EFS2 / Rev. Ind.
Cust. Ref. No.	App.	ACS880-607	SAP Doc. No. / .1
Customer	Project	Braking unit	MC Doc. No. 06 / Sheet 120
		ABB	Based on / Cont. 121
			ABB Ref. No. / Resp. Dept. / Lang.

Brake unit with two brake chopper modules – Follower



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Cust. Doc. No.	Prep. 06.06.2012	Title 640/800 kW (400/500V)	Product Circuit Diagram EFS2	Rev. Ind. .1
Cust. Ref. No.	App.	ACS880-607	SAP Doc. No.	
Customer	Project	Braking unit	MC Doc. No. 06	Sheet 121
		ABB	Based on	Cont. -
			ABB Ref. No. / Resp. Dept.	Lang.

Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to new.abb.com/contact-centers.

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

Providing feedback on ABB manuals

Your comments on our manuals are welcome. Navigate to forms.abb.com/form-26567.

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