

ABB GENERAL PURPOSE DRIVES

ACS580-01 drives

Quick installation and start-up guide

This guide is applicable to the China product types. There is a separate guide for the global product types.

Documentation in other languages

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

About this document

3AXD50001010362 Rev A EN
2023-02-10
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Original instructions.

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.

- 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 make sure that it is safe to start the work. 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.
- Frames R1...R2, IP21 (UL Type 1): Do not lift the drive by holding it from the cover. The cover can come loose and cause the drive to fall.
- Frames R5...R9: Do not tilt the drive. The drive is heavy and has a high center of gravity. It can topple accidentally.
- Frames R5...R9: Lift the drive with a lifting device. Use the lifting eyes of the drive.

1. Unpack the delivery

- 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:
- cable box (frames R1...R2 and R5...R9, IP21 (UL Type 1))
 - 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. Refer to *Capacitor reforming instructions* (3BF64059629 [English]) or contact ABB technical support.

3. Select the cables and fuses

- Select the power cables. Obey the local regulations.
- Input power cable:** ABB recommends to use symmetrical shielded cable (VFD cable) for the best EMC performance.
- Motor cable:** Use symmetrical shielded cable (VFD cable) for the best EMC performance. Symmetrical shielded cable also reduces bearing currents, wear, and stress on motor insulation.
- Power cable types:** In IEC installations, use copper or aluminum cables (if permitted). In UL installations, use only copper conductors.
- Current rating:** max. load current.
- Voltage rating:** min. 600 V AC.
- Temperature rating:** In IEC installations, select a cable rated for at least 70 °C (158 °F) maximum permissible temperature of conductor in continuous use. In UL installations and for drives with option +B056 (IP55, UL Type 12), select a cable rated for at least 75 °C (167 °F).
- Size:** Refer to *atings, fuses and typical power cable sizes* for the typical cable sizes and to *Terminal data for the power cables* for the maximum cable sizes.
- 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. Refer to *atings, fuses and typical power cable sizes*.

4. Examine the installation site

- Examine the site where you will install the drive. Make sure that:
- The installation site is sufficiently ventilated or cooled to remove heat from the drive.
 - The ambient conditions meet the requirements. Refer to *Ambient conditions*.
 - The installation surface is as close to vertical as possible and strong enough to support the weight of the drive. For the weights, refer to *Weights and free space requirements*.
 - The installation surface, floor and materials near the drive are not flammable.
 - There is sufficient free space around the drive for cooling, maintenance, and operation. For the minimum free space requirements, refer to *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.

Prepare the installation site

- Make marks with the help of the mounting template. Remove the mounting template before you install the drive on the wall.
- Drill the holes and put anchors or plugs into the holes.
- Install the screws. Leave a gap between the screw head and mounting surface.

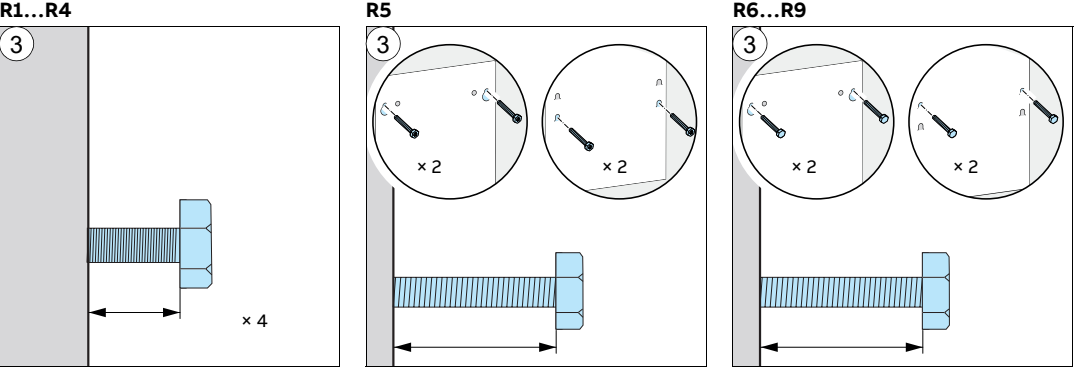
R1...R4

R5...R9

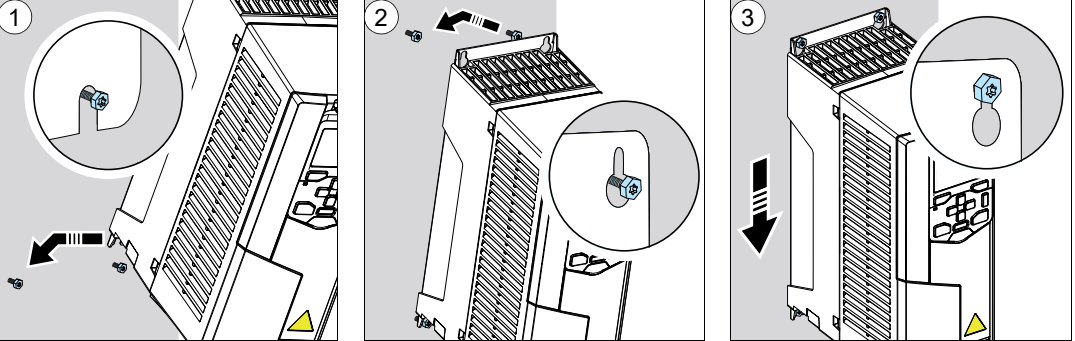
R1...R9

R1...R2: M5
R3...R5: M6
R6...R9: M8

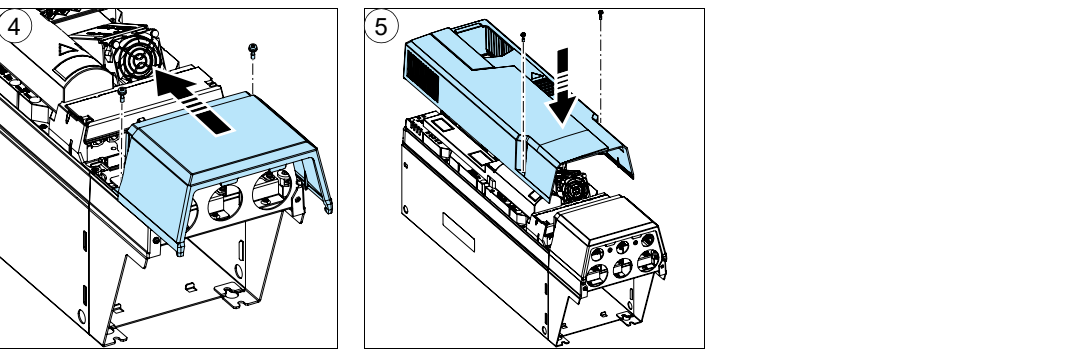
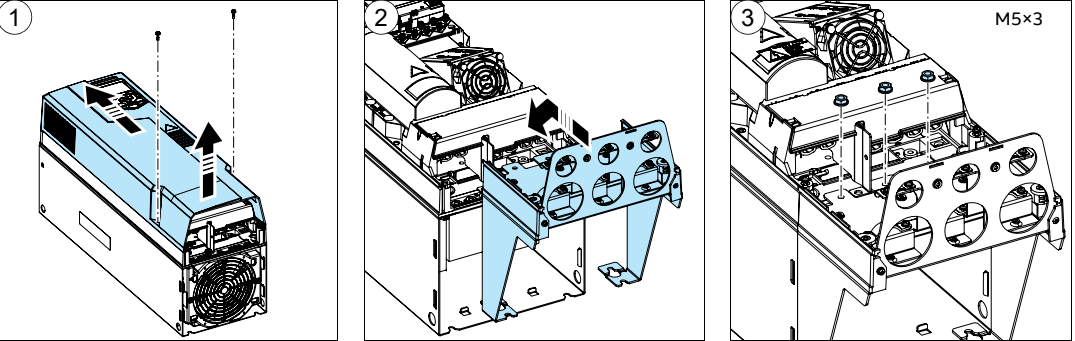
	R1		R2		R3		R5		R6		R8		R9	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
a	98	3.86	98	3.86	160	6.30	160	6.30	612	24.09	571	22.5	623	24.5
b	317	12.48	417	16.42	473	18.62	619	24.37	581	22.87	531	20.9	583	23.0
c	-	-	-	-	-	-	-	-	160	6.30	213	8.4	245	9.7
d	-	-	-	-	-	-	-	-	200	7.87	300	11.8	300	11.8
e	-	-	-	-	-	-	-	-	100	3.94	155	6.1	155	6.1



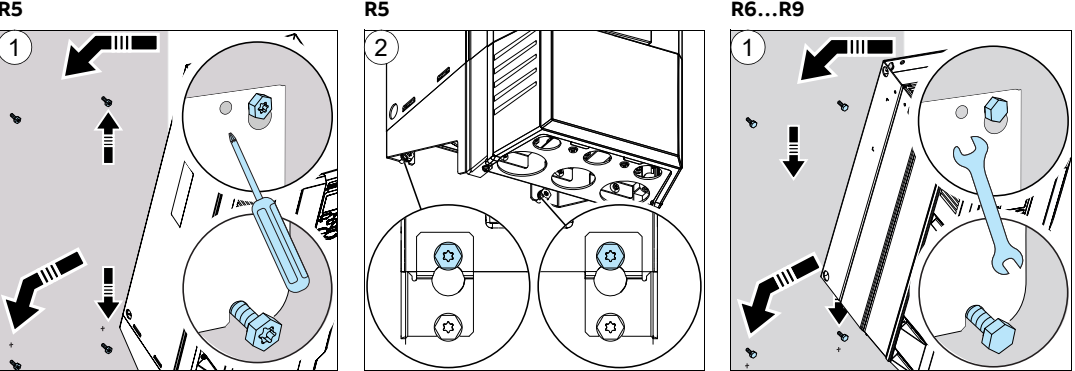
Frames R1...R4: Put the drive on the wall and tighten the screws



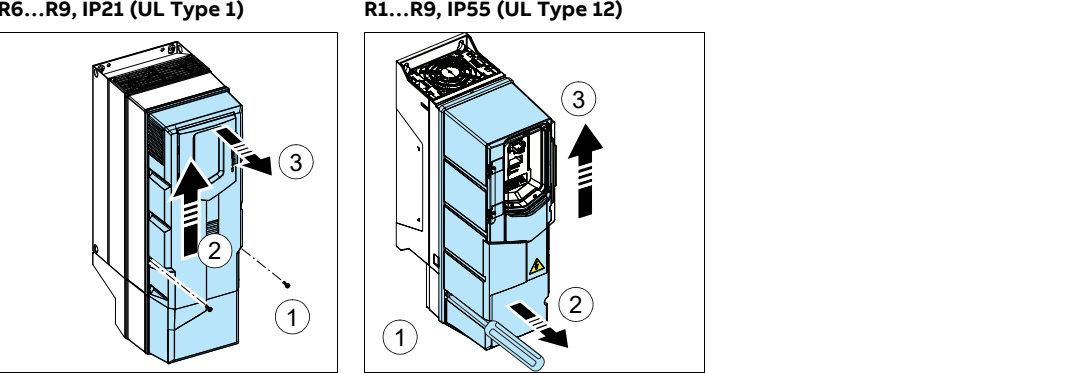
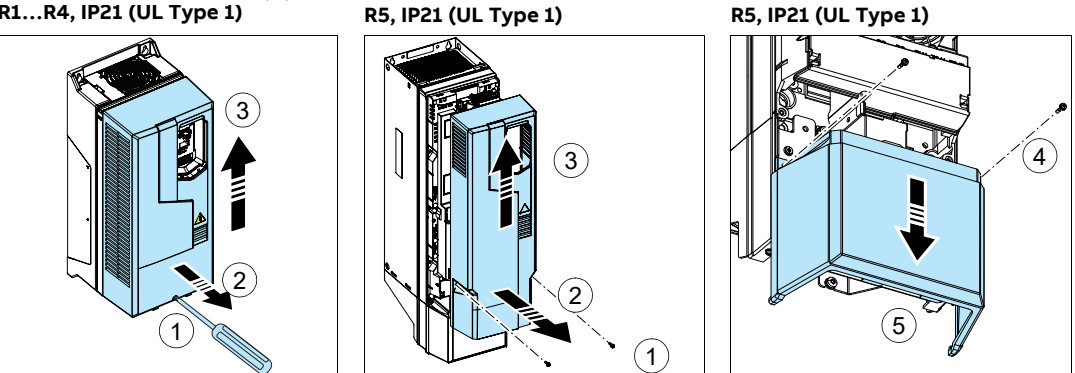
Frame R5, IP21 (UL Type 1): Install the cable box



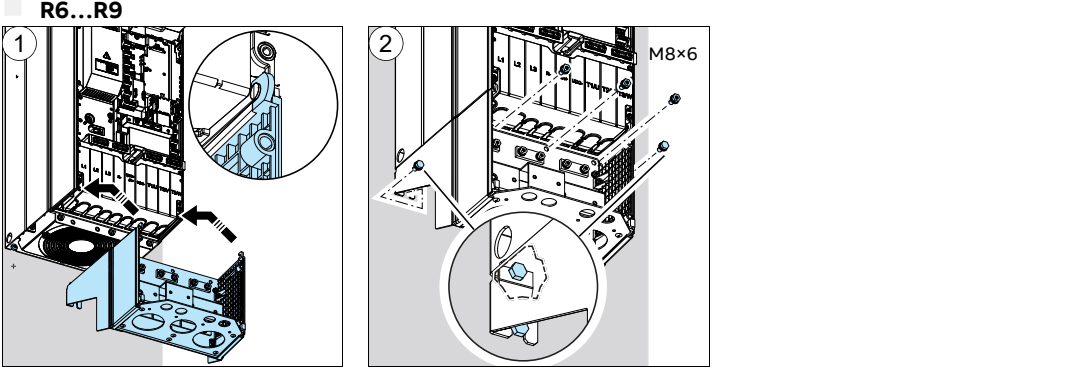
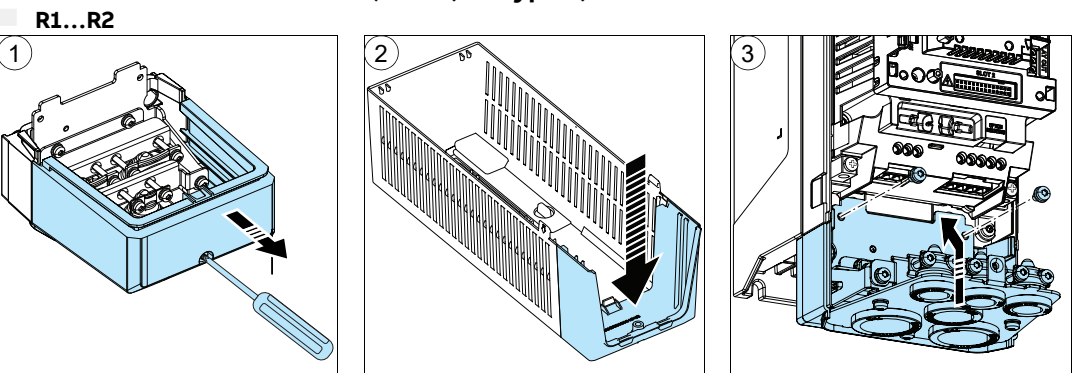
Frames R5...R9: Put the drive on the wall and tighten the screws



6. Remove the cover(s)



7. Frames R1...R2 and R6...R9, IP21 (UL Type 1): Install the cable box



8. Attach a residual voltage warning sticker to the drive in the local language

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

You can connect all drives to a symmetrical grounded TN-S system (center-grounded wye). If you install the drive to a different system, you must remove the EMC screw (disconnect the EMC filter) and/or remove the VAR screw (disconnect the varistor circuit).

Frame size	Symmetrical 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)}
R1...R3	Do not remove EMC or VAR screw.	Remove EMC screw. Do not remove VAR screw.	Remove EMC and VAR screws.	Remove EMC and VAR screws.
R4...R5	Do not remove EMC or VAR screw.	Note: The drive is not evaluated for use on these systems by IEC standards.	Remove EMC screws (2 pieces) and VAR screw.	Remove EMC screws (2 pieces) and VAR screw.
R6...R9	Do not remove EMC or VAR screw.	Remove EMC DC screw.	Remove EMC screws (2 pieces) and VAR screw.	Remove EMC screws (2 pieces) and VAR screw.

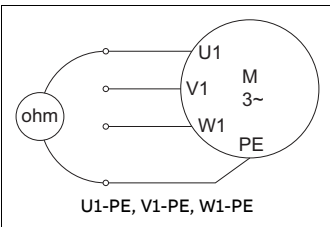
1) A residual current device must be installed in the supply system.

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

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

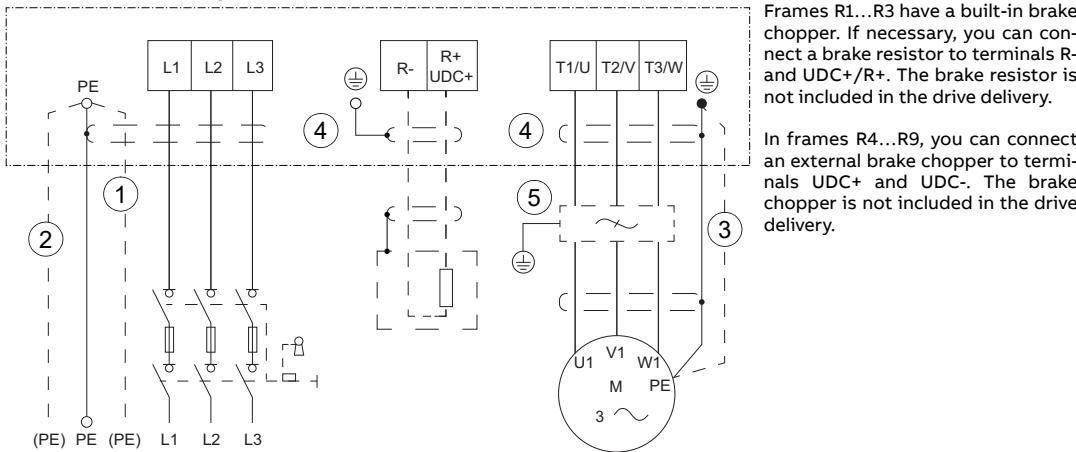
Measure the insulation resistance of the input cable before you connect it to the drive. Obey local regulations.

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 (77 °F)). 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 inside the motor casing, dry the motor and do the measurement again.



11. Connect the power cables

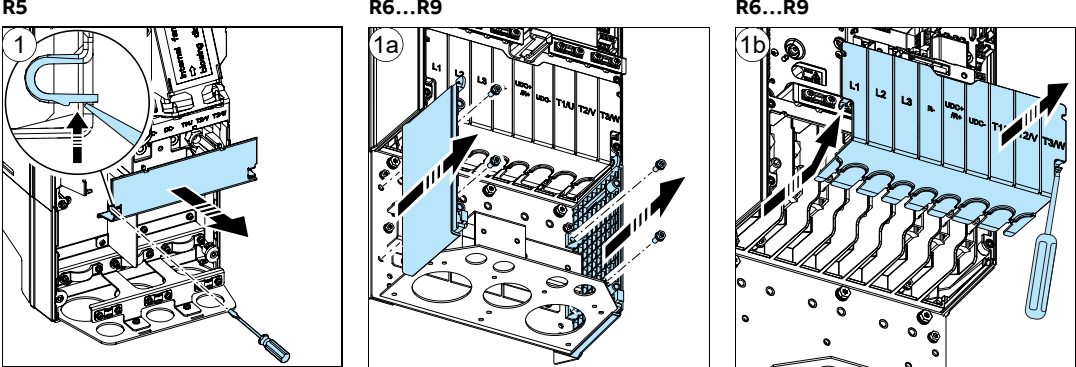
Connection diagram (shielded cables)



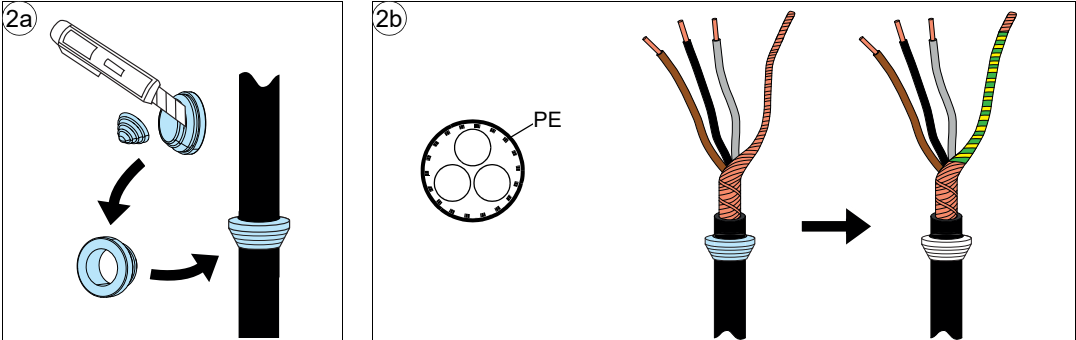
- Two protective earth (ground) conductors. Drive safety standard IEC/EN/UL 61800-5-1 requires two PE conductors if the cross-sectional area of the PE conductor is less than 10 mm² Cu or 16 mm² Al. For example, you can use the cable shield in addition to the fourth conductor.
- Use a separate grounding 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.
- 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.
- 360-degree grounding of the cable shield is required for the motor cable and brake resistor cable (if used). It is also recommended for the input power cable.
- If necessary, install an external filter (du/dt, common mode, or sine filter). Filters are available from ABB.

Connection procedure

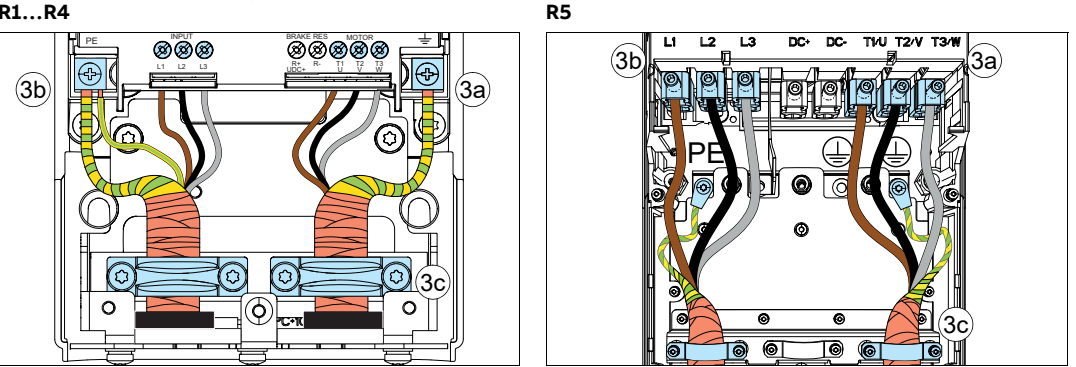
- Frames R5...R9: Remove the shroud (a) on the power cable terminals. Frames R6...R9: Remove the side plates (a). Remove the shroud (b), then make the necessary holes for the cables. In frames R8...R9, if you install parallel cables, also make the necessary holes in the lower shroud.



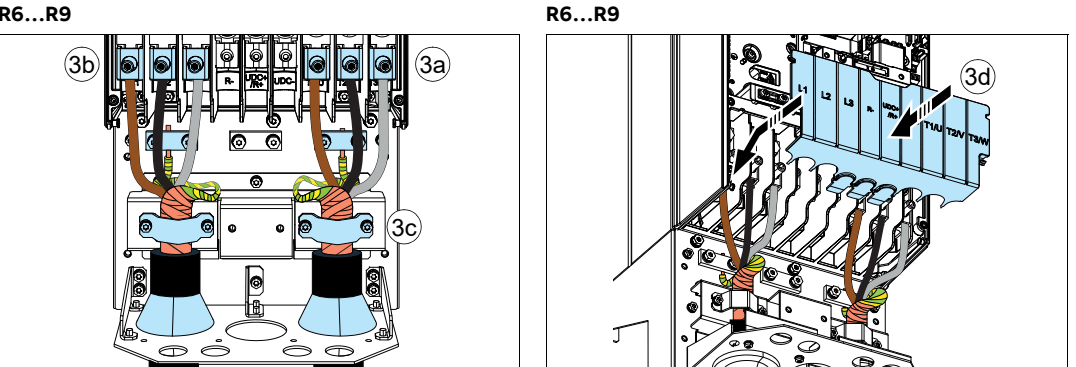
- Prepare the power cables:
 - Remove the rubber grommets from the cable entry.
 - Cut a sufficient hole in the rubber grommet. Slide the grommet onto the cable (a).
 - Prepare the ends of the input power cable and motor cable as illustrated in the figure (b).
 - Slide the cables through the holes in the cable entry and attach the grommets to the holes.
 - If you use aluminum cables, apply grease to the stripped conductors before you connect them to the drive.



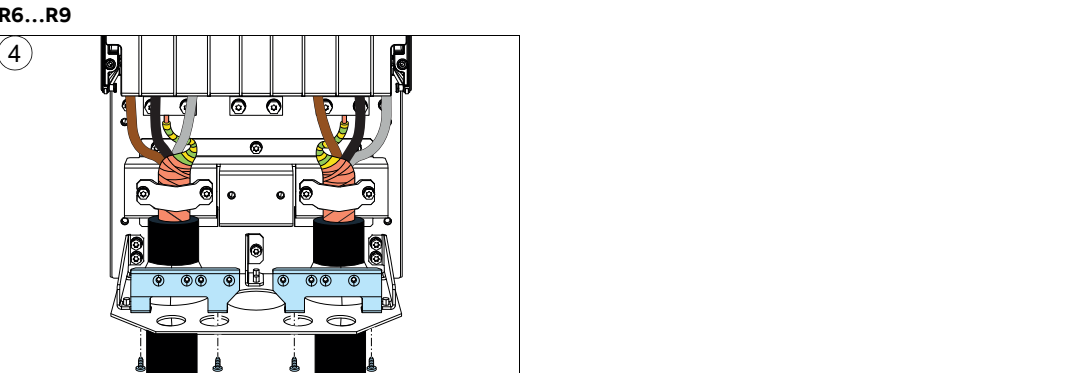
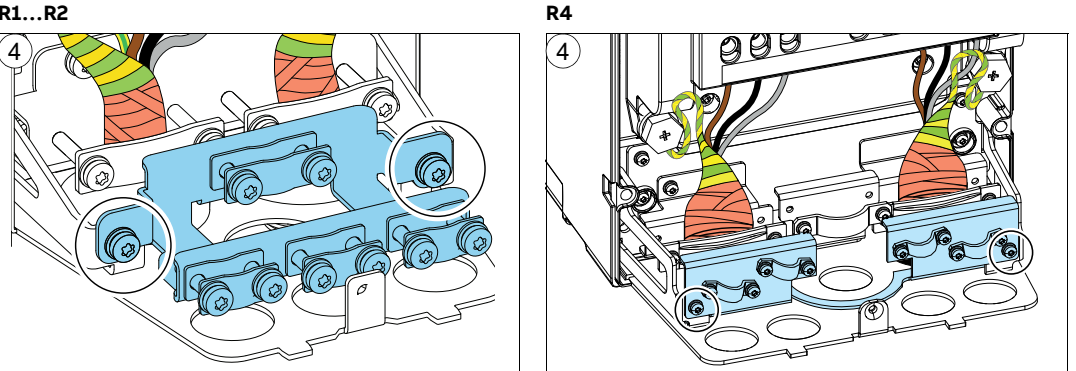
- Connect the power cables. For the tightening torques, refer to *Terminal data for the power cables*.
- Connect the phase conductors of the motor cable to terminals T1/U, T2/V and T3/W. Connect the twisted shield of the cable to the grounding terminal. (a)
- Connect the input power cable to terminals L1, L2 and L3. Connect the twisted shield of the cable and the additional PE conductor to the grounding terminal. (b)
- Frames R8...R9: If you use only one conductor, ABB recommends that you put it under the upper pressure plate. If you use parallel power cables, put the first conductor under the lower pressure plate and the second under the upper pressure plate.
- Frames R8...R9: If you use parallel power cables, install the second grounding shelf for the parallel power cables.
- Tighten the clamps of the power cable grounding shelf onto the stripped part of the cables (c). Torque the clamps to 1.2 N·m (10.6 lbf·in).
- If used, connect the brake resistor or brake chopper cables. In frames R1...R2, you must install the grounding shelf before you can connect the brake cables (refer to the next step).
- Frames R6...R9: After you connect the power cables, install the shroud on the terminals (d).



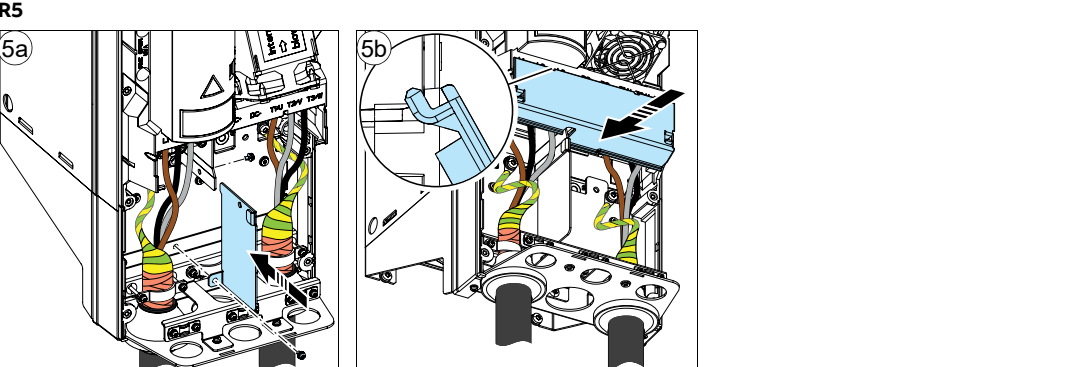
Note: The illustration above shows frames R1...R2. Frames R3...R4 are similar.



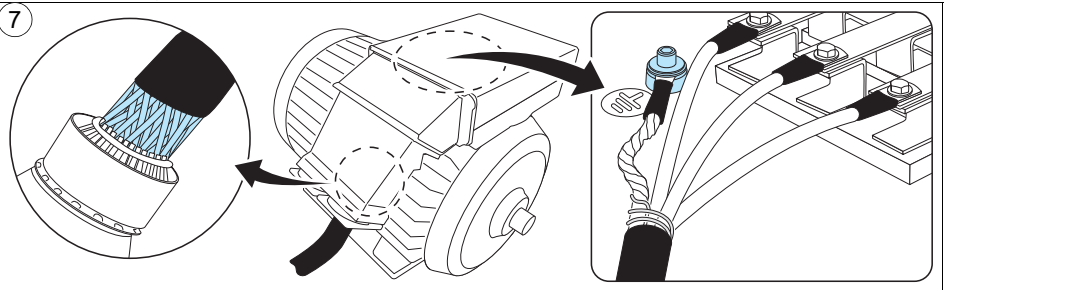
- Frames R1...R2, R4, R6...R9: Install the grounding shelf. In frames R6...R9, this is the grounding shelf for the control cables.



- Frame R5: Install the cable box plate (a) and shroud (b).



- Attach the cables outside the drive mechanically.
- 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.

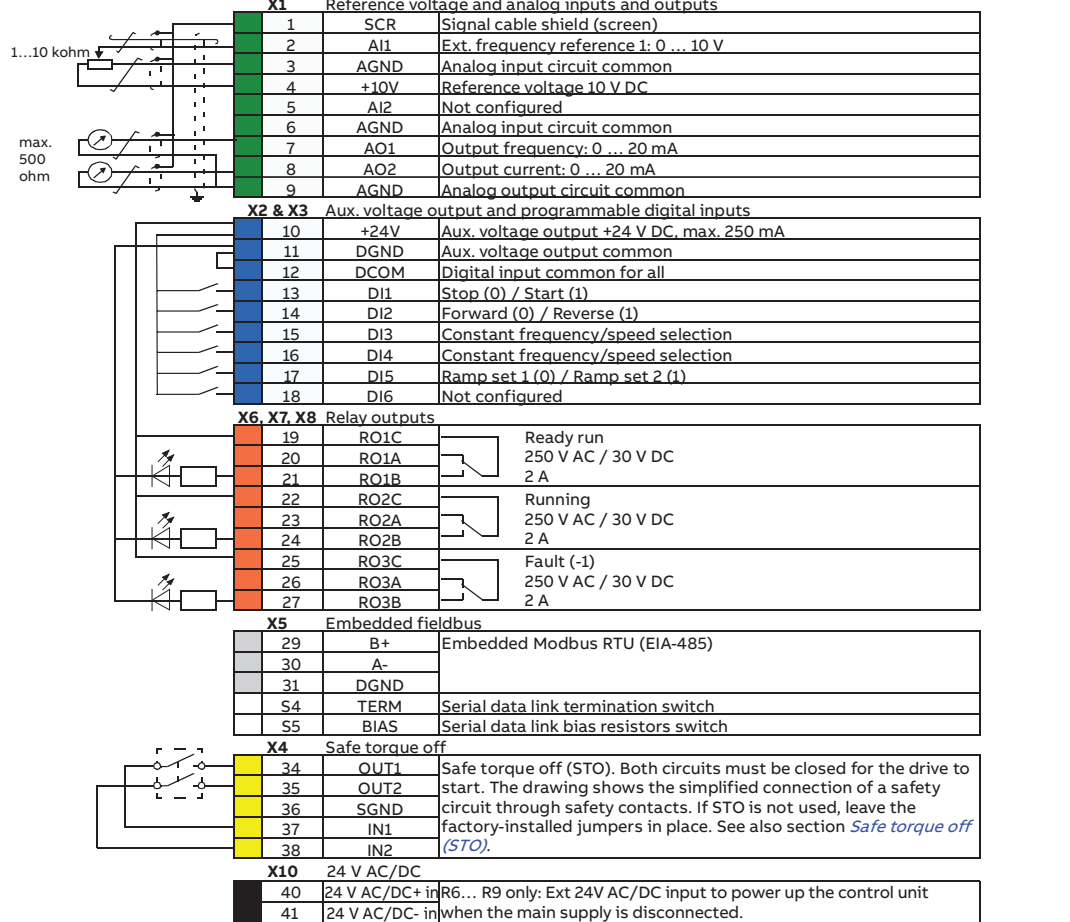


12. Connect the control cables

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

- Cut a hole into the rubber grommet and slide the grommet onto the cable.
- 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. Ground also the pair-cable shields and grounding wire at the SCR terminal.
- Tie all control cables to the provided cable tie mounts.

Default I/O connections (ABB standard macro)

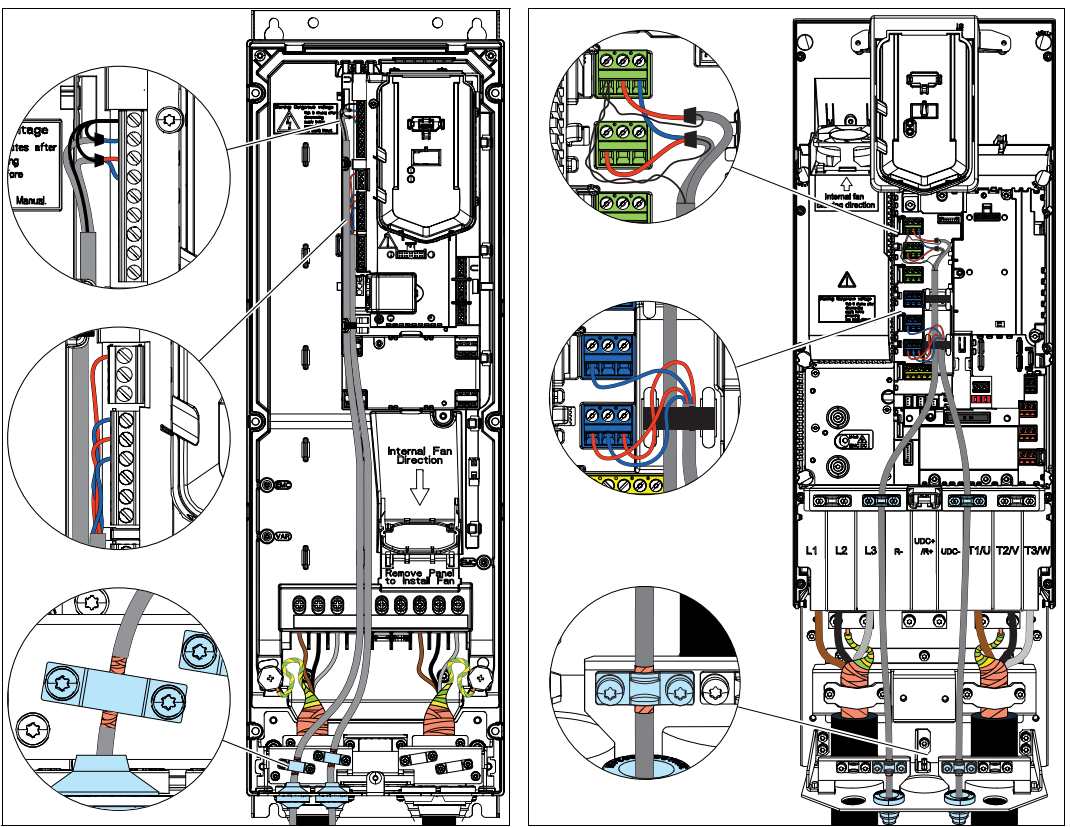


Total load capacity of the auxiliary voltage output +24V (X2:10) is 6.0 W (250 mA / 24 V DC).

Terminals	Wire size	Tightening torque
+24V, DGND, DCOM, B+, A-, DGND, Ext. 24V DI, AI, AO, AGND, RO, OUT, IN, SGND	0.2 ... 2.5 mm ² (24 ... 14 AWG) 0.14 ... 1.5 mm ² (26 ... 16 AWG)	0.5 ... 0.6 N·m (5 lbf·in)

Control cable installation examples

This section shows examples for routing the control cables in frames R4 and R6...R9. Frames R1...R3 and R5 are similar to frame R4.



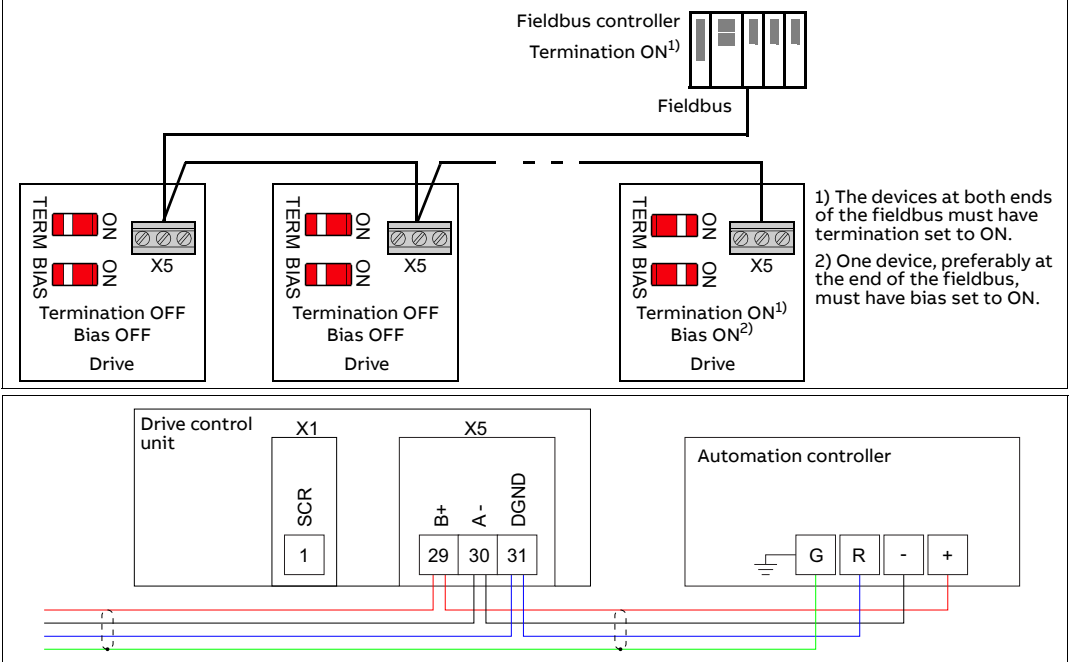
EIA-485 embedded fieldbus connection

You can connect the drive to a serial communication link with a fieldbus adapter module or the embedded fieldbus interface. The embedded fieldbus interface supports Modbus RTU protocol.

To configure Modbus RTU communication with the embedded fieldbus:

- Connect the fieldbus cable and the required I/O signals.
- If the drive is at the end of the fieldbus, set the termination switch to ON.
- Power up the drive and set the required parameters. Refer to *Fieldbus communication*.

Overview and connection diagrams for connecting the drive to the fieldbus are shown below.



- Connect the cable shields together at each drive, but do not connect them to the drive.
- Connect the shield only to terminal "G" (ground) in the automation controller.
- Connect the DGND conductor to terminal "R" (reference) in the automation controller.

23. Install optional modules, if included in the delivery







14. Install the cover(s)








The cover installation procedure is the opposite of the removal procedure. Refer to *Remove the cover(s)*. In frames R6...R9, install the side plates shown in *Connection procedure* before you install the cover.

15. 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! 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 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.

- Power up the drive. Make sure that you have the motor name plate data available.
- The First start assistant guides you through the first start-up. The assistant begins automatically. Wait until the control panel shows the language selection screen. Select the language you want to use and press  (OK). **Note:** After you select the language, it takes a few minutes for the control panel to wake up.
- Select **Start set-up** and press  (Next).
- Select the localization you want to use and press  (Next).
- To complete the first start assistant, select the values and settings when prompted by the assistant. Continue until the panel shows that the first start is complete.
- The Home view shows the values of the selected signals.
- Make additional adjustments, for example macro, ramps and limits, starting from the Main menu. Press  (Menu) in the Home view to enter the Main menu. Select **Primary settings** and press  (Select) or  (→). With the Primary settings menu, you can adjust settings related to the motor, PID, fieldbus, advanced functions and clock, region and display. You can also reset logs, parameters, and the control panel Home view. ABB recommends that you make at least these additional settings:
 - Choose a macro or set start, stop and reference values separately
 - Ramps
 - Limits.
To get more information on the Primary settings menu items, press  to open the help page.

Fieldbus communication

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

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

Other parameters related to the fieldbus configuration:

<i>58.14 Communication loss action</i>	<i>58.17 Transmit delay</i>	<i>58.28 EFB act1 type</i>	<i>58.34 Word order</i>
<i>58.15 Communication loss mode</i>	<i>58.25 Control profile</i>	<i>58.31 EFB act1 transparent source</i>	<i>58.101 Data I/O 1 ...</i>
<i>58.16 Communication loss time</i>	<i>58.26 EFB ref1 type</i>	<i>58.33 Addressing mode</i>	<i>58.114 Data I/O 14</i>

Warnings and faults

Warning	Fault	Name	Description
A2A1	2281	Current calibration	Warning: Current calibration is done at the next start. Fault: Output phase current measurement fault.
A2B1	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.
A7AB	-	Extension I/O configuration failure	The installed C-type module is not the same as configured, or there is an error in the communication between the drive and module.
AFF6	-	Identification run	The motor ID run occurs at the next start.
-	FAB1	Safe torque off 1	The Safe torque off circuit 1 is broken.
-	FAB2	Safe torque off 2	The Safe torque off circuit 2 is broken.

Ratings, fuses and typical power cable sizes

ACS580 -01-...	Nominal ratings						Fuses			Typical power cable sizes, Cu		Frame size
	Input current		Output current		Motor power ¹⁾	gG fuse (IEC 60269)	UL/AR fuse (DIN 43620)	UL class (2 3) 4)				
	I_L	I_A (480 V)	I_2	I_1 (480 V)		ABB type	Bussmann type					
	A		A		mm ²		AWG					
	U _L = 3-phase 400 V or 480 V											
02A7-4	2.6	2.1	2.6	2.1	0.75	1.0	OFAF000H4	170M1561	J1S-15	3×1.5 + 1.5	16	R1
03A4-4	3.3	3.0	3.3	3.0	1.1	1.5	OFAF000H6	170M1561	J1S-15	3×1.5 + 1.5	16	R1
04A1-4	4.0	3.4	4.0	3.4	1.5	2.0	OFAF000H6	170M1561	J1S-15	3×1.5 + 1.5	16	R1
05A7-4	5.6	4.8	5.6	4.8	2.2	3.0	OFAF000H10	170M1561	J1S-15	3×1.5 + 1.5	16	R1
07A3-4	7.2	6.0	7.2	6.0	3.0	3.0	OFAF000H10	170M1561	J1S-15	3×1.5 + 1.5	16	R1
09A5-4	9.4	7.6	9.4	7.6	4.0	5.0	OFAF000H16	170M1561	J1S-15	3×2.5 + 2.5	14	R1
12A7-4	12.6	11.0	12.6	11.0	5.5	7.5	OFAF000H16	170M1561	J1S-15	3×2.5 + 2.5	14	R1
018A-4	17.0	14.0	17.0	14.0	7.5	10.0	OFAF000H25	170M1563	J1S-30	3×2.5 + 2.5	14	R2
026A-4	25.0	21.0	25.0	21.0	11.0	15.0	OFAF000H32	170M1563	J1S-30	3×6 + 6	10	R2
033A-4	32.0	27.0	32.0	27.0	15.0	20.0	OFAF000H40	170M1565	J1S-40	3×10 + 10	8	R3
039A-4	38.0	34.0	38.0	34.0	18.5	25.0	OFAF000H50	170M1565	J1S-60	3×10 + 10	8	R3
046A-4	45.0	40.0	45.0	40.0	22.0	30.0	OFAF000H63	170M1566	J1S-60	3×10 + 10	8	R3
062A-4	62	52	62	52	30	40	OFAF000H80	170M1567	J1S-80	3×25 + 16	4	R4
073A-4	73	65	73	65	37	50	OFAF000H100	170M1568	J1S-100	3×35 + 16	2	R4
088A-4	88	77	88	77	45	60	OFAF000H100	170M1569	J1S-110	3×50 + 25	1/0	R5
106A-4	106	96	106	96	55	75	OFAF00H125	170M3817	J1S-150	3×120 + 35	2/0	R5
145A-4	145	124	145	124	75	100	OFAF00H160	170M3817	J1S-200	3×95 + 50	3/0	R6
169A-4	169	156	169	156	90	125	OFAF0H250	170M5809	J1S-225	3×120 + 70	250 MCM	R7
206A-4	206	180	206	180	110	150	OFAF1H315	170M5810	J1S-300	3×150 + 70	300 MCM	R7
246A-4	246	240	246	240	132	200	OFAF1H355	170M5812	J1S-350	2×(3×70+35)	2×2/0	R8
293A-4	293	260	293	260	160	250	OFAF2H425	170M6812D	J1S-400	2×(3×95+50)	2×3/0	R8
363A-4	363	361	363	361	200	300	OFAF2H500	170M6814D	J1S-500	2×(3×120+70)	2×250 MCM	R9
430A-4	430	414	430	414	250	350	OFAF3H630	170M8554D	J1S-600	2×(3×150+70)	2×300 MCM	R9

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) The recommended branch protection fuses must be used to maintain the IEC/EN/UL 61800-5-1 listing.

3) The drive is suitable for use on a circuit capable of delivering not more than 100000 symmetrical amperes (rms) at 480 V maximum when protected by the fuses given in this table.

4) Refer to *Alternate Fuses, MMPs and Circuit Breakers for ABB Drives (3AXD50000645015 [English])* for additional UL fuses and circuit breakers that can be used as branch circuit protection.

Terminal data for the power cables

Frame size	T1/U, T2/V, T3/W, L1, L2, L3, R-, R+/UDC+						PE					
	Min. wire size (solid/stranded)		Max. wire size (solid/stranded)		Tightening torque		Max. wire size (solid/stranded)		Tightening torque			
	mm ²	AWG	mm ²	AWG	N·m	lbf·ft	mm ²	AWG	N·m	lbf·ft		
R1	0.2/0.2	24	6/4	10	1.0	0.7	16/16	6	1.5	1.1		
R2	0.5/0.5	20	16/16	6	1.5	1.1	16/16	6	1.5	1.1		
R3	0.5/0.5	20	35/35	2	3.5	2.6	35/35	2	1.5	1.1		
R4	0.5/0.5	20	50	1	4.0	3.0	35/35	2	1.5	1.1		
R5	6	10	70	2/0	5.6	4.1	35/35	2	2.2	1.6		
R6	25	4	150	300 MCM	30	22.1	180 ¹⁾	350 MCM ¹⁾	9.8 ¹⁾	7.2 ¹⁾		
R7	95	3/0	240	500 MCM	40	29.5	180 ¹⁾	350 MCM ¹⁾	9.8 ¹⁾	7.2 ¹⁾		
R8	2×50	2×1/0	2×150	2×300 MCM	40	29.5	2×180 ¹⁾	2×350 MCM ¹⁾	9.8 ¹⁾	7.2 ¹⁾		
R9	2×95	2×3/0	2×240	2×500 MCM	70	51.6	2×180 ¹⁾	2×350 MCM ¹⁾	9.8 ¹⁾	7.2 ¹⁾		

1) Applicable only to 230 V drives. In 400/480 V drives, cable clamp is used for grounding.

Notes:

- The minimum specified wire size does not necessarily have sufficient current carrying capacity at maximum load.
- The terminals do not accept a conductor that is one size larger than the maximum specified wire size.
- The maximum number of conductors per terminal is 1.
- For UL compliance the R2 frame drive will not accept a size larger conductor.

Weights and free space requirements

This table shows the requirements for the ambient conditions when the drive is in operation (installed for stationary use).

Frame size	Weights		Free space requirements for vertical installation													
			Stand alone								Side by side ¹⁾					
	IP21 (UL Type 1)		IP55 (UL Type 12)		IP21 (UL Type 1)		IP55 (UL Type 12)		All types		All types					
	Above	Below ²⁾	Above	Below ²⁾	Above	Below ²⁾	Above	Below ²⁾	Sides	Above	Below ²⁾					
1	kg	lb	kg	lb	mm	in	mm	in	mm	in	mm	in	mm	in		
2	4.6	10.1	4.8	10.6	150	5.9	86	3.4	137	5.4	116	4.6	150	5.9	200	7.9
3	6.6	14.6	6.8	15.0	150	5.9	86	3.4	137	5.4	116	4.6	150	5.9	200	7.9
4	11.8	26.0	13.0	28.7	200	7.9	53	2.1	200	7.9	53	2.1	150	5.9	200	7.9
5	19.0	41.9	20.0	44.1	53	2.1	200	7.9	53	2.1	200	7.9	150	5.9	200	7.9
6	28.3	62.4	29.0	64.0	100	4.0	200	7.9	100	4.0	200	7.9	150	5.9	200	7.9
7	42.4	93.5	43.0	94.8	155	6.1	300	11.8	155	6.1	300	11.8	150	5.9	200	7.9
8	54	119.1	56	123.5	155	6.1	300	11.8	155	6.1	300	11.8	150	5.9	200	7.9
9	69	152.2	77	169.8	155	6.1	300	11.8	155	6.1	300	11.8	150	5.9	200	7.9
10	99	215.9	103	227.1	200	7.9	300	11.8	200	7.9	300	11.8	150	5.9	200	7.9