

ABB INDUSTRIAL DRIVES

ACS880-04F drive modules

Quick installation and start-up guide



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Quick installation and start-up instructions

Contents of this chapter

This chapter tells you briefly how to install the drive module into a cabinet. For more detailed instructions, engineering guide lines, technical data and complete safety instructions, see the hardware manual [3AXD50000034664 \[English\]](#)).

Obey the safety instructions

■ General safety

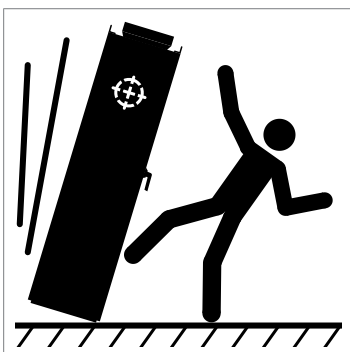
These instructions are for all personnel who do work on the drive.



WARNING!

Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur.

- Keep the drive in its package until you install it. After unpacking, protect the drive from dust, debris and moisture.
- Use the required personal protective equipment: safety shoes with metal toe cap, safety glasses, protective gloves and long sleeves, etc. Some parts have sharp edges.
- Lift a heavy drive with a lifting device. Use the designated lifting points.
- Obey the local laws and regulations applicable to lifting, such as requirements for planning the lifting, for capacity and condition of lifting equipment, and for training of personnel.
- Attach the drive cabinet to the floor to prevent it from falling over. The cabinet has a high center of gravity. Attach the cabinet also to the wall when necessary.



- Do not do work on the drive when a rotating permanent magnet motor is connected to it. A rotating permanent magnet motor energizes the drive, including its input and output terminals.
 - Make sure that debris from drilling, cutting and grinding does not enter the drive.
-

■ Electrical safety precautions

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



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 installation or maintenance work.

Do these steps before you begin any installation or maintenance work.

1. Clearly identify the work location and equipment.
 2. Disconnect all possible voltage sources. Make sure that re-connection is not possible. Lock out and tag out.
 - Open the main disconnecting device of the drive.
 - Open the charging switch if present.
 - Open the disconnecter 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 present), and all other possible disconnecting devices that isolate the drive from dangerous voltage sources.
 - If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive with a safety switch or by other means.
 - Disconnect all dangerous external voltages from the control circuits.
 - After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
 3. Protect any other energized parts in the work location against contact.
 4. Take special precautions when close to bare conductors.
 5. Measure that the installation is de-energized. Use a quality voltage tester. If the measurement requires removal or disassembly of shrouding or other cabinet structures, obey the local laws and regulations applicable to live working (including – but 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 drive input power terminals (L1, L2, L3) and the grounding (PE) busbar is zero.
 - Make sure that the voltage between the drive output terminals (T1/U, T2/V, T3/W) and the grounding (PE) busbar is zero.

Important! Repeat the measurement also with the DC voltage setting of the 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 terminals (UDC+ and UDC-) and the grounding (PE) terminal is zero.
 6. Install temporary grounding as required by the local regulations.
 7. Ask for a permit to work from the person in control of the electrical installation work.
-

Select the cables and fuses

Select the power cables. Obey local regulations.

- **Input power cable:** Use symmetrical shielded cable (VFD cable) for the best EMC performance. NEC installations: Conduit with continuous conductivity is also allowed and must be grounded on both ends.
- **Motor cable:** ABB recommends symmetrically shielded VFD motor cable to reduce bearing current and wear and stress on motor insulation and to provide the best EMC performance. Although not recommended, conductors inside continuously conductive conduit is allowed in NEC installations. Ground conduit on both ends. Use separate insulated ground from motor to drive inside the conduit.
- **Current rating:** Max. load current.
- **Voltage rating (minimum):** IEC installations: 600 V AC cable is accepted for up to 500 V AC, 750 V AC cable is accepted for up to 600 V AC, 1000 V AC cable is accepted for up to 690 V AC. NEC installations: 600 V AC cable for 230 V AC motors and 1000 V AC cable for 480 V AC and 600 V AC motors. 600 V AC cable for 230 V AC and 480 V AC power lines; 1000 V AC cable for 600 V AC power line.
- **Temperature rating:** IEC installations: Select a cable rated for at least 70 °C maximum permissible temperature of conductor in continuous use. NEC installations: Use 75 °C conductors minimum. Insulation temperature can be higher as long as the ampacity is based on 75 °C conductors.

Select the control cables.

- Use double-shielded twisted-pair cable for analog signals. Use double-shielded or single-shielded cable for the digital, relay and I/O signals. Do not run 24 V and 115/230 V signals in the same cable.

Protect the drive and input power cable with the correct fuses.

For typical power cable sizes, refer to section [Typical power cables](#) (page 26).

For the correct fuses, refer to section [Fuses](#) (page 23).

Examine the installation site

Examine the installation site. Make sure that:

- The installation site is sufficiently ventilated or cooled to remove heat from the drive. See the technical data.
 - The ambient conditions of the drive meet the specifications. See the technical data.
 - The material behind, above and below the drive is non-flammable.
 - There is sufficient free space around the drive for cooling, maintenance, and operation. See the free space specifications for the drive.
 - Make sure that there are no sources of strong magnetic fields such as high-current single-core conductors or contactor coils near the drive. A strong magnetic field can cause interference or inaccuracy in the operation of the drive.
-

Make sure that the drive is compatible with the grounding system

The standard drive with ground-to-phase varistors connected can be installed to a symmetrically grounded TN-S system. If you install the drive to another system, you may need to disconnect the EMC filter and ground-to-phase varistors. See ACS880 frames R1 to R11 EMC filter and ground-to-phase varistor disconnecting instructions (3AUA0000125152 [English]).



WARNING!

Do not install the drive with EMC filter options +E200 and +E202 to a system that the filter is not suitable for. This can cause danger, or damage the drive.



WARNING!

Do not install the drive with the ground-to-phase varistor connected to a system that the varistor is not suitable for. If you do, the varistor circuit can be damaged.

■ Corner-grounded and midpoint-grounded 525...690 V delta systems



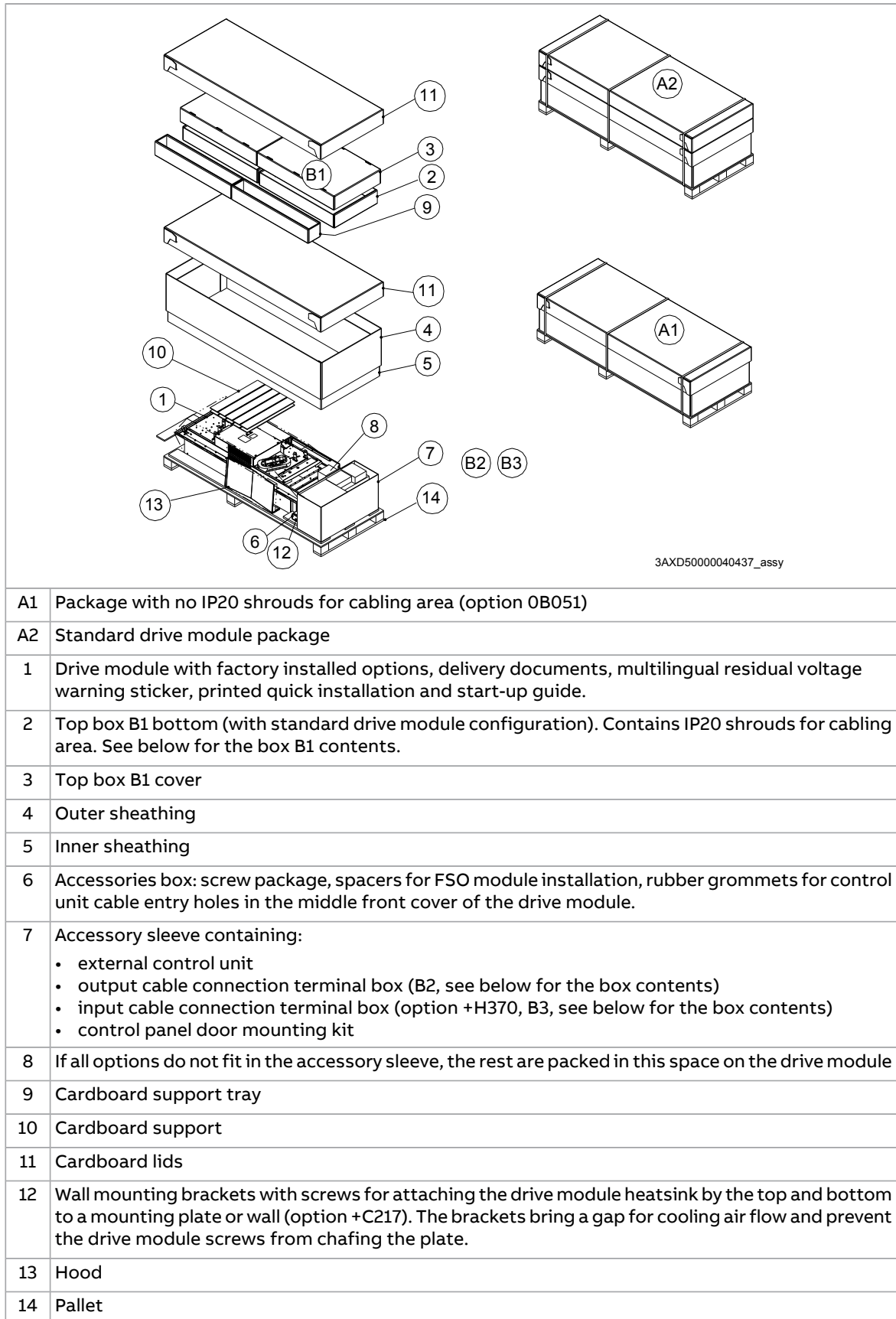
WARNING!

Do not install the drive on a 525...690 V corner-grounded or midpoint-grounded delta system. Disconnecting the EMC filter and ground-to-phase varistor does not prevent damage to the drive.

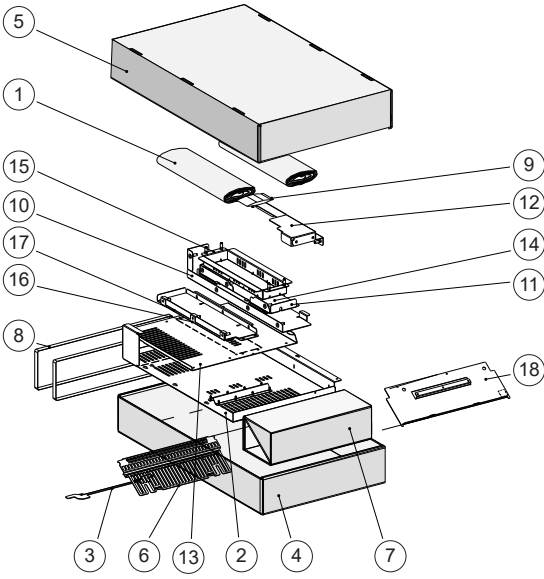
Move the drive to the installation site and unpack it

Unpack the package as follows:

- Cut the bands.
 - Lift the top lid. If top boxes (B1) are included, lift them off, and remove the lower lid.
 - Lift the inner and outer sheathings.
 - Remove the additional boxes and supports.
-



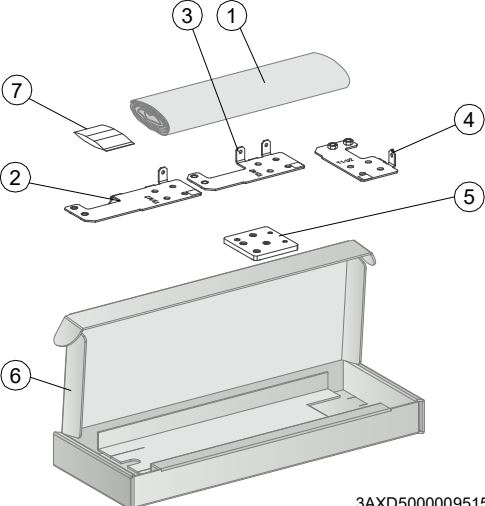
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Box B1 contents (standard drive module configuration)

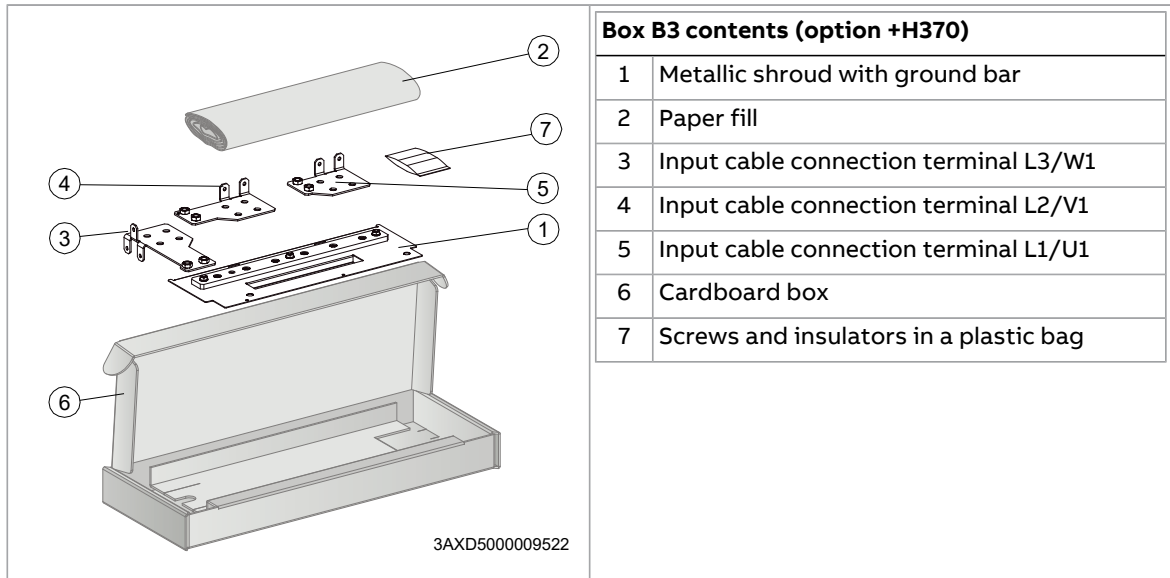
1	Paper fill
2	Clear plastic shroud for output power cabling
3	Mounting bracket for bottom grille
4	Cardboard box bottom
5	Cardboard box cover
6	Bottom grille
7	Support
8	Straps
9	Screws in a plastic bag
10	Back clear plastic shroud (upper)
11	Back clear plastic shroud (lower)
12	Front clear plastic shroud
13	Clear plastic shroud for input power cabling
14	Top clear plastic shroud
15	Entry clear plastic shroud for side input cabling
16	Clear plastic bottom shroud 1
17	Clear plastic bottom shroud 2
18	Metallic shroud



3AXD5000009515

Box B2 contents (standard drive module configuration)

1	Paper fill
2	Output cable connection terminal T3/W2
3	Output cable connection terminal T2/V2
4	Output cable connection terminal T1/U2
5	Grounding terminal
6	Cardboard box
7	Screws and insulators a plastic bag



Lift the drive from the lifting points

Refer to image A in section [Step-by-step drawings](#) for an installation example (page 31).

Reform the capacitors

If the drive has not been powered up for a year or more, you must reform the DC link capacitors. Refer to [Related documents](#) (page 29) or contact ABB technical support.

Ensure the cooling

See section [Losses and cooling data](#) (page 25) for the losses and required cooling air flow through the drive.

Install the drive module onto a mounting plate

See figure B in chapter [Step-by-step drawings](#) for an installation example (page 31).

Install the top metallic shroud and back plastic shrouds

See figures C and D in chapter [Step-by-step drawings](#) for an installation example (page 31).

- Remove the sheeting from the clear plastic shrouds from both sides.
- Install the top metallic shroud to the drive module.
- Install the back shrouds to the drive module.

Measure the insulation resistance of the input and motor cables and the motor

See figures F and G.

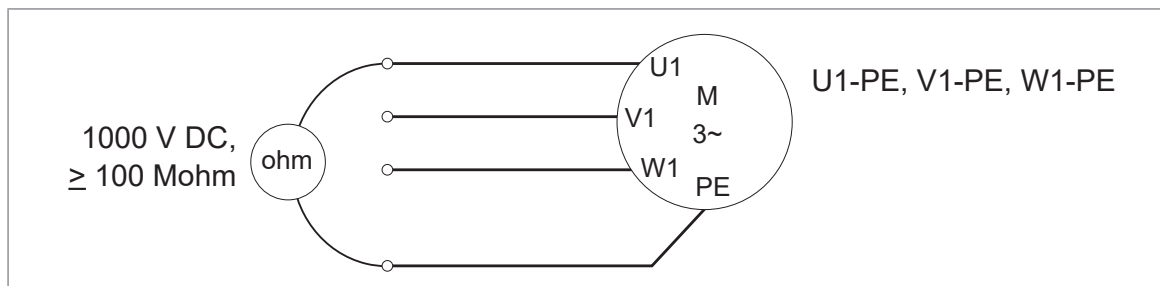
Before you connect the input power cable to the drive, measure its insulation resistance according to local regulations.

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Ground the motor cable shield at the motor end. For minimal interference, make a 360° grounding at the cable entry, or keep the pig tail short.


Measure the insulation resistance of the motor and motor cable when the motor cable is disconnected from the drive. Measure the insulation resistance between each phase conductor and the Protective Earth conductor using a measuring voltage of 1000 V DC. The insulation resistance of an ABB motor must exceed 100 Mohm (reference value at 25 °C or 77 °F). For the insulation resistance of other motors, consult the manufacturer's instructions.

Note: Moisture inside the motor casing will reduce the insulation resistance. If you suspect moisture, dry the motor and repeat the measurement.



Connect the power cables and install the shrouds

See the power cable connection diagram (figure E) in chapter [Step-by-step drawings](#) for an installation example (page 31)

Step	Task (motor cables)	Figure
1	Install the grounding terminal to the drive module base.	H
2	Run the motor cables to the cabinet. Ground the cable shields 360° at the cabinet entry.	I
3	Connect the twisted shields of the motor cables to the grounding terminal.	J
4	<div>WARNING! Do not use longer screws or bigger tightening torque than given in the installation drawing. They can damage the insulator and cause dangerous voltage to be present at the module frame.</div> <div>Screw in and tighten the insulators to the drive module by hand. Install the T3/W2 connection terminal to the insulators.</div>	K
5	Connect the phase T3/W2 conductors to the T3/W2 terminal.	L
6	Install the T2/V2 connection terminal to the insulators. See the warning in step 4.	-
7	Connect the phase T2/V2 conductors to the T2/V2 connection terminal.	-
8	Install the T1/U2 connection terminal to the insulators. See the warning in step 4.	-
9	Connect the phase T1/U2 conductors to the T1/U2 terminal.	-
10	<ul style="list-style-type: none">Step drill carefully sufficiently big holes to the inner clear plastic shrouds for the motor cables to the connected. Smooth the hole edges. Cut the shroud from the holes to the edge to make it possible to put the shroud around the cables.Remove the plastic sheeting from the shrouds from both sides.Install the inner clear plastic shrouds around the motor cables.	M, N
11	Remove the plastic sheeting from the outer clear plastic shroud from both sides. Install the shroud to the drive module.	P
12	Install the lower front cover to the drive module.	P

Step	Task (input cables)	Figure
1	Ground the input cable shields (if present) 360 degrees at the cabinet entry.	-
2	Connect the twisted shields of the input cables and separate ground cable (if present) to the cabinet grounding busbar.	-
3	<ul style="list-style-type: none"> • Step drill carefully sufficiently big holes to the clear plastic entry shroud for the cables to be connected. Align the holes in the vertical direction according to the alignment holes in the shroud. Smooth the hole edges. • Remove the plastic sheeting from both sides of the shroud. • Attach the cables firmly to the cabinet frame to prevent chafing against the hole edges. 	O
4	Put the conductors of the input cables through the drilled holes in the clear plastic shroud.	Q
5	Connect the input power cable conductors to the L1/U1, L2/V1 and L3/W1 connection busbars.	R
6	Move the entry clear plastic shroud along input cables to its final position. Install the front clear plastic shroud and upper front cover. Remove the cardboard protective covering from the drive module air outlet.	S
7	Cut the hole for the clear plastic entry shroud in the side clear plastic shroud. Install the side and top clear plastic shrouds to the drive module.	T

Connect the control cables


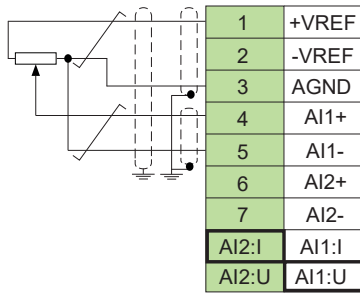
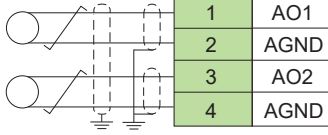
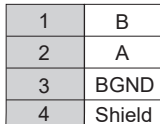
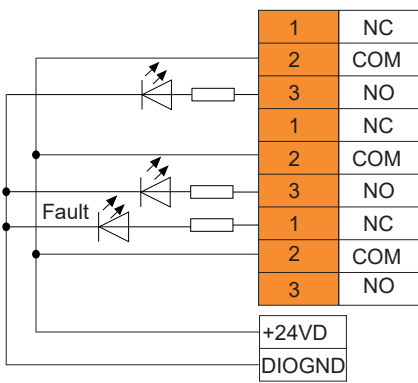
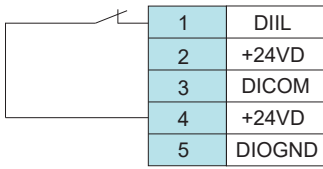
See figure U in chapter [Step-by-step drawings](#) for an installation example (page 31).

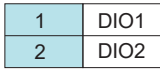
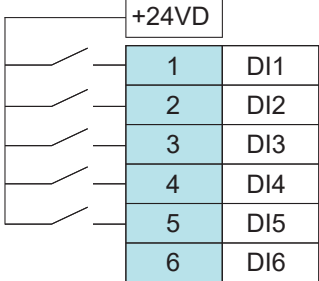

1. Disconnect the control panel cable from connector X13 on the control unit.
2. Loosen the mounting screws of the control panel holder and take the holder off.
3. Install the control cable grounding clamp plate to the control unit.
4. Connect the power supply, BGDR and fiber optic cables to the control unit.
5. Attach the control unit, for example, to a DIN rail.
6. Connect the power supply and BGDR cables to the drive module ZPOW and BGDR connectors. Connect the fiber optic cables to V10 and V11 connectors.
7. Ground the outer shields of all external control cables 360° at the cabinet entry.
8. Ground the pair-cable shields of external control cables to a grounding clamp below the control unit. Leave the other end of the shields unconnected or ground them indirectly via a high-frequency capacitor with a few nanofarads, eg, 3.3 nF / 630 V.
9. Connect the conductors to the appropriate connectors of the control unit.
10. Wire the optional modules if included in the delivery.
11. Connect the control panel cable to connector X13.
12. Put the control panel holder on the control unit. Put the control panel to the recess if removed.

■ Default I/O connections

The default I/O connections of the Factory macro of the ACS880 primary control program are shown below.

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Connection	Term	Description
XPOW External power input		
	+24VI	24 V DC, 2 A min. (without optional modules)
	GND	
XAI Reference voltage and analog inputs		
	+VREF	10 V DC, R_L 1...10 kohm
	-VREF	-10 V DC, R_L 1...10 kohm
	AGND	Ground
	AI1+	Speed reference
	AI1-	0(2)...10 V, $R_{in} > 200$ kohm
	AI2+	By default not in use.
	AI2-	0(4)...20 mA, $R_{in} = 100$ ohm
	J1	Current (I) / voltage (U) selection jumper for AI1
	J2	Current (I) / voltage (U) selection jumper for AI2
	XAO Analog outputs	
	AO1	Motor speed rpm
	AGND	0...20 mA, $R_L < 500$ ohm
	AO2	Motor current
	AGND	0...20 mA, $R_L < 500$ ohm
XD2D Drive-to-drive link		
	B	Master/follower, drive-to-drive or embedded fieldbus connection
	A	
	BGND	
	Shield	
	J3	Drive-to-drive link termination
XRO1, XRO2, XRO3 Relay outputs		
	NC	Ready run
	COM	250 V AC / 30 V DC
	NO	2 A
	NC	Running
	COM	250 V AC / 30 V DC
	NO	2 A
	NC	Fault (-1)
	COM	250 V AC / 30 V DC
	NO	2 A
XD24 Auxiliary voltage output, digital interlock		
	DIIL	Run enable
	+24VD	+24 V DC 200 mA
	DICOM	Digital input ground
	+24VD	+24 V DC 200 mA
	DIOGND	Digital input/output ground

Connection	Term	Description
XDIO Digital input/outputs		
	DIO1	Output: Ready run
	DIO2	Output: Running
	J6	Ground selection
XDI Digital inputs		
	DI1	Stop (0) / Start (1)
	DI2	Forward (0) / Reverse (1)
	DI3	Reset
	DI4	Acc/Dec time select
	DI5	Constant speed 1 (1 = On)
	DI6	By default, not in use.
		Safe torque off circuits must be closed for the drive to start.
X12	Safety options connection	
X13	Control panel connection	
X205	Memory unit connection	

The wire size accepted by all screw connectors (for both stranded and solid wire) is 0.5 ... 2.5 mm² (24...12 AWG). The torque is 0.5 N·m (5 lbf·in).

Start-up the drive










WARNING!

Before you start up the drive, make sure that the installation is completed. Make sure also that it is safe to start the motor. Disconnect the motor from other machinery if there is a risk of damage or injury.

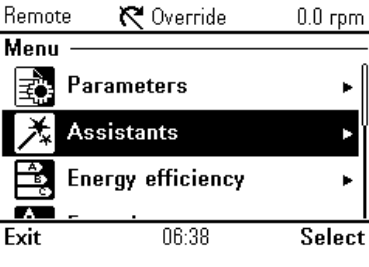
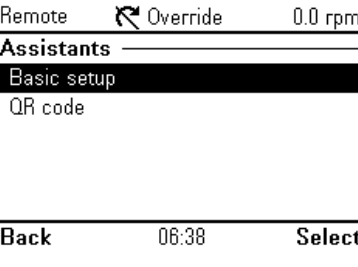
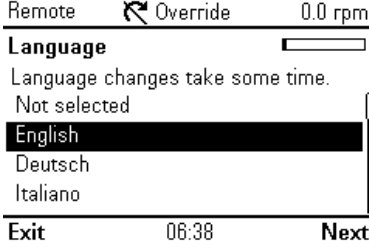
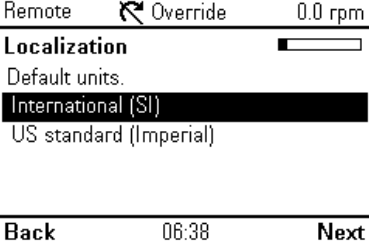
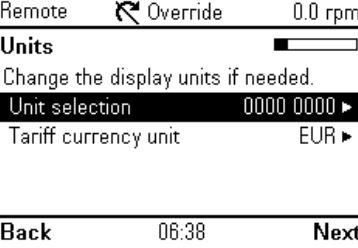
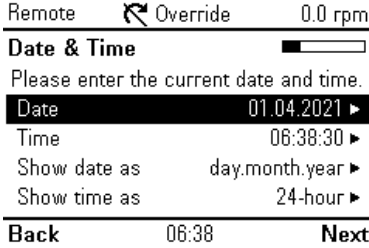
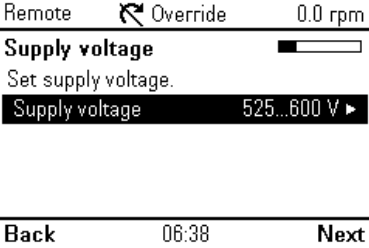
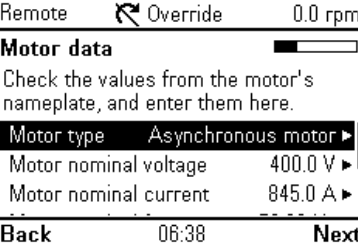
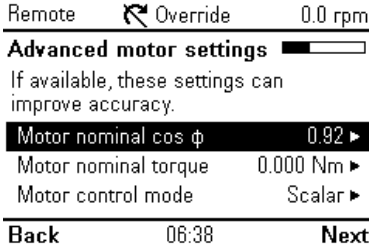
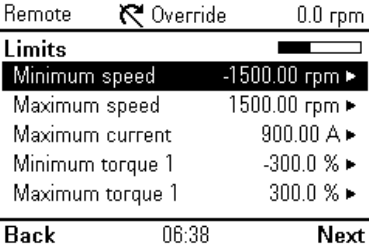
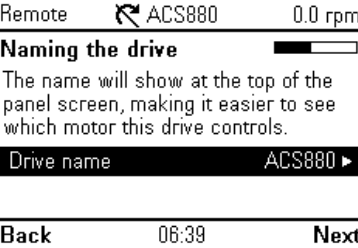





WARNING!

Before you activate the automatic fault reset or automatic restart functions of the drive control program, make sure that no dangerous situations can occur. These functions reset the drive automatically and continue operation after a fault or supply break. If these functions are activated, the installation must be clearly marked as defined in IEC/EN/UL 61800-5-1, subclause 6.5.3, for example, "THIS MACHINE STARTS AUTOMATICALLY".

Use the control panel to do the start-up procedure. The two commands at the bottom of the display show the functions of the two softkeys  and  located below the display. The commands assigned to the softkeys are different depending on the context. Use the arrow keys , ,  and  to move the cursor or change values depending on the active view. Key  shows a context-sensitive help page.

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<p>1. Power up the drive. Make sure that you have the motor name plate data available.</p>	<p>2. The First start assistant guides you through the first start-up. Select Menu and press (Menu) to open the main Menu. Select Assistants and press (Select).</p> 	<p>3. Select Basic setup and press (Select).</p> 
<p>4. Select the language you want to use and press (Next).</p> <p>Note: After you have selected the language, it takes a few minutes for the control panel to wake up.</p>	<p>5. Select the localization you want to use and press (Next).</p>	<p>6. Do the following selections. After each, press (Next).</p>
		
<p>7.</p> 	<p>8.</p> 	<p>9.</p> 
<p>10.</p> 	<p>11.</p> 	<p>12.</p> 
<p>13.</p>	<p>14.</p>	<p>15.</p>

Remote  ACS880 0.0 rpm Direction test Spin the motor to check direction. No, skip the test Yes, test now Back 06:39 Next	Remote  ACS880 0.0 rpm Make backup? Copies all settings into a backup file stored in the control panel. To restore a backup, go to Menu > Backups. Not now Backup Back 06:41 Next	Remote  ACS880 0.0 rpm Set-up complete Drive is ready for use. Back 06:41 Done
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■ Motor overload protection

The factory motor overload protection is not enabled by default. Motor thermal overload protection can be measured using motor temperature devices, can be estimated using a motor model defined by parameters, or can use measured motor current and motor Class curves. To enable protection using motor model parameters or measurement devices set parameter 35.11 and subsequent parameters through 35.55. To enable motor Class curves set parameter 35.56. Motor overload Class is defaulted to 20 and selectable in parameter 35.57.

Use the information key (?) on the drive control panel for more information on setting group 35 parameters. You must set the drive overload parameters correctly, or motor damage could occur.

■ Fieldbus communication

To configure the embedded fieldbus communication for Modbus RTU, you must set at least these parameters:

Parameter	Setting	Description
20.01 Ext1 commands	Embedded fieldbus	Selects fieldbus as the source for the start and stop commands when EXT1 is selected as the active control location.
22.11 Speed ref1 source	EFB ref1	Selects a reference received through the embedded fieldbus interface as speed reference 1.
26.11 Torque ref1 source	EFB ref1	Selects a reference received through the embedded fieldbus interface as torque reference 1.
28.11 Frequency ref1 source	EFB ref1	Selects a reference received through the embedded fieldbus interface as frequency reference 1.
58.01 Protocol enable	Modbus RTU	Initializes embedded fieldbus communication.
58.03 Node address	1 (default)	Node address. There must be no two nodes with the same node address on-line.
58.04 Baud rate	19.2 kbps (default)	Defines the communication speed of the link. Use the same setting as in the master station.
58.05 Parity	8 EVEN 1 (default)	Selects the parity and stop bit setting. Use the same setting as in the master station.
58.06 Communication control	Refresh settings	Validates any changed EFB configuration settings. Use this after changing any parameters in group 58.

Other parameters related to the fieldbus configuration:

58.14 Communication loss action	58.17 Transmit delay	58.28 EFB act1 type	58.34 Word order
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20 Quick installation and start-up instructions

58.15 Communication loss mode	58.25 Control profile	58.31 EFB act1 transparent source	58.101 Data I/O 1 ...
58.16 Communication loss time	58.26 EFB ref1 type	58.33 Addressing mode	58.124 Data I/O 24 time

■ Warnings and faults

Warning	Fault	Aux. code	Description
A2A1	2281	Current calibration	<u>Warning:</u> Current calibration is done at the next start. <u>Fault:</u> Output phase current measurement fault.
-	2310	Overcurrent	The output current is more than the internal limit. This can also be caused by an earth fault or phase loss.
A2B3	2330	Earth leakage	A load unbalance that is typically caused by an earth fault in the motor or the motor cable.
A2B4	2340	Short circuit	There is a short-circuit in the motor or the motor cable.
-	3130	Input phase loss	The intermediate DC circuit voltage oscillates due to missing input power line phase.
-	3181	Wiring or earth fault	Incorrect input and motor cable connection.
A3A1	3210	DC link overvoltage	Intermediate DC circuit voltage is too high.
A3A2	3220	DC link under-voltage	Intermediate DC circuit voltage is too low.
-	3381	Output phase loss	All three phases are not connected to the motor.
-	5090	STO hardware failure	STO hardware diagnostics has detected hardware failure. Contact ABB.
A5A0	5091	Safe torque off	The Safe torque off (STO) function is active.
A7CE	6681	EFB comm loss	Break in embedded fieldbus communication.
A7C1	7510	FBA A communication	Communication lost between drive (or PLC) and fieldbus adapter.
ACAB	-	Extension I/O configuration failure	The I/O extension module types and locations specified by parameters do not match the detected configuration.
AFF6	-	Identification run	The motor ID run occurs at the next start.
-	FA81	Safe torque off 1 loss	The Safe torque off circuit 1 is broken.
-	FA82	Safe torque off 2 loss	The Safe torque off circuit 2 is broken.

Technical data and references

Electrical ratings

IEC RATINGS											
ACS880-04F-...	Frame size	Input current	Output ratings								
			Nominal use					Light-duty use		Heavy-duty use	
		I_1	I_{\max}	I_{\max_start}	I_2	P_n	S_n	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}
		A	A	A	A	kW	kVA	A	kW	A	kW
$U_n = 400\text{ V}$											
504A-3	R11	504	560	671	504	250	349	485	250	361	200
584A-3	R11	584	730	828	584	315	405	575	315	429	250
649A-3	R11	649	730	954	649	355	450	634	355	477	250
725A-3	R11	725	1020	1100	725	400	502	715	400	566	315
820A-3	R11	820	1020	1100	820	450	568	810	450	625	355
880A-3	R11	880	1100	1100	880	500	610	865	500	725*	400
$U_n = 500\text{ V}$											
459A-5	R11	459	560	671	459	315	398	450	315	330	200
502A-5	R11	502	560	671	502	355	435	483	315	361	250
582A-5	R11	582	730	828	582	400	504	573	400	414	250
634A-5	R11	634	730	954	634	450	549	623	450	477	315
715A-5	R11	715	850	1100	715	500	619	705	500	566	400
820A-5	R11	820	1020	1100	820	560	710	807	560	625	450
880A-5	R11	880	1100	1100	880	560	762	857	560	697*	500
$U_n = 690\text{ V}$											
329A-7	R11	329	480	510	329	315	393	320	315	255	250
369A-7	R11	369	520	650	369	355	441	360	355	325	315
429A-7	R11	429	520	720	429	400	513	420	400	360**	355
470A-7	R11	470	655	830	470	450	562	455	450	415	400
522A-7	R11	522	655	910	522	500	624	505	500	455	450
590A-7	R11	590	800	1010	590	560	705	571	560	505	500
650A-7	R11	650	820	1100	650	630	777	630	630	571**	560
721A-7	R11	721	820	1100	721	710	862	705	630	571**	560

UL/NEC RATINGS									
ACS880-04F-...	Frame size	Input current	Max. current		Output ratings				
					App. power	Light-duty use		Heavy-duty use	
		I_1	I_{max}	I_{max_start}	S_n	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}
		A	A	A	kVA	A	hp	A	hp
$U_n = 480\text{ V}$									
459A-5	R11	459	560	671	-	-	-	-	-
502A-5	R11	502	560	671	435	483	400	361	300
582A-5	R11	582	730	828	504	573	450	414	350
634A-5	R11	634	730	954	549	623	500	477	400
715A-5	R11	715	850	1100	619	705	600	566	450
820A-5	R11	820	1020	1100	710	807	700	625	500
880A-5	R11	880	1100	1100	762	857	700	697**	600
$U_n = 575\text{ V}$									
329A-7	R11	329	480	510	393	320	300	255	250
369A-7	R11	369	520	650	441	360	350	325	300
429A-7	R11	429	520	720	513	420	450	360***	350
470A-7	R11	470	655	830	562	455	450	415	450
522A-7	R11	522	655	910	624	505	500	455	450
590A-7	R11	590	800	1010	705	571	600	505	500
650A-7	R11	650	820	1100	777	630	700	571***	600
721A-7	R11	721	820	1100	862	705	700	571***	600

Fuses

Drive type ACS880-04F-...	Ultrarapid (aR) fuses per drive module						
	Min. short-circuit current	Input current	Fuse				
	A	A	A	A ² s	V	Type DIN 43653	Size
$U_n = 400\text{ V}$							
504A-3	4500	504	800	465000	690	170M6012	3
584A-3	6500	584	1000	945000	690	170M6014	3
649A-3	6500	649	1000	945000	690	170M6014	3
725A-3	9100	725	1250	1950000	690	170M6016	3
820A-3	11000	820	1600	3900000	690	170M6019	3
880A-3	11000	880	1600	3900000	690	170M6019	3
$U_n = 500\text{ V}$							
459A-5	3000	459	630	210000	690	170M6010	3
502A-5	4500	502	800	465000	690	170M6012	3
582A-5	6500	582	1000	945000	690	170M6014	3
634A-5	6500	634	1000	945000	690	170M6014	3
715A-5	9100	715	1250	1950000	690	170M6016	3
820A-5	11000	820	1600	3900000	690	170M6019	3
880A-5	11000	880	1600	3900000	690	170M6019	3
$U_n = 690\text{ V}$							
329A-7	3600	329	700	300000	690	170M6011	3
369A-7	5600	369	900	670000	690	170M6013	3
429A-7	6500	429	1000	945000	690	170M6014	3
470A-7	7800	470	1100	1300000	690	170M6015	3
522A-7	9100	522	1250	1950000	690	170M6016	3
590A-7	10200	590	1400	2450000	690	170M6017	3
650A-7	10500	650	1500	3100000	690	170M6018	3
721A-7	10500	721	1500	3100000	690	170M6018	3

Drive type	UL fuses per drive module					
	Input current (A)	Fuse				
		A	V	Manufacturer	UL class	Type
U _n = 480 V						
ACS880-04F-459A-5	459	600	600	Bussmann	T	JJS-600
ACS880-04F-502A-5	502	600	600	Bussmann	T	JJS-600
ACS880-04F-582A-5	582	800	600	Ferraz	L	A4BY800
ACS880-04F-634A-5	634	800	600	Ferraz	L	A4BY800
ACS880-04F-715A-5	715	1000	600	Ferraz	L	A4BY1000
ACS880-04F-820A-5	820	1000	600	Ferraz	L	A4BY1000
ACS880-04F-880A-5	880	1000	600	Ferraz	L	A4BY1000
U _n = 575 V						
ACS880-04F-329A-7	329	500	600	Bussmann	T	JJS-500
ACS880-04F-369A-7	369	500	600	Bussmann	T	JJS-500
ACS880-04F-429A-7	429	500	600	Bussmann	T	JJS-500
ACS880-04F-470A-7	470	600	600	Bussmann	T	JJS-600
ACS880-04F-522A-7	522	600	600	Bussmann	T	JJS-600
ACS880-04F-590A-7	590	800	600	Ferraz	L	A4BY800
ACS880-04F-650A-7	650	800	600	Ferraz	L	A4BY800
ACS880-04F-721A-7	721	800	600	Ferraz	L	A4BY800

■ Notes for UL fuses

1. Fuses are required as part of the installation, are not included in the base drive configuration and must be provided by others.
2. Fuses with a higher current rating than specified must not be used.
3. The UL listed fuses recommended by ABB are the required branch circuit protection per NEC.
4. The recommended size or smaller UL listed 248 fast acting, time delay, or high speed fuses must be used to maintain the UL listing of the drive. Additional protection can be used. Refer to local codes and regulations.
5. A fuse of a different class can be used at the high fault rating where the I_{peak} and I^2t of the new fuse is not greater than that of the specified fuse.
6. UL listed 248 fast acting, time delay, or high speed fuses from other manufacturers can be used if they meet the same class and rating requirements specified in the rules above.
7. When you install a drive, always obey ABB installation instructions, NEC requirements and local codes.
8. Alternative fuses can be used if they meet certain characteristics. For permitted fuses, see Branch Circuit Protection for ABB drives manual supplement (3AXD500006450115).

Losses and cooling data

Drive type	Frame size	Air flow		Heat dissipation ¹⁾			Noise
		Heatsink	Front	Heatsink	Front	Total	
		m³/h	m³/h	W	W	W	dB(A)
U _n = 400 V							
ACS880-04F-504A-3	R11	1400	120	4104	522	4625	75
ACS880-04F-584A-3	R11	1400	120	5175	594	5769	75
ACS880-04F-649A-3	R11	1400	120	6063	657	6720	75
ACS880-04F-725A-3	R11	1400	120	7223	742	7965	75
ACS880-04F-820A-3	R11	1400	120	8779	859	9638	75
ACS880-04F-880A-3	R11	1400	120	9916	946	10863	75
U _n = 500 V							
ACS880-04F-459A-5	R11	1400	120	3740	492	4232	75
ACS880-04F-502A-5	R11	1400	120	4222	523	4744	75
ACS880-04F-582A-5	R11	1400	120	5232	590	5823	75
ACS880-04F-634A-5	R11	1400	120	5902	637	6539	75
ACS880-04F-715A-5	R11	1400	120	7184	728	7913	75
ACS880-04F-820A-5	R11	1400	120	8890	855	9745	75
ACS880-04F-880A-5	R11	1400	120	9927	934	10861	75
U _n = 690 V							
ACS880-04F-329A-7	R11	1400	120	2778	414	3192	75
ACS880-04F-369A-7	R11	1400	120	3218	436	3654	75
ACS880-04F-429A-7	R11	1400	120	3981	475	4456	75
ACS880-04F-470A-7	R11	1400	120	4689	507	5195	75
ACS880-04F-522A-7	R11	1400	120	5434	548	5982	75
ACS880-04F-590A-7	R11	1400	120	6522	609	7130	75
ACS880-04F-650A-7	R11	1400	120	7645	670	8315	75
ACS880-04F-721A-7	R11	1400	120	8870	747	9617	75

¹⁾ Typical drive losses when it operates at 90% of the motor nominal frequency and 100% of the drive nominal output current (calculated according to IEC61800-9-2).

Typical power cables

ACS880-04F-....	IEC ¹⁾		US ²⁾	
	Cu cable type	Al cable type	Cu cable type	Al cable type
	mm ²	mm ²	AWG/kcmil	AWG/kcmil
U_n = 400 V				
504A-3	3×(3×95)	3×(3×150)	2×500 MCM or 3×250 MCM	2×700 MCM or 3×350 MCM
584A-3	3×(3×120)	3×(3×185)	2×600 MCM or 3×300 MCM	3×400 MCM or 4×250 MCM
649A-3	3×(3×150)	3×(3×240)	2×700 MCM or 3×350 MCM	3×400 MCM or 4×250 MCM
725A-3	3×(3×185)	4×(3×185)	3×500 MCM or 4×300 MCM	3×500 MCM or 4×300 MCM
820A-3	3×(3×240)	4×(3×240)	3×600 MCM or 4×400 MCM	3×700 MCM or 4×500 MCM
880A-3	3×(3×240)	4×(3×240)	3×600 MCM or 4×400 MCM	4×500 MCM
U_n = 500 V				
459A-5	3×(3×95)	3×(3×150)	2×400 MCM or 3×4/0	2×600 MCM or 3×300 MCM
502A-5	3×(3×95)	3×(3×150)	2×500 MCM or 3×250 MCM	2×700 MCM or 3×350 MCM
582A-5	3×(3×120)	3×(3×185)	2×600 MCM or 3×300 MCM	3×500 MCM or 4×300 MCM
635A-5	3×(3×150)	3×(3×240)	2×700 MCM or 3×350 MCM	3×600 MCM or 4×400 MCM
715A-5	3×(3×185)	4×(3×185)	3×500 MCM or 4×300 MCM	3×600 MCM or 4×400 MCM
820A-5	3×(3×240)	4×(3×240)	3×600 MCM or 4×400 MCM	4×500 MCM
880A-5	3×(3×240)	4×(3×240)	3×600 MCM or 4×400 MCM	4×500 MCM
U_n = 690 V				
329A-7	2×(3×120)	3×(3×120)	2×250 MCM or 3×2/0	2×350 MCM or 3×4/0
369A-7	2×(3×120)	3×(3×120)	2×300 MCM or 3×3/0	2×400 MCM or 3×4/0
429A-7	2×(3×95)	2×(3×120)	2×350 MCM or 3×4/0	2×500 MCM or 3×250 MCM
470A-7	3×(3×95)	3×(3×150)	2×400 MCM or 3×4/0	2×600 MCM or 3×300 MCM
522A-7	3×(3×120)	3×(3×185)	2×500 MCM or 3×250 MCM	2×700 MCM or 3×350 MCM
590A-7	3×(3×150)	3×(3×185)	2×600 MCM or 3×300 MCM	3×500 MCM or 4×300 MCM
650A-7	3×(3×150)	3×(3×240)	2×700 MCM or 3×350 MCM	3×500 MCM or 4×300 MCM
721A-7	3×(3×185)	4×(3×185)	3×500 MCM or 4×300 MCM	3×600 MCM or 4×400 MCM

¹⁾ The cable selection is based on max. 9 cables laid on a cable ladder side by side, three ladder type trays one on top of the other, ambient temperature 30 °C (86 °F) PVC insulation, surface temperature 70 °C (158 °F) (EN 60204-1 and IEC 60364-5-52). For other conditions, select the cables according to local safety regulations, appropriate input voltage and the load current of the drive.

²⁾ The cable selection is based on NEC Table 310-16 for copper wires, 75 °C (167 °F) wire insulation at 40 °C (104 °F) ambient temperature. Not more than three current-carrying conductors in raceway or cable or earth (directly buried). For other conditions, dimension the cables according to local safety regulations, appropriate input voltage and the load current of the drive.

Temperature: For IEC, select a cable rated for at least 70 °C maximum permissible temperature of conductor in continuous use. For North America, power cables must be rated for 75 °C (167 °F) or higher.

Voltage: 600 V AC cable is accepted for up to 500 V AC. 750 V AC cable is accepted for up to 600 V AC. 1000 V AC cable is accepted for up to 690 V AC.

Terminal and entry data for the power cables

Maximum accepted cable size	4 × (3 × 240) mm ² or 4 × (3 × 500 MCM)
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Screw size for connecting busbars to the drive module input and output busbars	M12
Tightening torque	50...75 N·m (37...55 lbf·ft)

Protection classes for module

Degrees of protection (IEC/EN 60529)	IP20 (standard) IP00 (option +0B051) Heatsink: IP55
Enclosure types (UL 50/50E)	UL Open Type Heatsink: UL Type 12
Overvoltage category (IEC/EN 60664-1)	III
Protective class (IEC/EN 61800-5-1)	I

Ambient conditions

Installation altitude	<p><u>For TN and TT neutral-grounded network systems and IT non-cornergrounded network systems:</u> 0 to 4000 m (13123 ft) above sea level</p> <p><u>For corner-grounded network systems:</u> 0 to 2000 m (6561 ft) above sea level</p> <p>Installation on 525...690 V corner-grounded or midpoint-grounded delta systems is not permitted.</p> <p>The output current must be derated by 1% for each 100 m (328 ft) at altitudes above 1000 m (3281 ft).</p>
Surrounding air temperature	<p><u>Operation:</u> -15 ...+55 °C (5...131 °F). Frost is not permitted. The rated output current must be derated by 1% for each 1 °C (1.8 °F) over 40 °C (104 °F).</p> <p><u>Storage in the package:</u> -40 to +70 °C (-40 to +158 °F).</p>

Safe torque off (STO)

The drive has a Safe torque off (STO) function in accordance with IEC/EN 61800-5-2. It can be used, for example, as the final actuator device of safety circuits that stop the drive in case of danger (such as an emergency stop circuit).

When activated, the STO function disables the control voltage of the power semiconductors of the drive output stage, thus preventing the drive from generating the torque required to rotate the motor. The control program generates an indication as defined by parameter 31.22. If the motor is running when STO is activated, it coasts to a stop. Closing the activation switch deactivates STO. Any faults generated must be reset before restarting.

The STO function has a redundant architecture, that is, both channels must be used in the safety function implementation. The safety data given is calculated for redundant use, and does not apply if both channels are not used.



WARNING!

The Safe torque off function does not disconnect the voltage of the main and auxiliary circuits from the drive. Therefore maintenance work on electrical parts of the drive or the motor can only be carried out after isolating the drive from the main supply.

Note:

- If stopping by coasting is not acceptable, stop the drive and machinery using the appropriate stop mode before activating STO.
- The STO function overrides all other functions of the drive.

■ **Wiring**

The safety contacts must open/close within 200 ms of each other.

Double-shielded twisted-pair cable is recommended for the connection. The maximum length of the cabling between the switch and the drive control unit is 300 m (1000 ft). Ground the shield of the cable at the control unit only.

■ **Validation**

To ensure the safe operation of a safety function, a validation test is required. The test must be carried out by a competent person with adequate expertise and knowledge of the safety function. The test procedures and report must be documented and signed by this person. Validation instructions of the STO function can be found in the drive hardware manual.

■ **Technical data**

- Minimum voltage at IN1 and IN2 to be interpreted as “1”: 17 V DC
- STO reaction time (shortest detectable break): 1 ms
- STO response time: 2 ms (typical), 30 ms (maximum)
- Fault detection time: Channels in different states for longer than 200 ms
- Fault reaction time: Fault detection time + 10 ms
- STO fault indication (parameter 31.22) delay: < 500 ms
- STO warning indication (parameter 31.22) delay: < 1000 ms
- Safety integrity level (SIL, EN 62061): 3
- Performance level (PL, EN ISO 13849-1): e

The drive STO is a type B safety component as defined in IEC 61508-2.

For the full safety data, exact failure rates and failure modes of the STO function, refer to the drive hardware manual.

Markings

The applicable markings are shown on the type designation label of the drive.

								
CE	UL	TÜV	UKCA	EAC	EIP	RCM	KC	WEEE

Declarations of conformity

<div><p>ABB</p><p>EU Declaration of Conformity Machinery Directive 2006/42/EC</p><p>We, ABB Oy Himontie 11, 00380 Helsinki, Finland. Phone: +358 10 22 11</p><p>declare under our sole responsibility that the following products:</p><p>Frequency converters ACS880-01/-11/-31 ACS880-04/-04F/-M04/-14/-34</p><p>with regard to the safety functions</p><ul style="list-style-type: none">- Safe Torque Off- Safe stop 1, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Prevention of unexpected start-up (with FSD-12 option module, +Q971, encoderless)- Safe stop 2, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Safe speed monitor, Safe direction, Prevention of unexpected start-up (with FSD-21 and FSD-31 option modules, +Q972 and +L532, encoder supported)- Safe motor temperature (with PFPC-01 thermistor protection module, +L536)- Safe stop 1 (SS1-c, with PPS-21 PROFIsafe module, +Q986)<p>are in conformity with all the relevant safety component requirements of EU Machinery Directive 2006/42/EC, when the listed safety functions are used for safety component functionality.</p><p>The following harmonized standards have been applied: EN 61800-5-2:2007 Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional EN IEC 62061:2021 Safety of machinery – Functional safety of safety-related control systems EN ISO 13849-1:2015 Safety of machinery – Safety-related parts of control systems, Part 1: General requirements EN ISO 13849-2:2012 Safety of machinery – Safety-related parts of the control systems, Part 2: Validation EN 60204-1:2018 Safety of machinery – Electrical equipment of machines – Part 1: General requirements</p><p>The following other standards have been applied: IEC 61508-2:2010, parts 1-2 Functional safety of electrical / electronic / programmable electronic safety-related systems IEC 61800-5-2:2006 Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional</p><p>The product(s) referred to in this Declaration of conformity fulfill(s) the relevant provisions of other European Union Directives which are notified in Single EU Declaration of conformity 3AXD0000408193.</p><p>Authorized to compile the technical file: ABB Oy, Himontie 11, 00380 Helsinki, Finland.</p><p>Helsinki, August 31, 2022 Signed for and on behalf of:</p><p>Mika Vartiainen Local Division Manager ABB Oy</p><p>Aaron D. Wade Product Unit Manager ABB Oy</p><p>Document number 3AXD0000098405</p><p>Page 1 of 1</p></div>	<div><p>ABB</p><p>Declaration of Conformity Supply of Machinery (Safety) Regulations 2008</p><p>We, ABB Oy Himontie 11, 00380 Helsinki, Finland. Phone: +358 10 22 11</p><p>declare under our sole responsibility that the following products:</p><p>Frequency converters ACS880-01/-11/-31 ACS880-04/-04F/-M04/-14/-34</p><p>with regard to the safety functions</p><ul style="list-style-type: none">- Safe Torque Off- Safe stop 1, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Prevention of unexpected start-up (with FSD-12 option module, +Q971, encoderless)- Safe stop 2, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Safe speed monitor, Safe direction, Prevention of unexpected start-up (with FSD-21 and FSD-31 option modules, +Q972 and +L532, encoder supported)- Safe motor temperature (with PFPC-01 thermistor protection module, +L536)- Safe stop 1 (SS1-c, with PPS-21 PROFIsafe module, +Q986)<p>are in conformity with all the relevant safety component requirements of the Supply of Machinery (Safety) Regulations 2008, when the listed safety functions are used for safety component functionality.</p><p>The following designated standards have been applied: EN 61800-5-2:2007 Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional EN IEC 62061:2021 Safety of machinery – Functional safety of safety-related control systems EN ISO 13849-1:2015 Safety of machinery – Safety-related parts of control systems, Part 1: General requirements EN ISO 13849-2:2012 Safety of machinery – Safety-related parts of the control systems, Part 2: Validation EN 60204-1:2018 Safety of machinery – Electrical equipment of machines – Part 1: General requirements</p><p>The following other standards have been applied: EN 61508:2010, parts 1-2 Functional safety of electrical / electronic / programmable electronic safety-related systems EN 61800-5-2:2007 Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional</p><p>The product(s) referred to in this declaration of conformity fulfill(s) the relevant provisions of other UK statutory requirements, which are notified in a single declaration of conformity 3AXD0000130465.</p><p>Authorized to compile the technical file: ABB Limited, Daresbury Park, Cheshire, United Kingdom, W44 4BT.</p><p>Helsinki, August 31, 2022 Signed for and on behalf of:</p><p>Mika Vartiainen Local Division Manager ABB Oy</p><p>Aaron D. Wade Product Unit Manager ABB Oy</p><p>Document number 3AXD0000130465</p><p>Page 1 of 1</p></div>
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Related documents

Name	Code
ACS880-04F drive modules hardware manual	3AXD50000034664
ACS880-04F drive modules quick installation and start-up guide	3AXD50000044913
ACS-AP-I, -S, -W and ACH-AP-H, -W assistant control panels user's manual	3AUA0000085685
ACS880 primary control program firmware manual	3AUA0000085967
Drive Composer start-up and maintenance PC tool user's manual	3AUA0000094606
Converter module capacitor reforming instructions	3BFE64059629

30 Technical data and references

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



ACS880-04 manuals



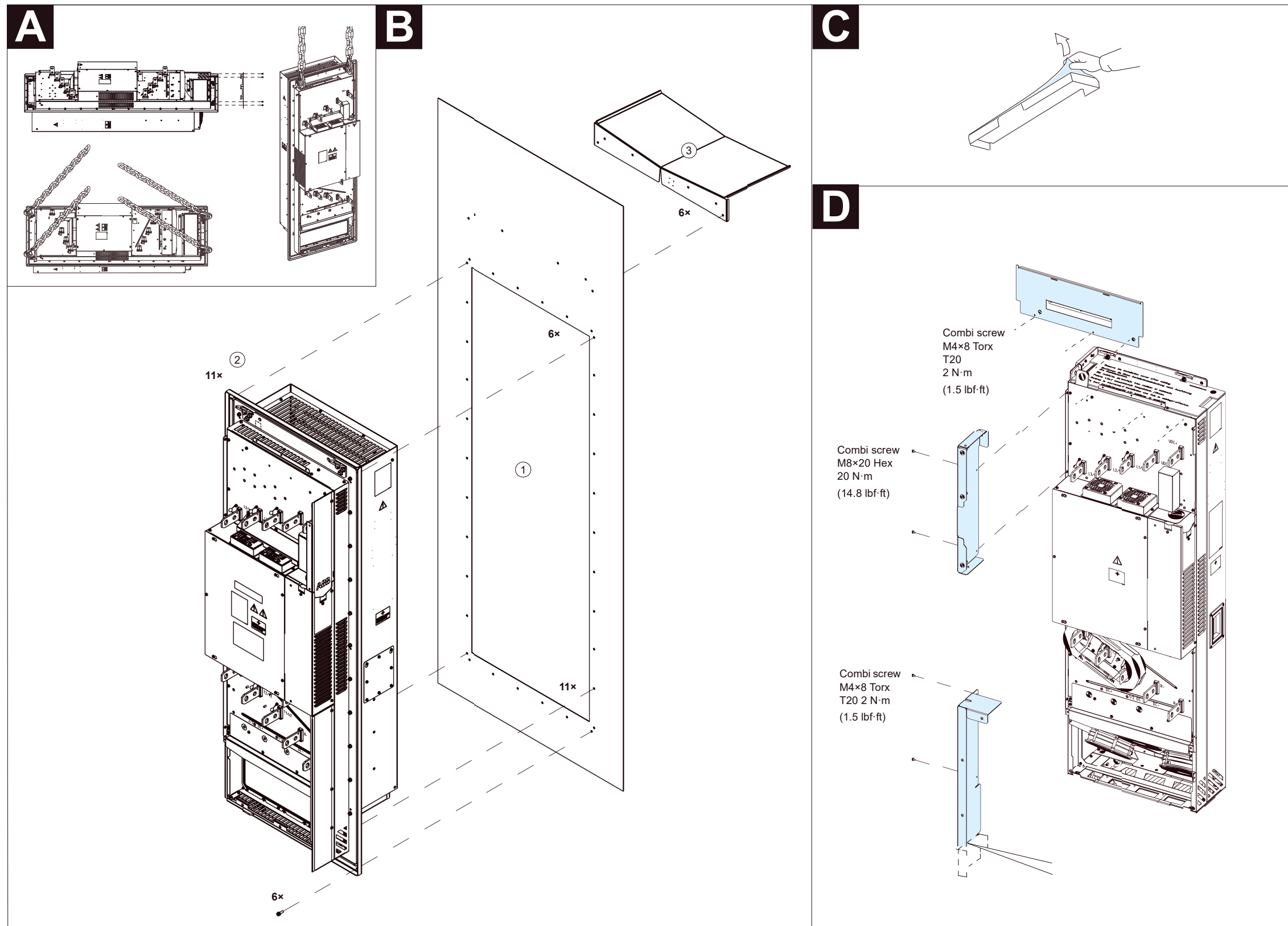
Ecodesign information (EU
2019/1781 and SI 2021 No. 745)

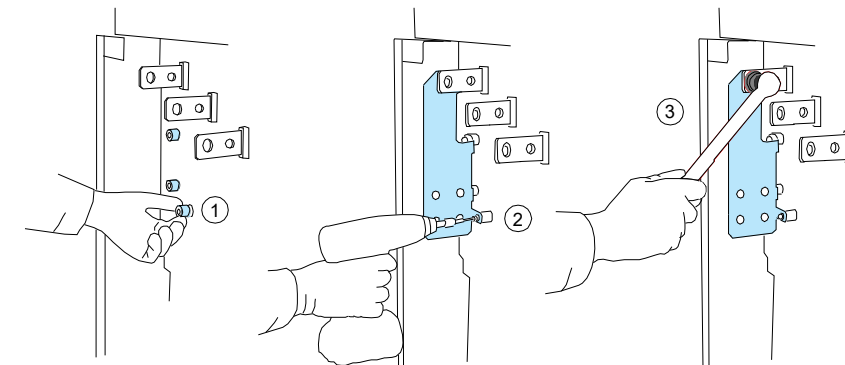
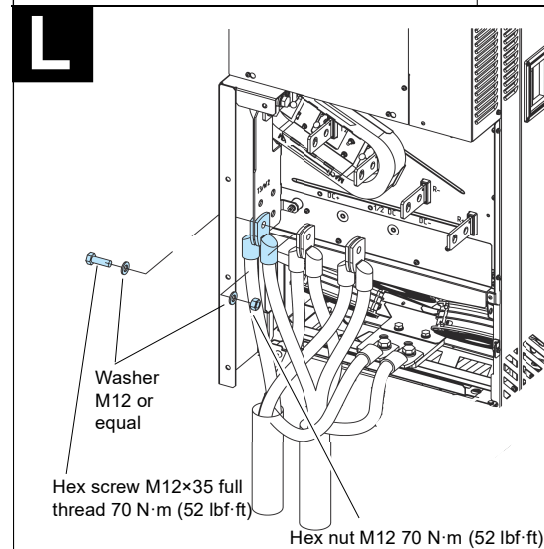
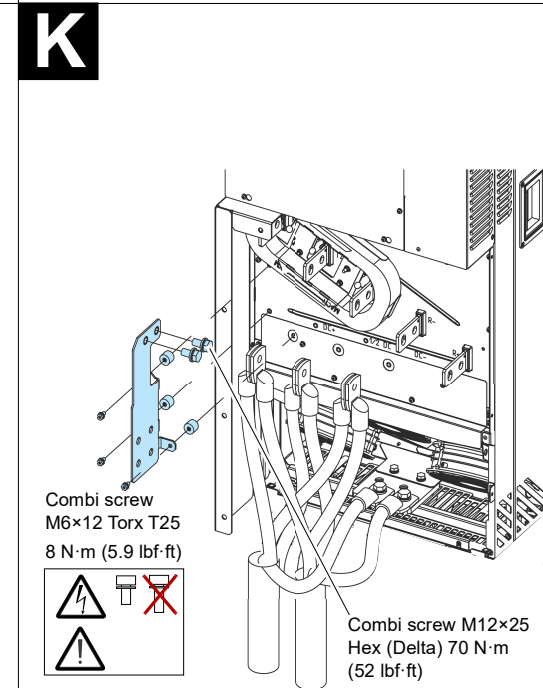
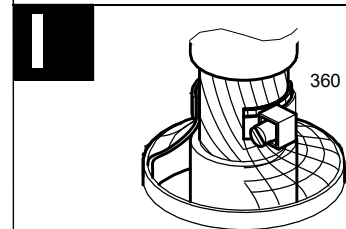
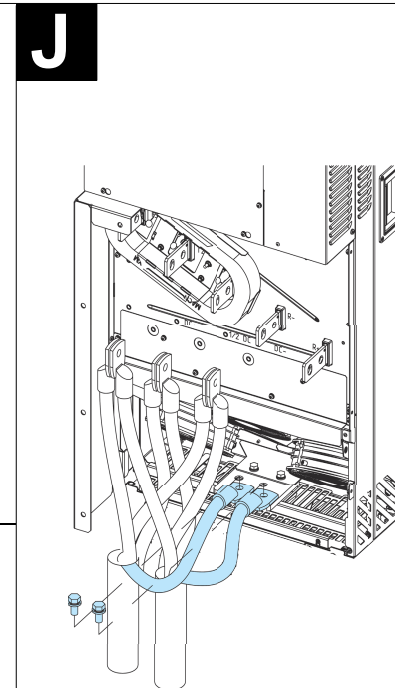
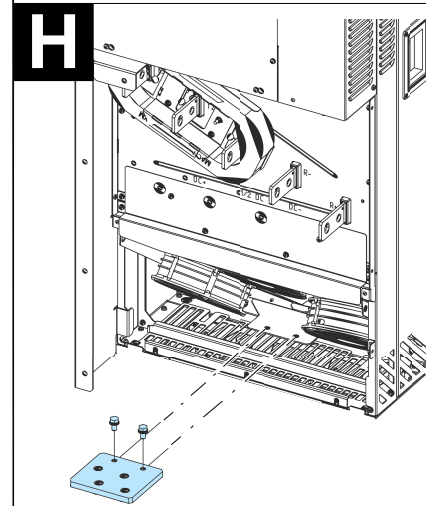
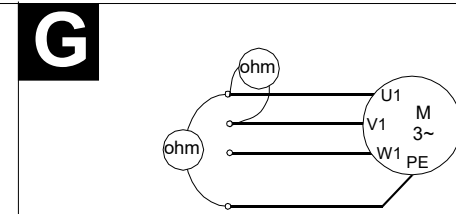
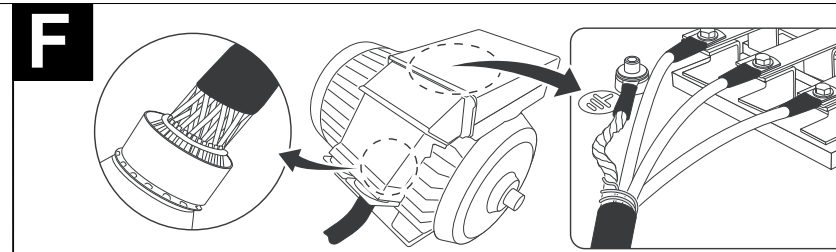
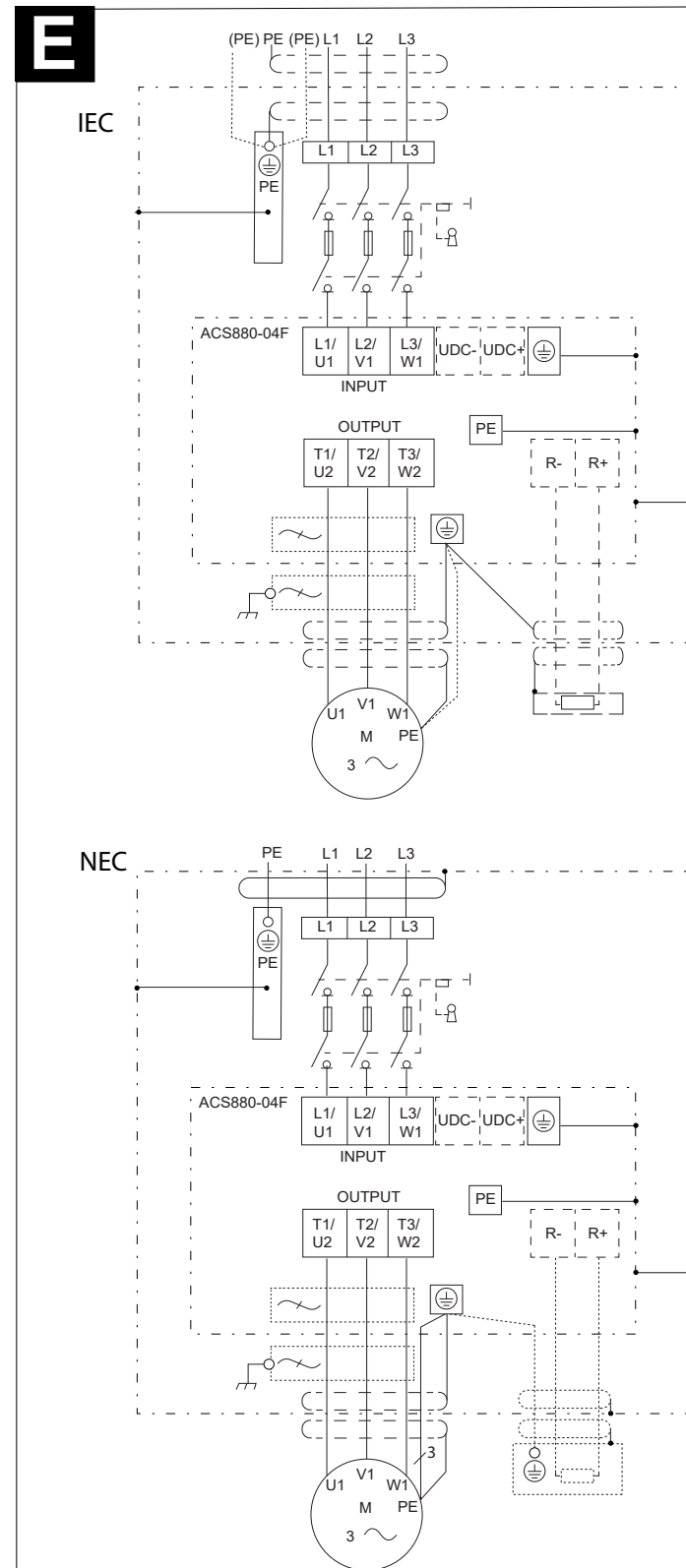


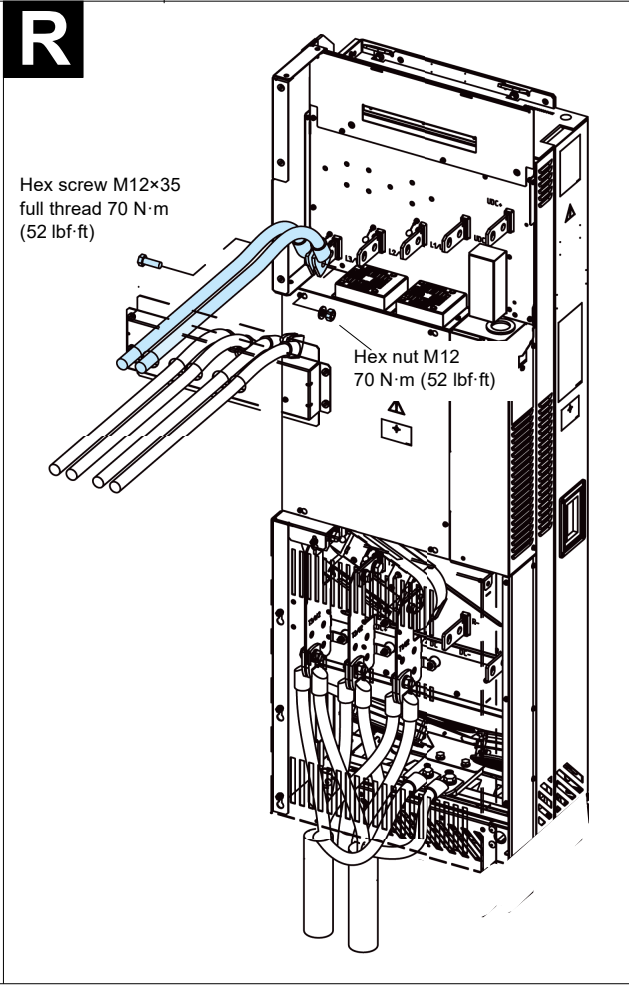
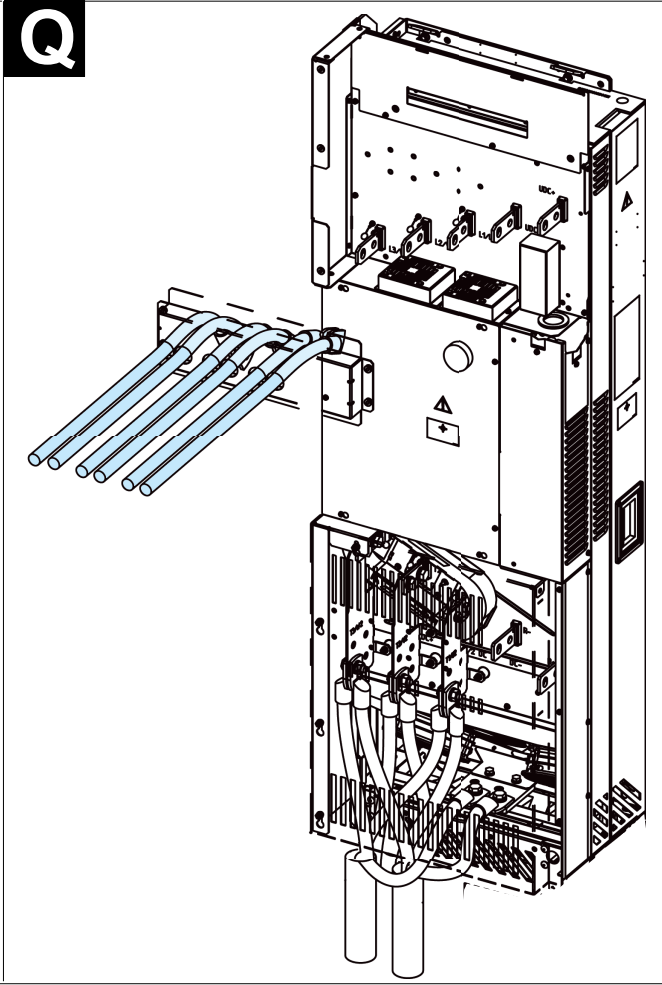
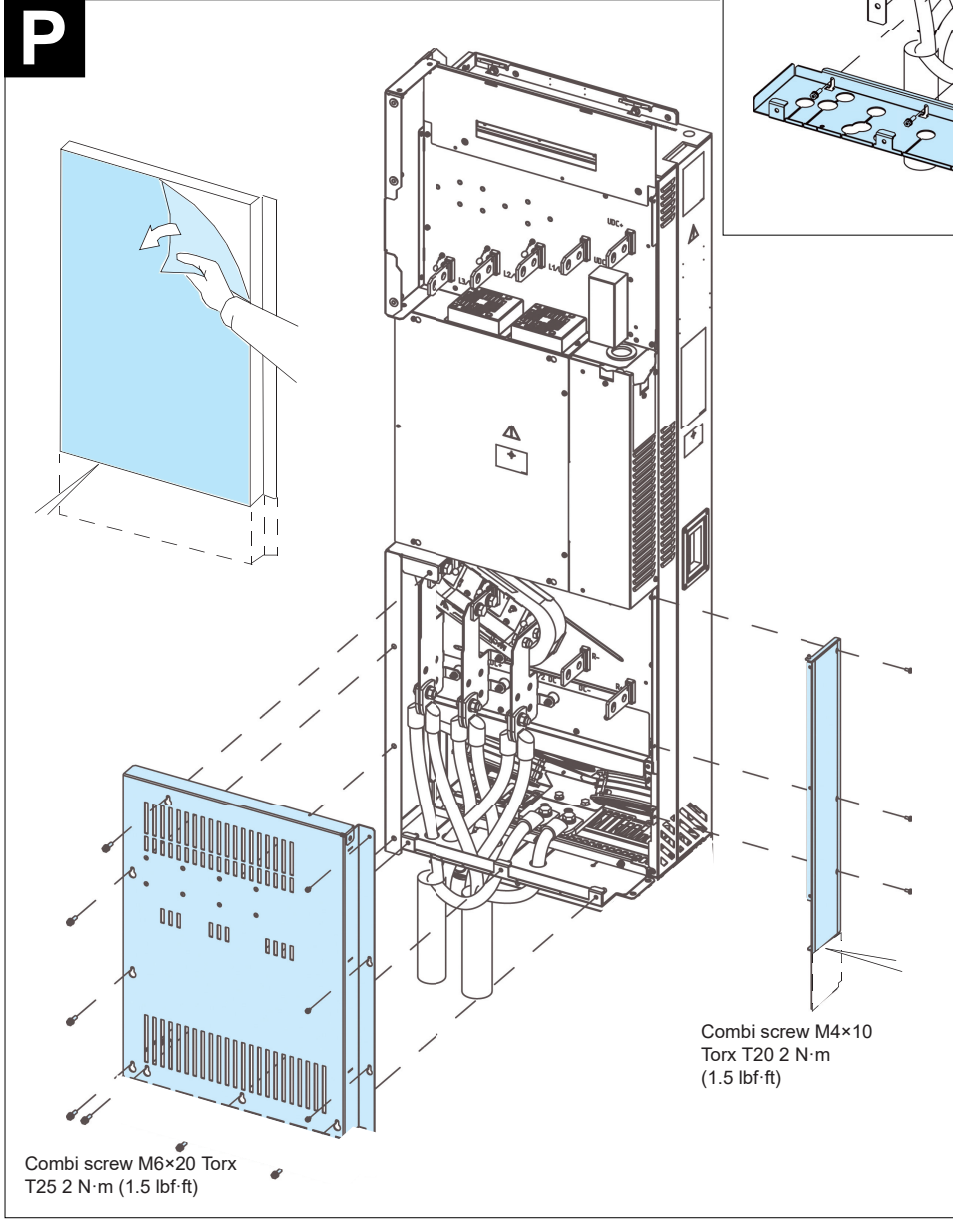
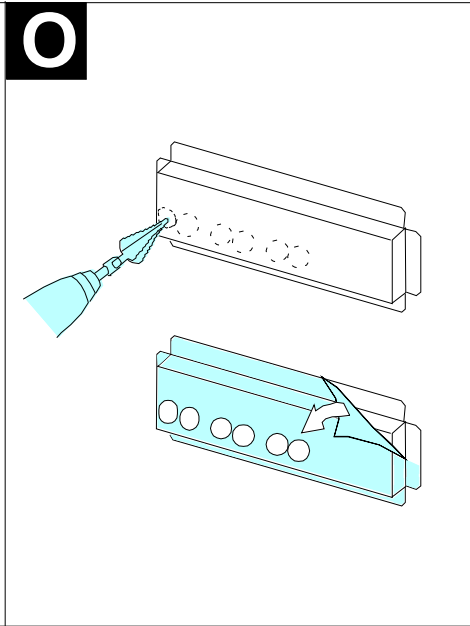
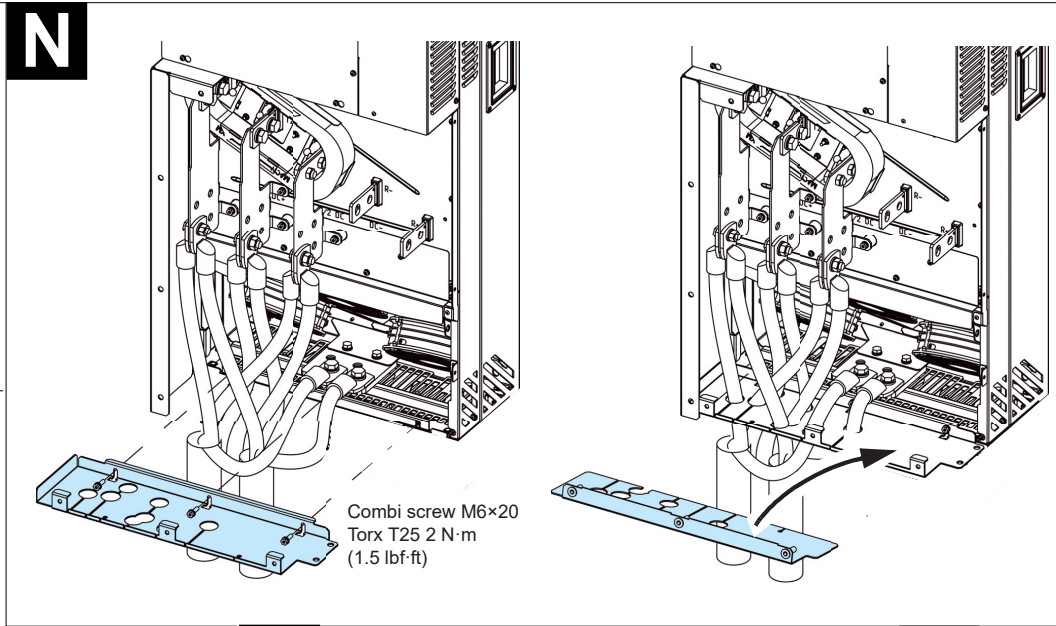
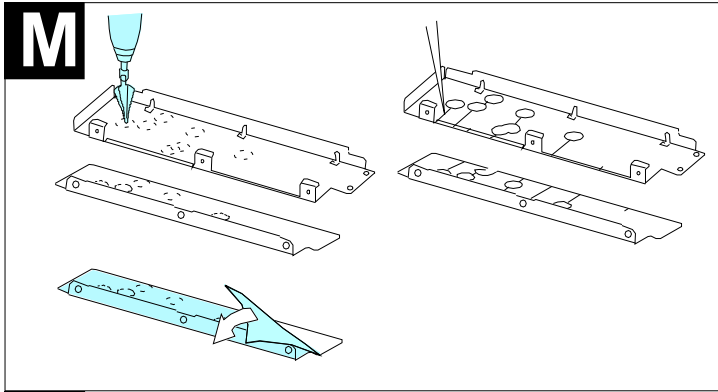
ACS880 China RoHS II DoC

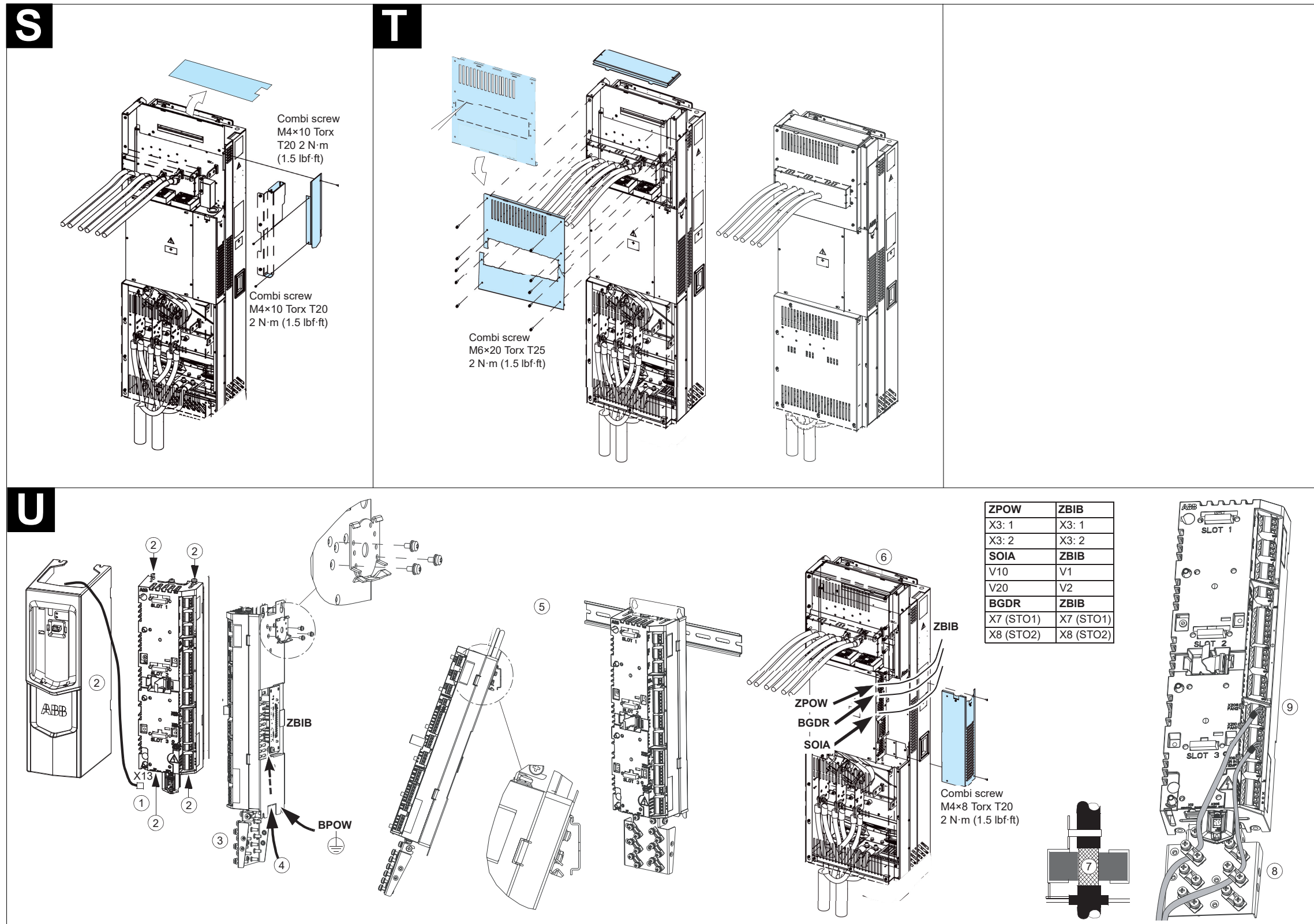
Step-by-step drawings for an installation example

Step-by-step drawings for an installation example 31











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 www.abb.com/searchchannels.

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 new.abb.com/drives/manuals-feedback-form.

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