

DRIVES FOR WATER

ACQ580-01 drives, frames R1 to R5

Quick installation and start-up guide

R1-
R4

R5



EN



List of related manuals in English

Drive manuals and guides

Code (English)

<i>ACQ580 pump control program firmware manual</i>	3AXD50000035867
<i>ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual</i>	3AXD50000044862
<i>ACQ580-01 frames R1 to R5 quick installation and start-up guide</i>	3AXD50000044864
<i>ACQ580-01 frames R6 to R9 quick installation and start-up guide</i>	3AXD50000037301
<i>ACx-AP-x assistant control panels user's manual</i>	3AUA0000085685

Option manuals and guides

<i>ACS580-01, ACH580-01 and ACQ580-01 installation guide for UK gland plate (option +H358)</i>	3AXD50000034735
<i>CPTC-02 ATEX-certified thermistor protection module, Ex II (2) GD (+L537+Q971) user's manual</i>	3AXD50000030058
<i>CDPI-01 communication adapter module user's manual</i>	3AXD50000009929
<i>DPMP-01 mounting platform for control panels</i>	3AUA0000100140
<i>DPMP-02/03 mounting platform for control panels</i>	3AUA0000136205
<i>FDNA-01 DeviceNet™ adapter module user's manual</i>	3AFE68573360
<i>FEIP-21 Ethernet/IP adapter module user's manual</i>	3AXD50000158621
<i>FENA-01/-11/-21 Ethernet adapter module user's manual</i>	3AUA0000093568
<i>FMBA-01 Modbus adapter module user's manual</i>	3AFE68586704
<i>FMBT-21 Modbus/TCP adapter module user's manual</i>	3AXD50000158607
<i>FPBA-01 PROFIBUS DP adapter module user's manual</i>	3AFE68573271
<i>FPNO-21 PROFINET adapter module user's manual</i>	3AXD50000158614
<i>FSCA-01 RS-485 adapter module user's manual</i>	3AUA0000109533
<i>ACS580-01..., ACH580-01... and ACQ580-01...+C135 drives with flange mounting kit supplement</i>	3AXD50000019100
<i>ACS580-01..., ACH580-01... and ACQ580-01...+C135 frames R1 to R3 flange mounting kit quick installation guide</i>	3AXD50000119172
<i>ACS580-01..., ACH580-01... and ACQ580-01...+C135 frames R4 to R5 flange mounting kit quick installation guide</i>	3AXD50000287093
<i>Main switch and EMC C1 filter options (+F278, +F316, +E223) installation supplement for ACS580-01, ACH580-01 and ACH580-01 frames R1 to R5</i>	3AXD50000155132
<i>UL Type 12 hood quick installation guide for ACS580-01, ACH580-01 and ACQ580-01 frames R1 to R9</i>	3AXD50000196067

You can find manuals and other product documents in PDF format on the Internet.

See section Document library on the Internet on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.

The QR code below opens an online listing of the manuals applicable to this product.



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DRIVES FOR WATER

ACQ580-01 drives

Quick installation guide

Frames R1 to R4

R1-
R4



English 15

EN

Ratings and fuses

IEC ratings at $U_N = 230\text{ V}$, 400 V and 480 V

■ $U_N = 230\text{ V}$

Type ACQ580 -01-	Input rating	Output ratings			Heat dissipation	Air flow	Frame size
		Max. current	Nominal use				
	I_1	I_{\max}	I_N	P_N			
	A	A	A	kW			
3-phase $U_N = 230\text{ V}$							
04A7-2	4.7	6.3	4.7	0.75	45	43	R1
06A7-2	6.7	8.9	6.7	1.1	55	43	R1
07A6-2	7.6	11.9	7.6	1.5	66	43	R1
012A-2	12.0	19.1	12.0	3.0	106	43	R1
018A-2	16.9	22.0	16.9	4.0	133	43	R1
025A-2	24.5	32.7	24.5	5.5	174	101	R2
032A-2	31.2	43.6	31.2	7.5	228	101	R2
047A-2	46.7	62.4	46.7	11	322	179	R3
060A-2	60	83.2	60.0	15	430	179	R3

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Type ACQ580-01-	Input ratings		Output ratings		Frame size
	I_1	I_N	P_N		
	A	A ¹⁾	kW		
1-phase $U_N = 230\text{ V}$					
04A7-2	3.3	2.2	0.37		R1
06A7-2	4.6	3.2	0.5		R1
07A6-2	6.3	4.2	0.75		R1
12A0-2	8.9	6.0	1.1		R1
018A-2	11.8	6.8	1.5		R1
025A-2	17.3	9.6	2.2		R2
032A-2	30.4	15.2	4.0		R2
047A-2	42	22	5.5		R3
060A-2	55	28	7.5		R3

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¹⁾ Continuous current, no overloadability

■ $U_N = 400 \text{ V}$

R1-
R4

Type ACQ580 -01-	Input rating	Output ratings			Heat dissipation	Air flow	Frame size
		Max. current	Nominal use				
			I_1	I_{max}			
A	A	A	kW	W	m^3/h		
3-phase $U_N = 400 \text{ V}$							
02A7-4	2.6	3.2	2.6	0.75	69	43	R1
03A4-4	3.3	4.7	3.3	1.1	78	43	R1
04A1-4	4.0	5.9	4.0	1.5	87	43	R1
05A7-4	5.6	7.2	5.6	2.2	113	43	R1
07A3-4	7.2	10.1	7.2	3.0	127	43	R1
09A5-4	9.4	13.0	9.4	4.0	165	43	R1
12A7-4	12.6	15.3	12.6	5.5	237	43	R1
018A-4	17.0	22.7	17.0	7.5	265	101	R2
026A-4	25.0	30.6	25.0	11.0	416	101	R2
033A-4	32.0	44.3	32.0	15.0	514	179	R3
039A-4	38.0	56.9	38.0	18.5	570	179	R3
046A-4	45.0	67.9	45.0	22.0	709	179	R3
062A-4	62	76	62	30	957	134	R4
073A-4	73	104	73	37	1230	134	R4

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■ $U_N = 480 \text{ V}$

Type ACQ580 -01-	Input rating	Output ratings			Heat dissipation	Air flow	Frame size
		Max. current	Nominal use				
			I_1	I_{Ld}			
A	A	A	hp	W	m^3/h		
3-phase $U_N = 480 \text{ V}$							
02A7-4	2.1	2.9	2.1	1.0	45	43	R1
03A4-4	3.0	3.8	3.0	1.5	55	43	R1
04A1-4	3.4	5.4	3.5	2.0	66	43	R1
05A7-4	4.8	6.1	4.8	3.0	84	43	R1
07A3-4	6.0	7.2	6.0	3.0	106	43	R1
09A5-4	7.6	8.6	7.6	5.0	133	43	R1
12A7-4	11.0	13.7	12.0	7.5	174	43	R1
018A-4	14.0	19.8	14.0	10.0	228	101	R2
026A-4	21.0	25.2	23.0	15.0	322	101	R2
033A-4	27.0	37.8	27.0	20.0	430	179	R3
039A-4	34.0	48.6	34.0	25.0	525	179	R3
046A-4	40.0	61.2	44.0	30.0	619	179	R3
062A-4	52	76	52	40	835	134	R4
073A-4	65	104	65	50	1024	134	R4

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gG fuses

Type ACQ580-01-	Min. short-circuit current ¹⁾	Input current	gG (IEC 60269)				
			Nominal current	I^2t	Voltage rating	ABB type	IEC 60269 size
			A	A ² s	V		
3-phase $U_N = 230$ V							
04A7-2	200	4.7	25.0	2500.0	500	OFAF000H25	000
06A7-2	200	6.7	25.0	2500.0	500	OFAF000H25	000
07A6-2	200	7.6	25.0	2500.0	500	OFAF000H25	000
012A-2	200	12.0	25.0	2500.0	500	OFAF000H25	000
018A-2	200	16.9	25.0	2500.0	500	OFAF000H25	000
025A-2	320	24.5	40.0	7700.0	500	OFAF000H40	000
032A-2	320	31.2	40.0	7700.0	500	OFAF000H40	000
047A-2	500	46.7	63.0	20100.0	500	OFAF000H63	000
060A-2	500	60.0	63.0	20100.0	500	OFAF000H63	000
3-phase $U_N = 400$ or 480 V							
02A7-4	32	2.6	4	55	500	OFAF000H4	000
03A4-4	48	3.3	6	110	500	OFAF000H6	000
04A1-4	48	4.0	6	110	500	OFAF000H6	000
05A7-4	80	5.6	10	360	500	OFAF000H10	000
07A3-4	80	7.2	10	360	500	OFAF000H10	000
09A5-4	128	9.4	16	740	500	OFAF000H16	000
12A7-4	128	12.6	16	740	500	OFAF000H16	000
018A-4	200	17.0	25	2500	500	OFAF000H25	000
026A-4	256	25.0	32	4000	500	OFAF000H32	000
033A-4	320	32.0	40	7700	500	OFAF000H40	000
039A-4	400	38.0	50	16000	500	OFAF000H50	000
046A-4	500	45.0	63	20100	500	OFAF000H63	000
062A-4	800	62	80	37500	500	OFAF000H80	000
073A-4	1000	73	100	65000	500	OFAF000H100	000

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¹⁾ Minimum short-circuit current of the installation

uR or aR fuses

R1-
R4

Type ACQ580 -01-	Min. short- circuit current ¹⁾	Input current	uR or aR (DIN 43620 blade style)				
			Nominal current	I^2t	Voltage rating	Bussmann type	IEC 60269 size
A		A	A	A ² s	V		
3-phase $U_N = 230$ V							
04A7-2	120.0	4.7	40.0	460.0	690	170M1563	000
06A7-2	120.0	6.7	40.0	460.0	690	170M1563	000
07A6-2	120.0	7.6	40.0	460.0	690	170M1563	000
012A-2	120.0	12.0	40.0	460.0	690	170M1563	000
018A-2	120.0	16.9	40.0	460.0	690	170M1563	000
025A-2	170.0	24.5	63.0	1450.0	690	170M1565	000
032A-2	170.0	31.2	63.0	1450.0	690	170M1565	000
047A-2	280.0	46.7	80.0	2550.0	690	170M1566	000
060A-2	280.0	60.0	80.0	2550.0	690	170M1566	000
089A-2	700.0	89.0	200.0	15000.0	690	170M3815	1
115A-2	700.0	115.0	200.0	15000.0	690	170M3815	1
144A-2	1000	144.0	315	46500	690	170M3817	1
171A-2	1280	171.0	450	105000	690	170M5809	2
213A-2	1450	213.0	500	155000	690	170M5810	2
276A-2	2050	276.0	630	220000	690	170M6810	3
3-phase $U_N = 400$ or 480 V							
02A7-4	65	2.6	25	130	690	170M1561	000
03A4-4	65	3.3	25	130	690	170M1561	000
04A1-4	65	4.0	25	130	690	170M1561	000
05A7-4	65	5.6	25	130	690	170M1561	000
07A3-4	65	7.2	25	130	690	170M1561	000
09A5-4	65	9.4	25	130	690	170M1561	000
12A7-4	65	12.6	25	130	690	170M1561	000
018A-4	120	17.0	40	460	690	170M1563	000
026A-4	120	25.0	40	460	690	170M1563	000
033A-4	170	32.0	63	1450	690	170M1565	000
039A-4	170	38.0	63	1450	690	170M1565	000
046A-4	280	45.0	80	2550	690	170M1566	000
062A-4	380	62	100	4650	690	170M1567	000
073A-4	480	73	125	8500	690	170M1568	000
088A-4	700	88	160	16000	690	170M1569	000
106A-4	1280	106	315	46500	690	170M3817	1
145A-4	1280	145	315	46500	690	170M3817	1
169A-4	1800	169	450	105000	690	170M5809	1
206A-4	2210	206	500	145000	690	170M5810	1
246A-4	3010	246	630	275000	690	170M5812	2
293A-4	4000	293	800	490000	690	170M6812D	2
363A-4	5550	363	1000	985000	690	170M6814D	2
430A-4	7800	430	1250	2150000	690	170M8554D	2

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1) Minimum short-circuit current of the installation

Type ACQ580 -01-	Min. short- circuit current ¹⁾	Input current	uR or aR (DIN 43653 bolted tags)				
			Nominal current	I^2t	Voltage rating	Busmann type	IEC 60269 size
			A	A ² s	V		
3-phase $U_N = 400$ or 480 V							
02A7-4	65	2.6	25	130	690	170M1311	000
03A4-4	65	3.3	25	130	690	170M1311	000
04A1-4	65	4.0	25	130	690	170M1311	000
05A7-4	65	5.6	25	130	690	170M1311	000
07A3-4	65	7.2	25	130	690	170M1311	000
09A5-4	65	9.4	25	130	690	170M1311	000
12A7-4	65	12.6	25	130	690	170M1311	000
018A-4	120	17.0	40	460	690	170M1313	000
026A-4	120	25.0	40	460	690	170M1313	000
033A-4	170	32.0	63	1450	690	170M1315	000
039A-4	170	38.0	63	1450	690	170M1315	000
046A-4	280	45.0	80	2550	690	170M1316	000
062A-4	380	62	100	4650	690	170M1417	000
073A-4	480	73	125	8500	690	170M1318	000
088A-4	700	88	160	16000	690	170M1319	000
106A-4	700	106	200	15000	690	170M3015	1
145A-4	1000	145	250	28500	690	170M3016	1
169A-4	1280	169	315	46500	690	170M3017	1
206A-4	1520	206	350	68500	690	170M3018	1
246A-4	2050	246	450	105000	690	170M5009	2
293A-4	2200	293	500	145000	690	170M5010	2
363A-4	3100	363	630	275000	690	170M5012	2
430A-4	3600	430	700	405000	690	170M5013	2

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¹⁾ Minimum short-circuit current of the installation

R1-
R4

EN – R1...R4 Quick installation guide

This guide briefly describes how to install the drive for IEC use. For complete information on installation, see *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD50000044862 [English]). For start-up instructions, see chapter [EN – Quick start-up guide](#) on page 43.

R1-
R4

To read a manual, go to www.abb.com/drives/documents and search for the document number.

Obey the 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 work.
- Do not work on the drive, motor cable or motor when main power is applied. If the drive is already connected to the input power, wait for 5 minutes after disconnecting the input power.
- Do not work on the control cables when power is applied to the drive or to the external control circuits.
- Make sure that debris from drilling, cutting and grinding does not enter the drive when installing.
- Make sure that the floor below the drive and the wall where the drive is installed are non-flammable.

EN

Check if capacitors need to be reformed

The capacitors must be reformed if the drive has not been powered (either in storage or unused) for a year or more.

You can determine the manufacturing time from the serial number, which you find on the type designation label attached to the drive. The serial number is of format MYYWWRXXXX. YY and WW tell the manufacturing year and week as follows:

YY: 17, 18, 19, ... for 2017, 2018, 2019, ...

WW: 01, 02, 03, ... for week 1, week 2, week 3, ...

For information on reforming the capacitors, see *Converter module capacitor reforming instructions* (3BFE64059629 [English]), available on the Internet at www.abb.com/drives/documents.

Select the power cables

Size the power cables according to local regulations to carry the nominal current given on the type designation label of your drive.

R1-
R4

Ensure the cooling

See table *IEC ratings at UN = 230 V, 400 V and 480 V* on page 9 for the heat dissipation. The allowed operating temperature range of the drive is -15 to +50 °C (+5 to +122 °F). No condensation or frost is allowed. For more information on the ambient temperature and derating, see chapter *Technical data* in *ACQ580-01 (0.75 to 250 kW) hardware manual* (3AXD50000044862 [English]).

Protect the drive and input power cable

EN

See tables *gG fuses* (on page 11) and *uR or aR fuses* (on page 12).

If you use gG fuses, make sure that the operating time of the fuse is below 0.5 seconds. Follow the local regulations.

Install the drive on the wall

See figure *R1...R4 Figures A* on page 51.

Check the insulation of the power cables and the motor

Check the insulation of the input cable according to local regulations before connecting it to the drive.

See figure *B1* on page 51.

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

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

Switch off the power and open the cover

See figure [B1](#) on page [51](#).

2. Switch off the power from the drive.
3. Remove the front cover: Loosen the retaining screw, if any, with a screwdriver (3a) and lift the cover from the bottom outwards (3b) and then up (3c).

R1-
R4

Install the cable box

Only for frames IP21, R1....R2.

See figures [B1](#) on page [51](#).

4. IP21, R1....R2: Remove the screw (4a) and lift the cover off (4b) from the separate cable box.
5. IP21, R1....R2: Attach the cable box cover to the front cover.
6. IP21, R1....R2: Install the cable box to the frame. Position the cable box (6a) and tighten the screws (6b).

EN

Attach the warning sticker

See figure [B2](#) on page [51](#).

7. Attach the residual voltage warning sticker in the local language.

Check the compatibility with IT (ungrounded), corner-grounded delta, midpoint-grounded delta, and TT systems

See figure [B3](#) on page [51](#).

■ EMC filter

A drive with the internal EMC filter connected can be installed to a symmetrically grounded TN-S system. If you install the drive to another system, you may need to disconnect the EMC filter. See section *Checking the compatibility with IT (ungrounded), corner-grounded delta, midpoint-grounded delta, and TT systems* (for IEC) in ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual (3AXD50000044862 [English]).



WARNING! Do not install a drive with the EMC filter connected to a system that the filter is not suitable for. This can cause danger, or damage the drive.

Note: When the internal EMC filter is disconnected, the EMC compatibility of the drive is considerably reduced. See section *EMC compatibility and motor cable length*

in chapter *Technical data* in *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD50000044862 [English]).

■ Ground-to-phase varistor

R1-
R4

A drive with the ground-to-phase varistor connected can be installed to a symmetrically grounded TN-S system. If you install the drive to another system, you may need to disconnect the varistor. See section *Checking the compatibility with IT (ungrounded), corner-grounded delta, midpoint-grounded delta, and TT systems* (for IEC) in *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD50000044862 [English]).



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

EN

Connect the power cables

See figures [C1](#) (page [51](#)), [C2](#), [D](#), [E1](#), [E2](#), [F](#), [G1](#), [G2](#) and [R1...R4 Figures H](#) (page [53](#)).

1. Remove the rubber grommets from the cable entry.

Use symmetrical shielded cable for motor cabling. If the cable shield is the sole PE conductor for drive or motor, make sure that it has sufficient conductivity for the PE.

2. Cut an adequate hole into the rubber grommet. Slide the grommet onto the cable.
3. Prepare the ends of the motor cable as illustrated in figures 3a and 3b (two different motor cable types are shown). In frames R1 and R2 there are markings on the drive frame near the power cable terminals helping you to strip the wires to the correct length of 8 mm. **Note:** The bare shield will be grounded 360 degrees. Mark the pigtail made from the shield as a PE conductor with yellow-and-green color.
4. Slide the cable through the hole in the cable entry, and attach the grommet to the hole.
5. Connect the motor cable:
 - Ground the shield 360 degrees by tightening the clamp of the power cable grounding shelf onto the stripped part of the cable (5a).
 - Connect the twisted shield of the cable to the grounding terminal (5b).
 - Connect the phase conductors of the cable to the T1/U, T2/V and T3/W terminals (5c). Tighten the screws to the torque given in the figure.
6. Repeat steps [2...4](#) for the input power cable.
7. Connect the input power cable. Connect the additional PE conductor of the cable (7c). Tighten the screws to the torque given in the figure.
8. [R1...R2, R4](#): Install the grounding shelf.
9. Repeat steps [2...4](#) for the brake resistor cable (if used). Cut off extra phase conductors (if any).
10. Connect the resistor cable (if used). Tighten the screws to the torque given in the figure.
11. Put the unused rubber grommets to the holes in the cable entry.
12. Secure the cables outside the unit mechanically.
13. 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.

R1-
R4

EN

Connect the control cables

See figures *1* and *12* on page *53*. It shows an example with one analog signal cable and one digital signal cable. Make the connections according to the default configuration in use. The default connections of the Water default configuration are shown in section *Default I/O connections* on page *21*.

R1-
R4

1. Remove the front cover, if not already removed. See section *Switch off the power and open the cover* on page *17*.

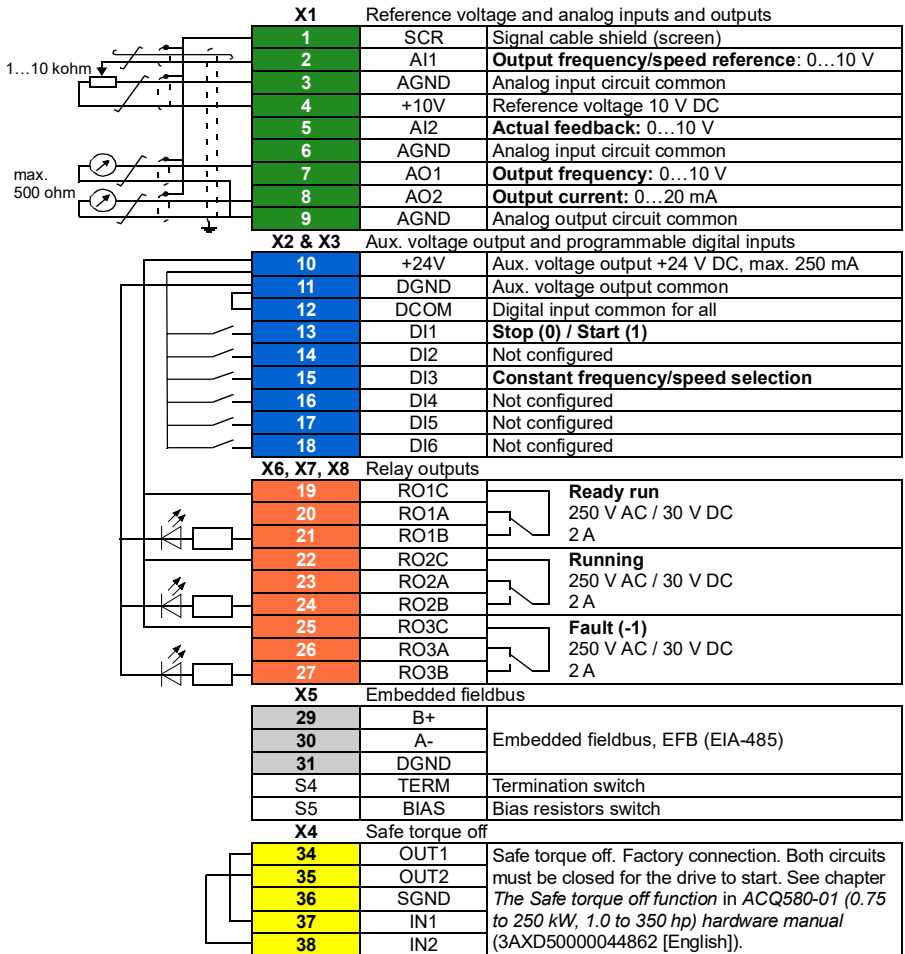
Example of connecting an analog signal cable:

2. Cut an adequate hole into the rubber grommet and slide the grommet onto the cable. Slide the cable through a hole in the cable entry and attach the grommet to the hole.
3. 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 board as possible. Ground also the pair-cable shields and grounding wire at the SCR1 terminal.
4. Route the cable as shown in the figure.
5. Connect the conductors to the appropriate terminals of the control board and tighten to 0.5...0.6 N·m (0.4 lbf·ft).
6. Tie all control cables to the provided cable tie mounts.

EN

Default I/O connections

Default I/O connections of the Water default configuration are shown below.



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

Wire sizes:

0.2...2.5 mm² (24...14 AWG): Terminals +24V, DGND, DCOM, B+, A-, DGND, Ext. 24V

0.14...1.5 mm² (26...16 AWG): Terminals DI, AI, AO, AGND, RO, STO

Tightening torques: 0.5...0.6 N·m (0.4 lbf·ft)

R1-
R4

EN

Install optional modules, if any

See chapter *Electrical installation* in *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual (3AXD50000044862 [English])*.

R1-
R4

Reinstall cover

See figure [J](#) on page [54](#).

1. Put the tabs on the inside of the cover top in their counterparts on the housing (1a) and then press the cover at the bottom (1b).
2. Tighten the retaining screw with a screwdriver.

EN

For start-up instructions, see chapter [EN – Quick start-up guide](#) on page [43](#).

Compliance with the European Machinery Directive 2006/42/EC

Declaration of conformity



R1-
R4

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 product:

Frequency converter(s)

ACQ580-01/-31

with regard to the safety function(s)

Safe Torque Off

is/are in conformity with all the relevant safety component requirements of EU Machinery Directive 2006/42/EC, when the listed safety function is 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 62061:2005 + AC:2010 + A1:2013 + A2:2015	Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic 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: 2006 + A1:2009 + AC:2010	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 3AXD10000486283.

Person authorized to compile the technical file

Name and address: Risto Mynttinen, Hiomotie 13, 00380 Helsinki, Finland.

Helsinki 07.06.2019

Manufacturer representative:	Tuomo Tarula Vice President, ABB Oy
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Document number 3AXD10000486283

R1-
R4



DRIVES FOR WATER

ACQ580-01 drives

Quick installation guide Frames R5

R5

English31

EN



Ratings and fuses

IEC ratings at $U_N = 230\text{ V}$, 400 V and 480 V

■ $U_N = 230\text{ V}$

Type ACQ580 -01-	Input rating	Output ratings			Heat dissipation	Air flow	Frame size
		Max. current	Nominal use				
	I_1	I_{\max}	I_N	P_N			
	A	A	A	kW	W	m^3/h	
3-phase $U_N = 230\text{ V}$							
089A-2	89	135	89	22	619	139	R5
115A-2	115	158	115	30	835	139	R5

3AXD00000586715.xls L

Type ACQ580-01-	Input ratings		Output ratings		Frame size
	I_1	I_N	P_N		
	A	A ¹⁾	kW		
1-phase $U_N = 230\text{ V}$					
089A-2	81	42	11	R5	
115A-2	111	54	15	R5	

3AXD00000586715.xls L

¹⁾ Continuous current, no overloadability

■ $U_N = 400\text{ V}$

Type ACQ580 -01-	Input rating	Output ratings			Heat dissipation	Air flow	Frame size
		Max. current	Nominal use				
	I_1	I_{\max}	I_N	P_N			
	A	A	A	kW	W	m^3/h	
3-phase $U_N = 400\text{ V}$							
088A-4	88	122	88	45	1316	139	R5
106A-4	106	148	106	55	1589	139	R5

3AXD00000586715.xls L

R5

■ $U_N = 480 \text{ V}$

Type ACQ580 -01-	Input rating	Output ratings			Heat dissipation	Air flow	Frame size	
		Max. current	Nominal use					
			I_1	I_{Ld}				P_{Ld}
		A	A	A				hp
R5	3-phase $U_N = 480 \text{ V}$							
	088A-4	77	122	77	60	1240	139	R5
	106A-4	96	148	96	75	1510	139	R5

3AXD00000586715.xls L

gG fuses

Type ACQ580-01-	Min. short-circuit current ¹⁾	Input current	gG (IEC 60269)				
			Nominal current	I^2t	Voltage rating	ABB type	IEC 60269 size
			A	A	A		
3-phase $U_N = 230$ V							
089A-2	1300	89.0	125.0	103000	500	OFAF00H125	00
115A-2	1300	115.0	125.0	103000	500	OFAF00H125	00
3-phase $U_N = 400$ or 480 V							
088A-4	1000	88	100	65000	500	OFAF000H100	000
106A-4	1300	106	125	103000	500	OFAF00H125	00

3AXD00000586715.xls L

1) Minimum short-circuit current of the installation

uR or aR fuses

Type ACQ580-01-	Min. short-circuit current ¹⁾	Input current	uR or aR (DIN 43620 blade style)				
			Nominal current	I^2t	Voltage rating	Bussmann type	IEC 60269 size
			A	A	A		
3-phase $U_N = 230$ V							
089A-2	700.0	89.0	200.0	15000.0	690	170M3815	1
115A-2	700.0	115.0	200.0	15000.0	690	170M3815	1
3-phase $U_N = 400$ or 480 V							
088A-4	700	88	160	16000	690	170M1569	000
106A-4	1280	106	315	46500	690	170M3817	1

3AXD00000586715.xls L

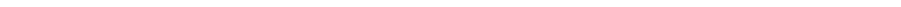
1) Minimum short-circuit current of the installation

Type ACQ580-01-	Min. short-circuit current ¹⁾	Input current	uR or aR (DIN 43653 bolted tags)				
			Nominal current	I^2t	Voltage rating	Bussmann type	IEC 60269 size
			A	A	A		
3-phase $U_N = 400$ or 480 V							
088A-4	700	88	160	16000	690	170M1319	000
106A-4	700	106	200	15000	690	170M3015	1

3AXD00000586715.xls L

1) Minimum short-circuit current of the installation

R5



EN – R5 Quick installation guide

This guide briefly describes how to install the drive for IEC use. For complete information on installation, see *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD5000044862 [English]). For start-up instructions, see chapter [EN – Quick start-up guide](#) on page 43.

To read a manual, go to www.abb.com/drives/documents and search for the document number.

R5

Obey the 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 work.
- Do not work on the drive, motor cable or motor when main power is applied. If the drive is already connected to the input power, wait for 5 minutes after disconnecting the input power.
- Do not work on the control cables when power is applied to the drive or to the external control circuits.
- Make sure that debris from drilling, cutting and grinding does not enter the drive when installing.
- Make sure that the floor below the drive and the wall where the drive is installed are non-flammable.

EN

Check if capacitors need to be reformed

The capacitors must be reformed if the drive has not been powered (either in storage or unused) for a year or more.

You can determine the manufacturing time from the serial number, which you find on the type designation label attached to the drive. The serial number is of format MYYWWRXXXX. YY and WW tell the manufacturing year and week as follows:

YY: 16, 17, 18, ... for 2016, 2017, 2018, ...

WW: 01, 02, 03, ... for week 1, week 2, week 3, ...

For information on reforming the capacitors, see *Converter module capacitor reforming instructions* (3BFE64059629 [English]), available on the Internet at www.abb.com/drives/documents.

Select the power cables

Size the power cables according to local regulations to carry the nominal current given on the type designation label of your drive.

Ensure the cooling

R5

See table *IEC ratings at UN = 230 V, 400 V and 480 V* on page 27 for the heat dissipation. The allowed operating temperature range of the drive is -15 to +50 °C (+5 to +122 °F). No condensation or frost is allowed. For more information on the ambient temperature and derating, see chapter *Technical data* in *ACQ580-01 (0.75 to 250 kW) hardware manual* (3AXD50000044862 [English]).

Protect the drive and input power cable

EN

See tables *gG fuses* (on page 29) and *uR or aR fuses* (on page 29).

If you use gG fuses, make sure that the operating time of the fuse is below 0.5 seconds. Follow the local regulations.

Install the drive on the wall

See figure *R5 Figures A* on page 55.

Check the insulation of the power cables and the motor

Check the insulation of the input cable according to local regulations before connecting it to the drive.

See figure *B* on page 55.

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

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

Switch off the power and open the cover

See figure [B](#) on page [55](#).

2. Switch off the power from the drive.
3. [IP21, Remove the module cover](#): Loosen the retaining screws with a screwdriver (3a) and lift the cover from the bottom outwards (3b) and then up (3c).
4. [IP21, Remove the box cover](#): Loosen the retaining screws with a screwdriver (4a) and slide the cover downwards (4b).
5. [IP55, Remove the front cover](#): Loosen the retaining screws with a screwdriver (4a) and lift the cover from the bottom outwards (4b) and then up (4c).

R5

Check the compatibility with IT (ungrounded), corner-grounded delta, midpoint-grounded delta, and TT systems

See figure [C](#) on page [56](#).

■ EMC filter

A drive with the internal EMC filter connected can be installed to a symmetrically grounded TN-S system. If you install the drive to another system, you may need to disconnect the EMC filter. See section *Checking the compatibility with IT (ungrounded), corner-grounded delta, midpoint-grounded delta, and TT systems* (for IEC) in *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD50000044862 [English]).



WARNING! Do not install a drive with the EMC filter connected to a system that the filter is not suitable for. This can cause danger, or damage the drive.

Note: When the internal EMC filter is disconnected, the EMC compatibility of the drive is considerably reduced. See section *EMC compatibility and motor cable length* in chapter *Technical data* in *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD50000044862 [English]).

■ Ground-to-phase varistor

A drive with the ground-to-phase varistor connected can be installed to a symmetrically grounded TN-S system. If you install the drive to another system, you may need to disconnect the varistor. See section *Checking the compatibility with IT (ungrounded), corner-grounded delta, midpoint-grounded delta, and TT systems* (for IEC) in *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD50000044862 [English]).

EN



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

R5

EN

Connect the power cables

See figures [D](#) (page [56](#)), [E](#) and [R5 Figures F](#) (page [57](#)).

1. Attach the residual voltage warning sticker in the local language next to the control board.
2. Remove the shroud on the power cable terminals by releasing the clips with a screwdriver and pulling the shroud out.

Use symmetrical shielded cable for motor cabling. If the cable shield is the sole PE conductor for drive or motor, make sure that it has sufficient conductivity for the PE.

3. Cut an adequate hole into the rubber grommet. Slide the grommet onto the cable.
4. Prepare the ends of the motor cable as illustrated in figures 4a and 4b (two different motor cable types are shown). **Note:** The bare shield will be grounded 360 degrees. Mark the pigtail made from the shield as a PE conductor with yellow-and-green color.
5. Slide the cable through the hole in the cable entry and attach the grommet to the hole.
6. Connect the motor cable:
 - 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 to the grounding terminal (6b).
 - Connect the phase conductors of the cable to the T1/U, T2/V and T3/W terminals (6c). Tighten the screws to the torque given in the figure.
7. Repeat steps [3...5](#) for the input power cable.
8. Connect the input power cable. Tighten the screws to the torque given in the figure.
9. Install the cable box plate. Position the plate and tighten the screw.
10. Reinstall the shroud on the power terminals by putting the tabs at the top of the shroud in their counterparts on the drive frame and then pressing the shroud in place.
11. Secure the cables outside the unit mechanically.
12. See figure [G](#) (page [57](#)). 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.

R5

EN

Connect the control cables

See figure *H* on page 57. It shows an example with one analog signal cable and one digital signal cable. Make the connections according to the default configuration in use. The default connections of the Water default configuration are shown in section *Default I/O connections* on page 37.

R5

1. Remove the front cover, if not already removed. See section *Switch off the power and open the cover* on page 33.

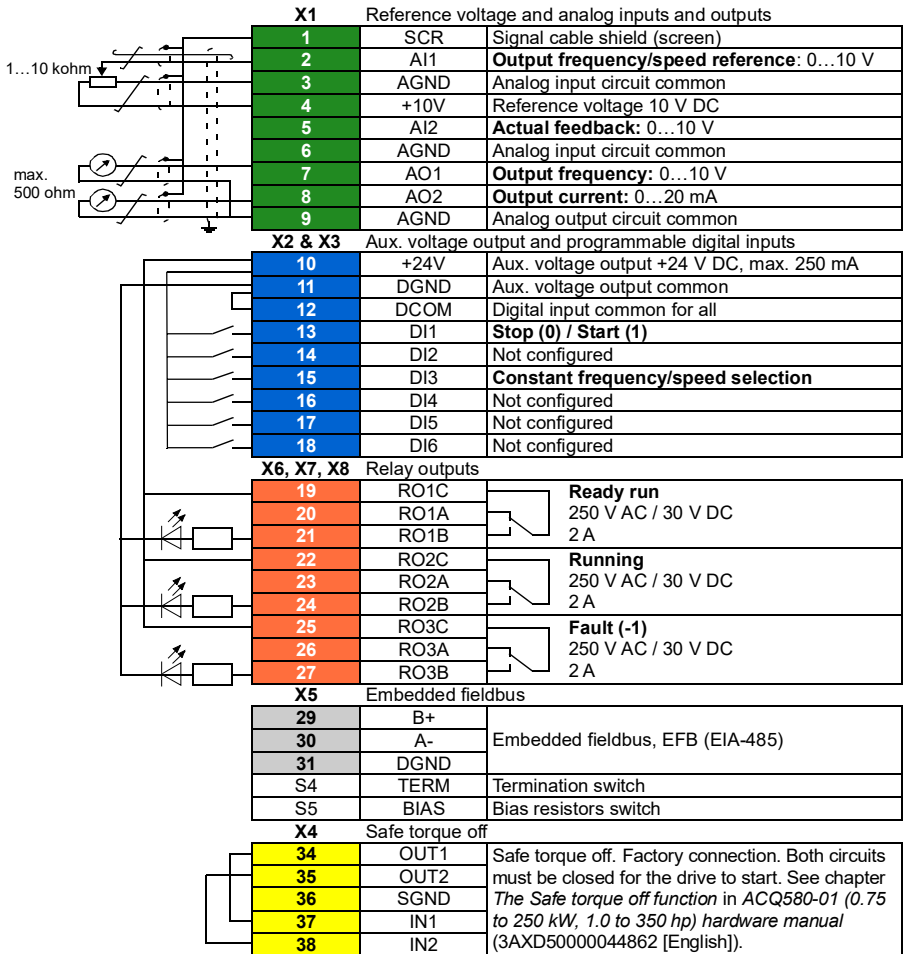
Example of connecting an analog signal cable:

EN

2. Cut an adequate hole into the rubber grommet and slide the grommet onto the cable. Slide the cable through a hole in the cable entry and attach the grommet to the hole.
 3. 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 board as possible. Ground also the pair-cable shields and grounding wire at the SCR1 terminal.
 4. Route the cable as shown in the figure.
 5. Connect the conductors to the appropriate terminals of the control board and tighten to 0.5...0.6 N·m (0.4 lbf·ft).
 6. Tie all control cables to the provided cable tie mounts.
-

Default I/O connections

Default I/O connections of the Water default configuration are shown below.



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

Wire sizes:

0.2...2.5 mm² (24...14 AWG): Terminals +24V, DGND, DCOM, B+, A-, DGND, Ext. 24V

0.14...1.5 mm² (26...16 AWG): Terminals DI, AI, AO, AGND, RO, STO

Tightening torques: 0.5...0.6 N·m (0.4 lbf·ft)

R5

EN

Install optional modules, if any

See chapter *Electrical installation* in *ACQ580-01 (0.75 to 250 kW, 1.0 to 350 hp) hardware manual* (3AXD50000044862 [English]).

Reinstall cover

R5 See figure *I* on page [58](#).

1. IP21, Reinstall the box cover: Slide the cover upwards (1a) and tighten the retaining screws (1b).
2. IP21, Reinstall the module cover: Put the tabs on the inside of the cover top in their counterparts on the housing (2a), press the cover at the bottom (2b) and tighten the retaining screws (2c).
3. IP55, Reinstall the front cover: Put the tabs on the inside of the cover top in their counterparts on the housing (3a), press the cover at the bottom (3a) and tighten the retaining screws (3b).

EN

For start-up instructions, see chapter [EN – Quick start-up guide](#) on page [43](#).

Compliance with the European Machinery Directive 2006/42/EC

R5



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 product:

Frequency converter

ACQ580-01

with regard to the safety function

Safe torque off

is in conformity with all the relevant safety component requirements of EU Machinery Directive 2006/42/EC, when the listed safety function is used for safety component functionality.

The following harmonized standards have been applied:

EN 61800-5-2:2007	<i>Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional</i>
EN 62061:2005 + AC:2010 + A1:2013 + A2:2015	<i>Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems</i>
EN ISO 13849-1:2015	<i>Safety of machinery – Safety-related parts of control systems. Part 1: General requirements</i>
EN ISO 13849-2:2012	<i>Safety of machinery – Safety-related parts of the control systems. Part 2: Validation</i>
EN 60204-1: 2006 + A1:2009 + AC:2010	<i>Safety of machinery – Electrical equipment of machines – Part 1: General requirements</i>

The following other standards have been applied:

IEC 61508:2010	<i>Functional safety of electrical / electronic / programmable electronic safety-related systems</i>
IEC 61800-5-2:2015	<i>Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional</i>

The product referred in this Declaration of conformity fulfils the relevant provisions of other European Union Directives which are notified in Single EU Declaration of conformity 3AXD10000497692.

Person authorized to compile the technical file:

Name and address: Risto Mynttinen, Hiomotie 13, 00380 Helsinki, Finland.

Helsinki, 30 Jun 2016

Manufacturer representative:



Tuomo Hoysniemi
Vice President, ABB Oy

DRIVES FOR WATER

ACQ580-01 drives

Quick start-up guide

Frames R1 to R9

R1-
R9



English 43

EN

EN – Quick start-up guide

This guide describes how to start-up the drive using the Set-up assistant on the HVAC control panel. For complete information on start-up, see *ACQ580 pump control program firmware manual* (3AXD50000035867 [English]).









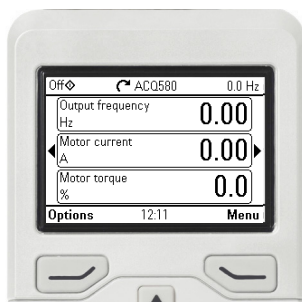
Before you start

Ensure that the drive has been installed as described in chapter [EN – R1...R4 Quick installation guide](#) on page 15 (frames R1...R4) or in chapter [EN – R5 Quick installation guide](#) page 31 (frame R5).

R1-
R9

Start-up with the Set-up assistant on an HVAC control panel

EN

Safety	
<input type="checkbox"/>	Make sure that the installation work is complete. Make sure that cover of the drive and the cable box, if included, are on place.
<input type="checkbox"/>	 Check that the starting of the motor does not cause any danger. De-couple the driven machine if there is a risk of damage in case of an incorrect direction of rotation.
Hints on using the assistant control panel	
<p>The two commands at the bottom of the display (Options and Menu in the figure on the right), show the functions of the two softkeys  and  located below the display. The commands assigned to the softkeys vary depending on the context.</p> <p>Use keys , ,  and  to move the cursor and/or change values depending on the active view.</p> <p>Key  shows a context-sensitive help page.</p>	
1 – First start assistant guided settings: Language, date and time, and motor nominal values	
<input type="checkbox"/>	Have the motor name plate data at hand. Power up the drive.





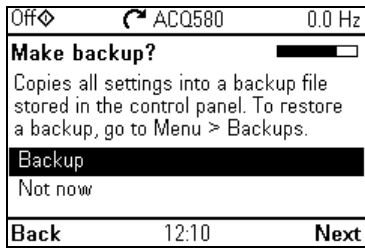


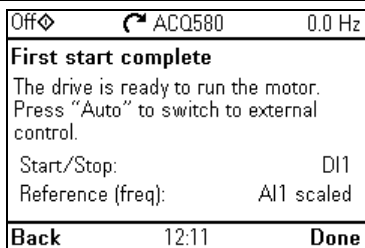



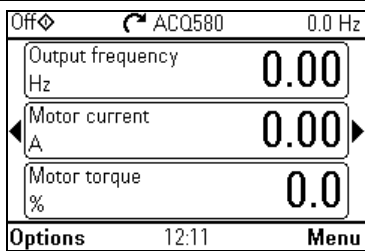







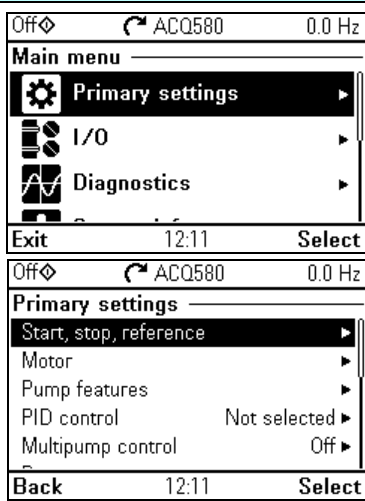





<input type="checkbox"/>	<p>The First start assistant guides you through the first start-up.</p> <p>The assistant begins automatically. Wait until the control panel enters the view shown on the right. Select the language you want to use by highlighting it (if not already highlighted) and pressing (OK).</p> <p>Note: After you have selected the language, it takes a few minutes for the control panel to wake up.</p>	
<input type="checkbox"/>	<p>Select Start set-up and press (Next).</p>	
<input type="checkbox"/>	<p>Set the date and time as well as date and time display formats.</p> <ul style="list-style-type: none"> Go to the edit view of a selected row by pressing . Scroll the view with and . <p>Go to the next view by pressing (Next).</p>	
<input type="checkbox"/>	<p>To change a value in an edit view:</p> <ul style="list-style-type: none"> Use and to move the cursor left and right. Use and to change the value. Press (Save) to accept the new setting, or press (Cancel) to go back to the previous view without making changes. 	
<input type="checkbox"/>	<p>Change the units shown on the control panel if needed.</p> <ul style="list-style-type: none"> Go to the edit view of a selected row by pressing . Scroll the view with and . <p>Go to the next view by pressing (Next).</p>	

<p><input type="checkbox"/> To give the drive a name that will be shown at the top, press .</p> <p>If you do not want to change the default name (ACQ580), continue by pressing (Next).</p> <p>For information on editing text, see <i>ACQ580 pump control program firmware manual</i> (3AXD50000035867 [English]).</p> <p>Hint: Name the drive, for example, Pump 1.</p>	
<p>Refer to the motor or pump nameplate for the following nominal value settings of the motor. Enter the values <u>exactly</u> as shown on the motor or pump nameplate.</p>	
<p>Example of a nameplate of an induction (asynchronous) motor:</p>	
<p><input type="checkbox"/> Check that the motor data is correct. Values are predefined on the basis of the drive size but you should verify that they correspond to the motor.</p> <p>Start with the motor type. Go to the edit view of a selected row by pressing .</p> <ul style="list-style-type: none"> • Scroll the view with and . <p>Motor nominal $\cos\Phi$ and nominal torque are optional.</p> <p>Press (Next) to continue.</p>	
<p><input type="checkbox"/> Adjust the limits according to your needs.</p> <ul style="list-style-type: none"> • Go to the edit view of a selected row by pressing . • Scroll the view with and . <p>Go to the next view by pressing (Next).</p>	

R1-R9



EN

<input type="checkbox"/>	<p>If you want to make a backup of the settings made so far, select Backup and press  (Next).</p> <p>If you do not want to make a backup, select Not now and press  (Next).</p>	 <p>Off  ACQ580 0.0 Hz</p> <p>Make backup?</p> <p>Copies all settings into a backup file stored in the control panel. To restore a backup, go to Menu > Backups.</p> <p>Backup</p> <p>Not now</p> <p>Back 12:10 Next</p>
<input type="checkbox"/>	<p>The set-up is now complete and the drive is ready for use.</p> <p>Press  (Done) to enter the Home view.</p>	 <p>Off  ACQ580 0.0 Hz</p> <p>First start complete</p> <p>The drive is ready to run the motor. Press "Auto" to switch to external control.</p> <p>Start/Stop: DI1</p> <p>Reference (freq): A11 scaled</p> <p>Back 12:11 Done</p>
<input type="checkbox"/>	<p>The Home view 1 monitoring the values of the selected signals is shown on the panel.</p> <p>There are four preconfigured Home view displays. Home view 1 is the default Home view. You can browse them with keys  and .</p> <p>For changing the signals and their display style shown in the Home view, see <i>ACx -AP-x assistant control panels user's manual</i> (3AUA0000085685 [English]).</p>	 <p>Off  ACQ580 0.0 Hz</p> <p>Output frequency 0.00 Hz</p> <p>Motor current 0.00 A</p> <p>Motor torque 0.0 %</p> <p>Options 12:11 Menu</p>
<h2 style="background-color: #e0f0ff; padding: 5px;">2 – Additional settings in the Primary settings menu</h2>		
<input type="checkbox"/>	<p>Make any additional adjustments, for example, pump protections, starting from the Main menu – press  (Menu) to enter the Main menu.</p> <p>Select Primary settings and press  (Select) (or ).</p> <p>In the Primary settings menu, select Pump features and press  (Select) (or ).</p> <p>To get more information on the Primary settings menu items, press  to open the help page.</p>	 <p>Off  ACQ580 0.0 Hz</p> <p>Main menu</p> <p> Primary settings ▶</p> <p> I/O ▶</p> <p> Diagnostics ▶</p> <p>Exit 12:11 Select</p> <hr/> <p>Off  ACQ580 0.0 Hz</p> <p>Primary settings</p> <p>Start, stop, reference ▶</p> <p>Motor ▶</p> <p>Pump features ▶</p> <p>PID control Not selected ▶</p> <p>Multipump control Off ▶</p> <p>Back 12:11 Select</p>

R1-
R9

EN

3 – Hand/Off/Auto operation




The drive can be in remote control or local control, and in local control there are additionally two different modes.

Remote control: Drive is controlled from the I/O or the fieldbus.

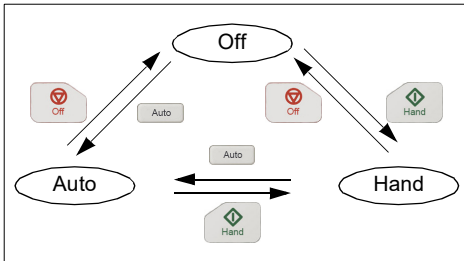
- Top row of the view shows Auto.

Local control: Drive is controlled from the control panel.


- Top row of the view shows Off, that is, the drive is in the Off mode. Drive is stopped.
- Top row of the view shows Hand, that is, the drive is in the Hand mode. Drive is running. The initial reference in the Hand mode is copied from the drive reference.



Symbol  on the top row indicates that you can change the reference with  and .




The following diagram shows the state transitions when you press the Hand, Off or Auto button:






Note: When you restart the drive while fault 7081 Control panel loss is active, the mode changes from Hand or Off to Auto.

Auto	 ACQ580	30.0 Hz
Output frequency	Hz	30.00
Motor current	A	0.46
Motor torque	%	8.9
	12:30	Menu

Off 	 ACQ580	0.0 Hz
Output frequency	Hz	0.00
Motor current	A	0.00
Motor torque	%	0.0
	12:37	Menu

Hand 	 ACQ580	 30.0 Hz
Output frequency	Hz	30.00
Motor current	A	0.46
Motor torque	%	8.8
Reference	12:38	Menu

Off 	 ACQ580	0.0 Hz
 Fault 7081		
Aux code: 0000 0000		
Control panel loss		12:41:43
Control panel loss fault		
Hide	12:42	Reset

R1-R9



EN

R1-
R9



EN

DRIVES FOR WATER

ACQ580-01 drives

Quick installation guide

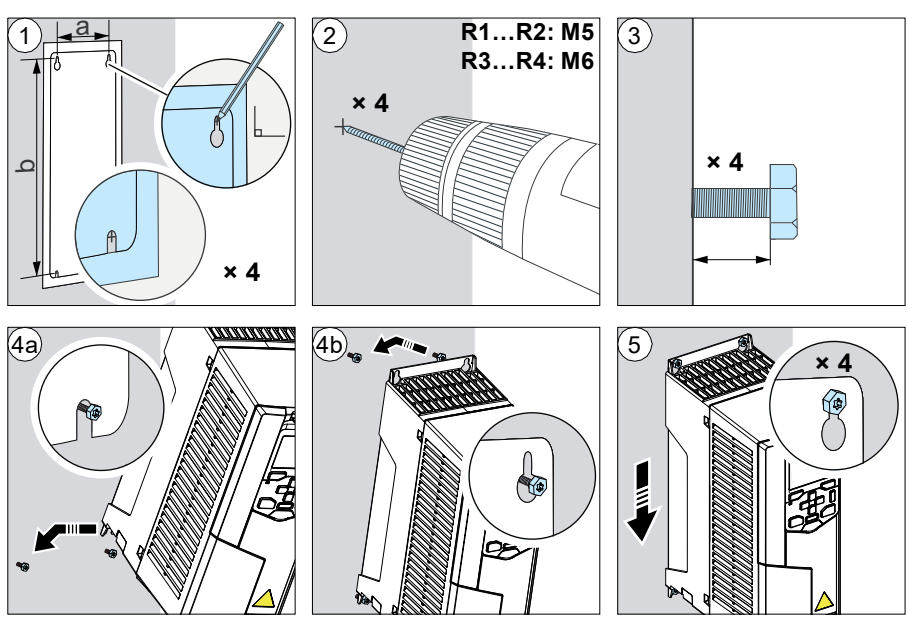
Frames R1 to R4 and R5 installation figures

R1-
R4

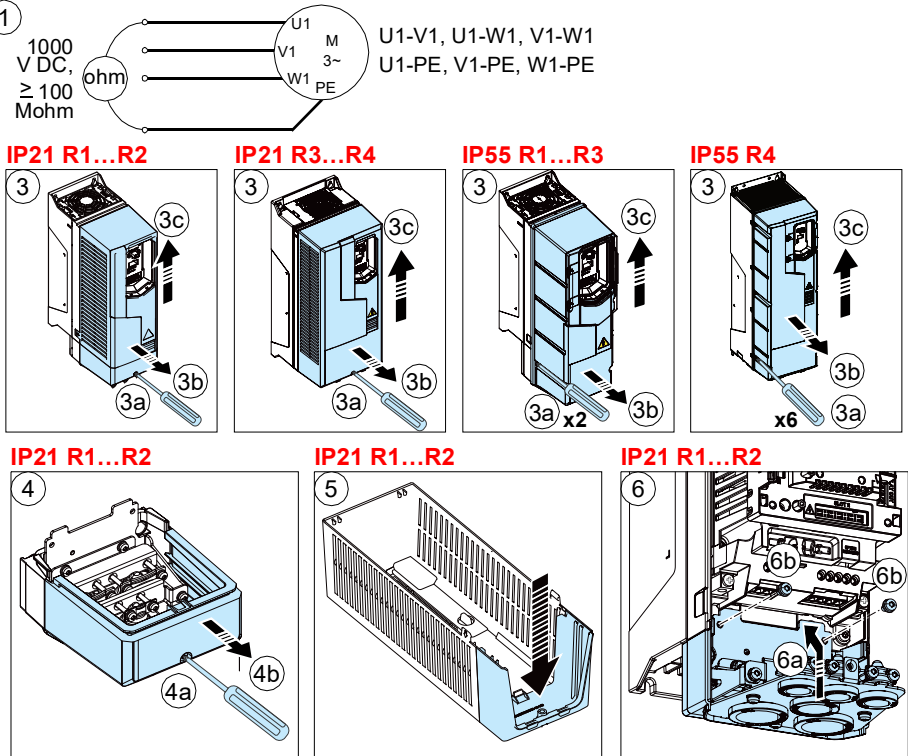
R5



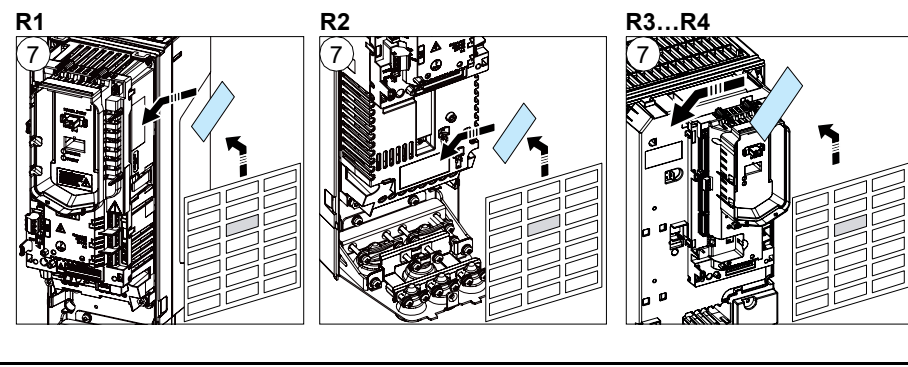
R1...R4 Figures A



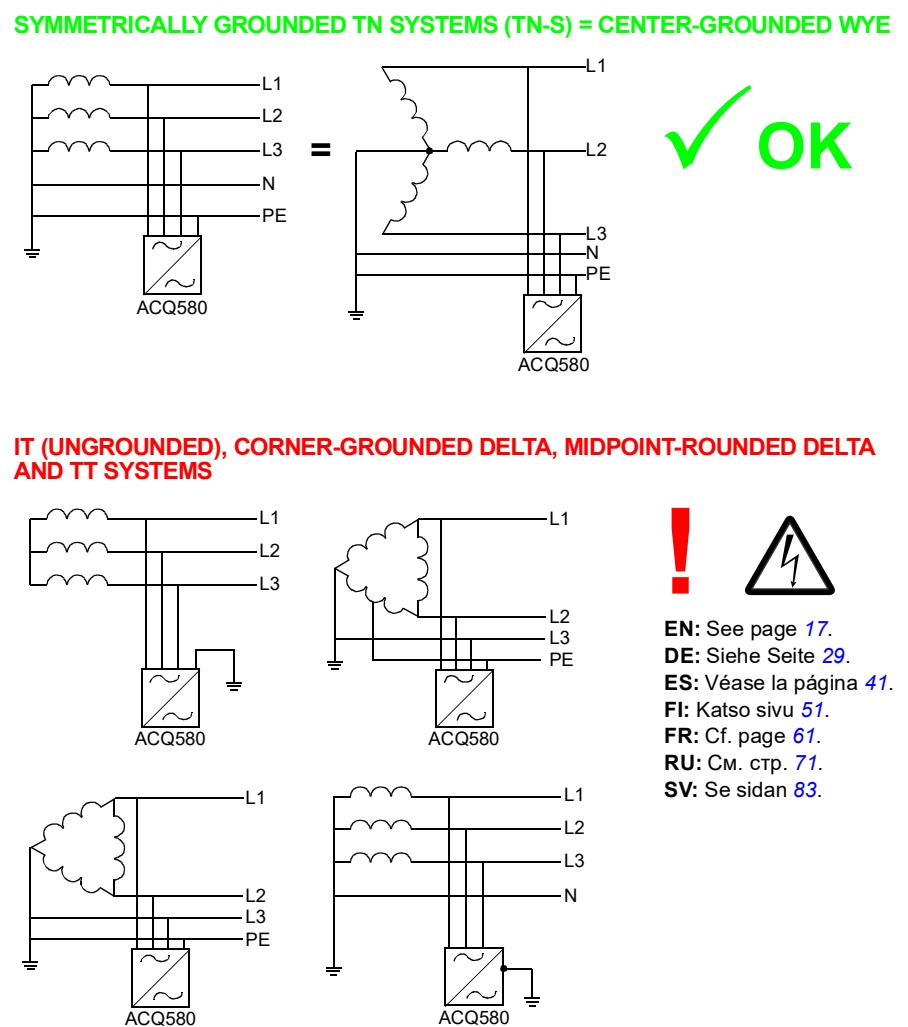
B1



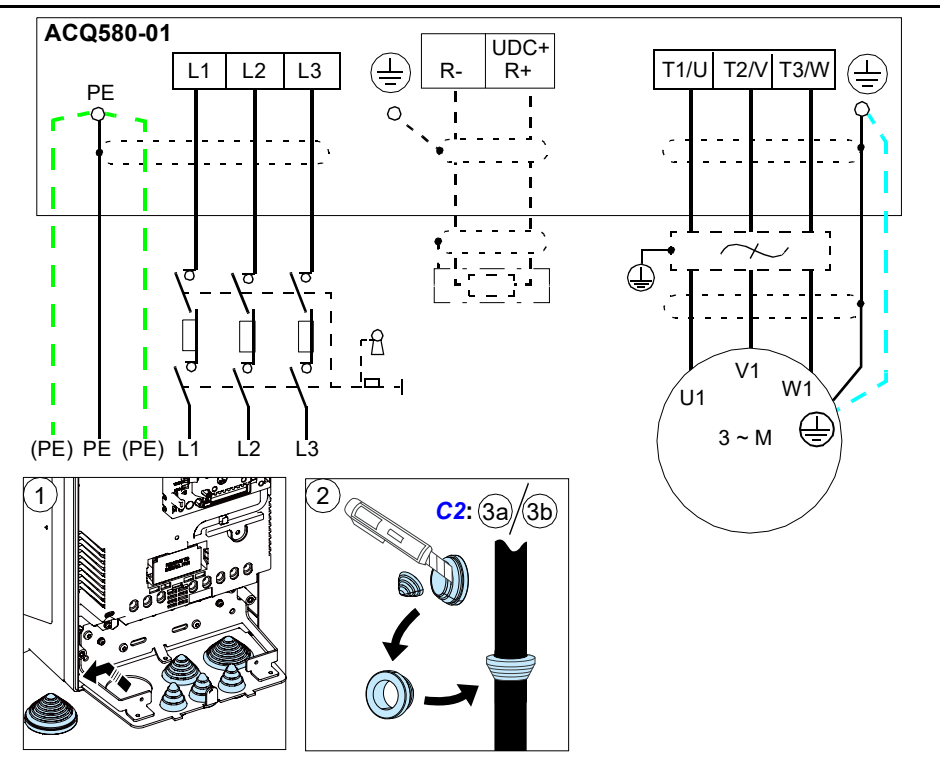
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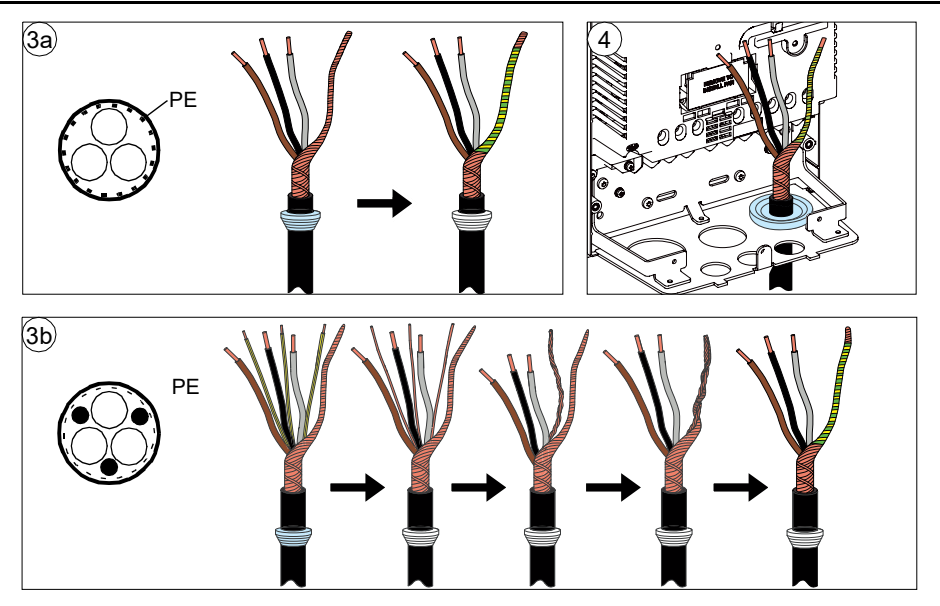
B3



C1



C2



R1...R2

R3

R4

Frame size	R1		R2	
	N·m	lbf·ft	N·m	lbf·ft
T1/U, T2/V, T3/W	1.0	0.7	1.5	1.1
PE, ⊕	1.5	1.1	1.5	1.1
	1.2	0.9	1.2	0.9

Frame size	R3		R4	
	N·m	lbf·ft	N·m	lbf·ft
T1/U, T2/V, T3/W	3.5	2.6	4.0	3.0
PE, ⊕	1.5	1.1	2.9	2.1
	1.2	0.9	1.2	0.9

E1

6a

6b

6c

E2

R1...R2

R3

R4

Frame size	R1		R2	
	N·m	lbf·ft	N·m	lbf·ft
L1, L2, L3	1.0	0.7	1.5	1.1
PE, ⊕	1.5	1.1	1.5	1.1
	1.2	0.9	1.2	0.9

Frame size	R3		R4	
	N·m	lbf·ft	N·m	lbf·ft
L1, L2, L3	3.5	2.6	4.0	3.0
PE, ⊕	1.5	1.1	2.9	2.1
	1.2	0.9	1.2	0.9

F

R1...R2

R4

G1

9

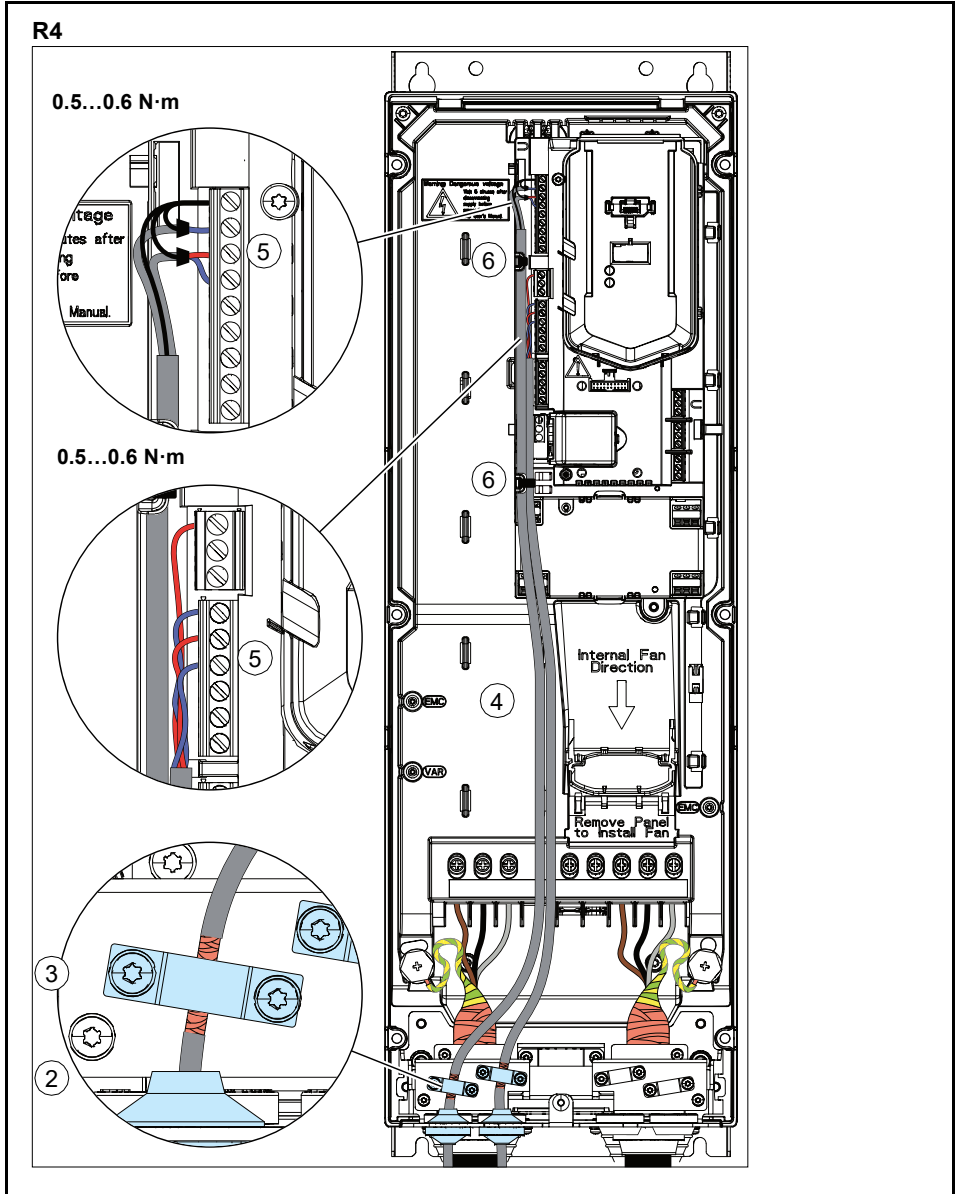
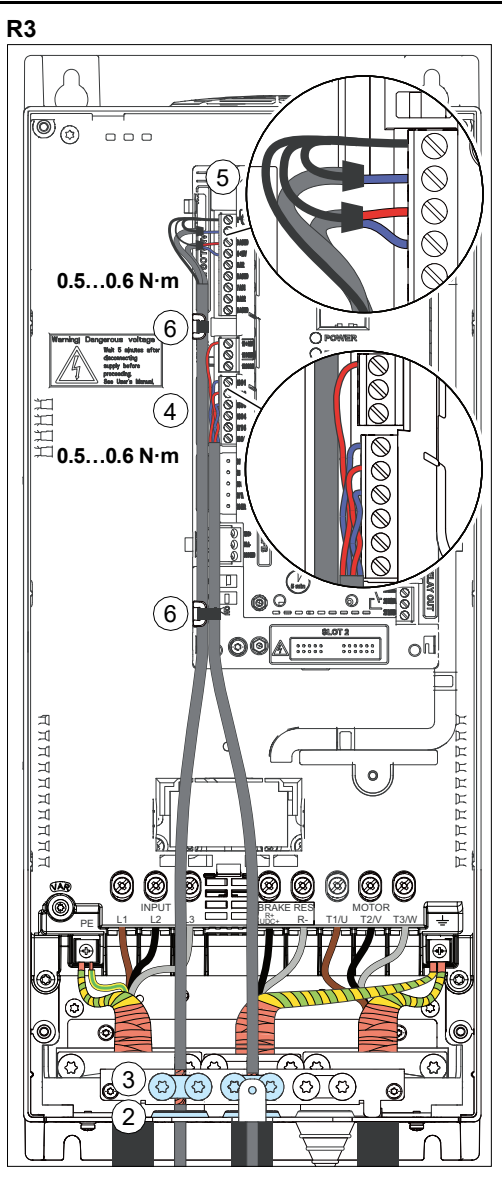
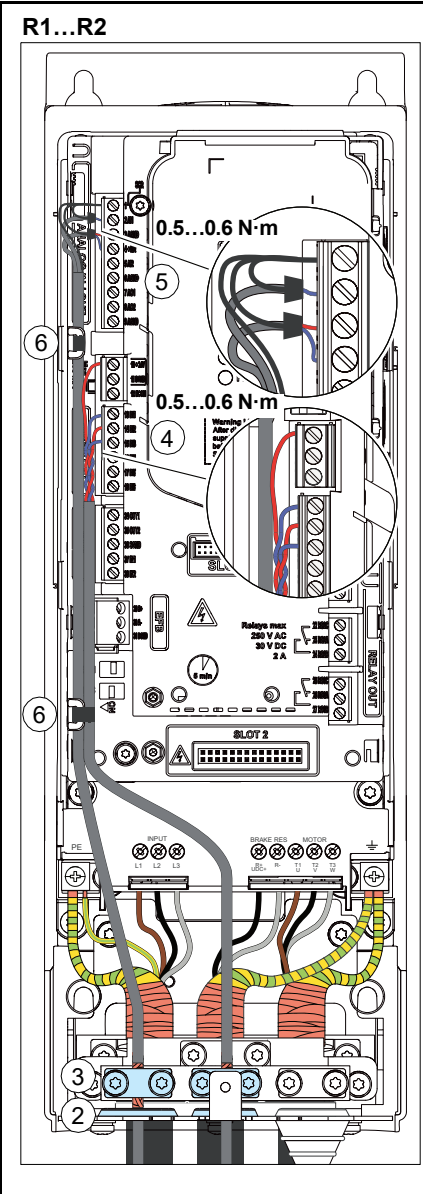
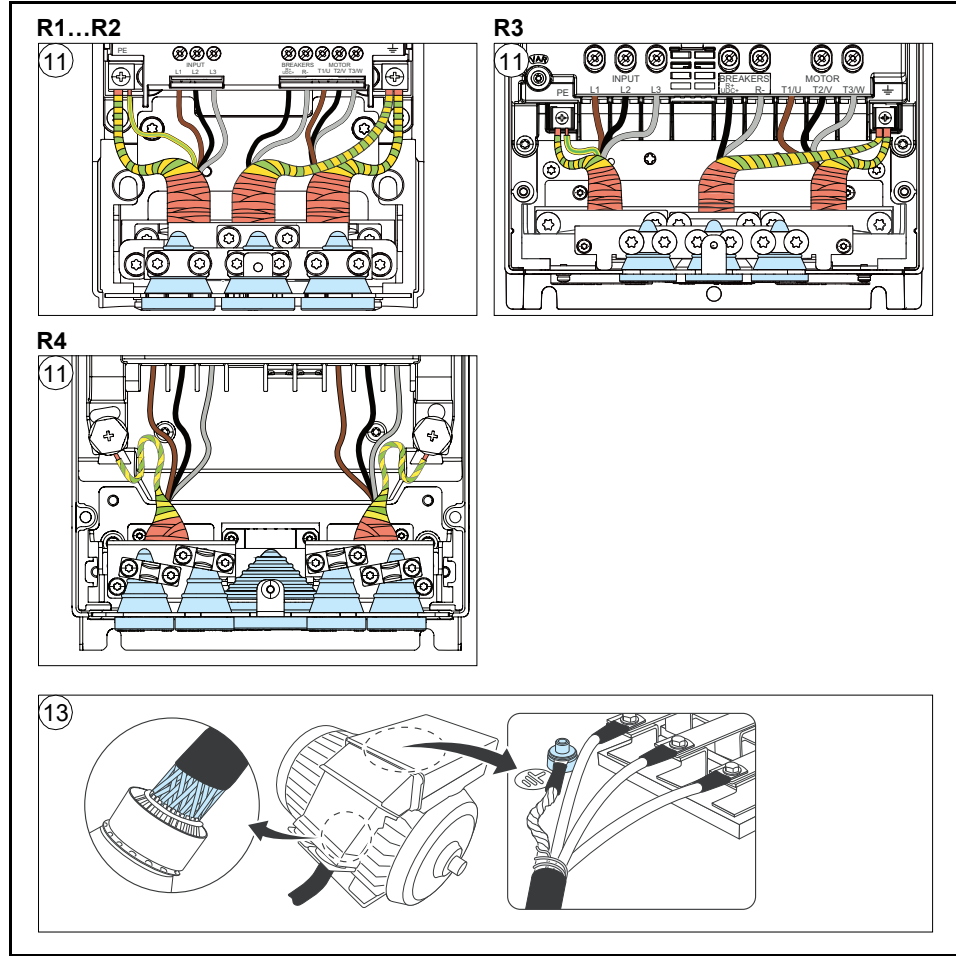
G2

R1...R2

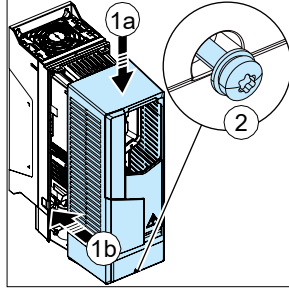
R3

Frame size	R1		R2		R3	
	N·m	lbf·ft	N·m	lbf·ft	N·m	lbf·ft
R-, R+	1.0	0.7	1.5	1.1	3.5	2.6
PE, ⊕	1.5	1.1	1.5	1.1	1.5	1.1
	1.2	0.9	1.2	0.9	1.2	0.9

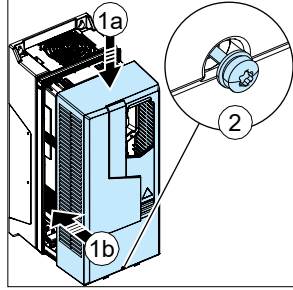
R1...R4 Figures H



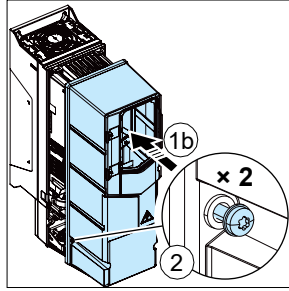
IP21 R1...R2



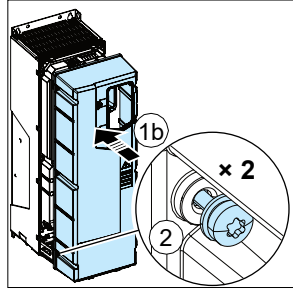
IP21 R3...R4



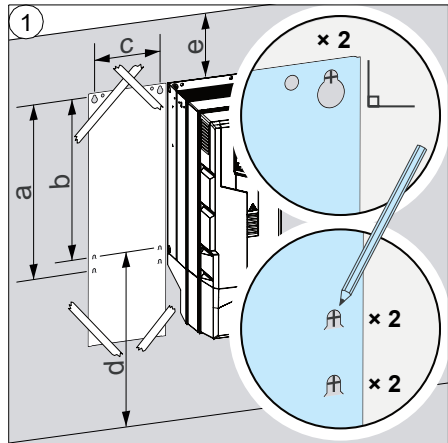
IP55 R1...R3



IP55 R4

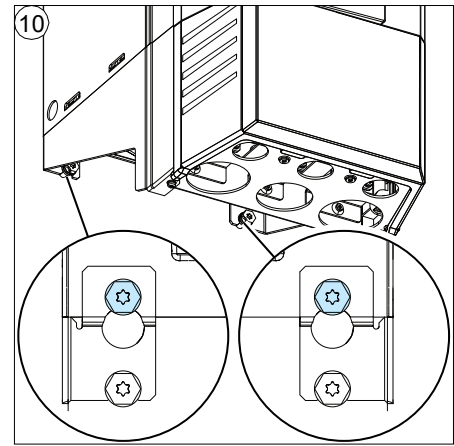
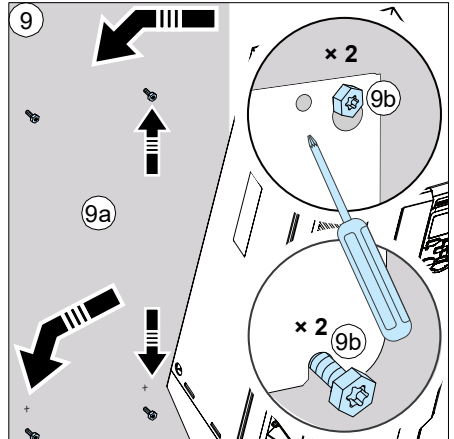
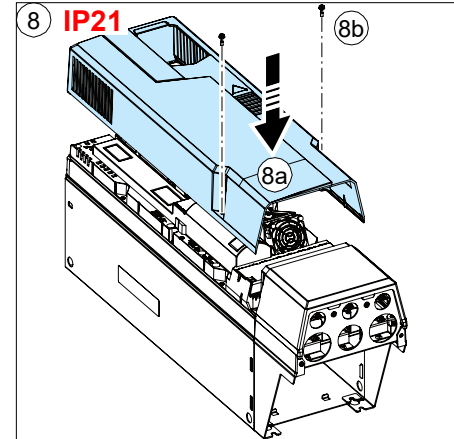
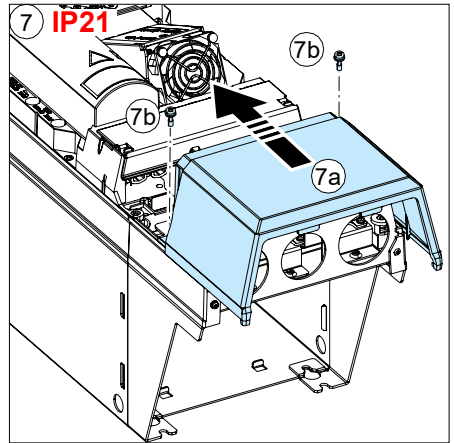
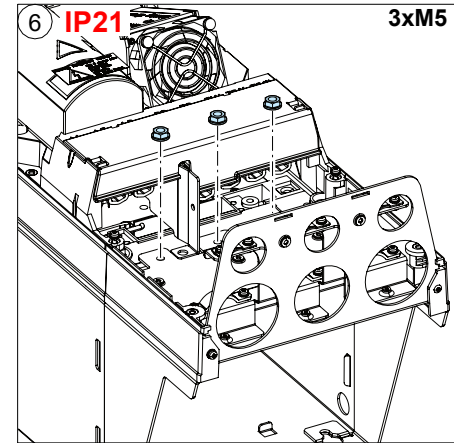
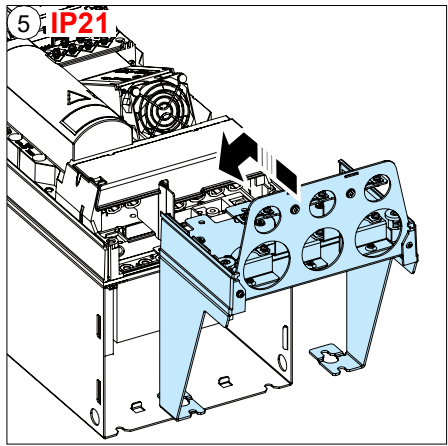
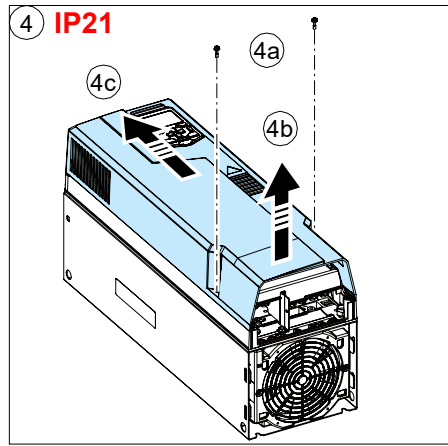
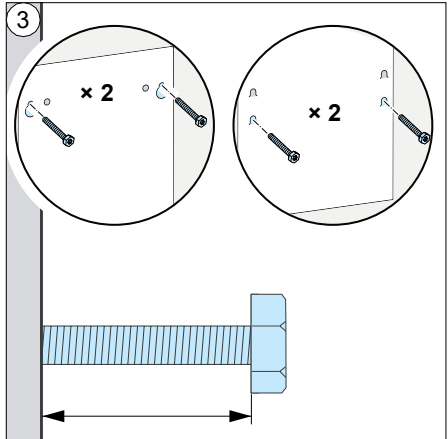
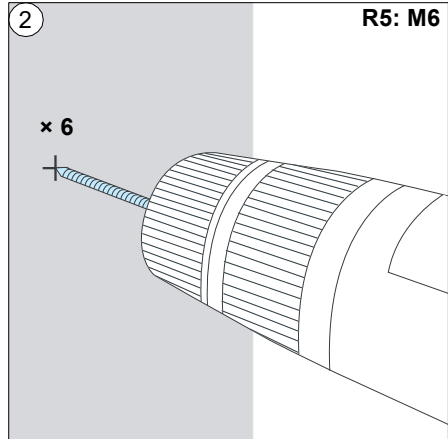


R5 Figures A

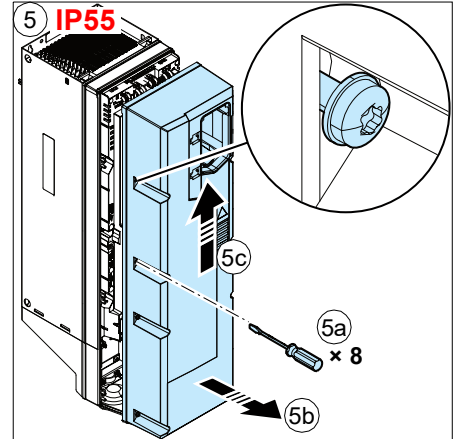
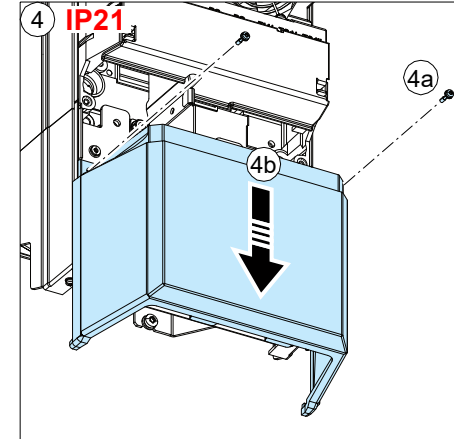
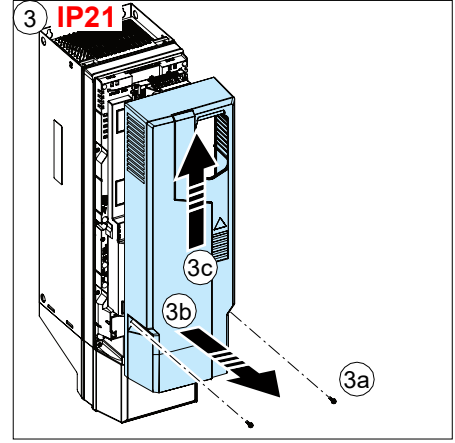
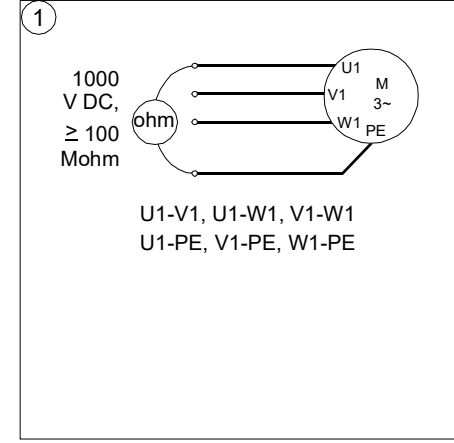


	R5 IP21		R5 IP55	
	mm	in	mm	in
a	612	24.09	612	24.09
b	581	22.87	581	22.87
c	160	6.30	160	6.30
d >	200	7.87	200	7.87
e >	100	3.94	100	3.94

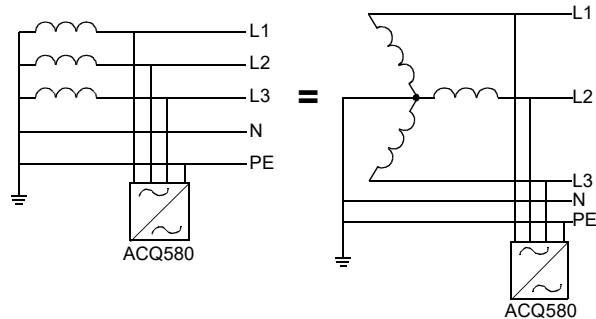
⚠	R5 IP21		R5 IP55	
	kg	lb	kg	lb
	28.3	62.4	29.0	64.0



B

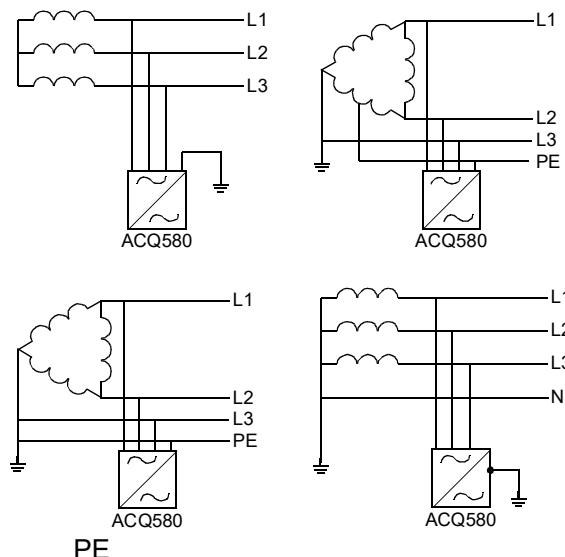


SYMMETRICALLY GROUNDED TN SYSTEMS (TN-S) = CENTER-GROUNDED WYE



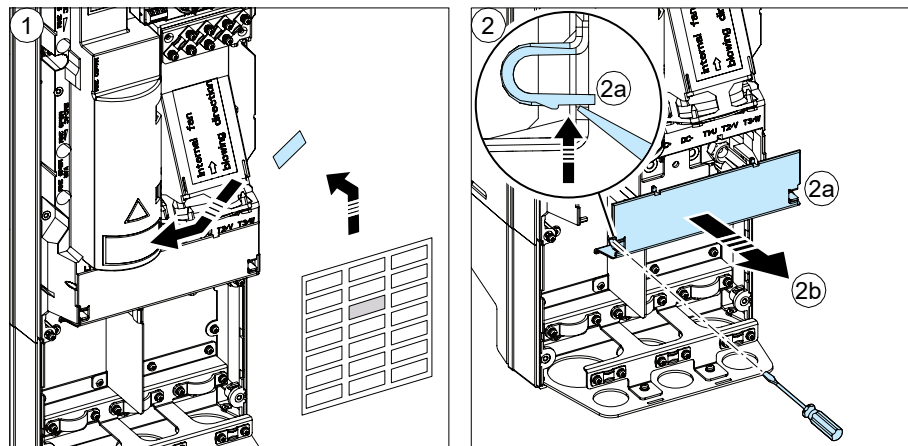
OK

IT (UNGROUNDED), CORNER-GROUNDED DELTA, MIDPOINT-ROUNDED DELTA AND TT SYSTEMS

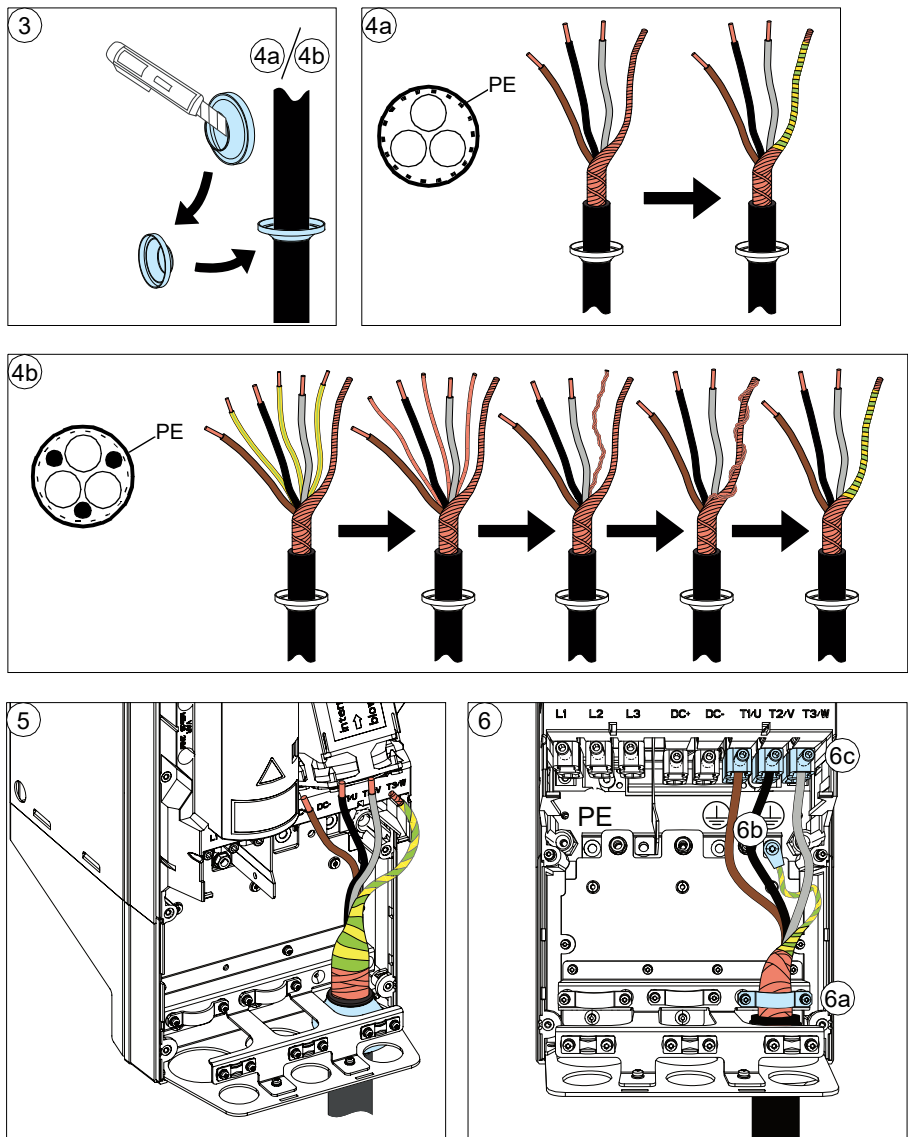
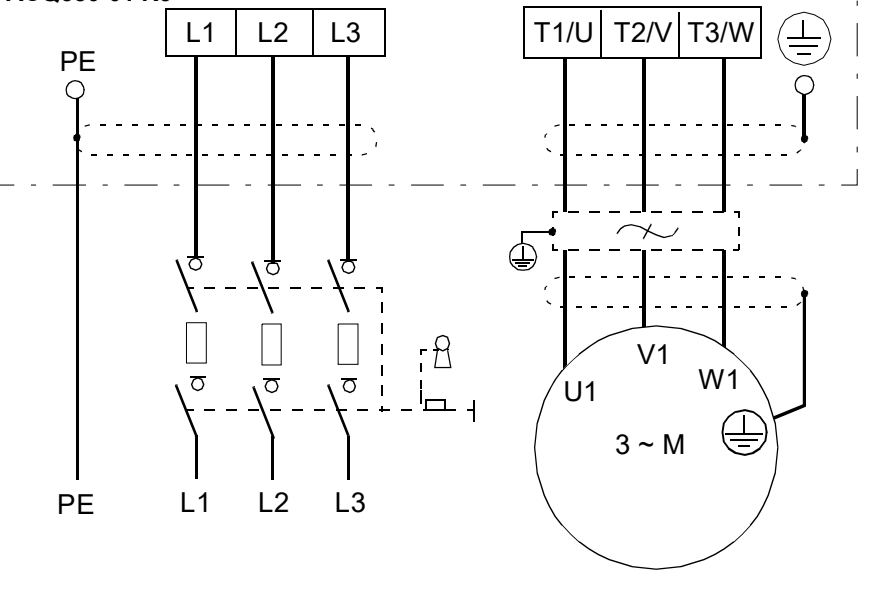


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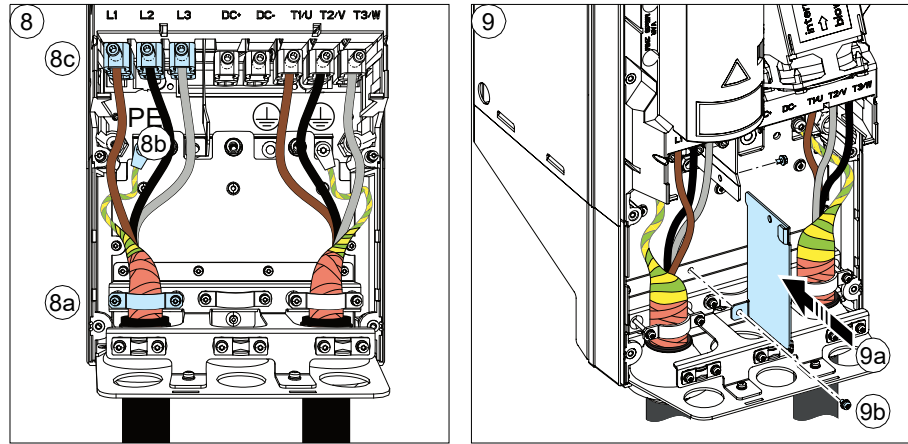
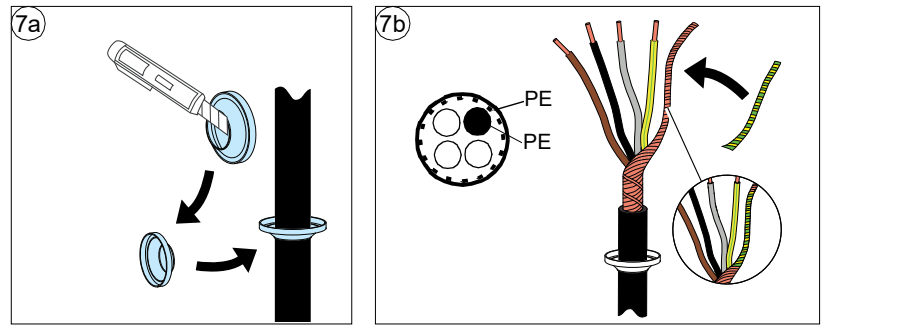
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DE: Siehe Seite 109.
ES: Véase la página 119.
FI: Katso sivu 129.
FR: Cf. page 139.
RU: См. стр. 149.
SV: Se sidan 159.



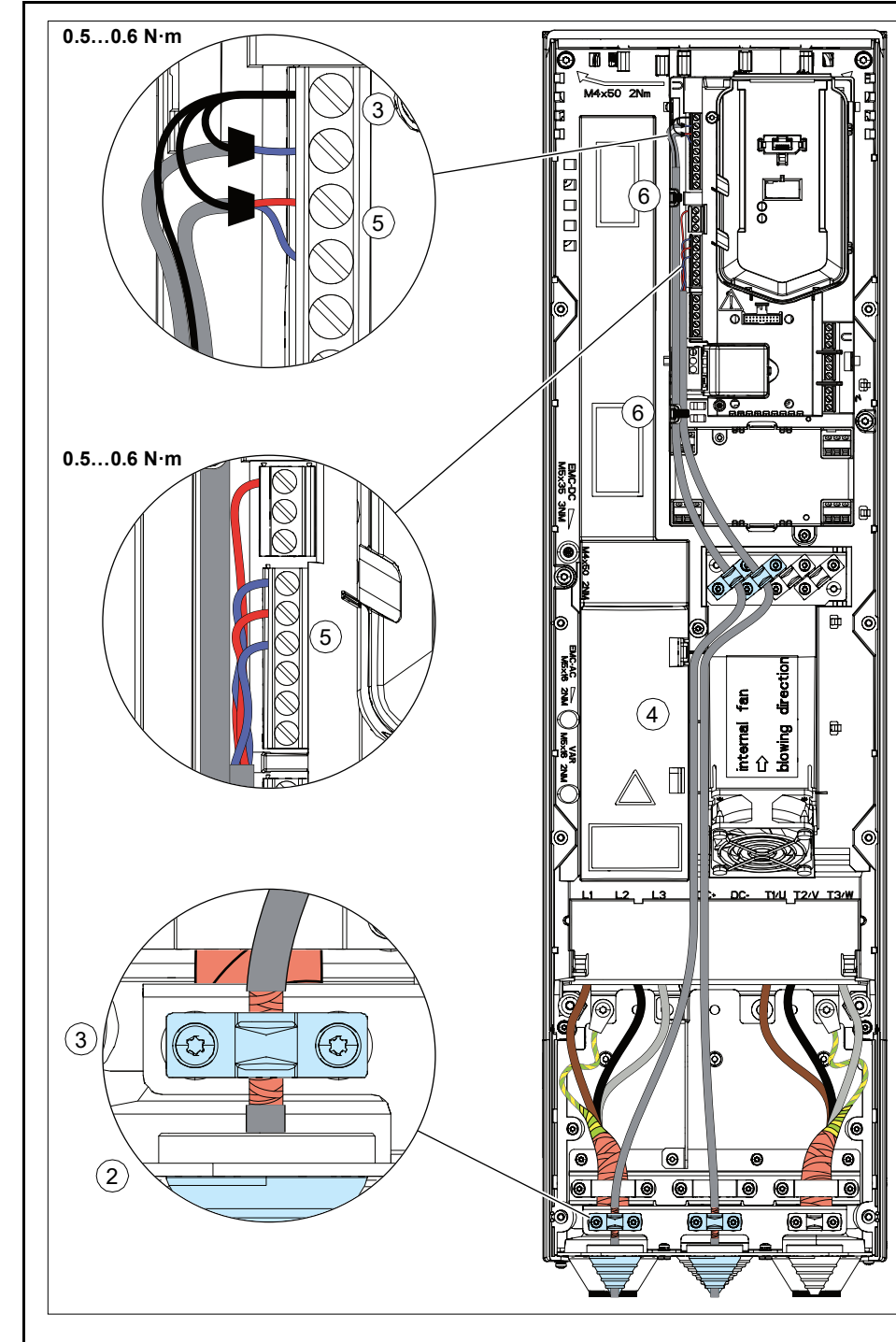
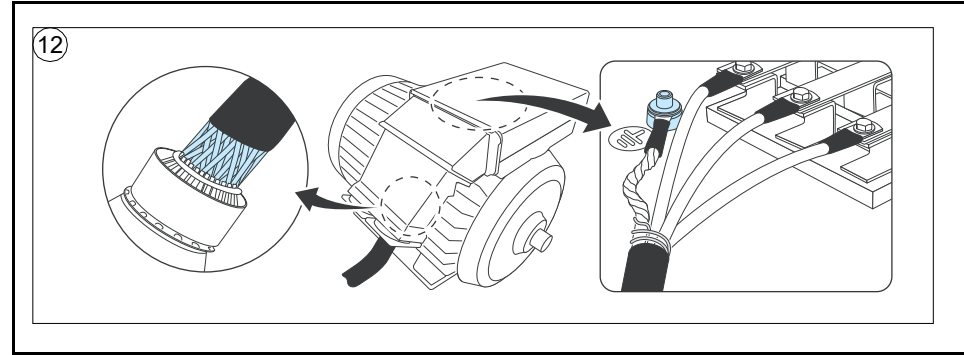
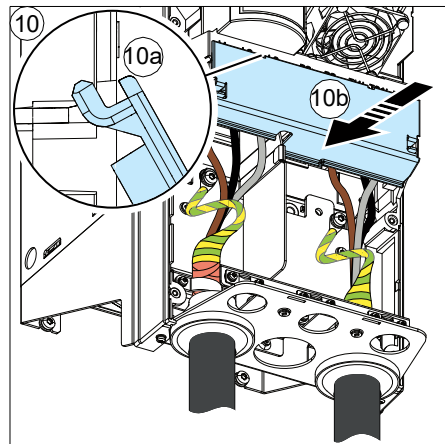
ACQ580-01 R5

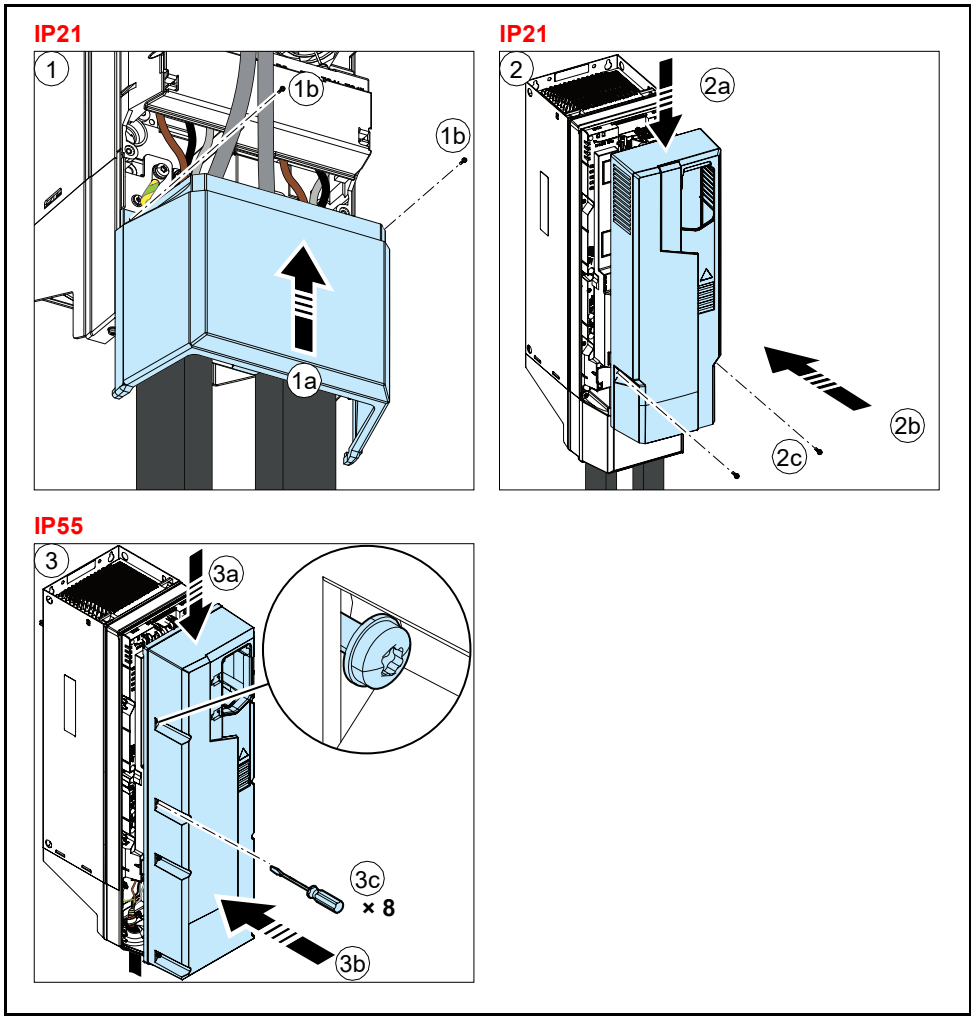


Frame size	T1/U, T2/V, T3/W		PE, ⊕			⊕ ⊖	
	N·m	lbf·ft	M	N·m	lbf·ft	N·m	lbf·ft
R5	5.6	4.1	M5	2.2	1,6	1.2	0.9



Frame size	L1, L2, L3,		PE, ⊕				
	N·m	lbf·ft	M	N·m	lbf·ft	N·m	lbf·ft
R5	5.6	4.1	M5	2.2	1,6	1.2	0.9





Further information

Product and service inquiries

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

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3AXD50000044864B