ABB drives for HVAC

Quick installation and start-up guide
ACH580-01 drives
Frames R0 to R3 and R6 to R9

R0-R3

R6-R9

EN

DA

DE

ES

FI

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List of related manuals in English

Drive manuals and guides	Code (English)
ACH580 HVAC control program firmware manual	*3AXD50000027537*
ACH580-01 (0.75 to 250 kW) hardware manual	*3AUA0000076331*
ACH580-01 quick installation and start-up guide	*3AUA0000076330*
ACS-AP-x assistant control panels user's manual	*3AUA0000085685*

Option manuals and quides	
CDPI-01 communication adapter module user's manual	*3AXD50000009929*
DPMP-01 mounting platform for ACS-AP control panel	*3AUA0000100140*
DPMP-02/03 mounting platform for ACS-AP control panel	*3AUA0000136205*
FBIP-21 BACnet/IP adapter module	*3AXD50000028468*
FCAN-01 CANopen adapter module user's manual	*3AFE68615500*
FCNA-01 ControlNet adapter module user's manual	*3AUA0000141650*
FDNA-01 DeviceNet™ adapter module user's manual	*3AFE68573360*
FECA-01 EtherCAT adapter module user's manual	*3AUA0000068940*
FENA-01/-11/-21 Ethernet adapter module user's manual	*3AUA0000093568*
FEPL-02 Ethernet POWERLINK adapter module user's manual	*3AUA0000123527*
FLON-01 LONWORKS® adapter module user's manual	*3AUA0000041017*
FPBA-01 PROFIBUS DP adapter module user's manual	*3AFE68573271*
FSCA-01 RS-485 adapter module user's manual	*3AUA0000109533*
Flange mounting quick guide for frames R6 to R9	*3AXD50000019099*
Flange mounting supplement	*3AXD50000019100*

Tool and maintenance manuals and guides	
Drive composer PC tool user's manual	*3AUA0000094606*
Converter module capacitor reforming instructions	*3BFE64059629*
NETA-21 remote monitoring tool user's manual	*3AUA00000969391*
NETA-21 remote monitoring tool installation and start-up guide	*3AUA0000096881*

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.

ACH580-01 manuals

3AUA0000076330 Rev A
EN
EFFECTIVE: 2015-09-09

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ACH580-01 drives
Frames R0 to R3

R0-R3

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3AUA0000076330 Rev A
EN
EFFECTIVE: 2015-09-09

Ratings and fuses

I

Type ACH580 -01-	Input rating	Output ratings		Heat dissipation	Air flow	Frame size
		Nominal use				
	I_{1N}	I_N	P_N			
	A	A	kW	W	m^3/h	
3-phase U_N = 400 V (380…415 V)						
02A6-4	2.6	2.6	0.75	45	34	R0
03A3-4	3.3	3.3	1.1	55	34	R0
04A0-4	4.0	4.0	1.5	66	34	R0
05A6-4	5.6	5.6	2.2	84	34	R0
07A2-4	7.2	7.2	3.0	106	50	R1
09A4-4	9.4	9.4	4.0	133	50	R1
12A6-4	12.6	12.6	5.5	174	50	R1
017A-4	17	17	7.5	228	128	R2
025A-4	25	25	11.0	322	128	R2
032A-4	32	32	15.0	430	116	R3
038A-4	38	38	18.5	525	116	R3
045A-4	45	45	22.0	619	116	R3

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II

Type ACH580 -01-	Input rating	Output ratings				Heat dissipation	Air flow	Frame size
		Nominal use		Heavy duty use				
	I_{1N}	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}			
	A	A	hp	A	hp	W	m^3/h	
3-phase U_N = 480 V (440…480 V)								
02A6-4	2.1	2.1	1.0	1.6	0.75	45	34	R0
03A3-4	3.0	3.0	1.5	2.1	1.0	55	34	R0
04A0-4	3.4	3.4	2.0	3.0	1.5	66	34	R0
05A6-4	4.8	4.8	3.0	3.4	2.0	84	34	R0
07A2-4	6.0	6.0	3.0	4.0	3.0	106	50	R1
09A4-4	7.6	7.6	5.0	4.8	3.0	133	50	R1
12A6-4	11.0	11.0	7.5	7.6	5.0	174	50	R1
017A-4	14	14.0	10.0	11.0	7.5	228	128	R2
025A-4	21	21.0	15.0	14.0	10.0	322	128	R2
032A-4	27	27.0	20.0	21.0	15.0	430	116	R3
038A-4	34	34.0	25.0	27.0	20.0	525	116	R3
045A-4	40	40.0	30.0	34.0	25.0	619	116	R3

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R0-R3

III

Type ACH580 -01-	gG				
	I_N	I^2t	Voltage rating	ABB type	Type IEC 60269
	A	A^2s	V		
3-phase U_N = 400/480 V (380…415 V, 440…480 V)					
02A6-4	4	55	500	OFAF000H4	000
03A3-4	6	110	500	OFAF000H6	000
04A0-4	6	110	500	OFAF000H6	000
05A6-4	10	360	500	OFAF000H10	000
07A2-4	10	360	500	OFAF000H10	000
09A4-4	16	740	500	OFAF000H16	000
12A6-4	16	740	500	OFAF000H16	000
017A-4	25	2500	500	OFAF000H25	000
025A-4	32	4000	500	OFAF000H32	000
032A-4	40	7700	500	OFAF000H40	000
038A-4	50	16000	500	OFAF000H50	000
045A-4	63	20100	500	OFAF000H63	000

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IV

Type ACH580 -01-	uR or aR				
	I_N	I^2t	Voltage rating	Bussmann type	Type IEC 60269
	A	A^2s	V		
3-phase U_N = 400/480 V (380…415 V, 440…480 V)					
02A6-4	25	130	690	170M1561	000
03A3-4	25	130	690	170M1561	000
04A0-4	25	130	690	170M1561	000
05A6-4	25	130	690	170M1561	000
07A2-4	25	130	690	170M1561	000
09A4-4	25	130	690	170M1561	000
12A6-4	25	130	690	170M1561	000
017A-4	40	460	690	170M1563	000
025A-4	40	460	690	170M1563	000
032A-4	63	1450	690	170M1565	000
038A-4	63	1450	690	170M1565	000
045A-4	80	2550	690	170M1566	000

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V

Type ACH580 -01-	UL			
	I_N A	Voltage rating V	Bussmann type	UL class
3-phase U_N = 460 V (440…480 V)				
02A6-4	3	600	JJS-3	T
03A3-4	6	600	JJS-6	T
04A0-4	6	600	JJS-6	T
05A6-4	10	600	JJS-10	T
07A2-4	10	600	JJS-10	T
09A4-4	15	600	JJS-15	T
12A6-4	20	600	JJS-20	T
017A-4	25	600	JJS-25	T
025A-4	35	600	JJS-35	T
032A-4	40	600	JJS-40	T
038A-4	50	600	JJS-50	T
045A-4	60	600	JJS-60	T

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R0-
R3

EN – R0…R3 Quick installation guide

This guide briefly describes how to install the drive. For complete information on installation, see *ACH580-01 hardware manual* (3AUA0000076331 [English]). For start-up instructions, see chapter *EN – Quick start-up guide* on page *49*.

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 electrician, 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 borings and grindings 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.

Check if capacitors need to be reformed

If the drive has not been powered (either in storage or unused) for over one year, you must reform the capacitors.

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: 13, 14, 15, … for 2013, 2014, 2015, ...
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.

R0-R3

Ensure the cooling

See table *I* on page *7* (UL: table *II* on page *7*) 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, see chapter *Technical data* in *ACH580-01 hardware manual* (3AUA0000076331 [English]).

EN

Protect the drive and input power cable

See tables *III* (on page *8*) and *IV* (on page *8*); (UL: table *V* on page *9*) for the fuses.

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 *R0…R3 Figures A* on page *19*.

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 *19*.

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 *19*.

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

R0-R3

Check the compatibility with IT (ungrounded) and corner-grounded TN systems

EN

EMC filter

The internal EMC filter is not suitable for use on an IT (ungrounded) system or on a corner-grounded TN system. Disconnect the EMC filter before connecting the drive to the supply network. Check the table on page *15*.

WARNING! Do not install the drive with the internal EMC filter connected on an IT system (an ungrounded power system or a high-resistance-grounded [over 30 ohms] power system), otherwise the system will be connected to ground potential through the EMC filter capacitors of the drive. This can cause danger, or damage the drive.

Do not install the drive with the internal EMC filter connected on a corner-grounded TN system, otherwise the drive will be damaged.

Note: When the internal EMC filter is disconnected, the drive EMC compatibility is considerably reduced.

Ground-to-phase varistor

The ground-to-phase varistor is not suitable for use on an IT (ungrounded) system. Disconnect the ground-to-phase varistor before connecting the drive to the supply network. Check the table on page *15*.

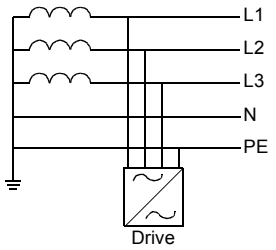
WARNING! Do not install the drive with the ground-to-phase varistor connected on an IT system (an ungrounded power system or a high-resistance-grounded [over 30 ohms] power system), otherwise the varistor circuit can be damaged.

Check from the table below if you have to disconnect the EMC filter (EMC) or ground-to-phase varistor (VAR). For instructions on how to do this, see page *16*.

R0-R3

Frame sizes	EMC filter (EMC)	Ground-to-phase varistor (VAR)	Symmetrically grounded TN systems (TN-S systems) [1]	Corner grounded TN systems [2]	IT systems (ungrounded or high-resistance grounded [>30 ohms]) [3]
R0…R3	1 × EMC	-	Do not disconnect	Disconnect	Disconnect
	-	1 × VAR	Do not disconnect	Do not disconnect	Disconnect

1



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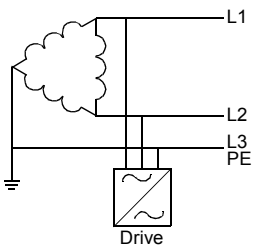

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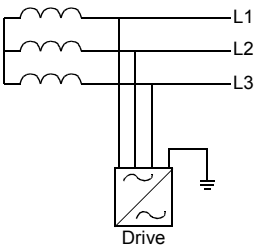


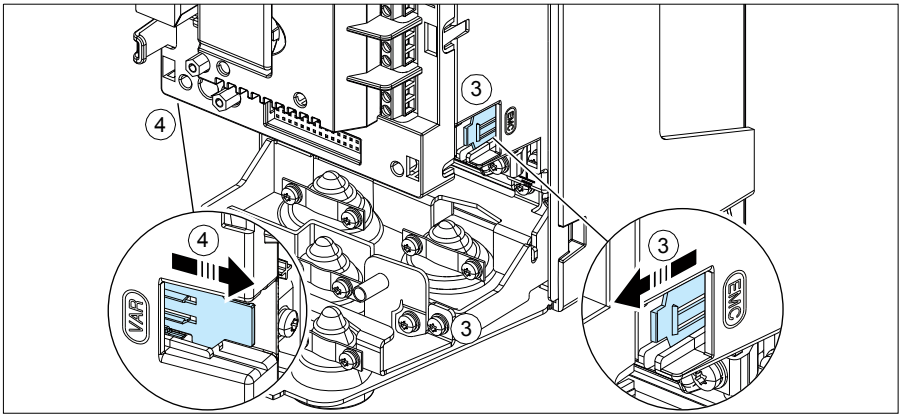
EN

Disconnect EMC filter or ground-to-phase varistor, if needed

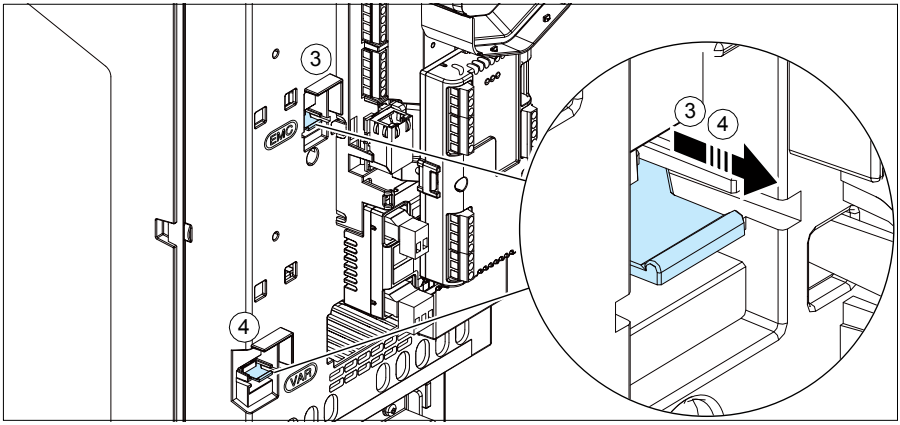
To disconnect the internal EMC filter or ground-to-phase varistor, if needed, do as follows:

1. Switch off the power from the drive.
2. Open the front cover, if not already opened, see figure *B* on page *19*.
3. To disconnect the internal EMC filter, slide the EMC switch in the direction shown by the arrow.
4. To disconnect the ground-to-phase varistor, slide the varistor switch in the direction shown by the arrow.

R0…R2



R3



Connect the power cables

See figures *C (*page *19*) *D*, *E*, *F1*, *F2* and *G*.

1. Remove the rubber grommets from the lead-through plate.

R0-R3 Use symmetrical shielded cable for motor cabling. If the cable shield is the sole PE conductor for drive or motor, make sure that is 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. **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.

EN

4. Slide the cable through the hole of the bottom plate 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. Install the grounding shelf for the brake resistor cable.
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. Install the grounding shelf for the control cables.
12. Put the unused rubber grommets to the holes in the lead-through plate.
13. Secure the cables outside the unit mechanically.
14. Ground the motor cable shield at the motor end. For minimum radio frequency interference, ground the motor cable shield 360 degrees at the lead-through of the motor terminal box.

Connect the control cables

See figure *H* on page *20*. 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 HVAC default configuration are shown in section *Default I/O connections* on page *19*.

R0-R3

1. Remove the front cover, if not already removed. See section *Switch off the power and open the cover* on page *14*.

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 of the bottom plate 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.

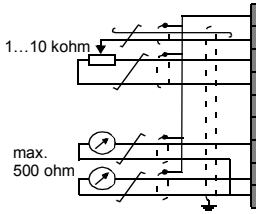
EN

Default I/O connections

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

R0-R3

EN



X1		Reference voltage and analog inputs and outputs	
	1	SCR	Signal cable shield (screen)
	2	AI1	**Output frequency/speed reference**: 0…10 V
	3	AGND	Analog input circuit common
	4	+10V	Reference voltage 10 V DC
	5	AI2	**Actual feedback:** 0…10 V
	6	AGND	Analog input circuit common
	7	AO1	**Output frequency:** 0…10 V
	8	AO2	**Output current:** 0…20 mA
	9	AGND	Analog output circuit common
X2 & X3		Aux. voltage output and programmable digital inputs	
	10	+24V	Aux. voltage output +24 V DC, max. 250 mA
	11	DGND	Aux. voltage output common
	12	DCOM	Digital input common for all
	13	DI1	**Stop (0) / Start (1)**
	14	DI2	Not configured
	15	DI3	**Constant frequency/speed selection**
	16	DI4	Not configured
	17	DI5	Not configured
	18	DI6	Not configured
X6, X7, X8		Relay outputs	
	19	RO1C	**Ready run** 250 V AC / 30 V DC 2 A
	20	RO1A	
	21	RO1B	
	22	RO2C	**Running** 250 V AC / 30 V DC 2 A
	23	RO2A	
	24	RO2B	
	25	RO3C	**Fault (-1)** 250 V AC / 30 V DC 2 A
	26	RO3A	
	27	RO3B	
X5		Embedded fieldbus	
	29	B+	Embedded fieldbus, EFB (EIA-485)
	30	A-	
	31	DGND	
	S4	TERM	Termination switch
	S5	BIAS	Bias resistors switch
X4		Safe torque off	
	34	OUT1	Safe torque off. Factory connection. Both circuits must be closed for the drive to start. See chapter *The Safe torque off function* in *ACH580-01 hardware manual* (3AUA0000076331 [English]).
	35	OUT2	
	36	SGND	
	37	IN1	
	38	IN2	

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 mm^2 (24…14 AWG): Terminals +24V, DGND, DCOM, B+, A-, DGND, Ext. 24V

0.14…1.5 mm^2 (26…16 AWG): Terminals DI, AI, AO, AGND, RO, STO

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

Install optional modules, if any

See chapter *Electrical installation* in *ACH580-01 hardware manual* (3AUA0000076331 [English]).

Reinstall cover

See figure *I* on page *20*.

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.

For start-up instructions, see chapter *EN – Quick start-up guide* on page *49*.

R0-
R3

EN

Compliance with the European Machinery Directive 2006/42/EC

Declaration of conformity

R0-R3

Declaration of Conformity

(According to Machinery Directive 2006/42/EC)

Manufacturer: ABB Oy, Drives
Address: Hiomotie 13, P.O Box 184, 00381 Helsinki, Finland.

hereby declares that the product

ACH580-01 (frame sizes R0, R1, R2 and R3)

with regard to the following safety function

Safe torque off

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

The following harmonized standards below were used:

EN 61800-5-2: 2007	*Adjustable speed electrical power drive systems – Part 5-2: Safety requirements - Functional*
EN 62061: 2005 + A1: 2013	*Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*
EN ISO 13849-1: 2008 + AC: 2009	*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*

Other used standards:

IEC 61508 ed. 2: 2010	Functional safety of electrical / electronic / programmable electronic safety-related systems

The products referred in this Declaration of Conformity fulfil the relevant provisions of the Low Voltage Directive 2006/95/EC and EMC Directive 2004/108/EC. Declaration of conformity according to these directives is available from the manufacturer.

Person authorized to compile the technical file:

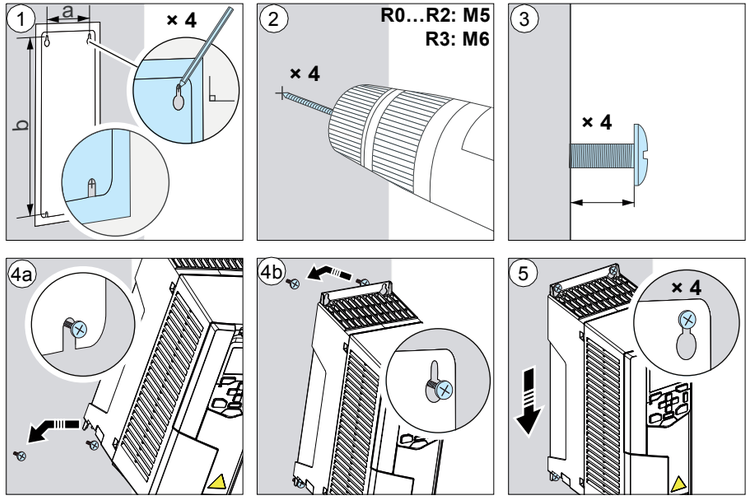
Name: Risto Mynttinen
Address: P.O. Box 184, FIN-00381 Helsinki, Finland

Helsinki, 2015-06-12

Tuomo Höysniemi
Vice President
ABB Oy

R0-
R3

R0…R3 Figures A



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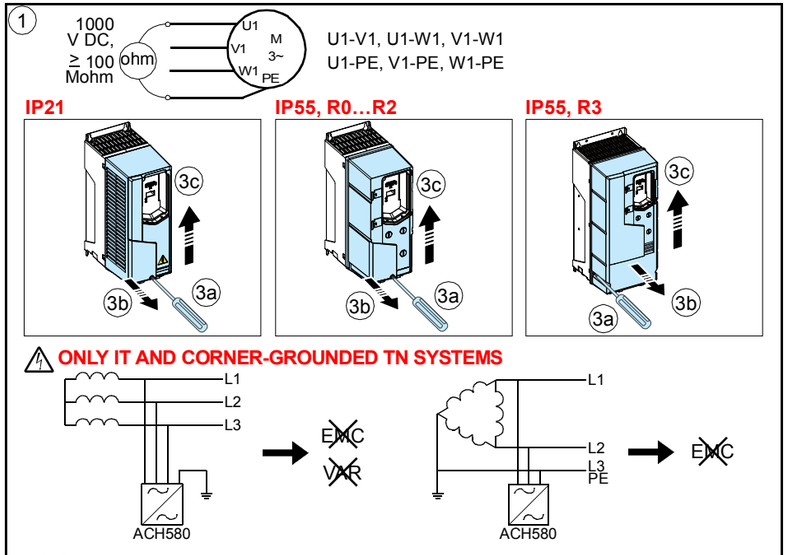
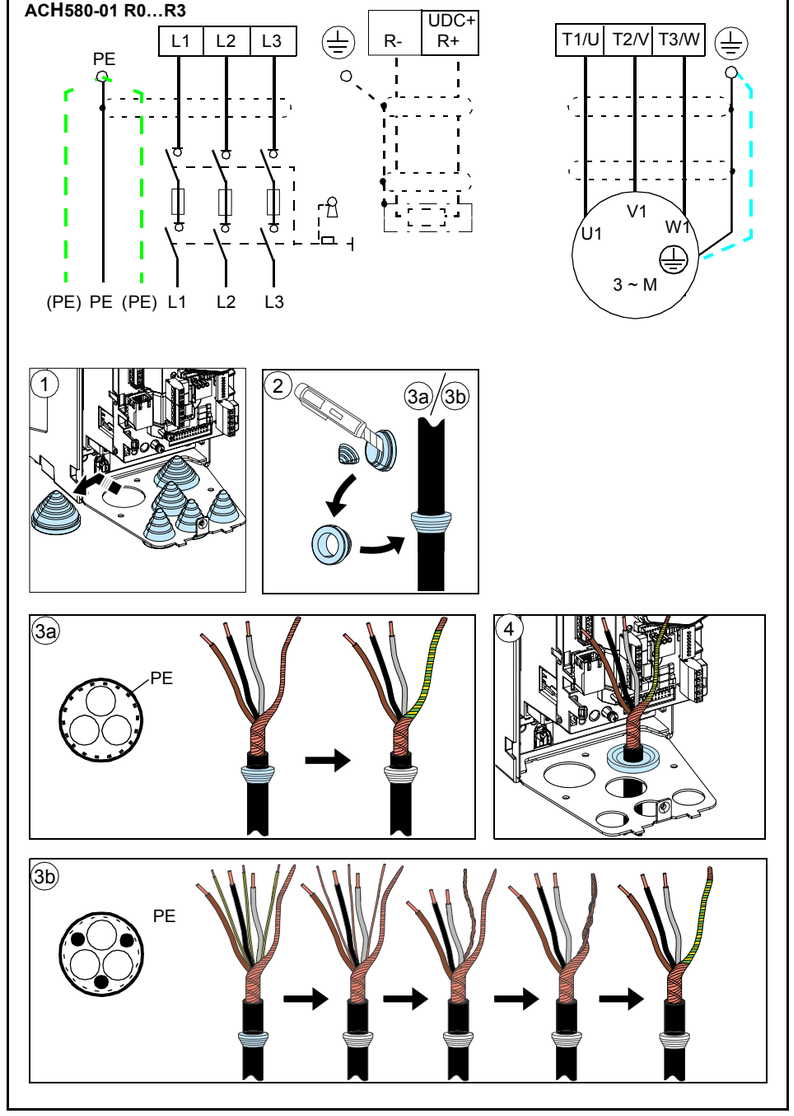


EN: See page *14*.

C



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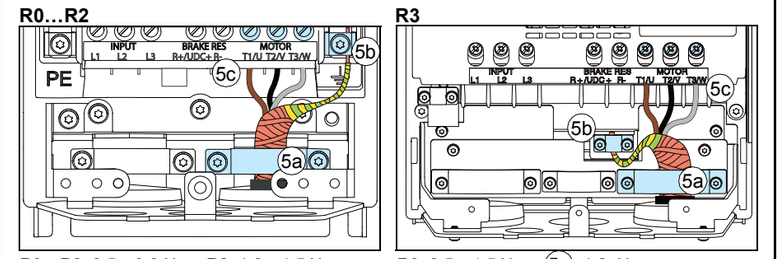

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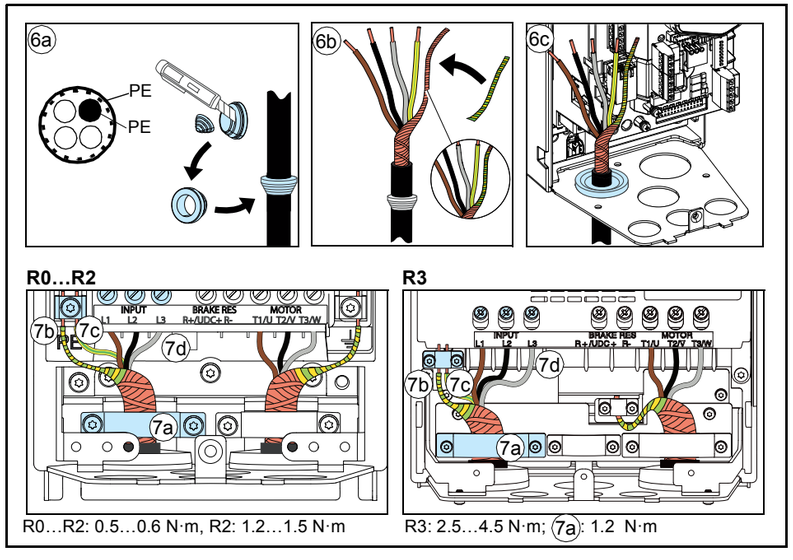
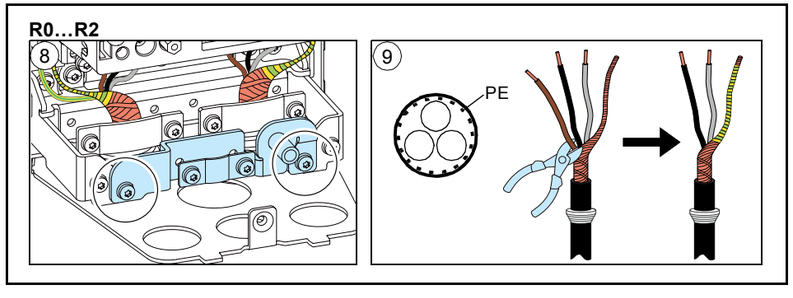
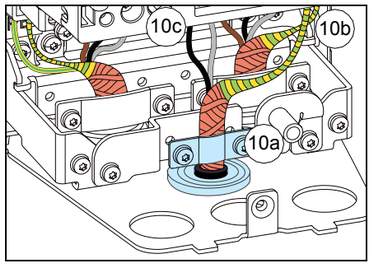


F1



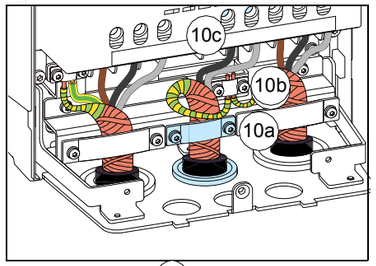
F2

R0…R2



R0…R2: 0.5…0.6 N·m, R2: 1.2…1.5 N·m

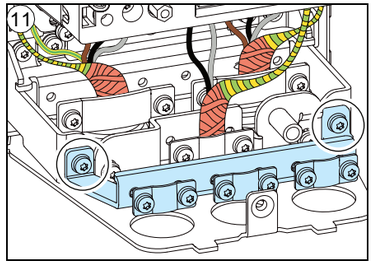
R3



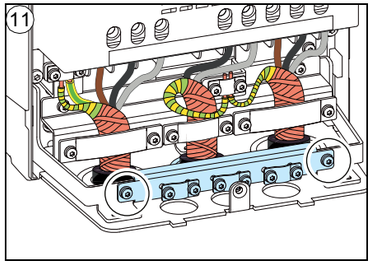
R3: 2.5…4.5 N·m; 10a: 1.2 N·m

G

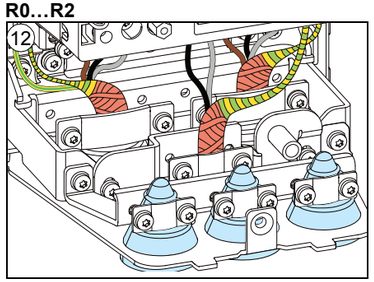
R0…R2



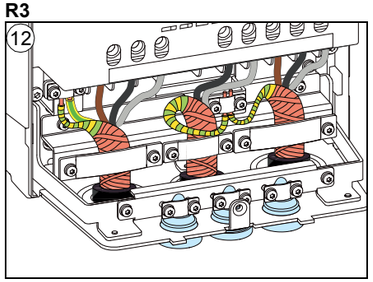
R3

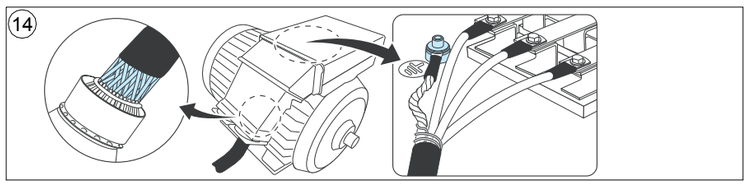


R0…R2



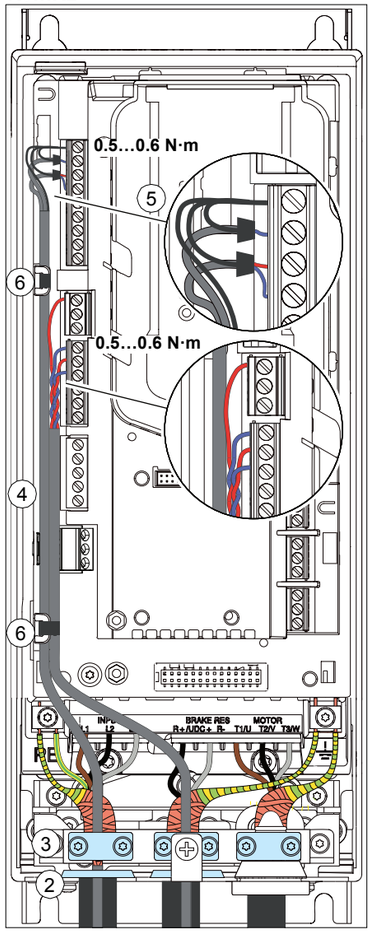
R3



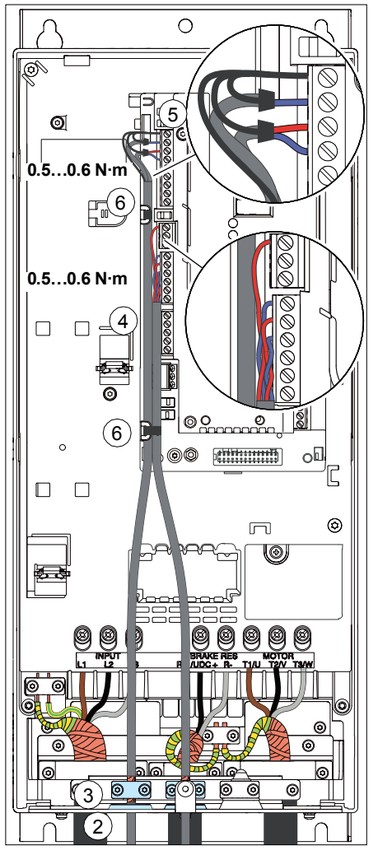


H

R0…R2

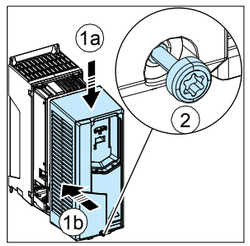


R3

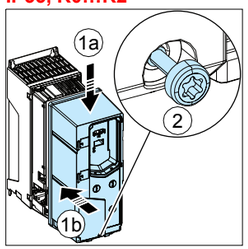


I

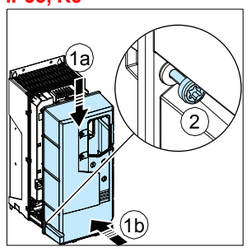
IP21



IP55, R0…R2



IP55, R3



3AUA0000076330 Rev A

ABB drives for HVAC

Quick installation guide
ACH580-01 drives
Frames R6 to R9

R6-R9

EN
DA
DE
ES
FI
FR
IT
NL
PL
PT
RU
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TR
ZH

Power and productivity
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3AUA0000076330 Rev A
EN
EFFECTIVE: 2015-09-09

Ratings and fuses

I

ACH580 -01-	Input rating	Output ratings			Heat dissipation	Air flow	Frame size
		Nominal use					
	I_{1N}	I_{2N}	P_N	P_{Ld}			
	A	A	kW	kW	W	m^3/h	
3-phase U_N = 400 V (380…415 V)							
105A-4	105	105	55	55	1331	256	R6
145A-4	145	145	75	75	1476	256	R6
169A-4	169	169	90	90	1976	265	R7
206A-4	206	206	110	110	2346	265	R7
246A-4	246	246	132	132	3336	324	R8
293A-4	293	293	160	160	3936	324	R8
363A-4	363	363	200	200	4836	677	R9
430A-4	430	430	250	200	6036	677	R9

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R6-R9

II

ACH580 -01-	Input rating	Output ratings				Heat dissipation	Air flow	Frame size
		Nominal use		Heavy duty use				
	I_{1N}	I_{2Ld}	P_{Ld}	I_{2Hd}	P_{Hd}			
	A	A	hp	A	hp	W	m^3/h	
3-phase U_N = 480 V (440…480 V)								
105A-4	96	96	75	77	60	1331	256	R6
145A-4	124	124	100	96	75	1476	256	R6
169A-4	156	156	125	124	100	1976	265	R7
206A-4	180	180	150	156	125	2346	265	R7
246A-4	240	240	200	180	150	3336	324	R8
293A-4	260	260	200	240*	150	3936	324	R8
363A-4	361	361	300	302	250	4836	677	R9
430A-4	414	414	350	361**	300	6036	677	R9

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* 130% overload only

** 125% overload only

III

ACH580 -01-	gG				
	I_N	I^2t	Voltage rating	ABB type	Type IEC 60269
	A	A^2s	V		
3-phase U_N = 400/480 V (380…415 V, 440…480 V)					
105A-4	125	103000	500	OFAF00H125	00
145A-4	160	185000	500	OFAF00H160	00
169A-4	250	600000	500	OFAF0H250	0
206A-4	315	710000	500	OFAF1H315	1
246A-4	355	920000	500	OFAF1H355	1
293A-4	425	1300000	500	OFAF2H425	2
363A-4	500	2000000	500	OFAF2H500	2
430A-4	600	2800000	500	OFAF3H630	3

R6-R9

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IV

ACH580 -01-	uR or aR				
	I_N	I^2t	Voltage rating	Bussmann type	Type IEC 60269
	A	A^2s	V		
3-phase U_N = 400/480 V (380…415 V, 440…480 V)					
105A-4	200	15000	690	170M3815	1
145A-4	250	28500	690	170M3816	1
169A-4	315	46500	690	170M3817	1
206A-4	350	68500	690	170M3818	1
246A-4	450	105000	690	170M5809	2
293A-4	500	145000	690	170M5810	2
363A-4	630	275000	690	170M5812	2
430A-4	700	405000	690	170M5813	2

3AXD00000586715.xls G

V

ACH580 -01-	UL			
	I_N A	Voltage rating V	Bussmann type	UL class
3-phase U_N = 460 V (440…480 V)				
105A-4	150	600	JJS-150	T
145A-4	200	600	JJS-200	T
169A-4	225	600	JJS-225	T
206A-4	300	600	JJS-300	T
246A-4	350	600	JJS-350	T
293A-4	400	600	JJS-400	T
363A-4	500	600	JJS-500	T
430A-4	600	600	JJS-600	T

3AXD00000586715.xls G

R6-
R9

EN – R6…R9 Quick installation guide

This guide briefly describes how to install the drive. For complete information on installation, see *ACH580-01 hardware manual* (3AUA0000076331 [English]). For start-up instructions, see chapter *EN – Quick start-up guide* on page *49*.

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 electrician, 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.
- Use the lifting eyes of the drive when you lift the drive. Do not tilt the drive. The drive is heavy and its center of gravity is high. An overturning drive can cause physical injury.
- Make sure that debris from borings and grindings 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.

Check if capacitors need to be reformed

If the drive has not been powered (either in storage or unused) for over one year, you must reform the capacitors.

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: 13, 14, 15, … for 2013, 2014, 2015, …
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

R6-R9

See table *I* on page *27* (UL: table *II* on page *27*) for the heat dissipation. The maximum ambient temperature is 40 C (+104 °F). No condensation or frost is allowed. For more information on the ambient temperature, see chapter *Technical data* in *ACH580-01 hardware manual* (3AUA0000076331 [English]).

Protect the drive and input power cable

EN

See tables *III*, *IV* and *V* on pages *28* and *29* for the fuses.

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

Warning! The drive module is heavy (45 to 98 kg / 99 to 216 lb). Use a suitable lifting device. Do not lift the module manually. Make sure that the wall and the fixing devices can carry the weight.

See figure *R6…R9 Figures A* on page *41*.

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 *41*.

1. Check the insulation of the motor cable and motor before connecting it to 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.

Check the compatibility with IT (ungrounded) and corner-grounded TN systems

EMC filter

The internal EMC filter is not suitable for use on an IT (ungrounded) system or on a corner-grounded TN system. Disconnect the EMC filter before connecting the drive to the supply network. Check the table on page *34*.

WARNING! Do not install the drive with the internal EMC filter connected on an IT system (an ungrounded power system or a high-resistance-grounded [over 30 ohms] power system), otherwise the system will be connected to ground potential through the EMC filter capacitors of the drive. This can cause danger, or damage the drive.

Do not install the drive with the internal EMC filter connected on a corner-grounded TN system, otherwise the drive will be damaged.

Note: When the internal EMC filter is disconnected, the drive EMC compatibility is considerably reduced.

Ground-to-phase varistor

The ground-to-phase varistor is not suitable for use on an IT (ungrounded) system. Disconnect the ground-to-phase varistor before connecting the drive to the supply network. Check the table on page *34*.

WARNING! Do not install the drive with the ground-to-phase varistor connected on an IT system (an ungrounded power system or a high-resistance-grounded [over 30 ohms] power system), otherwise the varistor circuit can be damaged.

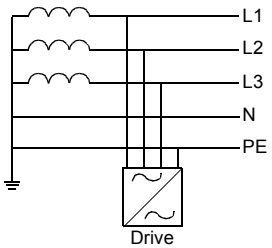
R6-R9

Check from the table below if you have to disconnect the EMC filter (EMC) or ground-to-phase varistor (VAR). For instructions on how to do this, see page *35*.

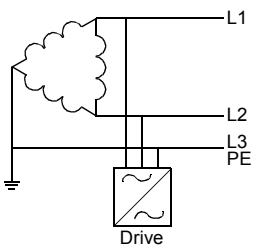
EN

Frame sizes	EMC filter (EMC)	Ground-to-phase varistor (VAR)	Symmetrically grounded TN systems (TN-S systems) [1]	Corner grounded TN systems [2]	IT systems (ungrounded or high-resistance grounded [>30 ohms]) [3]
R6…R9	2 × EMC	-	Do not disconnect	Disconnect	Disconnect
	-	1 × VAR	Do not disconnect	Do not disconnect	Disconnect

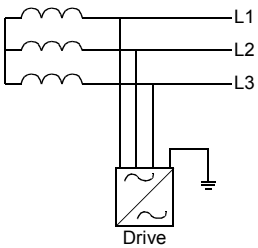
1



2



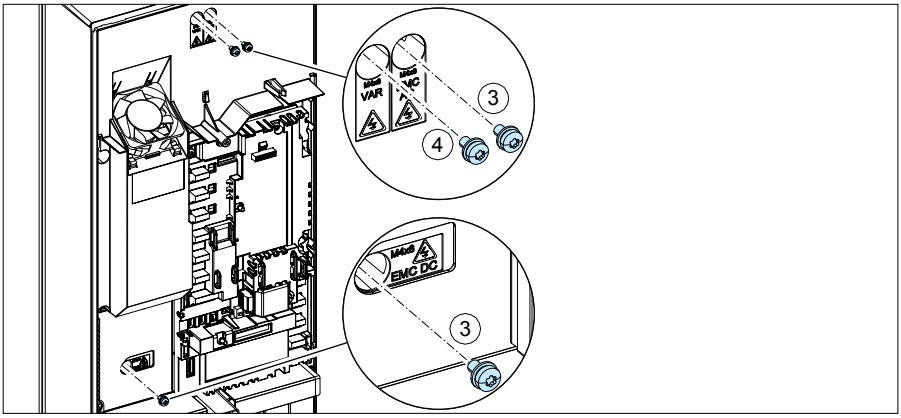
3



Disconnect EMC filter or ground-to-phase varistor, if needed

To disconnect the internal EMC filter or ground-to-phase varistor, if needed, do as follows:

1. Switch off the power from the drive.
2. Open the front cover, if not already opened, see steps 5, IP21 and 5, IP55 in figure *R6…R9 Figures A* on page *41.*
3. To disconnect the internal EMC filter, remove the two EMC screws.
4. To disconnect the ground-to-phase varistor, remove the varistor screw.



Connect the power cables

See figure *C* on page *41*. Use symmetrical shielded cable for motor cabling. If the cable shield is the sole PE conductor for drive or motor, make sure that is has sufficient conductivity for the PE.

1. Attach the residual voltage warning sticker in the local language next to the control board.

R6-R9

2. Remove the side plates of the cable entry box: Loosen the retaining screws and slide the walls out.
3. Remove the shroud on the power cable terminals by releasing the clips with a screwdriver and pulling the shroud out.
4. Knock out holes for the cables to be installed.

EN

5. Cut an adequate hole into the rubber grommet. Slide the grommet onto the cable.
6. Prepare the ends of the input power cable and motor cable as illustrated in the figure. **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.
7. Slide the cables through the holes of the bottom plate and attach the grommets to the holes (the motor cable to the right and the input power cable to the left).
8. Connect the motor cable:
   - Ground the shield 360 degrees under the grounding clamp (8a).
   - Connect the twisted shield of the cable to the grounding terminal (8b).
   - Connect the phase conductors of the cable to terminals T1/U, T2/V and T3/W. Tighten the screws to the torque given in the figure (8c). **Note:** Phase conductors (R8, R9) are detachable.
9. Connect the input power cable as in step *8*. Use terminals L1, L2 and L3.
10. R8…R9: If you install parallel, install the second grounding shelf for the parallel power cables. Repeat steps *5*...*9*.
11. Install the grounding shelf for the control cables.
12. Reinstall the shroud on the power terminals.
13. Secure the cables outside the unit mechanically.
14. Ground the motor cable shield at the motor end. For minimum radio frequency interference, ground the motor cable shield 360 degrees at the lead-through of the motor terminal box.

Connect the control cables

See figure *D* on page *42*. 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 ABB standard macro are shown in section *Default I/O connections* on page *38*.

Example of connecting an analog signal cable:

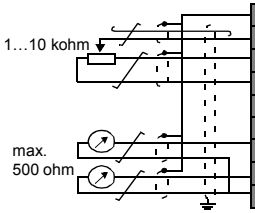
1. Cut an adequate hole into the rubber grommet and slide the grommet onto the cable. Slide the cable through a hole of the bottom plate and attach the grommet to the hole.
2. Ground the stripped outer shield of the cable 360 degrees under the grounding clamp. Keep the cable otherwise unstripped as close to the terminals of the control board as possible. For analog signal cables, ground also the pair-cable shields and grounding wire at the SCR1 terminal. Secure the cables mechanically at the clamps below the control board.
3. Route the cable as shown in the figure.
4. Connect the conductors to the appropriate terminals of the control board and tighten to 0.5…0.6 N·m (0.37...4.43 lbf·ft).
5. Tie all control cables to the provided cable tie mounts.
6. Put the unused rubber grommets to the holes in the lead-through plate.

R6-R9

EN

Default I/O connections

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



X1	Reference voltage and analog inputs and outputs	
1	SCR	Signal cable shield (screen)
2	AI1	**Output frequency/speed reference**: 0…10 V
3	AGND	Analog input circuit common
4	+10V	Reference voltage 10 V DC
5	AI2	**Actual feedback:** 0…10 V
6	AGND	Analog input circuit common
7	AO1	**Output frequency:** 0…10 V
8	AO2	**Output current:** 0…20 mA
9	AGND	Analog output circuit common
X2 & X3	Aux. voltage output and programmable digital inputs	
10	+24V	Aux. voltage output +24 V DC, max. 250 mA
11	DGND	Aux. voltage output common
12	DCOM	Digital input common for all
13	DI1	**Stop (0) / Start (1)**
14	DI2	Not configured
15	DI3	**Constant frequency/speed selection**
16	DI4	Not configured
17	DI5	Not configured
18	DI6	Not configured
X6, X7, X8	Relay outputs	
19	RO1C	**Ready run** 250 V AC / 30 V DC 2 A
20	RO1A	
21	RO1B	
22	RO2C	**Running** 250 V AC / 30 V DC 2 A
23	RO2A	
24	RO2B	
25	RO3C	**Fault (-1)** 250 V AC / 30 V DC 2 A
26	RO3A	
27	RO3B	
X5	Embedded fieldbus	
29	B+	Embedded fieldbus, EFB (EIA-485)
30	A-	
31	DGND	
S4	TERM	Termination switch
S5	BIAS	Bias resistors switch
X4	Safe torque off	
34	OUT1	Safe torque off. Factory connection. Both circuits must be closed for the drive to start. See chapter *The Safe torque off function* in *ACH580-01 hardware manual* (3AUA0000076331 [English]).
35	OUT2	
36	SGND	
37	IN1	
38	IN2	
X10	24 V AC/DC	
40	24 V AC/DC- in	Ext. 24V AC/DC input to power up the control unit when the main supply is disconnected.
41	24 V AC/DC+ in	

Total load capacity of the Auxiliary voltage output +24V (X2:10) is 6.0 W (250 mA / 24 V DC).
Wire sizes: 0.14…2.5 mm^2 (26…16 AWG): All terminals
Tightening torques: 0.5…0.6 N·m (0.4 lbf·ft)

Install optional modules, if any

See chapter *Electrical installation* in *ACH580-01 hardware manual* (3AUA0000076331 [English]).

Install side plates and covers

See figure *R6…R9 Figures E* on page *44*.

IP21

1. Reinstall the side plates of the cable entry box. Tighten the retaining screws with a screwdriver.
2. Slide the cover of the cable entry box on the module from below until the cover snaps into place.
3. Reinstall the module cover. Tighten the two retaining screws with a screwdriver.

IP55

1. Reinstall the module cover. Tighten the two retaining screws with a screwdriver.

For start-up instructions, see chapter *EN – Quick start-up guide* on page *49*.

R6-
R9

EN

Compliance with the European Machinery Directive 2006/42/EC

Declaration of conformity

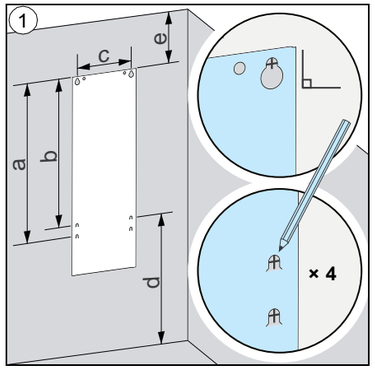
To be added.

R6-R9

R6-
R9

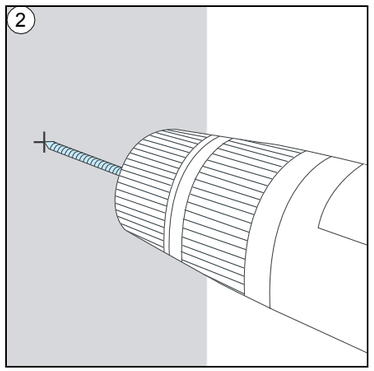
R6…R9 Figures A

1



	R6	R7	R8	R9
a (mm/in)	571/ 22.5	623/ 24.5	701/ 27.6	718/ 28.3
b (mm/in)	531/ 20.9	583/ 22.9	658/ 25.9	658/ 25.9
c (mm/in)	213/ 8.4	245/ 9.7	263/ 10.4	345/ 13.6
d (> mm/in)	300/ 11.8	300/ 11.8	300/ 11.8	300/ 11.8
e (> mm/in)	200/ 7.9	200/ 7.9	200 / 7.9	200/ 7.9
kg/lb ⚠	45/ 99	55/ 121	70/ 154	98/ 216

2



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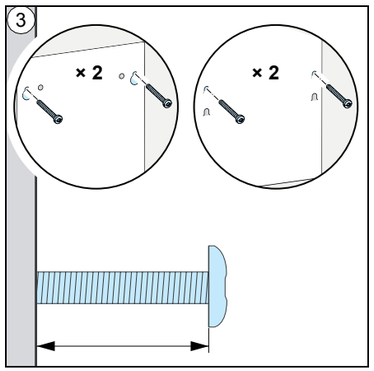
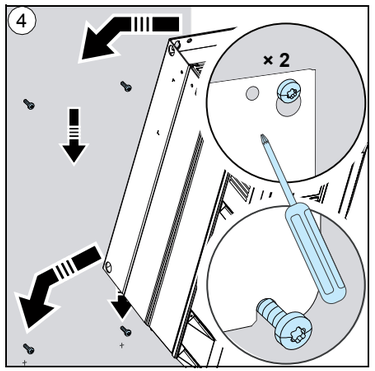
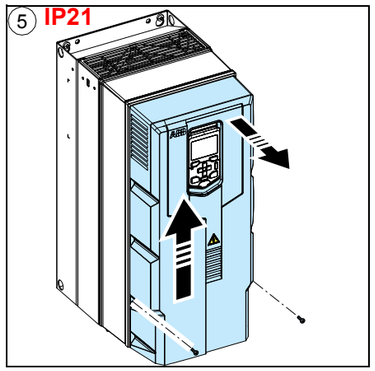


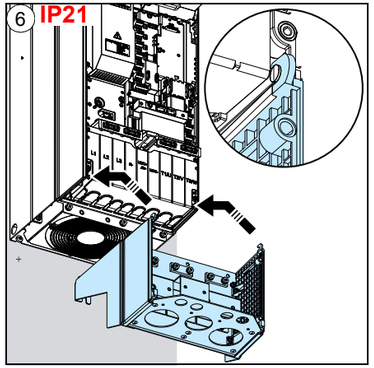
4



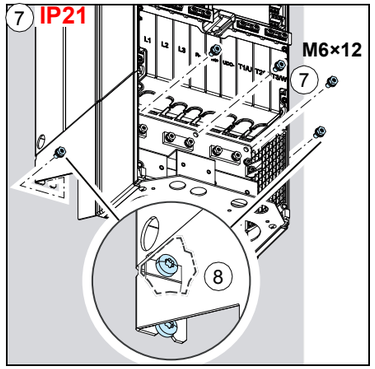
5 IP21



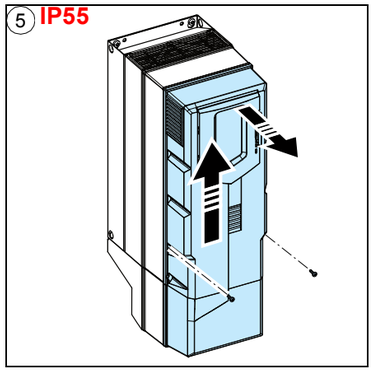
6 IP21



7 IP21

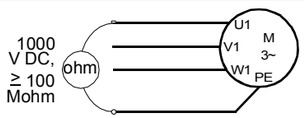


5 IP55



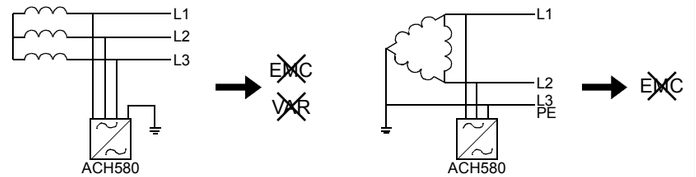
B

1



U1-V1, U1-W1, V1-W1
U1-PE, V1-PE, W1-PE

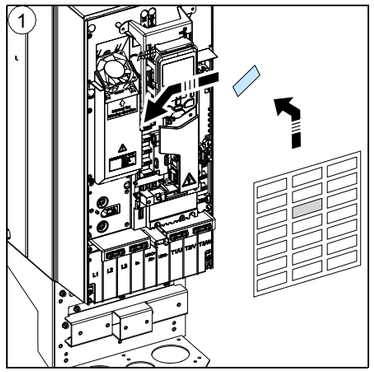
2 ⚠ ONLY IT AND CORNER-GROUNDED TN SYSTEMS



EN: See page *33*.

C

1



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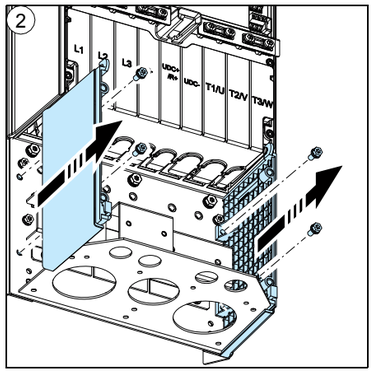

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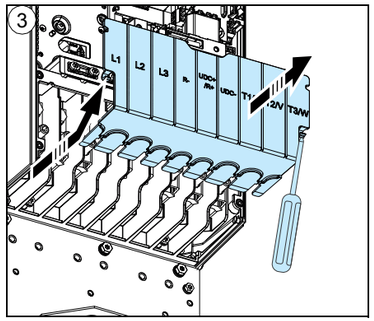

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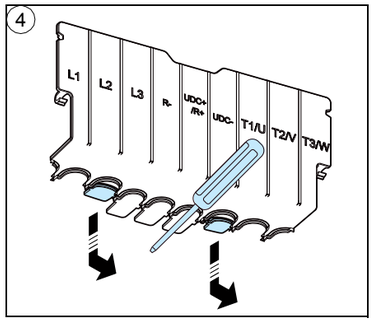
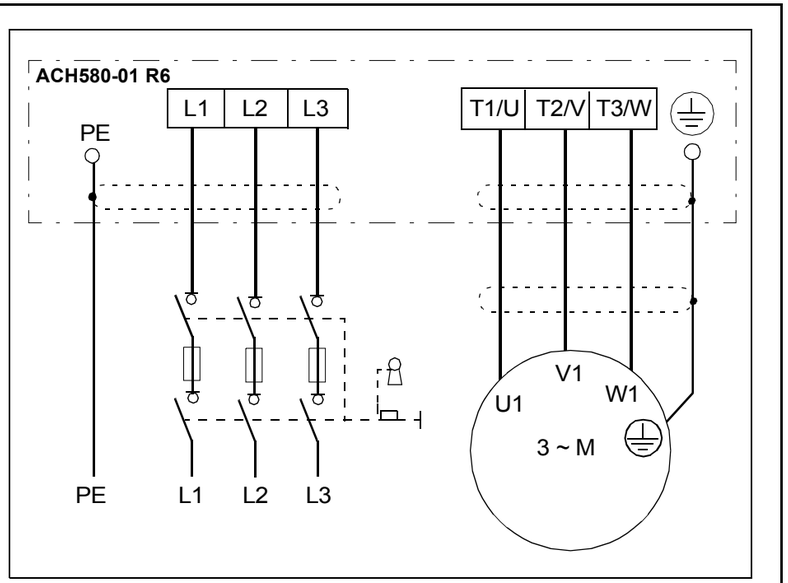
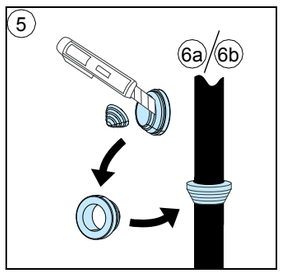
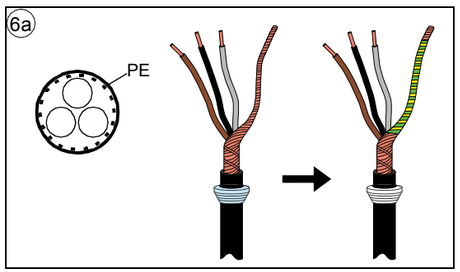
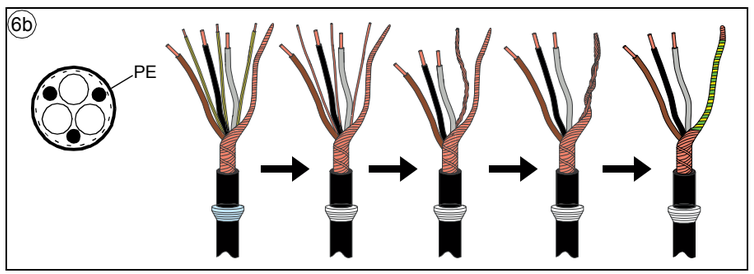
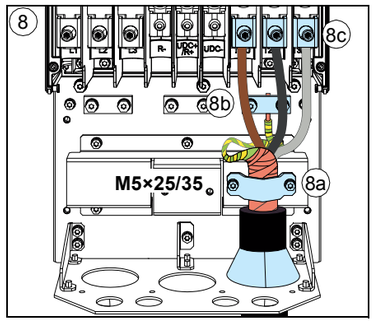


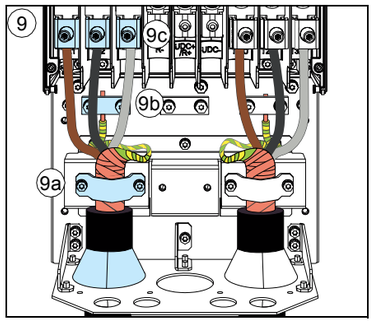






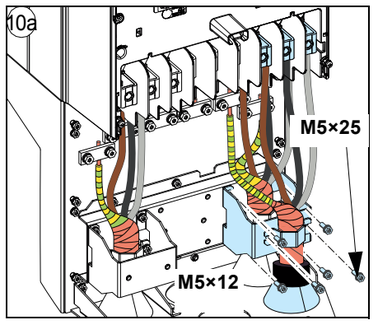


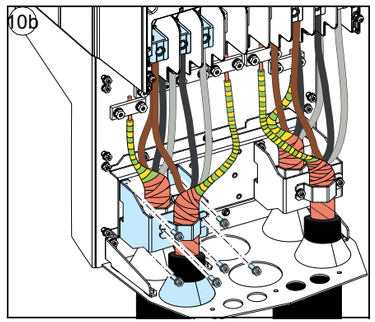


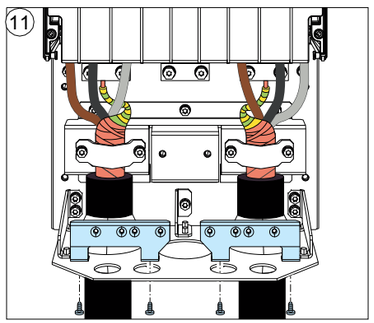


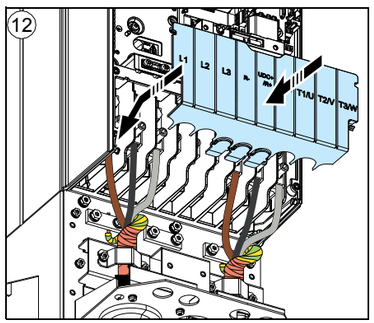
	R6		R7		R8		R9	
	N·m	lbf·ft	N·m	lbf·ft	N·m	lbf·ft	N·m	lbf·ft
L1, L2, L3, T1/U, T2/V, T3/W	40	30	40	30	40	30	70	52
PE	10	7	10	7	10	7	10	7

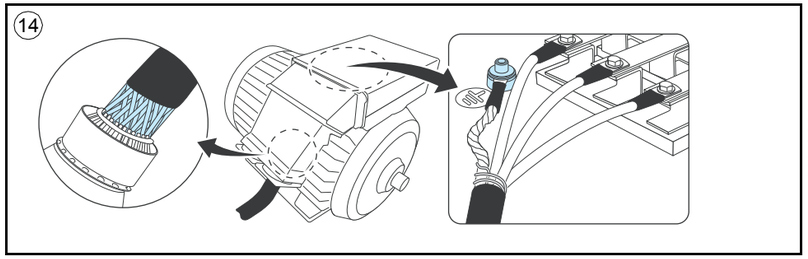
R8...R9 only



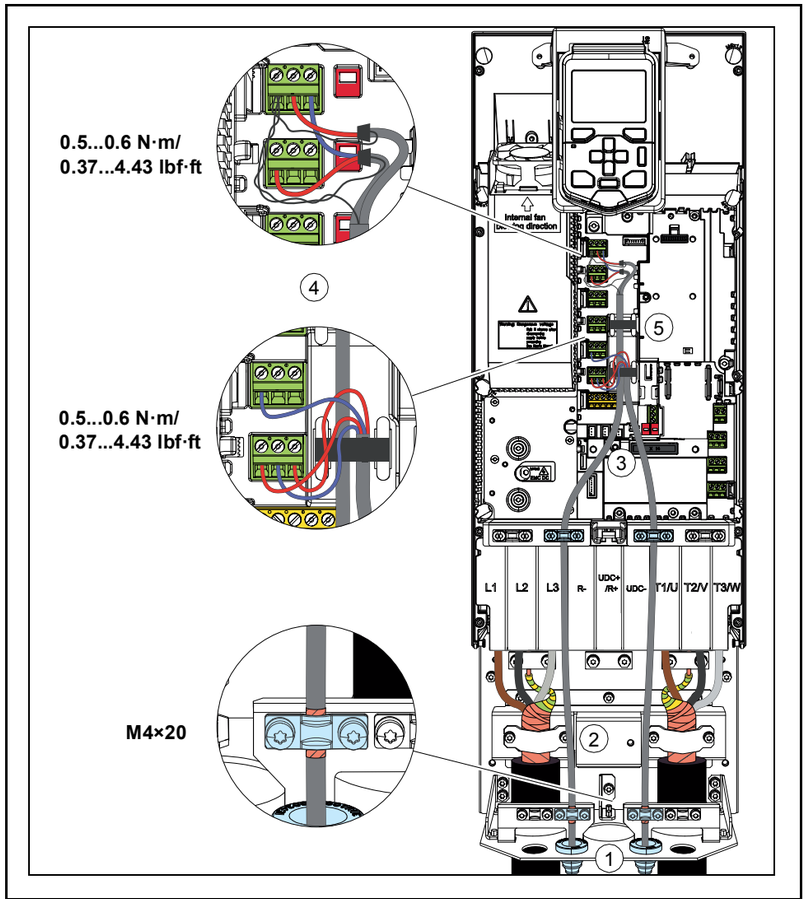






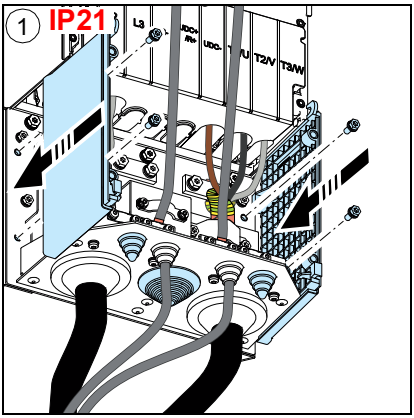


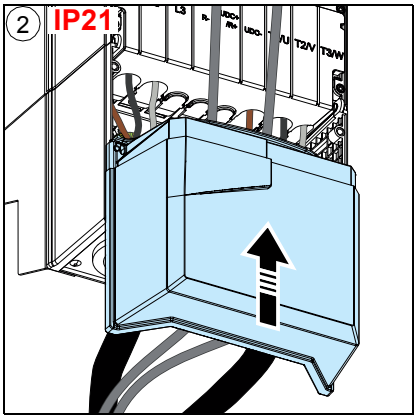
D

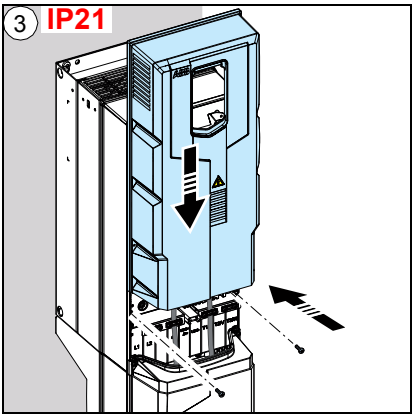


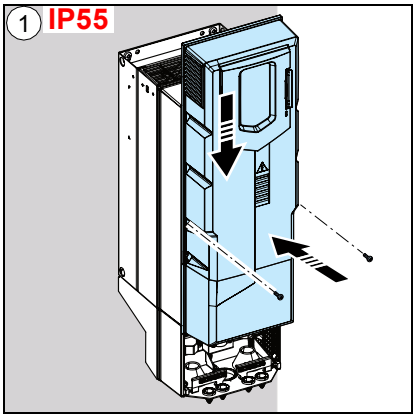
3AUA0000076330 Rev A

R6…R9 Figures E









3AUA0000076330 Rev A

ABB drives for HVAC

Quick start-up guide
ACH580-01 drives
Frames R0 to R3 and R6 to R9

R0-R3

R6-R9

EN

DA

DE

ES

FI

FR

IT

NL

PL

PT

RU

SV

TR

ZH

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ABB

3AUA0000076330 Rev A
EN
EFFECTIVE: 2015-09-09

EN – Quick start-up guide

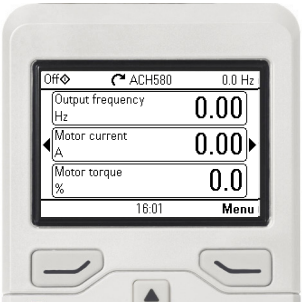
This guide describes how to start-up the drive using the First start assistant on the HVAC control panel. For complete information on start-up, see *ACH580 firmware manual* (3AXD50000027537 [English]).

Before you start

Ensure that the drive has been installed as described in chapter *EN – R0…R3 Quick installation guide* on page *12* (frames R0…R3) or *EN – R6…R9 Quick installation guide* on page *31* (frames R6…R9).

Start-up with the First start assistant on an HVAC control panel

Safety	
☐	Make sure that the installation work is complete. Make sure that cover of the drive and the cable box, if included, are on place.
☐	⚠ 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	
	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. Use keys ◄, ►, ▲ and ▼ to move the cursor and/or change values depending on the active view. Key ? shows a context-sensitive help page.
1 – First start assistant guided settings: Language, motor nominal values, and date and time	
☐	Have the motor name plate data at hand. Power up the drive.



R0-R3

R6-R9

EN

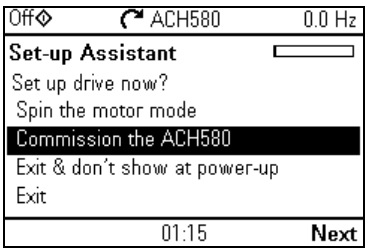
☐ The First start assistant guides you through the first start-up.

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**).

Note: After you have selected the language, it takes a few minutes for the control panel to wake up.

☐ Select **Commission the ACH580** and press (**Next**).



Refer to the motor nameplate for the following nominal value settings of the motor. Enter the values exactly as shown on the motor nameplate.

Example of a nameplate of an induction (asynchronous) motor:

ABB Motors CE

3 ~ motor	M2AA 200 MLA 4						
	IEC 200 M/L 55						
		No					
		Ins.cl. F			IP 55		
V	Hz	kW	r/min	A	cos φ	IA/IN	t E/s
690 Y	50	30	1475	32.5	0.83		
400 D	50	30	1475	56	0.83		
660 Y	50	30	1470	34	0.83		
380 D	50	30	1470	59	0.83		
415 D	50	30	1475	54	0.83		
440 D	60	35	1770	59	0.83		
Cat. no	3GAA 202 001 - ADA						
6312/C3		6210/C3			180 kg		
			IEC 34-1				

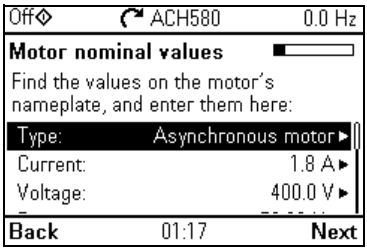
☐ Check that the motor data is correct. Values are predefined on the basis of the drive size but you should verify that they correspond to the motor.

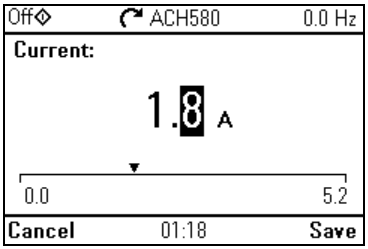
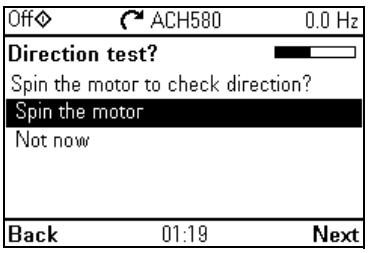
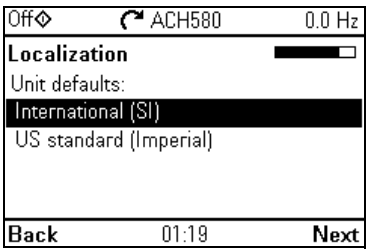
Start with the motor type.

- Go to the edit view of a selected row by pressing .
- Scroll the view with and .

Motor nominal cosΦ and nominal torque are optional.

Press (**Next**) to continue.

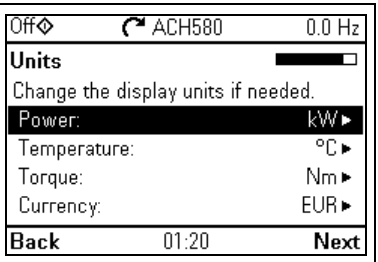
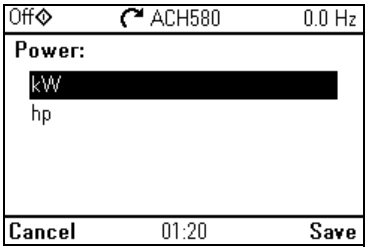
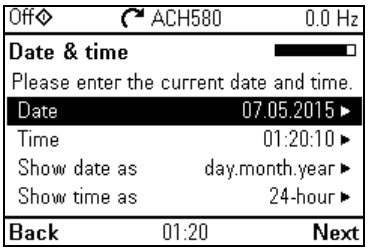
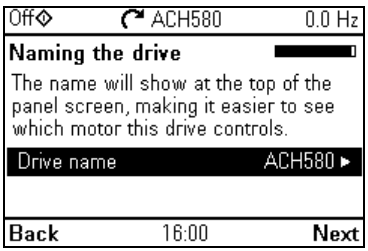


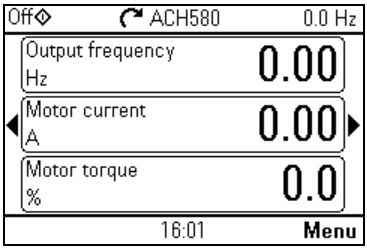
☐	To change a value in an edit view: • Use ◄ and ► to move the cursor left and right. • Use ▲ and ▼ to change the value. Press (**Save**) to accept the new setting, or press (**Cancel**) to go back to the previous view without making changes.	
☐	This step is optional, and requires rotating the motor. Do not do this if it could cause any risk, or if the mechanical set-up does not allow it. To do the direction test, select **Spin the motor** and press (**Next**).	
☐	Press the Hand key (Hand) on the panel to start the drive.	
☐	Check the direction of the motor. If it is forward, select **Yes, motor is spinning forward** and press (**Next**) to continue. If the direction is not forward, select **No, fix direction** and press (**Next**) to continue.	
☐	Select the localization you want to use and press (**Next**).	

R0-R3

R6-R9

EN

☐	Change the units shown on the panel if needed. • Go to the edit view of a selected row by pressing ▶. • Scroll the view with ▲ and ▼. Go to the next view by pressing (**Next**).	
☐	To select a value in an edit view: • Use ▲ and ▼ to select the value. Press (**Save**) to accept the new setting, or press (**Cancel**) to go back to the previous view without making changes.	
☐	Set the date and time as well as date and time display formats. • Go to the edit view of a selected row by pressing ▶. • Scroll the view with ▲ and ▼. Go to the next view by pressing (**Next**).	
☐	To give the drive a name that will be shown at the top, press ▶. If you do not want to change the default name (ACH580), continue by pressing (**Next**). For information on editing text, see *ACH580 firmware manual* (3AXD50000027537 [English]).	
☐	The first start is now complete and the drive is ready for use. Press (**Done**) to enter the Home view.	

☐	The Home view monitoring the values of the selected signals is shown on the panel.	

2 – Hand/Off/Auto operation

R0-R3

R6-R9

EN

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

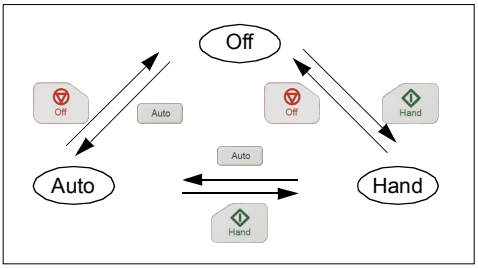
Remote control: Drive is controlled from the I/O or the fieldbus.

- Top row of the view shows Auto.

Local control: Drive is controlled from the control panel.

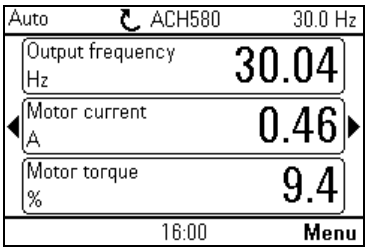
- Top row of the view shows Off, that is, the drive is in the Off mode. Drive is stopped.
- Top row of the view shows Hand, that is, the drive is in the Hand mode. Drive is running. The initial reference in the Hand mode is copied from the drive reference.
  Symbol ▲▼ on the top row indicates that you can change the reference with ▲ and ▼.

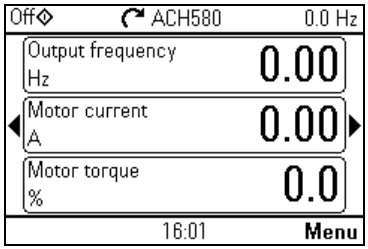
The following diagram shows the state transitions when you press the Hand, Off or Auto button:

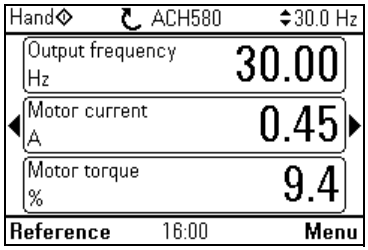


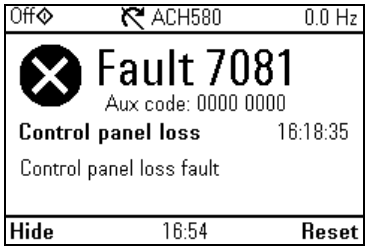
Note: When you restart the drive while fault 7081 Control panel loss is active, the mode changes from Hand or Off to Auto.

Note: Override operation overrides the actual running mode. See *ACH580 firmware manual* (3AXD50000027537 [English]).









Further information

Product and service inquiries

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

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

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