ABB INDUSTRIAL DRIVES

ACS880-11

Quick installation and start-up guide

This guide is applicable to the global IEC and NEC North American installations.

Documentation in other languages

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

About this document

3AXD50000803026 Rev C EN
2022-09-20

Original instructions.

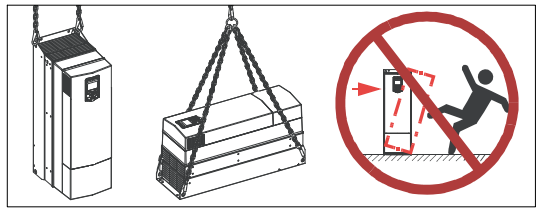
3AXD50000803026C

Safety instructions

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.

WARNING! If 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”.

- Do not do work on the drive, motor cable, motor, or control cables when the drive is connected to the input power. Before you start the work, isolate the drive from all dangerous voltage sources and measure that there are no dangerous voltages. Always wait for 5 minutes after disconnecting the input power to let the intermediate circuit capacitors discharge.
- 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.
- Frames R6 and R8: Use the lifting eyes of the drive when you lift the drive. Do not tilt the drive. The drive is heavy and its center of gravity is high. An overturning drive can cause physical injury.



1. Unpack the drive

Keep the drive in its package until you are ready to install it. After unpacking, protect the drive from dust, debris and moisture. Make sure that these items are included: drive, mounting template, control panel, quick installation and start-up guide, multilingual residual voltage warning stickers, hardware and firmware manuals (if ordered), options in separate packages (if ordered). Make sure that there are no signs of damage to the items.

2. Reform the capacitors

If the drive has not been powered up for a year or more, you must reform the DC link capacitors. See Related documents or contact ABB technical support.

3. Select the cables and fuses

- Select the power cables. Obey the 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.
  - **Power cable types:** IEC installations: Use copper cables. Aluminum cables can only be used with frame sizes R6 and R8, except the biggest R8. NEC installations: Only copper conductors are allowed.
  - **Current rating:** max. load current.
  - **Voltage rating (minimum):** IEC installations: 600 V AC cable is accepted for up to 500 V AC. NEC installations: 1000 V AC for 480 V AC motors. 600 V AC for 480 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. See Ratings, fuses and typical power cables.

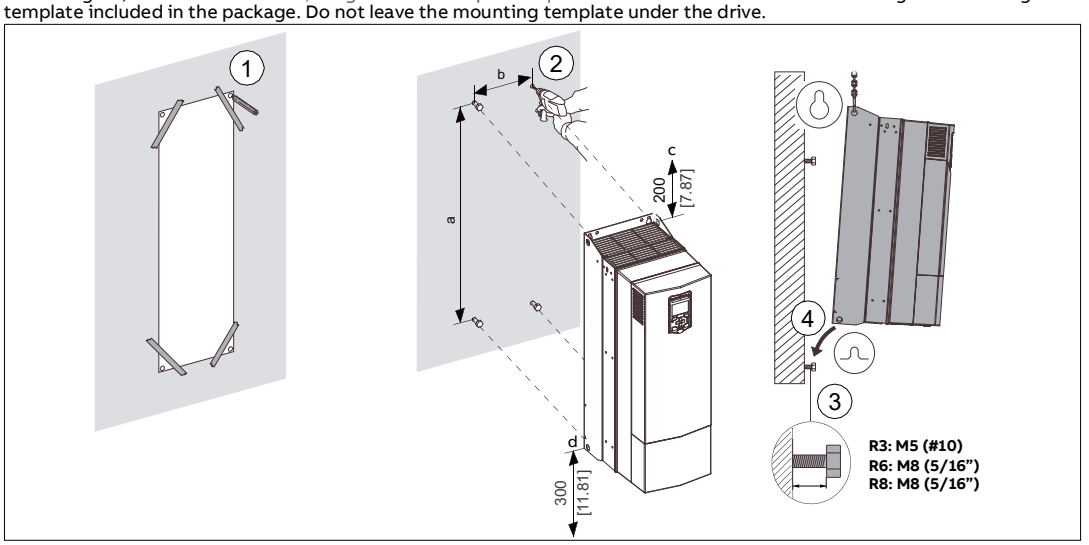
4. Examine the installation site

Examine the drive installation site. Make sure that:

- The installation site is sufficiently ventilated or cooled to remove heat from the drive.
- The ambient conditions of the drive meet the specifications. See Ambient conditions.
- The wall behind the drive and the material above and below the unit is of non-flammable material.
- The installation surface is as close to vertical as possible and strong enough to support the drive.
- There is sufficient free space around the drive for cooling, maintenance and operation. For the minimum free space requirements, refer to Dimensions, weights and free space requirements.
- 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.

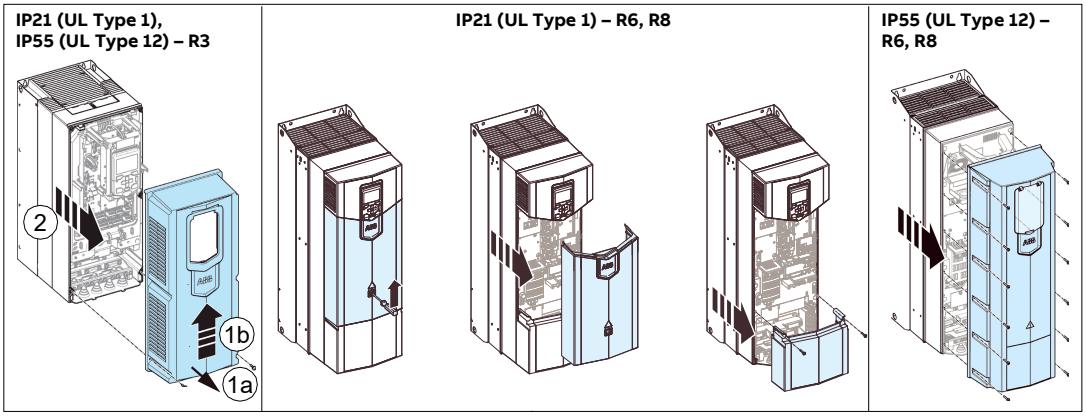
5. Install the drive on the wall

Select fasteners that comply with local requirements applicable to wall surface materials, drive weight and application. For drive weights, refer to Dimensions, weights and free space requirements. Mark the hole locations using the mounting template included in the package. Do not leave the mounting template under the drive.



	R3		R6		R8	
	mm	in	mm	in	mm	in
a	474	18.66	753	29.64	945	37.20
b	160	6.30	212.5	8.37	262.5	10.33
Required free space above the drive						
c	200	7.87	200	7.87	200	7.87
Required free space below the drive						
d	300	11.81	300	11.81	300	11.81

6. Remove the covers.



7. Make sure that the drive is compatible with the grounding system

You can connect all drives to a symmetrically grounded TN-S system (center-grounded wye). With option +E200 or +E202: If you install the drive to a different system, you may need to remove the EMC screw (disconnect the EMC filter) and/or remove the VAR screw (disconnect the varistor circuit).

Frame	Symmetrically grounded TN-S systems (center-grounded wye)	Corner-grounded delta and midpoint-grounded delta systems	IT systems (ungrounded or high-resistance grounded)	TT systems [1) 2)]
R3	Do not remove EMC or VAR screws.	Do not remove EMC or VAR screws.	Remove EMC and VAR screws.	Remove EMC and VAR screws.
R6	Do not remove EMC or VAR screws.	Remove EMC screw. Do not remove VAR screw. See Note 2 below.	Remove EMC and VAR screws.	Remove EMC and VAR screws.
R8	Do not remove EMC AC or VAR screws.	Remove EMC DC and VAR screws.	Remove EMC DC and VAR screws.	Remove EMC DC and VAR screws.

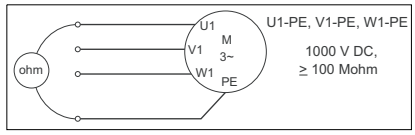
1) A residual current device must be installed in the supply system. In NEC installations the residual current device is only required at or above 1000 amps.

2) ABB does not guarantee the EMC category or the operation of the ground leakage detector built inside the drive.

8. Measure the insulation resistance of the power cables and the motor

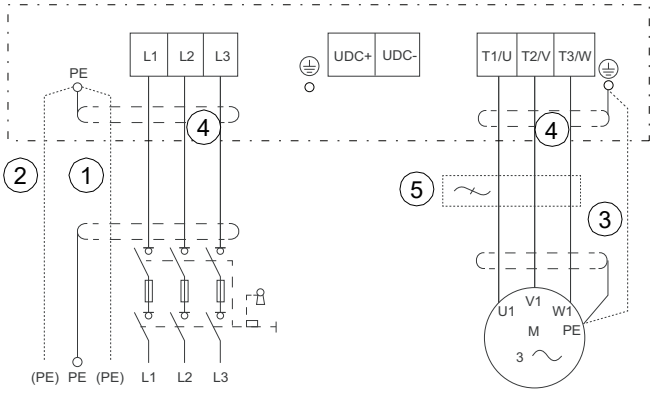
Measure the insulation resistance of the input cable before you connect it to the drive. Obey local regulations.

Measure the insulation resistance of the motor cable and motor when the cable is disconnected from the drive. Measure the insulation resistance between each phase conductor and the PE conductor. Use a measuring voltage of 1000 V DC. The insulation resistance of an ABB motor must be more than 100 Mohm (reference value at 25 °C). For the insulation resistance of other motors, see the manufacturer's instructions. Moisture inside the motor decreases the insulation resistance. If you think that there is moisture, dry the motor and do the measurement again.



9. Connect the power cables

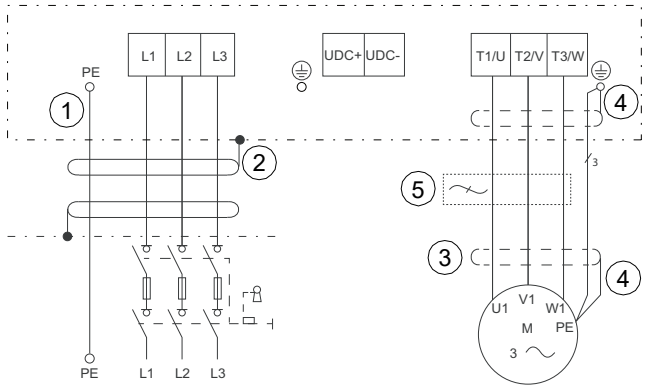
IEC connection diagram with shielded cables



1. Two protective earth (ground) conductors. Drive safety standard IEC/EN 61800-5-1 requires two PE conductors, if the cross-sectional area of the PE conductor is less than 10 mm^2 Cu or 16 mm^2 Al. For example, you can use the cable shield in addition to the fourth conductor.
2. Use a separate grounding cable or a cable with a separate PE conductor for the line side, if the conductivity of the fourth conductor or shield does not meet the requirements for the PE conductor.
3. Use a separate grounding cable for the motor side, if the conductivity of the shield is not sufficient, or if there is no symmetrically constructed PE conductor in the cable.
4. 360-degree grounding of the cable shield is required for the motor cable. It is also recommended for the input power cable.
5. If necessary, install an external filter (du/dt, common mode, or sine filter). Filters are available from ABB.

NEC connection diagram with symmetrically shielded cable or conduit

Note: NEC installation can include separate insulated conductors inside a conduit, shielded VFD cable in conduit, or shielded VFD cable without conduit. The normal dashed symbol (3) in this diagram represents the shield of shielded VFD cable. The same solid symbol (2) represents conduit.



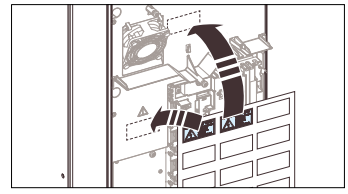
1. Insulated ground conductor in a conduit: Ground to drive's PE terminal and to the distribution panel ground bus. For a VFD cable installation see 4.
2. Conduit ground: Bond the conduit to the drive's conduit box and to the distribution panel enclosure. For a VFD cable installation see 3.
3. Shield of a VFD shielded cable: Ground the shield 360° under drive's grounding clamp, then twist with the ground conductors and connect under the drive's ground terminal. Ground the shield also 360° at the motor end, then twist and connect under the motor's ground terminal. For a conduit installation see 2.
4. Symmetrically constructed grounding conductors inside a VFD shielded cable: Twist together, combine with the shield and connect under the drive's ground terminal and under the motor's ground terminal. For a conduit installation see 1.
5. If necessary, install an external filter (du/dt, common mode, or sine filter). Filters are available from ABB.

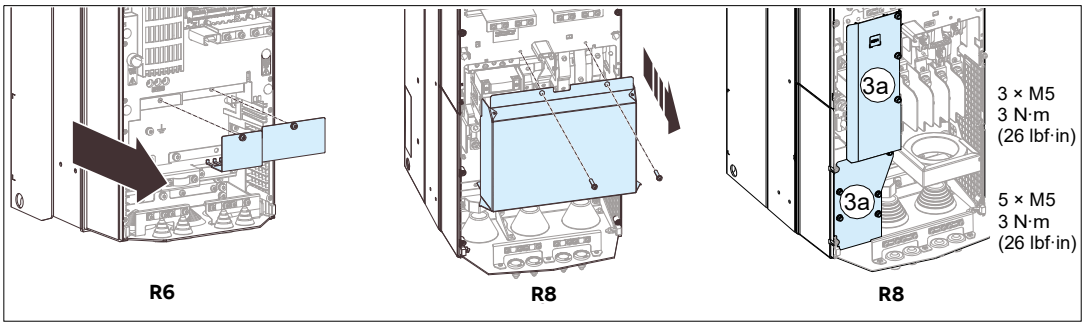
Note: All openings in the drive enclosure must be closed with UL listed devices having the same Type rating as the drive Type.

Connection procedure with VFD cable

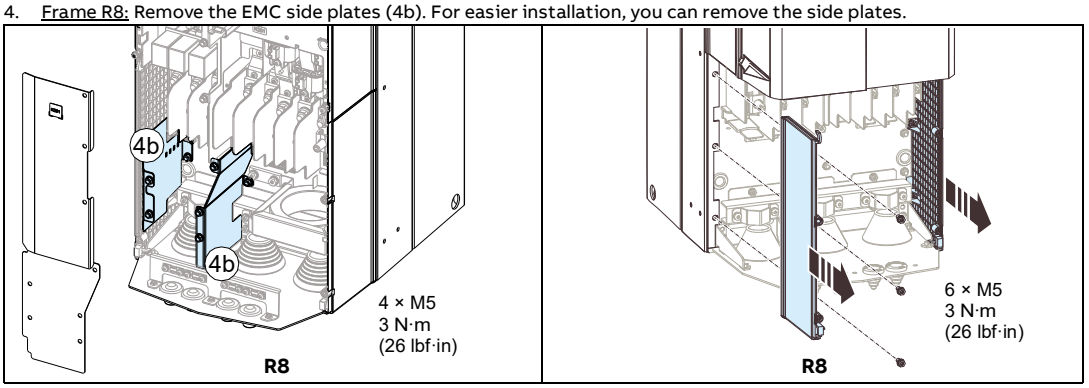
For connection procedure with conduits, see Connection procedure with conduit.

1. Attach a residual voltage warning sticker in the local language.
2. Frames R6 and R8: Remove the shroud on the power cable terminals.
3. Frame R6: If you need more working space, unscrew the screw and lift the EMC plate off. Install the EMC plate again after you have installed the motor and input power cables.
   Frame R8: Remove the EMC cover plates (3a).

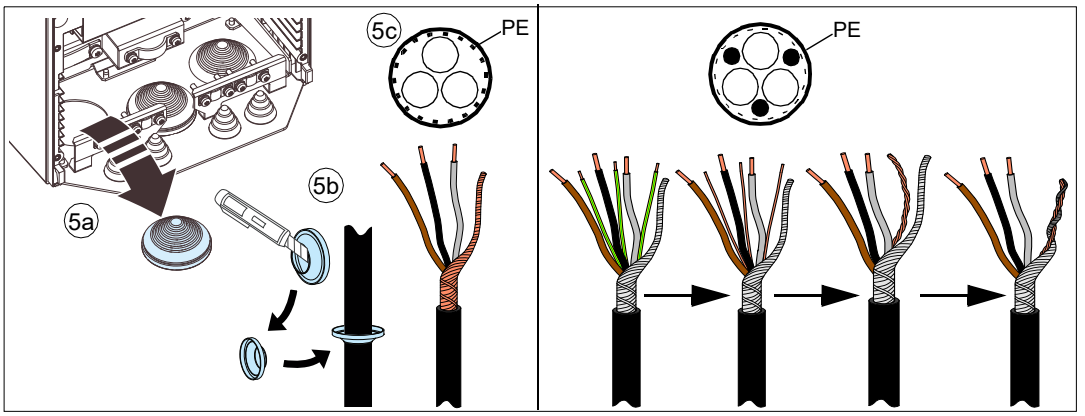




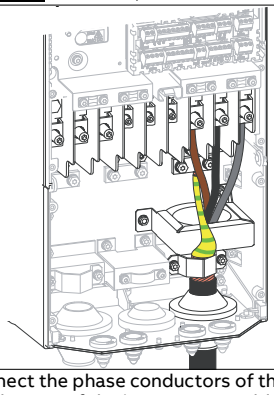
4. Frame R8: Remove the EMC side plates (4b). For easier installation, you can remove the side plates.



5. Prepare the power cables:
   - Remove the rubber grommets of the cables to be installed from the cable entry plate. Remove the unused grommets and reinstall with the cone pointing down (5a).
   - Cut a sufficient hole in the rubber grommet. Slide the grommet onto the cable (5b) with the remaining cone pointing down.
   - Prepare the ends of the input power cable and motor cable as illustrated in the applicable figure (5c).
   - Slide the cables through the holes in the cable entry and attach the grommets to the holes.



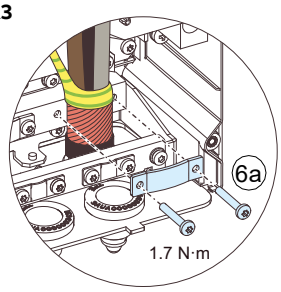
6. Connect the power cables. For the tightening torques, refer to Terminal data.
   - Ground the shield 360 degrees by tightening the clamp of the power cable grounding shelf onto the stripped part of the cable (6a).
   - Connect the twisted shield of the cable shields to the grounding terminals (6b).
   - Frame R8: If needed, install the common mode filter. For instructions, see Related documents.

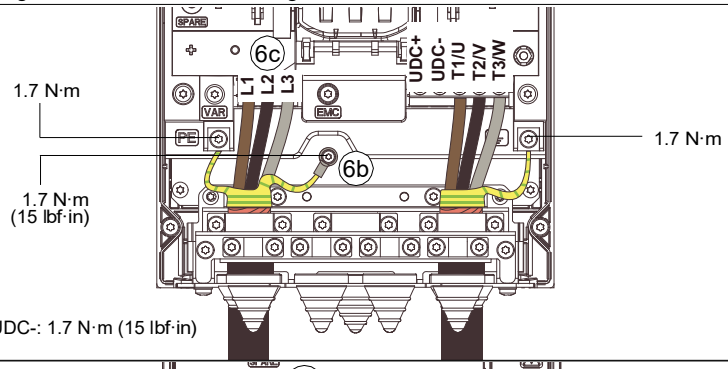


T1/U, T2/V, T3/W		⏚
T (Wire screw)		*T*
M…	N·m	N·m
M10	30	9.8

   - Connect the phase conductors of the motor cable to the T1/U, T2/V and T3/W terminals. Connect the phase conductors of the input power cable to the L1, L2 and L3 terminals (6c).
   - If the DC cables are present, cut off one phase conductor and isolate the end. Connect the remaining conductors to the UDC+ and UDC- terminals.
   - Tighten the screws to the torque given in the installation drawing below.

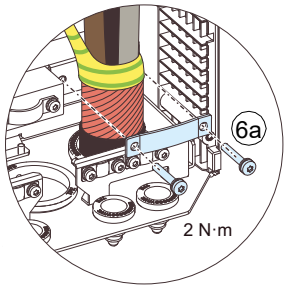
R3

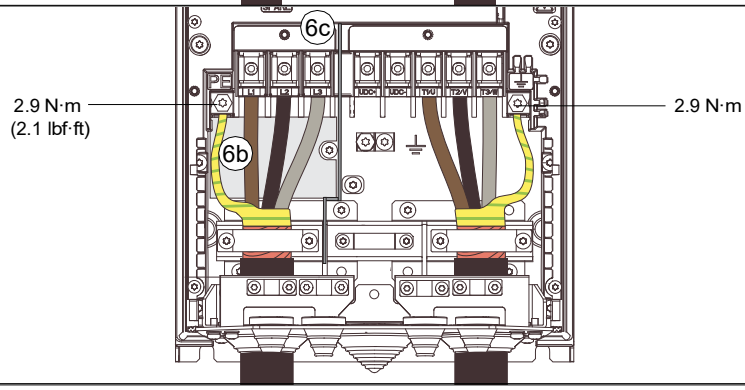




L1, L2, L3, T1/U, T2/V, T3/W, UDC+, UDC-: 1.7 N·m (15 lbf·in)

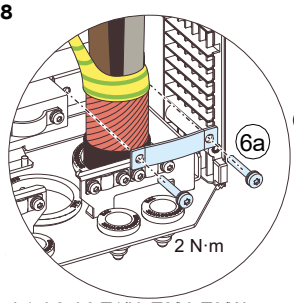
R6

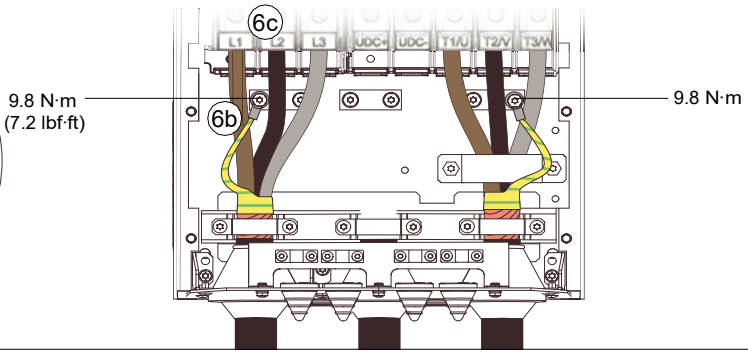




L1, L2, L3, T1/U, T2/V, T3/W,
UDC+, UDC-: 15 N·m (11 lbf·ft)

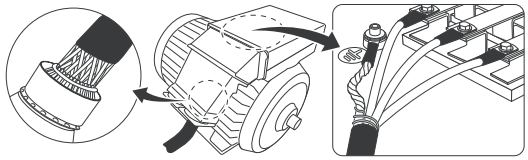
R8





L1, L2, L3 T1/U, T2/V, T3/W,
UDC+, UDC-: 30 N·m (22.0 lbf·ft)

7. Frame R8: Install the EMC plates in reverse order. See steps 3 and 4.
8. Frame R8: Install the side plates if removed in step 4.
9. Install the shroud onto the power cable connection terminals.
10. Attach the cables outside the drive mechanically.
11. Ground the motor cable shield at the motor end. For minimum radio frequency interference, ground the motor cable shield 360 degrees at the cable entry of the motor terminal box.



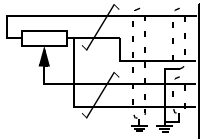
10. Connect the control cables

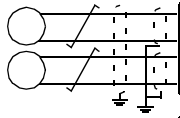
Make the connections according to the application. Keep the signal wire pairs twisted as near to the terminals as possible to prevent inductive coupling.

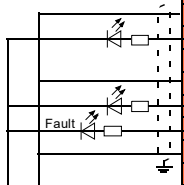
1. Cut a hole into the rubber grommet and slide the grommet onto the cable with the remaining cone pointing down.
2. Ground the outer shield of the cable 360 degrees under the grounding clamp. Keep the cable unstripped as close to the terminals of the control unit as possible. For R3, ground the pair cable shields and grounding wire under the grounding clamp screw at the cable entry. For R6 and R8, ground the pair-cable shields and grounding wire under a grounding clamp screw below the control unit.
3. Tie all control cables to the provided cable tie mounts.

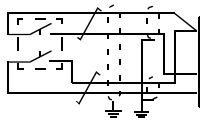
Default I/O connections

Wire sizes: 0.5 … 2.5 mm^2 (24…12 AWG) Tightening torques: 0.5 N·m (5 lbf·in) for both stranded and solid wiring.







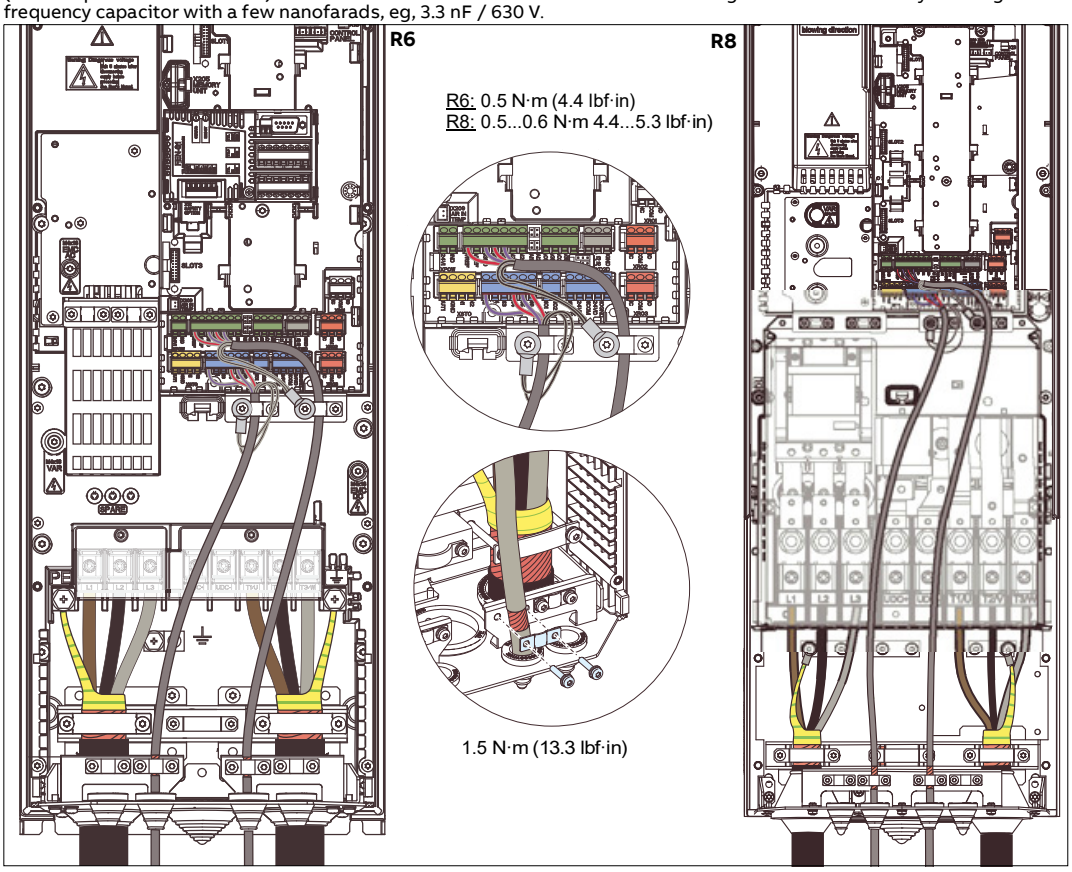


XPOW	External power input	
1	+24VI	24 V DC, 2 A
2	GND	
XAI	Reference voltage and analog inputs	
1	+VREF	10 V DC, R_L 1…10 kohm
2	-VREF	-10 V DC, R_L 1…10 kohm
3	AGND	Ground
4	AI1+	**Speed reference** 0(2)…10 V, R_{in} > 200 kohm
5	AI1-	
6	AI2+	By default not in use. 0(4)…20 mA, R_{in} = 100 ohm
7	AI2-	
AI1:I	AI1:U	AI1 current/voltage selection jumper
AI2:I	AI2:U	AI2 current/voltage selection jumper
XAO	Analog outputs	
1	AO1	**Motor speed rpm** 0…20 mA, R_L < 500 ohm
2	AGND	
3	AO2	**Motor current** 0…20 mA, R_L < 500 ohm
4	AGND	
XD2D	Drive-to-drive link	
1	B	Drive-to-drive link
2	A	
3	BGND	
J3	J3	Drive-to-drive link termination switch
XRO1, XRO2, XRO3	Relay outputs	
11	NC	**Ready** 250 V AC / 30 V DC 2 A
12	COM	
13	NO	
21	NC	**Running** 250 V AC / 30 V DC 2 A
22	COM	
23	NO	
31	NC	**Faulted(-1)** 250 V AC / 30 V DC 2 A
32	COM	
33	NO	
XD24	Digital interlock	
1	DIIL	Run enable
2	+24VD	+24 V DC 200 mA [1]
3	DICOM	Digital input ground
4	+24VD	+24 V DC 200 mA [1]
5	DIOGND	Digital input/output ground
J6	Ground selection switch	
XDIO	Digital input/outputs	
1	DIO1	Output: Ready
2	DIO2	Output: Running
XDI	Digital inputs	
1	DI1	Stop (0) / Start (1)
2	DI2	Forward (0) / Reverse (1)
3	DI3	Reset
4	DI4	Acceleration & deceleration select
5	DI5	Constant speed 1 (1 = On)
6	DI6	By default not in use.
XSTO	Safe torque off	
1	OUT1	Safe torque off. Both circuits must be closed for the drive to start.
2	SGND	
3	IN1	
4	IN2	
X12	Safety functions module connection	
X13	Control panel connection	
X205	Memory unit connection	

[1] Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2.

Control cable installation examples

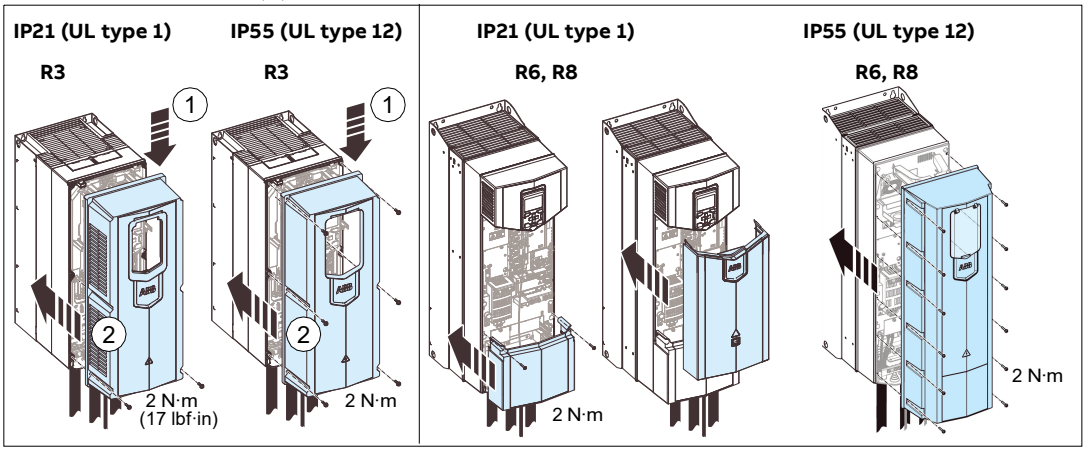
Use an unused ground clamp screw for grounding pair cable shields and grounding wire. If none available ground as shown (R3 example not shown below). Leave the other end of the shields unconnected or ground them indirectly via a high-frequency capacitor with a few nanofarads, eg, 3.3 nF / 630 V.



11. Install optional modules, if included in the delivery

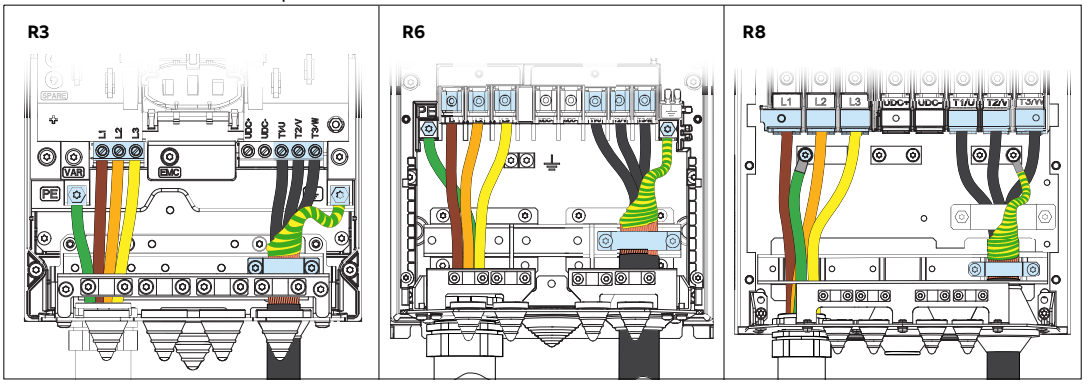
For frame R3: To gain access to SLOT1 and SLOT2, pull the control panel holder up.

12. Install the cover(s)

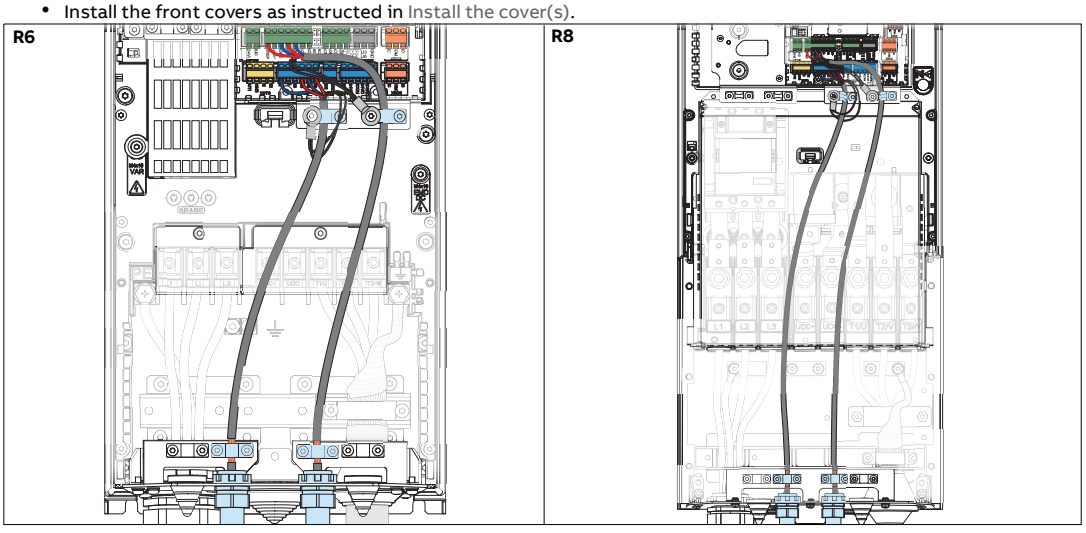


Connection procedure with conduit

1. Connect the power cables. ABB recommends symmetrically shielded VFD cable for connecting the motor.
   - Remove the covers as instructed in Remove the covers. Attach the residual voltage warning sticker.
   - Remove the shroud on the power cable terminals as instructed in Connection procedure with VFD cable.
   - Frame R8: Remove the EMC plates as instructed in Connection procedure with VFD cable.
   - Remove the rubber grommets from the conduit plate for the conduit to be connected. If you remove the cable shelves, reinstall the four screw plugs to avoid moisture exchange through the empty holes.
   - Attach the conduit to the drive conduit plate, and to the motor or source of power distribution. Make sure conduit is correctly bonded at both ends of the conduit. Ensure conductivity of the conduit. Slide the VFD shielded cable or discrete conductors through the conduit and strip the cable ends.
   - If you use a symmetrically shielded VFD cable, twist the grounding wires together with the cable shield and connect them to the grounding terminals. Ground the shield 360 degrees at the grounding clamp. If you use discrete conductors connect the insulated ground conductor to the ground terminal.
   - Connect the input and motor conductors and tighten cable terminals. For the tightening torques, refer to Terminal data.
   - Frame R8: Install the EMC plates.
   - Install the shroud on the power cable terminals.



2. Connect the control cables
   - Attach the cable conduits to the drive conduit plate. Make sure conduit is correctly bonded at both ends and that the conductivity is consistent throughout the conduit. Slide the control cables through the conduit.
   - Cut to suitable length (note the extra length of the grounding conductors) and strip the conductors.
   - Ground the outer shields of all control cables 360 degrees at a grounding clamp.
   - For R3, ground the pair cable shields and grounding wire under the grounding clamp screw at the cable entry. For R6 and R8, ground the pair-cable shields and grounding wire under the clamp below the control unit. Use an unused ground clamp screw. If none available ground as shown (R3 example not shown below). 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.
   - Connect the conductors to the appropriate terminals of the control unit.
   - Wire the optional modules if included in the delivery. For frame R3: To gain access to SLOT1 and SLOT2, pull the control panel holder up.
   - Install the front covers as instructed in Install the cover(s).



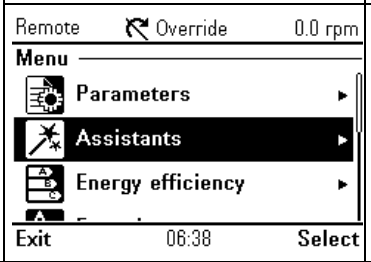
13. Start-up the drive

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.

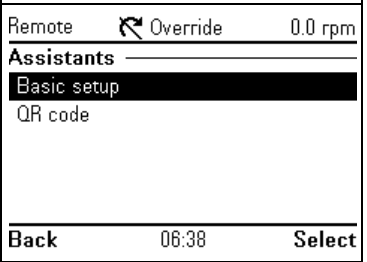
Use the control panel to do the start-up procedure. The two commands at the bottom of the display show the functions of the two softkeys and located below the display. The commands assigned to the softkeys are different depending on the context. Use the arrow keys, and to move the cursor or change values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

1. Power up the drive. Make sure that you have the motor name plate data available.

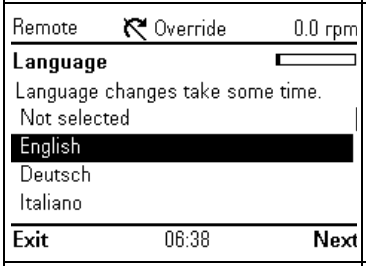
2. The First start assistant guides you through the first start-up.
Select **Menu** and press **(Menu)** to open the main Menu.
Select **Assistants** and press **(Select)**.



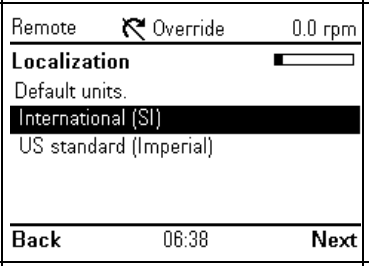
3. Select **Basic setup** and press **(Select)**.



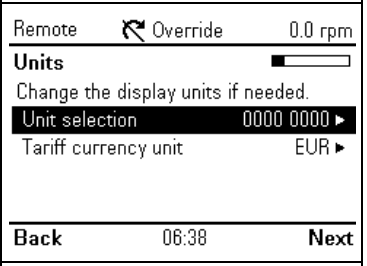
4. Select the language you want to use and press **(Next)**.
Note: After you have selected the language, it takes a few minutes for the control panel to wake up.



5. Select the localization you want to use and press **(Next)**.



6. Do the following selections. After each, press **(Next)**.



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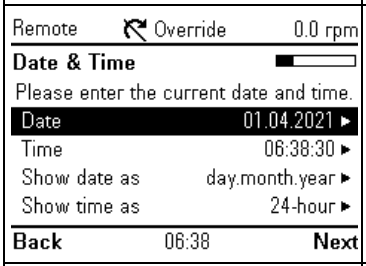

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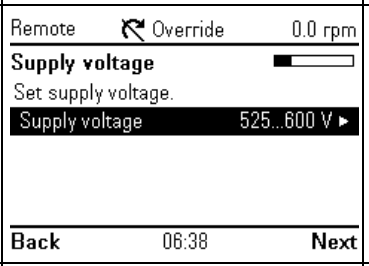

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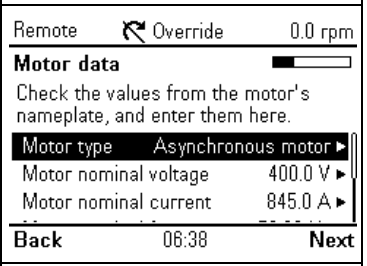

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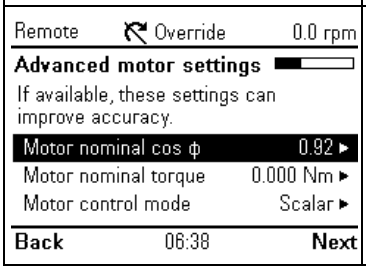

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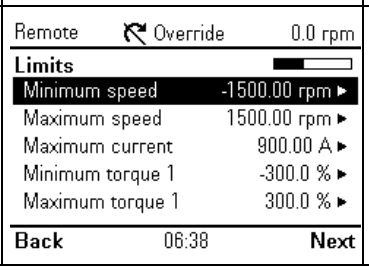

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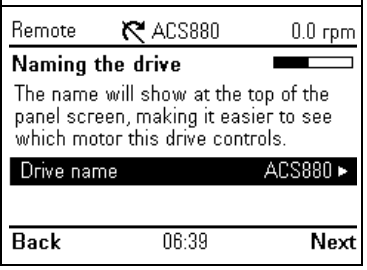
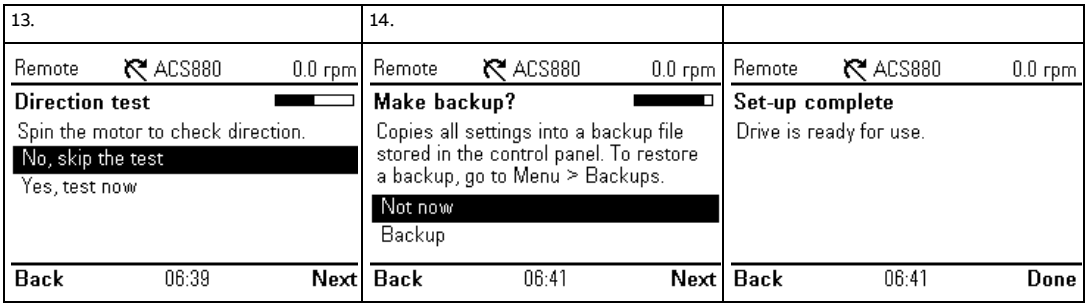




Motor overload protection

The factory motor overload protection is not enabled by default. Motor thermal overload protection can use motor temperature sensors, 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 sensors, 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 can 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
58.15 Communication loss mode	58.25 Control profile	58.31 EFB act1 transparent source	58.101 Data I/O 1 … 58.124 Data I/O 24
58.16 Communication loss time	58.26 EFB ref1 type	58.33 Addressing mode	

Warnings and faults

Warning	Fault	Aux. code	Description
A2A1	2281	Current calibration	Warning: Current calibration is done at the next start. Fault: 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 undervoltage	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.
AF80	7580	INU-LSU comm loss	DDCS communication between converters is lost.
-	7583	Line side unit faulted	The supply unit (or other converter) connected to the inverter unit has generated a fault.

Warning	Fault	Aux. code	Description
A7AB	-	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.

For other warnings and faults, see the firmware manual.

Ratings, fuses and typical power cables

1) Typical motor power with no overload capacity (nominal use). The kilowatt ratings apply to most IEC 4-pole motors. The horsepower ratings apply to most NEMA 4-pole motors.

2) For IEC installations, ABB recommends aR fuses. The gG fuses can be used for frame R3 if they operate rapidly enough (max. 0.1 seconds). The operating time depends on the supply network impedance and the cross-sectional area and length of the supply cable. Obey the local regulations. See hardware manual for guidelines in selecting between aR and gG fuses, and for additional fuse alternatives.

3) The recommended branch protection fuses must be used to maintain the IEC/EN/UL 61800-5-1 and CSA C22.2 No. 274 certifications. Refer to note 6 for circuit breaker protection.

4) IEC 61439-1: The drive is suitable for use on a circuit capable of delivering not more than 65 kA when protected by the fuses given in this table.

5) UL 61800-5-1, CSA C22.2 No. 274: The drive is suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (rms) at 480 V maximum when protected by the ABB recommended fuses.

6) For alternative UL fuses and circuit breakers see Related documents.

7) Class J, CC, and CF fuses are also allowed at the same nominal current and voltage ratings.

8) These losses are typical power losses and they are not calculated according to the ecodesign standard IEC 61800-9-2.

9) IEC Installations: The cable sizing 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, PV insulation, surface temperature 70 °C (EN 60204-1 and IEC 60364-5-52/2001). For other conditions, size the cables according to local safety regulations, appropriate input voltage and the load current of the drive.

10) NEC Installations: The cable sizing 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, size the cables according to local safety regulations, appropriate input voltage and the load current of the drive.

ACS880 -11-...	Frame size	Nominal ratings				Motor power[1]		Fuses[3]			Typical power cable		Power loss[8]
		IEC		UL (NEC)				gG fuse[4] (DIN 43620)	aR fuse[2][4] (DIN 43620)	UL class T[5][6][7]	Copper		
		Input current	Output current	Input current	Output current								
		I_1	I_2	I_1	I_{Ld}	P_n	P_{Ld}	ABB type	Bussmann type		mm^2 [9]	AWG [10]	W
		A	A	A	A	kW	hp						
U_n = 3-phase 400 V													
09A4-3	R3	8	10.0	-	-	4.0	-	OFAF000H16	170M1561	-	3×1.5	-	226
12A6-3	R3	10	12.9	-	-	5.5	-	OFAF000H16	170M1561	-	3×1.5	-	329
017A-3	R3	14	17.0	-	-	7.5	-	OFAF000H25	170M1563	-	3×6	-	395
025A-3	R3	20	25	-	-	11	-	OFAF000H32	170M1563	-	3×6	-	579
032A-3	R6	27	32	-	-	15	-	-	170M1565	-	3×10	-	625
038A-3	R6	33	38	-	-	18.5	-	-	170M1565	-	3×10	-	751
045A-3	R6	40	45	-	-	22	-	-	170M1566	-	3×16	-	912
061A-3	R6	51	61	-	-	30	-	-	170M1567	-	3×25	-	1088
072A-3	R6	63	72	-	-	37	-	-	170M1568	-	3×35	-	1502
087A-3	R6	76	87	-	-	45	-	-	170M1569	-	3×35	-	1904
105A-3	R8	88	105	-	-	55	-	-	170M3817	-	3×50	-	1877
145A-3	R8	120	145	-	-	75	-	-	170M3817	-	3×95	-	2963
169A-3	R8	144	169	-	-	90	-	-	170M5809	-	3×120	-	3168
206A-3	R8	176	206	-	-	110	-	-	170M5810	-	3×150	-	3990
U_n = 3-phase 480 V (NEC), 500 V (IEC)													
07A6-5	R3	7	7.6	7	7.6	4	5	OFAF000H16	170M1561	JJS-15	3×1.5	14	219
11A0-5	R3	9	11.0	9	11.0	5.5	7.5	OFAF000H16	170M1561	JJS-20	3×1.5	14	278
014A-5	R3	12	14	12	14	7.5	10	OFAF000H25	170M1563	JJS-25	3×6	10	321
021A-5	R3	17	21	17	21	11	15	OFAF000H32	170M1563	JJS-35	3×6	10	473
027A-5	R6	24	27	24	27	15	20	-	170M1565	JJS-40	3×10	8	625
034A-5	R6	29	34	29	34	18.5	25	-	170M1565	JJS-50	3×10	8	711
040A-5	R6	34	40	34	40	22	30	-	170M1566	JJS-60	3×16	6	807
052A-5	R6	44	52	44	52	30	40	-	170M1567	JJS-80	3×25	4	960
065A-5	R6	54	65	54	65	37	50	-	170M1568	JJS-90	3×35	2	1223
077A-5	R6	66	77	66	77	45	60	-	170M1569	JJS-110	3×35	2	1560
101A-5	R8	71	101	74	96	55	75	-	170M3816	JJS-150	3×50	1	1995
124A-5	R8	96	124	100	124	75	100	-	170M3817	JJS-200	3×95	2/0	2800
156A-5	R8	115	156	120	156	90	125	-	170M5808	JJS-225	3×120	3/0	3168
180A-5	R8	141	180	147	180	110	150	-	170M5810	JJS-300	3×150	250MCM	3872

Terminal data

Frame size	Cable entries			L1, L2, L3, T1/U, T2/V, T3/W, UDC+ and UDC- terminals			
	pcs	Max. cable diameter*		Wire size		Tightening torque	
		mm	in	mm^2	AWG/kcmil	N·m	lbf·ft
R3	3	23	0.91	0.5…16.0	20…6	1.7	1.2
R6	3	45	1.77	6.0…70.0	6…1/0	15	11.0
R8	3	50	1.97	25…150	4…300 MCM	30	22.5

For tightening torques of grounding terminals, see section Connect the power cables.

* Maximum cable diameter accepted.

Notes:

- The minimum specified wire size does not necessarily have sufficient current carrying capacity at maximum load. Make sure the installation complies with local laws and regulations.
- For IEC installations using mm^2 cable, the terminals do not accept a conductor that is one size larger than the recommended wire size. For NEC installations using AWG cable, this applies only to the R8 frame 180A drive.
- The maximum number of conductors per terminal is 1.

Dimensions, weights and free space requirements

Frame size	Weight	Weight	Height	Height	Width	Width	Depth	Depth
	kg	lb	mm	in	mm	in	mm	in
IP21 (UL Type 1)								
R3	21.3	47	495	19.49	205	8.07	356	14.02
R6	61	135	771	30.35	252	9.92	382	15.03
R8	118[1)]	260	965	38.01	300	11.81	430	16.94
IP55 (UL Type 12), option +B056								
R3	23.3	51	495	19.49	205	8.07	360	14.17
R6	63	139	771	30.35	252	9.92	445	17.54
R8	124[2)]	273	965	38.01	300	11.81	496	19.53
IP20 (UL Open Type), option +P940								
R3	18.3	40.34	490	19	203	7.99	349	13.74
R6	59	131	771	30.35	252	9.92	358	14
R8	100-115[3)]	254[4)]	965	38.01	300	11.81	430	16.94

1) for types -105A-3, 145A-3, -101A-5, -124A-5: 103 kg

2) for types -105A-3, 145A-3, -101A-5, -124A-5: 109 kg

3) for types -105A-3, 145A-3, -101A-5, -124A-5: 100 kg

4) for types -105A-3, 145A-3, -101A-5, -124A-5: 220 lb

200 mm (7.9 in) free space is required at top of the drive.

300 mm (11.8 in) free space (when measured from the drive base without the cable box) is required at bottom of the drive.

Ambient conditions

Installation altitude	0 … 4000 m (0 … 13123 ft) above sea level. The output current must be derated at altitudes above 1000 m (3281 ft). The derating is 1% for each 100 m (328 ft) above 1000 m (3281 ft).
Surrounding air temperature	Operation: -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) except for IP55 (UL Type 12) drive type -206A-3, see the hardware manual. Storage (in the package): -40 to +70 °C (-40 to +158 °F).

Safe torque off (STO)

The drive has a Safe torque off function (STO) 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 Safe torque off is activated, it coasts to a stop. Closing the activation switch deactivates the 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 in this manual is calculated for redundant use, and does not apply if both channels are not used.

WARNING! The STO function does not disconnect the voltage from the main and auxiliary circuits of the drive.

Notes:

- If stopping by coasting is not acceptable, stop the drive and machinery using the appropriate stop mode before activating the 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: Frames R3 and R6: 2 ms (typical), 10 ms (maximum) Frame R8: 2 ms (typical), 15 ms (maximum)
- Fault detection time: Channels in different states for longer than 200ms
- Fault reaction time: Fault detection time + 10ms
- STO fault indication (parameter 31.22) delay: < 500 ms
- STO warning indication (parameter 31.22) delay: < 1000 ms
- Safety integrity level (EN 62061): SIL 3
- Performance level (EN ISO 13849-1): PL e

The drive STO is a type A 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

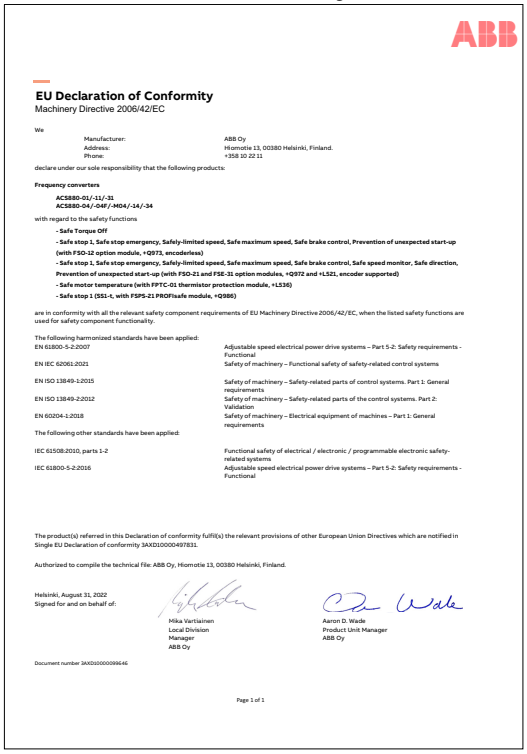
The applicable markings are shown on the type designation label of the drive.

CE UL RCM EAC EIP WEEE TÜV Nord CSA UKCA KC

Related documents

Document	Code (English)
ACS880-11 hardware manual	3AXD50000045932
ACS880 primary control program firmware manual	3AXD50000085967
ACS-AP-I, -S, -W and ACH-AP-H, -W Assistant control panels user's manual	3AUA0000085685
Drive composer PC tool user's manual	3AUA0000094606
Converter module capacitor reforming instructions	3BFE64059629
Common mode filter kit for ACS880-01 frame R7, and for ACS880-11, ACS880-31, ACH580-31 and ACQ580-31 frame R8 installation instructions	3AXD50000015179
Alternate Fuses, MMPs and Circuit Breakers for ABB Drives	3AXD50000645015

Declarations of Conformity



ABB

EU Declaration of Conformity
Machinery Directive 2006/42/EC

We

Manufacturer: ABB Oy
Address: Hiomotie 13, 00380 Helsinki, Finland.
Phone: +358 10 22 11

declare under our sole responsibility that the following products:

Frequency converters

ACS880-01(-11/-31
ACS880-04(-048/-M04/-14/-34

with regard to the safety functions

- Safe Torque Off
- Safe stop 1, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Prevention of unexpected start-up (with FSO-12 option module, +Q973, encoderless)
- Safe stop 1, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Safe speed monitor, Safe direction, Prevention of unexpected start-up (with FSO-21 and FSE-31 option modules, +Q972 and +L521, encoder supported)
- Safe motor temperature (with FPTC-01 thermistor protection module, +L536)
- Safe stop 1 (SS1-t, with FSPS-21 PROFIsafe module, +Q986)

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.

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

The following other standards have been applied:

IEC 61508:2010, parts 1-2	Functional safety of electrical / electronic / programmable electronic safety-related systems
IEC 61800-5-2:2016	Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional

The product(s) referred in this Declaration of conformity fulfil(s) the relevant provisions of other European Union Directives which are notified in Single EU Declaration of conformity 3AXD10000497831.

Authorized to compile the technical file: ABB Oy, Hiomotie 13, 00380 Helsinki, Finland.

Helsinki, August 31, 2022
Signed for and on behalf of:

Mika Vartiainen
Local Division Manager
ABB Oy

Aaron D. Wade
Product Unit Manager
ABB Oy

Document number 3AXD10000099646

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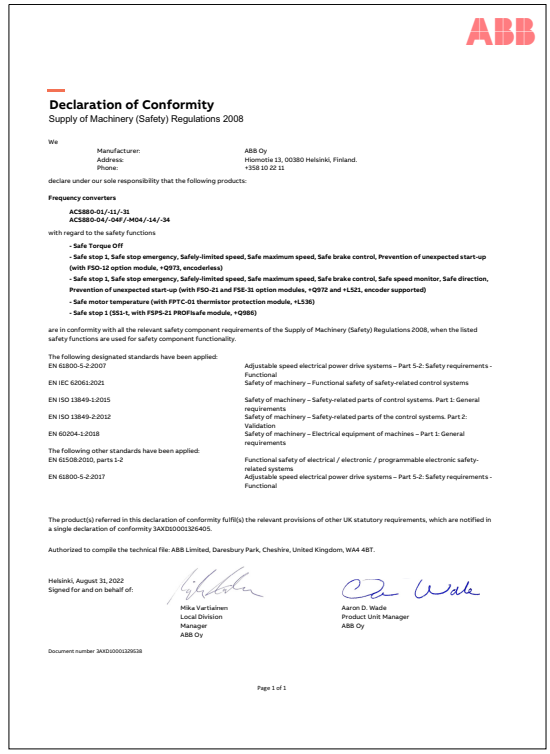

ABB

Declaration of Conformity
Supply of Machinery (Safety) Regulations 2008

We

Manufacturer: ABB Oy
Address: Hiomotie 13, 00380 Helsinki, Finland.
Phone: +358 10 22 11

declare under our sole responsibility that the following products:

Frequency converters

ACS880-01(-11/-31
ACS880-04(-048/-M04/-14/-34

with regard to the safety functions

- Safe Torque Off
- Safe stop 1, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Prevention of unexpected start-up (with FSO-12 option module, +Q973, encoderless)
- Safe stop 1, Safe stop emergency, Safely-limited speed, Safe maximum speed, Safe brake control, Safe speed monitor, Safe direction, Prevention of unexpected start-up (with FSO-21 and FSE-31 option modules, +Q972 and +L521, encoder supported)
- Safe motor temperature (with FPTC-01 thermistor protection module, +L536)
- Safe stop 1 (SS1-t, with FSPS-21 PROFIsafe module, +Q986)

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.

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

The following other standards have been applied:

EN 61508:2010, parts 1-2	Functional safety of electrical / electronic / programmable electronic safety-related systems
EN 61800-5-2:2017	Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional

The product(s) referred in this declaration of conformity fulfil(s) the relevant provisions of other UK statutory requirements, which are notified in a single declaration of conformity 3AXD10000326405.

Authorized to compile the technical file: ABB Limited, Daresbury Park, Cheshire, United Kingdom, WA4 4BT.

Helsinki, August 31, 2022
Signed for and on behalf of:

Mika Vartiainen
Local Division Manager
ABB Oy

Aaron D. Wade
Product Unit Manager
ABB Oy

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