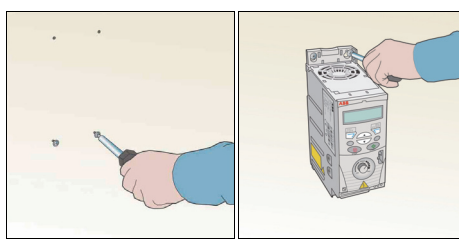


ACS150 drives

Quick installation and start-up guide

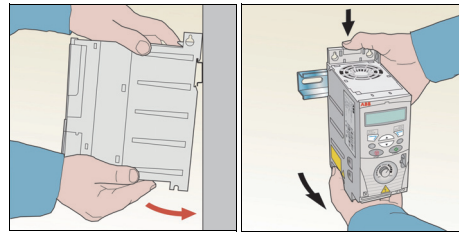


- Start to tighten the screws into the mounting holes.
- Place the drive onto the mounting screws.
- Tighten the mounting screws securely.



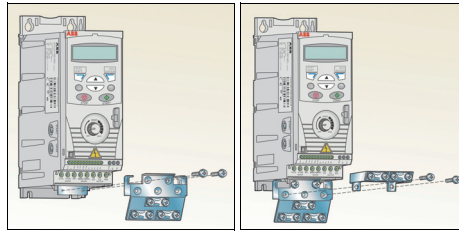
To install the drive to a DIN rail

- Place the top of the drive onto the DIN installation rail in an angle as shown in figure.
- Set the drive against the wall.
- To remove the drive, press the release lever on top of the drive.



3. Attach the clamping plates

- Fasten the clamping plate to the plate at the bottom of the drive with the provided screws.
- Fasten the I/O clamping plate to the clamping plate with the provided screws.



4. Measure the insulation resistance

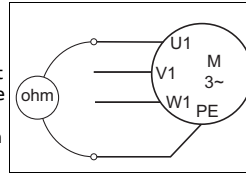
Measuring the insulation is typically not required in North America.

Drive: Do not do voltage tolerance or insulation resistance tests on the drive, because this can cause damage to the drive.

Input power cable: Before you connect the input power cable, measure the insulation of the input power cable. Obey the local regulations.

Motor and motor cable:

- Make sure that the motor cable is connected to the motor and disconnected from the drive output terminals U2, V2 and W2.
- Use a voltage of 1000 V DC to measure the insulation resistance between each phase conductor and the protective earth conductor. The insulation resistance of an ABB motor must be more than 100 Mohm (at 25 °C/77 °F). For the insulation resistance of other motors, refer to the manufacturer's documentation. Moisture in the motor decreases the insulation resistance. If you think that there is moisture in the motor, dry the motor and do the measurement again.



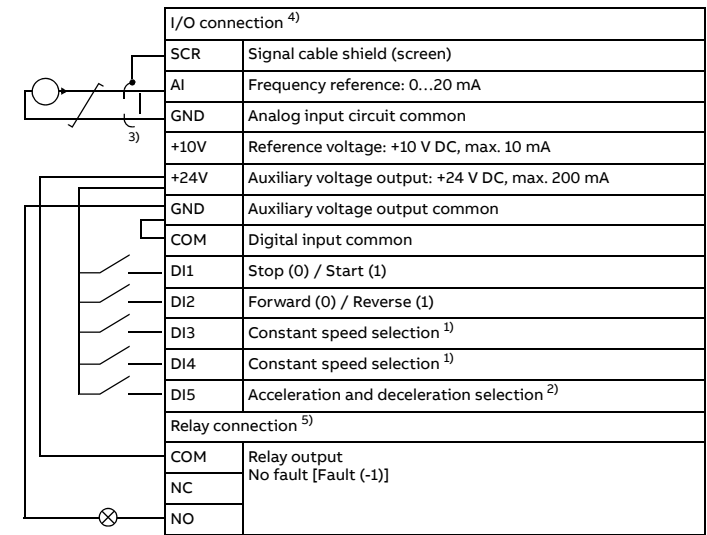
Frame size	Tightening torques	
	U1, V1, W1, U2, V2, W2, BRK+ and BRK-	PE
R0...R2	0.8 N·m (7 lbf·in)	1.2 N·m (11 lbf·in)

00353783 L

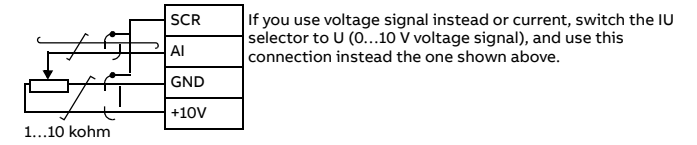
7. Connect the control cables

Default I/O connections

The diagram shows the I/O connections when parameter 9902 has value 1 (ABB STANDARD).



Alternative connection for AI1:



¹⁾ See parameter group 12 CONSTANT SPEEDS:

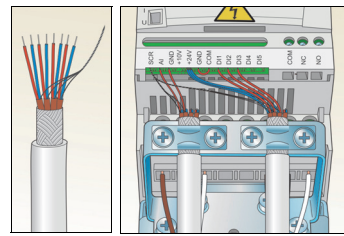
DI3	DI4	Operation (parameter)
0	0	Set speed through integrated potentiometer
1	0	Speed 1 (I202)
0	1	Speed 2 (I203)
1	1	Speed 3 (I204)

²⁾ 0 = ramp times according to parameters 2202 and 2203. 1 = ramp times according to parameters 2205 and 2206.
³⁾ 360 degree grounding under a clamp.
⁴⁾ Tightening torque: 0.22 N·m / 2 lbf·in
⁵⁾ Tightening torque: 0.5 N·m / 4.4 lbf·in

Connection procedure

To prevent inductive coupling, keep the signal wire pairs twisted all the way up to the terminals.

- Strip the outer insulation of the cable and ground the bare shield 360 degrees under the clamp.
- Connect the conductors to the correct control terminals. Torque the input signals to 0.22 N·m (2 lbf·in) and relay output to 0.5 N·m (4.4 lbf·in).
- For double-shielded cables, twist also the grounding conductors of each pair in the cable together and connect the bundle to the SCR terminal (terminal 1).
- Mechanically attach the control cables on the outside of the drive.



8. Start up the drive

WARNING! Before you start up the drive, make sure that the installation is complete. Make sure that the cover of the drive is in place. Make sure also that the motor does not cause danger when it starts. Disconnect the motor from other machinery, if there is a risk of damage or injury. There is an extensive installation checklist in the drive user's manual.

Before you start, ensure that you have the motor nameplate data at hand.

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.

- 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.
- When the drive or connected equipment is energized, do not do work on the drive, motor cable, motor, control cables or control circuits.

Electrical safety precautions

- Clearly identify the work location and equipment.
- 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.
 - Disconnect any 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.
- Protect any other energized parts in the work location against contact.
- Take special precautions when close to bare conductors.
- Measure that the installation is de-energized.
 - Use a multimeter with a minimum impedance of 1 Mohm.
 - Make sure that the voltage between the drive input power terminals (U1, V1, W1) and the ground (PE) is close to 0 V.
 - Make sure that the voltage between the drive output terminals (U2, V2, W2) and the ground (PE) is close to 0 V.
 - Make sure that the voltage between the drive DC terminals (BRK+ and BRK-) and the ground (PE) is close to 0 V.
- Install temporary grounding as required by the local regulations.
- Ask the person in control of the electrical installation work for a permit to work.

See the drive user's manual for the complete safety instructions.

1. Examine the installation area

The drive is intended for cabinet installation and has a degree of protection of IP20 / UL open type as standard.

Make sure that in the installation area:

- There is sufficient space above and below the drive for cooling, and hot air does not recirculate. Refer to [Free space requirements](#).
- The ambient conditions are suitable. Refer to [Ambient conditions](#).
- The mounting surface is non-flammable and can hold the weight of the drive. Refer to [Dimensions and weights](#).
- Materials near the drive are non-flammable.
- 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 in the operation of the drive.

2. Install the drive

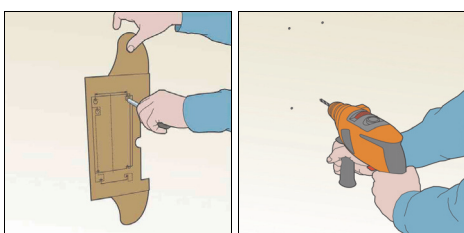
You can install the drive with screws or to a DIN rail [Top Hat, W x H = 35 x 7.5 mm (1.4 x 0.3 in)].

- Make sure that there is a minimum of 75 mm (3 in) of free space above and below the drive for cooling air.
- When placing drives on top of each other in a panel or cabinet, make sure that the hot air from the drives below do not directly enter the drive above.

WARNING! Do not install the drive upside down. Make sure that the cooling air exhaust (at the top) is above the cooling air inlet (at the bottom).

To install the drive with screws

- Cut out the mounting template from the package and use it to mark the locations for the mounting holes.
- Make the holes for the mounting screws and install suitable plugs or anchors.



5. Select the cables

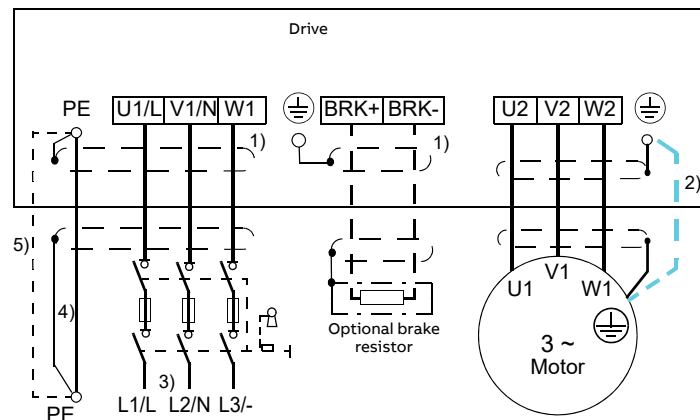
Input power cable: IEC/EN 61800-5-1 requires two protective earth (ground) conductors. Prefer a symmetrical shielded cable (VFD cable).

Motor cable: Use a symmetrical shielded cable (VFD cable) for the best EMC performance and to meet the European EMC requirements.

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

6. Connect the power cables

Connection diagram (shielded cables)

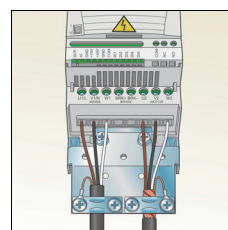
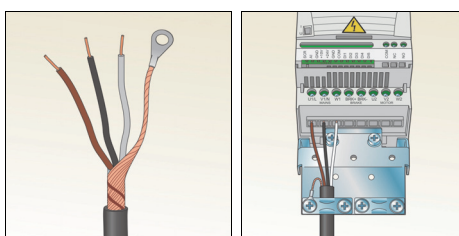


- 360-degree grounding of the cable shield. Required for the motor cable and brake resistor cable, recommended for the input power cable.
- Use a separate grounding cable if the conductivity of the cable shield is not sufficient (smaller than the conductivity of the phase conductor) for the protective grounding, or there is no symmetrically constructed grounding conductor in the cable.
- In one-phase installations, connect phase to U1/L, neutral to V1/N and leave W1 disconnected.
- Use two grounding conductors if the cross-section of a single grounding conductor is less than 10 mm² Cu or 16 mm² Al (IEC/EN 61800-5-1). For example, use the cable shield in addition to the fourth conductor.
- Use a separate grounding cable (line side) if the conductivity of the fourth conductor or shield is not sufficient for the protective grounding.

Connection procedure (shielded cables)

WARNING! Make sure that the drive is compatible with the earthing system. You can connect all drive types to a symmetrically grounded TN-S system. For other systems, see the drive user's manual.

- Strip the input power cable. Ground the cable shield (if any) under the grounding clamp. Twist the cable shield into a bundle, mark it accordingly and connect it to the grounding terminal. Connect other grounding conductors (PE) to the grounding terminal. Connect the phase conductors to the U1, V1 and W1 terminals.
- Strip the motor cable. Ground the cable shield under the grounding clamp. Twist the motor cable shield into a bundle, mark it accordingly and connect it to the grounding terminal. Connect the phase conductors to the U2, V2 and W2 terminals.
- If applicable, connect the brake resistor cable to the BRK+ and BRK- terminals. Use a shielded cable and ground the shield under the grounding clamp.
- Mechanically attach the cables on the outside of the drive.



POWER-UP

Apply input power. The panel powers up into the Output mode.

LOC OUTPUT **0.0** Hz FWD

ENTRY OF START-UP DATA

Select the application macro (parameter *9902*) according to how the control cables are connected. The default value 1 (ABB STANDARD) is suitable in most cases.

LOC **9902** S PAK FWD

The general parameter setting procedure in the Short parameter mode is described below.

- To go to the Main menu, press if the bottom line shows OUTPUT; otherwise press repeatedly until you see MENU at the bottom.
- Press keys / until you see "PAR S" on the display.
- Press . The display shows a parameter of the Short parameter mode.
- Find the appropriate parameter with keys / .
- Press and hold for about two seconds until the parameter value is shown with **SET** under the value.
- Change the value with keys / . The value changes faster while you keep the key pressed down.
- Save the parameter value by pressing .

LOC **rEF** MENU FWD

LOC **PAR S** MENU FWD

LOC **9902** S PAR FWD

LOC **9907** S PAR FWD

LOC **500** Hz PAR SET FWD

LOC **600** Hz PAR SET FWD

LOC **9907** S PAR FWD

Enter the motor data from the motor nameplate.

- motor nominal voltage (*9905*)
- motor nominal current (*9906*)
- motor nominal frequency (*9907*)

LOC **9905** S PAR FWD

Set the maximum value for external reference REF1 (*1105*).

LOC **1105** S PAR FWD

Set constant speeds 1, 2 and 3 (*1202*, *1203*, *1204*).

LOC **1202** S PAR FWD

Set the minimum value (%) corresponding to the minimum signal for AI(1) (*1301*). Typical settings: 0% for 0...20 mA (or 0...10 V) signal 20% for 4...20 mA (or 2...10 V) signal

LOC **1301** S PAR FWD

Set the maximum limit for the drive output frequency (*2008*). This is equal to power line frequency, typically. That is: 50 or 60 Hz.

LOC **2008** S PAR FWD

Select the motor stop function (*2102*). 1 = Stop by cutting off the motor power supply. Motor coasts to stop. 2 = Stop along ramp defined by parameter.

LOC **2102** S PAR FWD

DIRECTION OF THE MOTOR ROTATION

Check the direction of the motor rotation.

- Turn the potentiometer fully counterclockwise.
- If the drive is in remote control (REM shown on the left), switch to local control by pressing .
- Press to start the motor.
- Turn the potentiometer slightly clockwise until the motor rotates.
- Check that the actual direction of the motor is the same as indicated on the display (FWD means forward and REV reverse).
- Press to stop the motor.

To change the direction of the motor rotation:

- Disconnect input power from the drive, and wait 5 minutes for the intermediate circuit capacitors to discharge. Lock out and tag out. Measure the voltage between each input terminal (U1, V1 and W1) and earth with a multimeter to ensure that the drive is discharged.
- Exchange the position of two motor cable phase conductors at the drive output terminals or at the motor connection box.
- Verify your work by applying input power and repeating the check as described above.

LOC **1202** S PAR FWD

forward reverse

ACCELERATION/DECELERATION TIMES

Set the acceleration time 1 (*2202*) and deceleration time 1 (*2203*).

LOC **2202** S PAR FWD

FINAL CHECK

The start-up is now completed. If you want to save your setting as a user macro, scroll to Parameter 9902 and select value -1 (USER S1 SAVE).

Check that there are no faults or alarms shown on the display.

The drive is now ready for use.

LOC **9902** S PAR FWD

Fault codes

This is a short list of fault messages.

Fault	Description
F0001	OVERCURRENT - Output current has exceeded trip level.
F0002	DC OVERVOLT - Excessive intermediate circuit DC voltage.
F0003	DEV OVERTEMP - Drive IGBT temperature is excessive.
F0004	SHORT CIRC - Short-circuit in motor cable(s) or motor.
F0006	DC UNDERVOLT - Intermediate circuit DC voltage is not sufficient.
F0009	MOT OVERTEMP - Motor temperature estimation is too high.
F0016	EARTH FAULT - Drive has detected earth (ground) fault in motor or motor cable.
F0022	INPUT PHASE LOSS - Intermediate circuit DC voltage is oscillating due to missing input power line phase or blown fuse.

Ratings

ACS150- x = E/U ¹	Input		Output					Frame size
	I _N A	I _N (480 V) A	I _{2N} A	I _{2,1/10} A	I _{2max} A	P _N kW hp		
1-phase U _N = 230 V (200...240 V)								
01x-02A4-2	6.1	-	2.4	3.6	4.2	0.37	0.5	R0
01x-04A7-2	11.4	-	4.7	7.1	8.2	0.75	1	R1
01x-06A7-2	16.1	-	6.7	10.1	11.7	1.1	1.5	R1
01x-07A5-2	16.8	-	7.5	11.3	13.1	1.5	2	R2
01x-09A8-2	21.0	-	9.8	14.7	17.2	2.2	3	R2
3-phase U _N = 230 V (200...240 V)								
03x-02A4-2	4.3	-	2.4	3.6	4.2	0.37	0.5	R0
03x-03A5-2	6.1	-	3.5	5.3	6.1	0.55	0.75	R0
03x-04A7-2	7.6	-	4.7	7.1	8.2	0.75	1	R1
03x-06A7-2	11.8	-	6.7	10.1	11.7	1.1	1.5	R1
03x-07A5-2	12.0	-	7.5	11.3	13.1	1.5	2	R1
03x-09A8-2	14.3	-	9.8	14.7	17.2	2.2	3	R2
3-phase U _N = 400/480 V (380...480 V)								
03x-01A2-4	2.2	1.8	1.2	1.8	2.1	0.37	0.5	R0
03x-01A9-4	3.6	3.0	1.9	2.9	3.3	0.55	0.75	R0
03x-02A4-4	4.1	3.4	2.4	3.6	4.2	0.75	1	R1
03x-03A3-4	6.0	5.0	3.3	5.0	5.8	1.1	1.5	R1
03x-04A1-4	6.9	5.8	4.1	6.2	7.2	1.5	2	R1
03x-05A6-4	9.6	8.0	5.6	8.4	9.8	2.2	3	R1
03x-07A3-4	11.6	9.7	7.3	11.0	12.8	3	4	R1
03x-08A8-4	13.6	11.3	8.8	13.2	15.4	4	5	R1

I_N continuous rms input current (for dimensioning cables and fuses)

I_N (480 V) continuous rms input current (for dimensioning cables and fuses) for drives with 480 V input voltage

I_{2N} continuous rms current. 50% overload is allowed for one minute every ten minutes.

I_{2,1/10} maximum (50% overload) current allowed for one minute every ten minutes

I_{2max} maximum output current. Available for two seconds at start, otherwise as long as allowed by the drive temperature.

P_N typical motor power. The kilowatt ratings apply to most IEC 4-pole motors. The horsepower ratings apply to most NEMA 4-pole motors.

Fuses and typical power cable sizes

The table lists the fuses for protection against short-circuits in the input power cable or drive. The table also shows typical power cable sizes.

ACS150-...x = E/U	Fuses		Size of CU conductor in cabling							
	gG	UL Class T (600 V)	Supply (U1, V1, W1)		Motor (U2, V2, W2)		PE		Brake (BRK+ and BRK-)	
	A	A	mm ²	AWG	mm ²	AWG	mm ²	AWG	mm ²	AWG
1-phase U _N = 230 V (200...240 V)										
01x-02A4-2	10	10	2.5	14	0.75	18	2.5	14	2.5	14
01x-04A7-2	16	20	2.5	14	0.75	18	2.5	14	2.5	14
01x-06A7-2	16/20 ¹⁾	25	2.5	10	1.5	14	2.5	10	2.5	12
01x-07A5-2	20/25 ¹⁾	30	2.5	10	1.5	14	2.5	10	2.5	12
01x-09A8-2	25/35 ¹⁾	35	6	10	2.5	12	6	10	6	12
3-phase U _N = 230 V (200...240 V)										
03x-02A4-2	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-03A5-2	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-04A7-2	10	15	2.5	14	0.75	18	2.5	14	2.5	14
03x-06A7-2	16	15	2.5	12	1.5	14	2.5	12	2.5	12
03x-07A5-2	16	15	2.5	12	1.5	14	2.5	12	2.5	12
03x-09A8-2	16	20	2.5	12	2.5	12	2.5	12	2.5	12
3-phase U _N = 400/480 V (380...480 V)										
03x-01A2-4	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-01A9-4	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-02A4-4	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-03A3-4	10	10	2.5	12	0.75	18	2.5	12	2.5	12
03x-04A1-4	16	15	2.5	12	0.75	18	2.5	12	2.5	12
03x-05A6-4	16	15	2.5	12	1.5	14	2.5	12	2.5	12
03x-07A3-4	16	20	2.5	12	1.5	14	2.5	12	2.5	12
03x-08A8-4	20	25	2.5	12	2.5	12	2.5	12	2.5	12

¹⁾ If 50% overload capacity is needed, use the larger fuse alternative.

Ambient conditions

Requirement	During operation (installed for stationary use)
Installation altitude	0...2000 m (0...6562 ft) above sea level (with output derating above 1000 m [3281 ft])
Surrounding air temperature	-10...+50 °C (14...122 °F). If the temperature is more than 40 °C (104 °F), output derating is necessary. No frost permitted.
Relative humidity	0...95% without condensation
Contamination levels (IEC 60721-3-3:2002)	No conductive dust permitted
Shock (IEC 60068-2-27, ISTA 1A)	Not permitted
Free fall	Not permitted

Dimensions and weights

Frame size	IP20 (cabinet) / UL open											
	H1		H2		H3		W		D		Weight	
	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb
R0	169	6.65	202	7.95	239	9.41	70	2.76	142	5.59	1.1	2.4
R1	169	6.65	202	7.95	239	9.41	70	2.76	142	5.59	1.3/1.2 ¹⁾	2.9/2.6 ¹⁾
R2	169	6.65	202	7.95	239	9.41	105	4.13	142	5.59	1.5	3.3
Frame size	IP20 / NEMA 1											
	H4		H5		W		D		-		Weight	
	mm	in	mm	in	mm	in	mm	in	-	-	kg	lb
R0	257	10.12	280	11.02	70	2.76	142	5.59	-	-	1.5	3.3
R1	257	10.12	280	11.02	70	2.76	142	5.59	-	-	1.7/1.6 ¹⁾	3.7/3.5 ¹⁾
R2	257	10.12	282	11.10	105	4.13	142	5.59	-	-	1.9	4.2

¹⁾ 200 V unit weight / 400 V unit weight

IP20 (cabinet) / UL open

H1 height without fastenings or clamping plate

H2 height with fastening and without clamping plate

H3 height with fastenings and clamping plate

W width

D depth

IP20 / NEMA 1 (drive with optional MUL-xx kit installed)

H4 height with fastenings and connection box

H5 height with fastenings, connection box and hood

Free space requirements

Above		Below		Sides	
mm	in	mm	in	mm	in
75	3	75	3	0	0

3AXD00000353783 L

Markings

The applicable markings are shown on the type designation label

CE
 UL LISTED
 RCM
 EAC
 WEEE
 EIP

Related documents

ACS150 user's manual

ACS150 manual list

3AXD50000625970 Rev A EN 2020-04-21
© Copyright 2020 ABB. All rights reserved.