ACH580 Ultra-Low Harmonic Drives

Installation, Operation and Maintenance Manual (I, O & M)
ACH580 HVAC Drives (4...355 kW, 5...400 HP)
ACH580-BCR/BDR/ E-Clipse Bypass Drives (4...355 kW, 5...400 HP)
ACH580-PCR/PDR Packaged Drives with Disconnect (4...355 kW, 5...400 HP)

Safety instructions

These are the safety instructions which you must obey when you install and operate the drive and do maintenance on the drive. If you ignore the safety instructions, injury, death or damage can occur.

Use of warnings and notes in this manual

Warnings tell you about conditions which can cause injury or death, or damage to the equipment. They also tell you how to prevent the danger. Notes draw attention to a particular condition or fact, or give information on a subject.

The manual uses these warning symbols:

Electricity warning tells about hazards from electricity which can cause injury or death, or damage to the equipment.
General warning tells about conditions, other than those caused by electricity, which can cause injury or death, or damage to the equipment.
Electrostatic sensitive devices warning tells you about the risk of electrostatic discharge which can cause damage to the equipment.

General safety in installation, start-up and maintenance

These instructions are for all personnel that install the drive and do maintenance work on it.

WARNING! Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur.

- Use safety shoes with a metal toe cap to avoid foot injury. Wear protective gloves and long sleeves. Some parts have sharp edges.
- Handle the drive carefully.
  - Lift the drive with a lifting device. Use the lifting eyes of the drive.

- Beware of hot surfaces. Some parts, such as heatsinks of power semiconductors, remain hot for a while after disconnection of the electrical supply.
- Keep the drive in its package or protect it otherwise from dust and burr from drilling and grinding until you install it.
- Vacuum clean the area below the drive before the start-up to prevent the drive cooling fan from drawing the dust inside the drive.
- Do not cover the air inlet and outlet when the drive runs.
- Make sure that there is sufficient cooling. See the *ACH580-31 Hardware Manual* (*3AXD50000037066*) for more information.

- Before you connect voltage to the drive, make sure that the drive covers are on. Keep the covers on during the operation.
- Before you adjust the drive operation limits, make sure that the motor and all driven equipment can operate throughout the range of operation limits.
- Before you activate the automatic fault reset or automatic restart functions of the drive control program, make sure that no dangerous situations can occur. These functions reset the drive automatically and continue operation after a fault or supply break. If these functions are activated, the installation must be clearly marked as defined in IEC/EN 61800-5-1, subclause 6.5.3, for example, “THIS MACHINE STARTS AUTOMATICALLY”.
- The maximum number of drive power-ups is five in ten minutes. Too frequent power-ups can damage the charging circuit of the DC capacitors.
- If you have connected safety circuits to the drive (for example, emergency stop and Safe torque off), validate them at the start up. For the validation of the Safe torque off, see *ACH580 HVAC control program firmware manual* (*3AXD50000027537* [English]). For the validation of other safety circuits, see the instructions provided with them.

Note:

- If you select an external source for start command and it is on, and the start command is level-triggered, the drive will start immediately after fault reset. See parameters *20.02 Ext1 start trigger type* and *20.07 Ext2 start trigger type* in *ACH580 HVAC control program firmware manual* (*3AXD50000027537* [English]).
- When the control location is not set to HAND (text Hand is not shown on the top row of the panel and parameter 19.19 HAND/OFF disable action has value OFF button disabled), the OFF key on the control panel will not stop the drive.
- Frame R3: Do not attempt to repair a malfunctioning drive; contact your local representative for replacement or repair by authorized persons.
- Frames R6 and R8: Can be repaired by authorized persons.

Electrical safety in installation, start-up and maintenance

Precautions before electrical work

These warnings are for all personnel who do work on the drive, motor cable or motor.

WARNING! Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do electrical installation or maintenance work. Go through these steps before you begin any installation or maintenance work.

1. Clearly identify the work location.
2. Secure a permit to work from the person in control of the electrical installation work.
3. Disconnect all possible voltage sources. Lock and tag.
   - Open the main disconnector at the power supply of the drive.
   - Make sure that reconnection is not possible.
   - Disconnect any external power sources from the control circuits.
   - After you disconnect the drive, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you continue.
4. Protect any other energized parts in the work location against contact.
5. Take special precautions when close to bare conductors.

6. Measure that the installation is de-energized.
7. Confirm the multimeter is working by testing a known source.
   - Use a multimeter with an impedance of at least 1 Mohm.
   - Make sure that the voltage between the drive input power terminals (L1, L2, L3) and the grounding terminal (PE) is close to 0 V.
8. Install temporary grounding as required by the local regulations.

If the drive does not operate according to these steps, refer to the *ACH580-31 Hardware Manual* (*3AXD5000037066*).

Additional instructions and notes

WARNING! Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur.

- A drive with the EMC filter connected can be installed to a symmetrically grounded TN-S system. If you install the drive to another system, check if you must disconnect the EMC filter. See sections *When to disconnect EMC filter or ground-to-phase varistor: TN-S, IT, Corner-grounded delta, and Midpoint-grounded delta systems* on page *15* and *Guidelines for installing the drive to a TT system* on page *16*.

  WARNING! Do not install the 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 drive EMC compatibility is considerably reduced. See section *Checking the compatibility of EMC filters with IT (ungrounded), Corner-grounded delta, Midpoint-grounded delta, and TT systems* on page *14* and *Maximum recommended motor cable length* on page *17*.
- 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, check if you must disconnect the varistor. See sections *When to disconnect EMC filter or ground-to-phase varistor: TN-S, IT, Corner-grounded delta, and Midpoint-grounded delta systems* on page *15* and *Guidelines for installing the drive to a TT system* on page *16*.

  WARNING! Do not install the 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.
- Use all ELV (extra low voltage) circuits connected to the drive only within a zone of equipotential bonding, that is, within a zone where all simultaneously accessible conductive parts are electrically connected to prevent hazardous voltages appearing between them. You can accomplish this by a proper factory grounding, that is, make sure that all simultaneously accessible conductive parts are grounded to the protective earth (PE) bus of the building.

  WARNING! Do not do insulation or voltage withstand tests on the drive or drive modules.

Note:

- The motor cable terminals of the drive are at a dangerous voltage when the input power is on, regardless of whether the motor is running or not.
- The DC terminals (UDC+, UDC-) are at a dangerous voltage.
- External wiring can supply dangerous voltages to the terminals of relay outputs (RO1, RO2 and RO3).
- The Safe torque off function does not remove the voltage from the main and auxiliary circuits. The function is not effective against deliberate sabotage or misuse.

WARNING! Use a grounding wrist band when you handle the printed circuit boards. Do not touch the boards unnecessarily. The boards contain components sensitive to electrostatic discharge.

Grounding

These instructions are for all personnel who are responsible for the electrical installation, including the grounding of the drive.

WARNING! Obey these instructions. If you ignore them, injury or death, or equipment malfunction can occur, and electromagnetic interference can increase.

- If you are not a qualified electrical professional, do not do grounding work.
- Always ground the drive, the motor and adjoining equipment to the protective earth (PE) bus of the power supply. This is necessary for the personnel safety. Proper grounding also reduces electromagnetic emission and interference.
- In a multiple-drive installation, connect each drive separately to the protective earth (PE) bus of the power supply.
- Make sure that the conductivity of the protective earth (PE) conductors is sufficient. See section *Power cable terminal and lead-through data* on page *16*. Obey the local regulations.
- Connect the power cable shields to the protective earth (PE) terminals of the drive.
- Make a 360° grounding of the power and control cable shields at the cable entries to suppress electromagnetic disturbance.
- Standard IEC/EN 61800-5-1 (section 4.3.5.5.2.) requires that as the normal touch current of the drive is higher than 3.5 mA AC or 10 mA DC, you must use a fixed protective earth (PE) connection. In addition,
  - install a second protective earth conductor of the same cross-sectional area as the original protective earthing conductor,

    or
  - install a protective earth conductor with a cross-section of at least 10 mm^2 Cu or 16 mm^2 Al,

    or
  - install a device which automatically disconnects the supply if the protective earth conductor breaks.

Additional instructions for Safety Functions

WARNING! Bypass configurations (ACH580-3BxR) do not support Safe Torque Off (STO) functionality in bypass mode.

Additional instructions for permanent magnet motor drives

Safety in installation, start-up and maintenance

These are additional warnings concerning permanent magnet motor drives. The other safety instructions in this chapter are also valid.

WARNING! Obey these instructions. If you ignore them, injury or death and damage to the equipment can occur.

- Do not work on a drive when a rotating permanent magnet motor is connected to it. A rotating permanent magnet motor energizes the drive including its power terminals.

Before installation, start-up and maintenance work on the drive:

- Stop the motor.
- Disconnect the motor from the drive with a safety switch or by other means.
- If you cannot disconnect the motor, make sure that the motor cannot rotate during work. Make sure that no other system, like hydraulic crawling drives, can rotate the motor directly or through any mechanical connection like felt, nip, rope, etc.
- Measure that the installation is de-energized.
  - Confirm the multimeter is working by testing known source.
  - Use a multimeter with an impedance of at least 1 Mohm.

  - Make sure that the voltage between the drive output terminals (T1/U, T2/V, T3/W) and the grounding (PE) busbar is close to 0 V.
  - Make sure that the voltage between the drive input power terminals (L1, L2, L3) and the grounding (PE) busbar is close to 0 V.
  - Make sure that the voltage between the drive DC terminals (UDC+, UDC-) and the grounding (PE) terminal is close to 0 V.
- Install temporary grounding to the drive output terminals (T1/U, T2/V, T3/W). Connect the output terminals together as well as to the PE.

Start-up and operation:

- Make sure that the operator cannot run the motor over the rated speed. Motor overspeed causes overvoltage that can damage or destroy the capacitors in the intermediate circuit of the drive.

General safety in operation

These instructions are for all personnel that operate the drive.

⚠ **WARNING!** Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur.

- Do not control the motor with the line side disconnect at the drive power supply; instead, use the control panel start and stop keys or commands through the I/O terminals of the drive.
- Give a stop command to the drive before you reset a fault. If you have an external source for the start command and the start is on, the drive will start immediately after the fault reset, unless you configure the drive for pulse start. See the firmware manual.
- Before you activate automatic fault reset functions of the drive control program, make sure that no dangerous situations can occur. These functions reset the drive automatically and continue operation after a fault.

Note: When the drive is not in the Hand mode, the Off key on the control panel will not stop the drive.

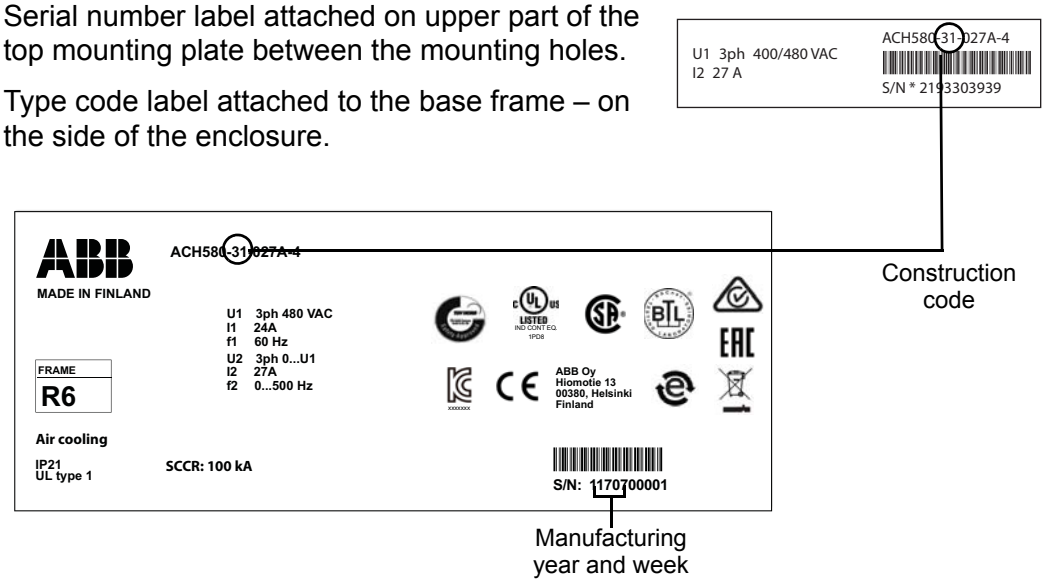
Cybersecurity disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Contents

This manual is the Installation, Operation and Maintenance Manual for the ACH580-31 Ultra-Low Harmonic Drives. Complete technical details are available in the *ACH580-31 Drives Hardware manual*, publication number *3AXD50000037066*. Complete programming information is available in the *ACH580 HVAC Control Firmware manual*, publication number *3AXD50000027537*.

1. To determine the type of your drive, refer to its construction code on either:
   - Serial number label attached on upper part of the top mounting plate between the mounting holes.
   - Type code label attached to the base frame – on the side of the enclosure.



2. According to the construction code, proceed to your drive's installation, operation, diagnostics and maintenance information:
   - 31 (Wall-Mount Drives)
   - 3BCR, 3BDR (E-Clipse Bypass) – page *85*.
   - 3PCR, 3PDR (Packaged Drives with Disconnect) – page *120*.

ACH580 Ultra-Low Harmonic Drives Installation

Installation

Study these installation instructions carefully before proceeding. **Failure to observe the warnings and instructions may cause a malfunction or personal hazard.**

WARNING! Before you begin read *Safety instructions* on page *3*.

1. Check mounting surface and free space requirements

The drive must be installed on a vertical wall or surface. The surface construction or support structure must be sufficient to support the weight of the connected drive(s). Follow IBC and any local code requirements for the correct mounting and fastening requirements. The mounting surface must be free from vibration and not exceed the vibration specifications defined in the ACH580-31 Hardware manual, Technical data section for Vibration (IEC 60068-2). Three acceptable mounting orientation include:

- vertically alone
- vertically side by side
- horizontally alone

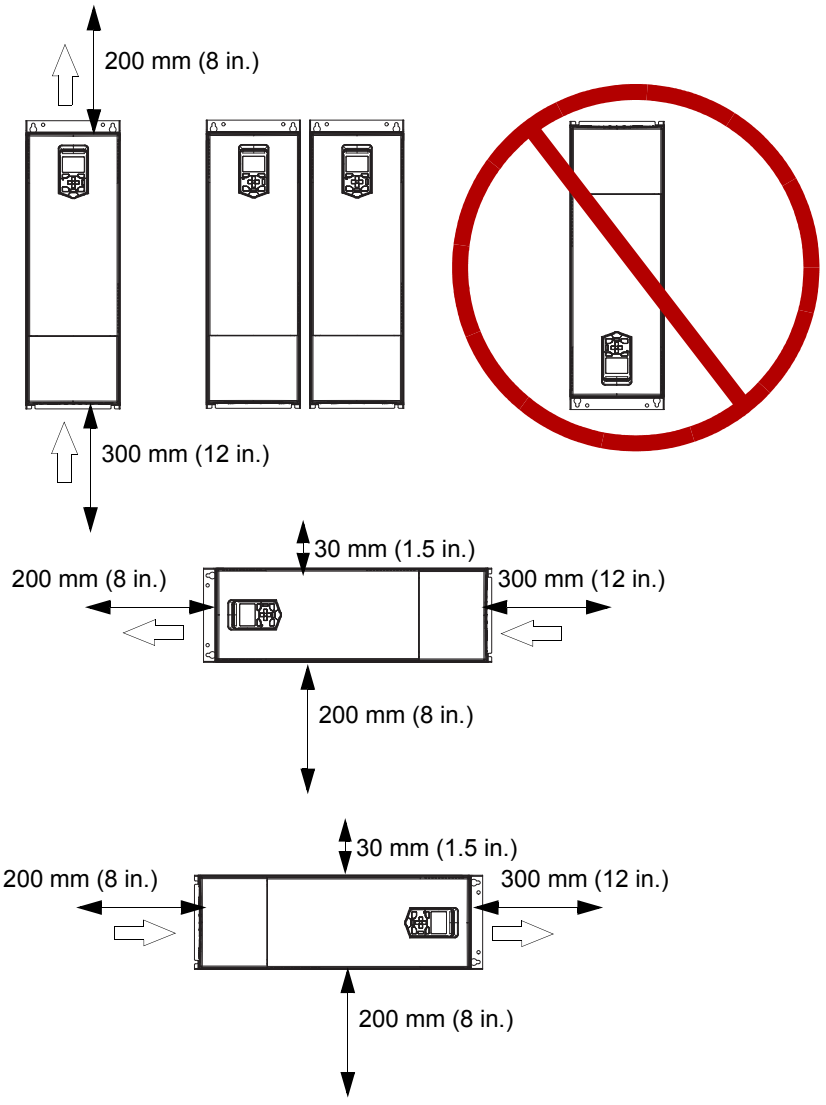
  Note: UL Type 1 (IP21) only meets UL “Open” type in horizontal orientation

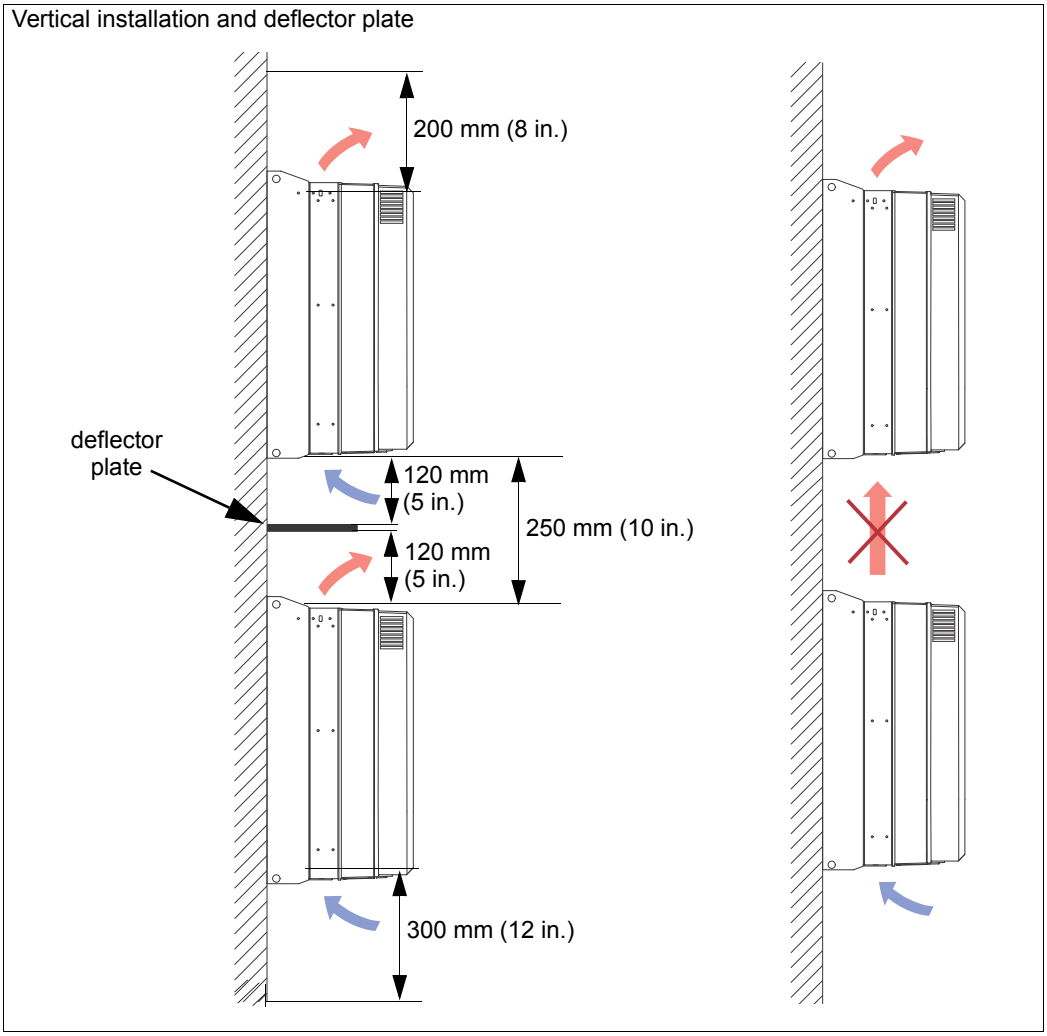
Note: Do not install upside down.

Check that adequate clearance exists between the drive and other surfaces including other drives.

Vertical and horizontal clearances are defined in the following diagrams for each orientation.

Allowable mounting orientations





2. Prepare for installation

Lifting R3, R6 and R8

Use provided lifting points to install drive.

Transporting R3, R6 and R8

1. Use appropriate lifting equipment to move the transport package/enclosure to the installation site.

WARNING! Frames R3, R6 and R8: Lift the drive with a lifting device. Use the lifting eyes of the drive. **The drive is heavy and its center of gravity is high. An overturning drive can cause physical injury.**

2. Use a hoist to lift the drive. (Do not place drive in final position until mounting site is prepared.)

Unpack the drive

1. Unpack the drive.
2. Check for any damage and notify the shipper immediately if damaged components are found.
3. Check the contents against the order and the shipping label to verify that all parts have been received.

Tools required

To install the ACH580 Ultra-Low Harmonic Drives you need the following:

- Screwdrivers as appropriate for the mounting hardware used, including a T20 Torx driver for drive cover removal
- Wire stripper
- Tape measure and/or provided mounting template
- Drill
- Use pallet truck and hoist
- Use the appropriate crimping tool for power cable lugs (if applicable).
- Mounting hardware: screws or nuts and bolts. The type, length and quantity of hardware depends on the mounting surface and the frame size:

WARNING! Before installing the ACH580 Ultra-Low Harmonic Drives, ensure the input power supply to the drive is off.

WARNING! Metal shavings or debris in the enclosure can damage electrical equipment and create a hazardous condition. Where parts, such as conduit plates require cutting or drilling, first remove the part. If that is not practical, cover nearby electrical components to protect them from all shavings or debris.

Flange Mounting

Further information is in*: Flange mounting kit supplement*, 3AXD50000019100.

Frame size	Kit
R3	3AXD50000255726
R6	3AXD50000179633
R8	3AXD50000164318

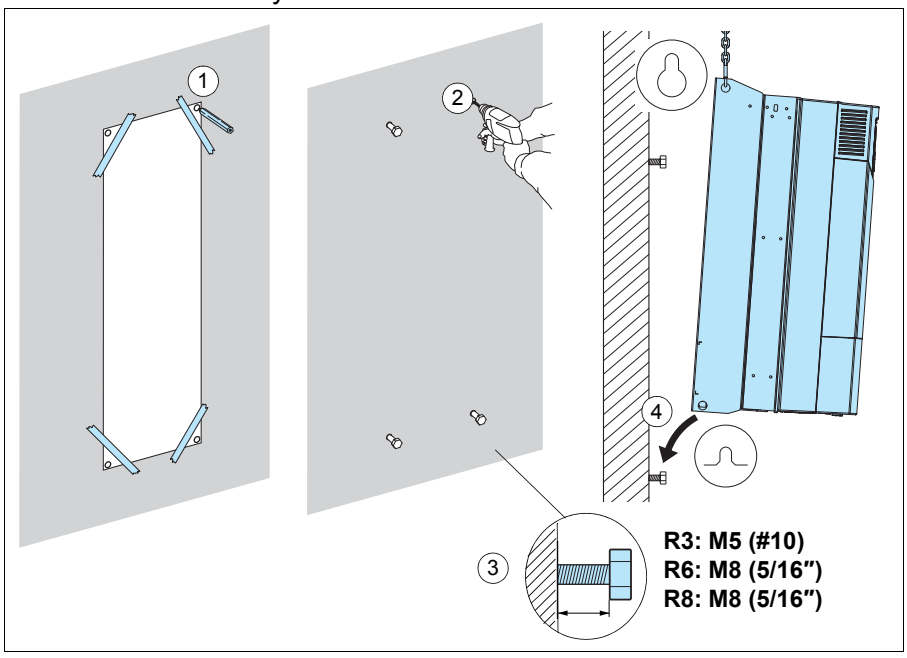
3. Install the drive

Installing the drive vertically, frames R3, R6, R8

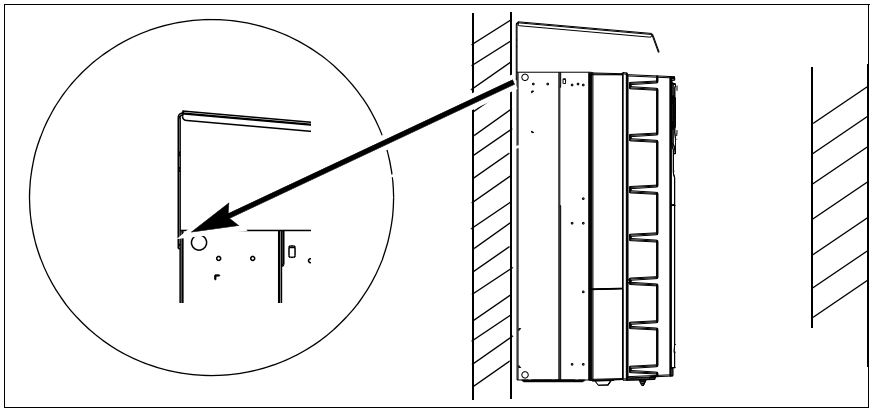
The figures show frame R3 as an example.

1. Mark the hole locations using the mounting template included in the package.
2. Drill the mounting holes.

3. Insert anchors or plugs into the holes and start the screws or bolts into the anchors or plugs. Drive the screws or bolts long enough into the wall to make them carry the weight of the drive.
4. Position the drive onto the bolts on the wall. For R6 and R8 with option +B056 (UL Type 12), see also step 6.
5. Tighten the bolts in the wall securely.



6. Frames R6 and R8 with option +B056 (UL Type 12) installation: Install the hood on top of the drive before you tighten the upper fastening bolts. Place the vertical edge of the hood in between the wall and the drive back plate. Then, tighten the bolts to fasten the hood on its place.



4. Install wiring

WARNING! Ensure the motor is compatible for use with the ACH580 Ultra-Low Harmonic Drives. The ACH580 Ultra-Low Harmonic Drives must be installed by a competent person. If in doubt, contact your local ABB sales or service office.

WARNING! If the drive will be connected on an IT (ungrounded) system, make sure neither the EMC filter nor the ground-to-phase varistor are connected. If the drive will be connected on a corner-grounded TN system, make sure you have not connected the EMC filter. See *Checking the compatibility with IT (ungrounded) and corner-grounded TN systems (North America)* in the *ACH580-31 Drives Hardware manual*, publication number *3AXD50000037066*.

Checking the insulation of the assembly

WARNING! Do not make any voltage tolerance or insulation resistance tests on any part of the drive as testing can damage the drive. The drive has been tested at the factory.

1. Before testing make sure the cable is not connected to the drive.
2. Check the insulation of the input cable according to local regulations. Minimum cable temperature rating of 70 °C (158 °F) must be used.

   Note: For drives rated over 100 amperes, the power cables must be rated for 75 °C (167 °F) or higher. For UL Type 12 drives of frame R6, the power cables must be rated for 90 °C (194 °F) minimum.

3. With the motor cable connected to the motor, but NOT to the drive output terminals T1/U, T2/V and T3/W, measure the insulation resistance between the phase conductors and between each phase conductor and the Protective Earth (PE) conductor, using a measuring voltage of 1000 V DC. The insulation resistance must exceed 100 Mohm at 25 °C (77 °F).

Ground connections

For personnel safety, proper operation and to reduce electromagnetic emission/pick-up, the drive and the motor must be grounded at the installation site.

- Conductors must be adequately sized as required by safety regulations.
- Power cable shields must be connected to the drive PE terminal in order to meet safety regulations.
- Power cable shields are suitable for use as equipment grounding conductors only when the shield conductors are adequately sized as required by safety regulations.
- In multiple drive installations, do not connect drive grounding terminals in series.

Checking the compatibility of EMC filters with IT (ungrounded), Corner-grounded delta, Midpoint-grounded delta, and TT systems

EMC filter

A drive with the EMC filter connected can be installed to a symmetrically grounded TN-S system. If you install the drive to another system type, you may need to disconnect the EMC filter. Refer to the following sections of the *ACH580-31 Drives Hardware manual*, publication number *3AXD50000037066*:

- When to disconnect EMC filter or ground-to-phase varistor: TN-S, IT, Corner-grounded delta, and Midpoint-grounded delta systems
- Guidelines for installing the drive to a TT system

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

Note: When the internal EMC filter is disconnected, the drive EMC compatibility is considerably reduced. Refer to the EMC compatibility and motor cable length section of the *ACH580-31 Drives Hardware manual,* publication number *3AXD50000037066*.

Ground-to-phase varistor (MOVs)

A drive with the ground-to-phase varistor connected can be installed into a symmetrically grounded TN-S system. If you install the drive into another system, you may need to disconnect the varistor. Refer to the following sections of the *ACH580-31 Drives Hardware manual*, publication number *3AXD50000037066*:

- When to disconnect EMC filter or ground-to-phase varistor: TN-S, IT, Corner-grounded delta, and Midpoint-grounded delta systems
- Guidelines for installing the drive to a TT system

WARNING! Do not install the 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.

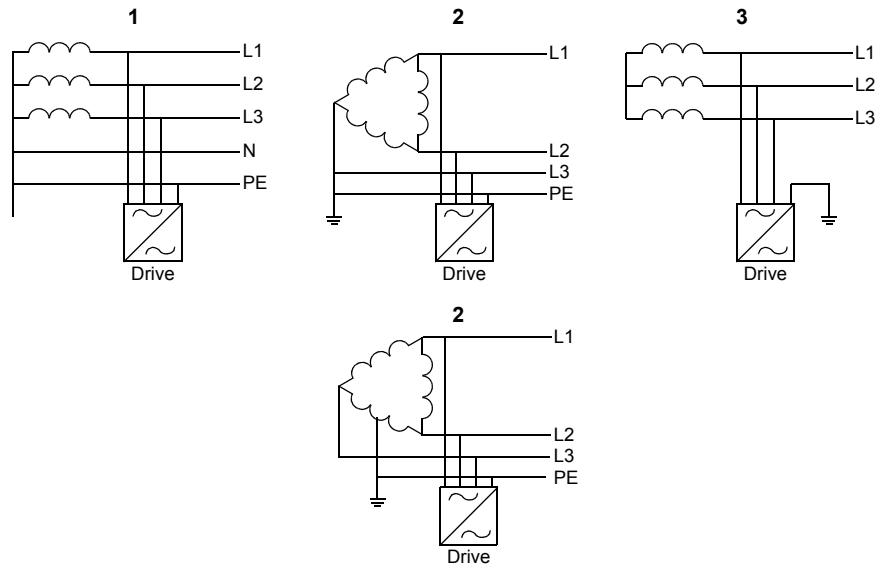
WARNING! If the drive will be connected on an IT system (ungrounded or high-resistance-grounded [over 30 ohms]), make sure that neither the EMC filter nor the ground-to-phase varistor are connected, that is, the metal screws must not be installed.

If the drive will be connected on a corner-grounded TN system, make sure that the EMC filter is not connected, that is, the metal screws must not be installed.

Connections with metal screws in these systems can cause danger or damage.

When to disconnect EMC filter or ground-to-phase varistor: TN-S, IT, Corner-grounded delta, and Midpoint-grounded delta systems

Frame size	Symmetrically grounded TN-S systems [1]	Corner-grounded and Midpoint-grounded delta systems [2]	IT systems (ungrounded or high-resistance grounded [>30 ohms]) [3]
R3	Do not disconnect EMC or VAR screws	Do not disconnect EMC or VAR screws	Disconnect EMC and VAR screws.
R6	Do not disconnect EMC or VAR screws	See Note 1 below.	Disconnect EMC AC, EMC DC and VAR screws.
R8	Do not disconnect EMC or VAR screws	Disconnect EMC and VAR screws	Disconnect EMC and VAR screws.



Note 1:Frames R3 and R6 are evaluated for use on Corner-grounded and Midpoint-grounded delta systems by UL standards. Disconnect EMC DC screw. Do not disconnect EMC AC or VAR screws. Frames R3 and R6 are not evaluated by IEC standards for use on Corner-grounded or Midpoint-grounded systems.

EMC and varistor screws for R3, R6, and R8 Frames		
Frame Size	**EMC filter screws**	**Ground-to-phase varistor screws**
R3	EMC	VAR
R6	EMC AC, EMC DC	VAR
R8	EMC DC	VAR*

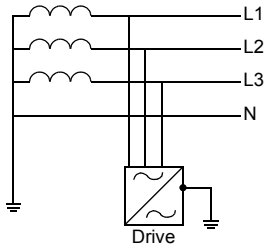
* VAR screw also functions as the EMC AC screw in R8.

Guidelines for installing the drive to a TT system

The drive can be connected to a TT system under these conditions:

1. Residual current device has been installed in the supply system.
2. These screws have been disconnected. Otherwise EMC filter and ground-to-phase varistor capacitor leakage current will cause the residual current device to trip.

Frame size	EMC filter screws	Ground-to-phase varistor screws
R3	EMC	VAR
R6	EMC AC, EMC DC	VAR
R8	EMC DC	VAR*



*VAR screw also functions as the EMC AC screw in R8.

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Note:

- Because the EMC filter screws have been disconnected, ABB does not guarantee the EMC category.
- ABB does not guarantee the functioning of the ground leakage detector built inside the drive.
- In large systems the residual current device can trip without a real reason.

Power cable terminal and lead-through data

UL (NEC) ratings at U_N = 460 V

Input, motor and DC cable entries, maximum wire sizes (per phase) and terminal screw sizes and tightening torques are given below.

Frame size	Cable entries		L1, L2, L3 terminals			T1/U, T2/V, T3/W, UDC+, UDC- terminals			Grounding terminals
	Per cable type	Ø[1]	Min wire size (solid/ stranded)[2]	Max wire size (solid/	Tightening torque	Min wire size (solid/ stranded)[2]	Max wire size (solid/ stranded)	Tightening torque	Tightening torque
	pcs	in	AWG	AWG	lbf·ft	AWG	AWG	lbf·ft	lb-ft
R3	1	0.91	20	6	1.3	20	6	1.3	1.2
R6	1	1.77	10	2/0	4.1	10	2/0	4.1	2.1
R8	1	1.77	6	300	25	4	300	22	7.2

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[1] Maximum cable diameter accepted. For the bottom plate hole diameters, see the *Dimension drawings* chapter in the *ACH580-31 Drives Hardware manual*, publication number *3AXD50000037066*.
[2] Minimum wire size does not necessarily have enough current capability for full load. Make sure the installation complies with local codes and regulations.
Note: Only copper cables are allowed for drive types up to -039A-4.

Control cable terminal and lead-through data

Control cable entries, wire sizes and tightening torques (*T*) are given below.

Frame size	Cable entries		Control cable entries and terminal sizes			
	Holes	Max cable size	+24V, DCOM, DGND, EXT. 24V terminals		DI, AI/O, AGND, RO, STO terminals	
			Wire size	*T*	Wire size	*T*
	pcs	in	AWG	lbf·ft	AWG	lbf·ft
R3	3	0.67	24…14	0.4	26…14	0.4
R6	4	0.67	26…14	0.4	26…14	0.4
R8	4	0.67	26…14	0.4	26…14	0.4

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Current and power ratings

UL (NEC) ratings at U_N = 460 V

Type ACH580 -31-	Input rating	Max. current	App. power	Output ratings		Frame size
				Light-duty use		
	I_1	I_{max}	S_N	I_{Ld}	P_{Ld}	
	A	A	kVA	A	hp	
3-phase U_N = 480 V (440…480 V)						
07A6-4	7.0	9.5	6.3	7.6	5.0	R3
012A-4	9.0	15.0	10.0	12.0	7.5	R3
014A-4	12.0	20.4	11.6	14.0	10.0	R3
023A-4	17.0	28.8	19.1	23.0	15.0	R3
027A-4*	24	39.1	22.4	27	20.0	R6
034A-4*	29	45.9	28.3	34	25.0	R6
044A-4*	34	57.8	36.6	44	30.0	R6
052A-4*	44	74.8	43.2	52	40.0	R6
065A-4*	54	88.4	54.0	65	50.0	R6
077A-4*	66	110.5	64.0	77	60.0	R6

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Maximum recommended motor cable length

Frame Size	Maximum motor cable length, 4 kHz			
	Scalar control		Vector control	
	m	ft	m	ft
Standard drive, without external options				
R3	200	656	200	656
R6	300	990	300	990
R8	300	990	300	990

Heat dissipation and Air flow requirements

Type ACH580 -31-	Heat dissipation				Air flow		Noise	Frame size
	Main circuit at rated I_1 at I_2	Control circuit minimum	Control circuit maximum	Main and control boards maximum				
	W	W	W	W	m^3/h	ft^3/min	dB(A)	
NEC ratings: 3-phase U_N = 480 V (440…480 V)								
07A6-4	183	4.1	36	219	361	212	57	R3
012A-4	242	4.1	36	278	361	212	57	R3
014A-4	285	4.1	36	321	361	212	57	R3
023A-4	437	4.1	36	473	361	212	57	R3
027A-4	589	4.1	36	625	550	324	65	R6
034A-4	675	4.1	36	711	550	324	65	R6
044A-4	771	4.1	36	807	550	324	65	R6
052A-4	924	4.1	36	960	550	324	65	R6
065A-4	1187	4.1	36	1223	550	324	65	R6
077A-4	1524	4.1	36	1560	550	324	65	R6

3AXD00000586715

Definitions

U_N Output voltage of the drive.

I Continuous rms output current, allowing 110% overload for 1 minute every 10 minutes.

P Typical motor power valid at nominal voltage, 460V.

Fuses

UL class T fuses for branch circuit protection per NEC are listed below. ABB recommends fast acting class T or faster fuses for drives installed in North America. **Check on the fuse time-current curve to ensure the operating time of the fuse is below 0.5 seconds for frames R3 and R6 and below 0.1 seconds for frame R8. Comply with NFPA70 (NEC) and all local.**

Note 1: See also *Implementing thermal overload and short-circuit protection* in *ACH580-31 Hardware Manual* (*3AXD5000037066*).

Note 2: Fuses with higher current rating than the recommended ones must not be used.

Note 3: Fuses from other manufacturers can be used if they meet the ratings and the melting curve of the fuse does not exceed the melting curve of the fuse mentioned in the table.

Type ACH580 -01-	Input current	UL (one fuse per phase)			
		Nominal current	Voltage rating	Bussmann type	UL class
	A	A	V		
UL (NEC) ratings: 3-phase U_N = 480 V (440…480 V)					
07A6-4	7.0	15	600	JJS-15	T
012A-4	9.0	20	600	JJS-20	T
014A-4	12.0	25	600	JJS-25	T
023A-4	17.0	35	600	JJS-35	T
027A-4	24	40	600	JJS-40	T
034A-4	29	50	600	JJS-50	T
044A-4	34	60	600	JJS-60	T
052A-4	44	80	600	JJS-80	T
065A-4	54	90	600	JJS-90	T
077A-4	66	110	600	JJS-110	T

3AXD00000586715

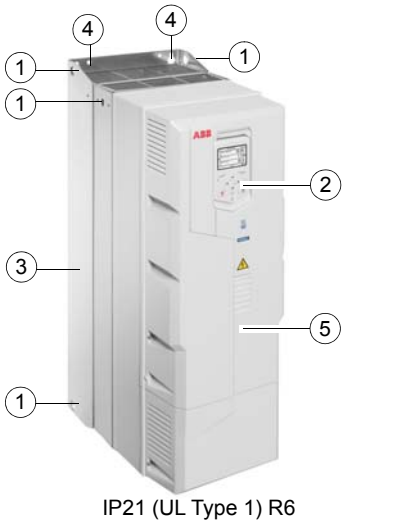
[1] Minimum short-circuit current of the installation

Note: The UL listed fuses in the table are the required branch circuit protection. Fuses are to be provided as part of the installation.

- Fuses are not included in the purchased drive and must be provided by others.
- Fuses with higher current rating than specified must not be used.
- Fuses with lower current rating than specified may be used if they are of the same class and voltage rating. It is the user's responsibility to verify that lower current rated fuses are compliant with local regulations and appropriate for the application.
- Drive fuses must be used to maintain the drive UL listing. Additional protection can be used. Refer to local codes and regulations.

Layout

The layout of the drive is shown below.



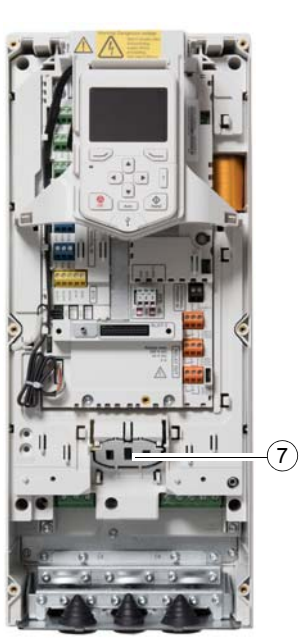
IP21 (UL Type 1) R6

IP55 (UL Type 12) option +B056, R6

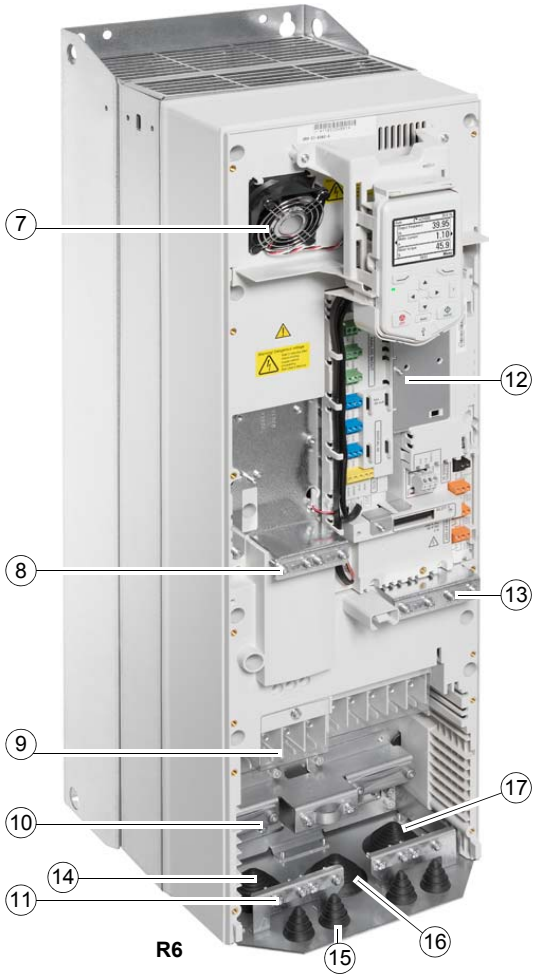
UL Type 12 R6

IP20 (UL Open Type) option +P940, R3

1	Lifting holes (2 pcs in frame R3, 6 pcs in frames R6 and R8)	5	Front cover
2	Control panel	6	Control panel behind the control panel cover
3	Heatsink	7	Hood in frames R6 and R8.
4	Mounting points (4 pieces)	-	-



R3

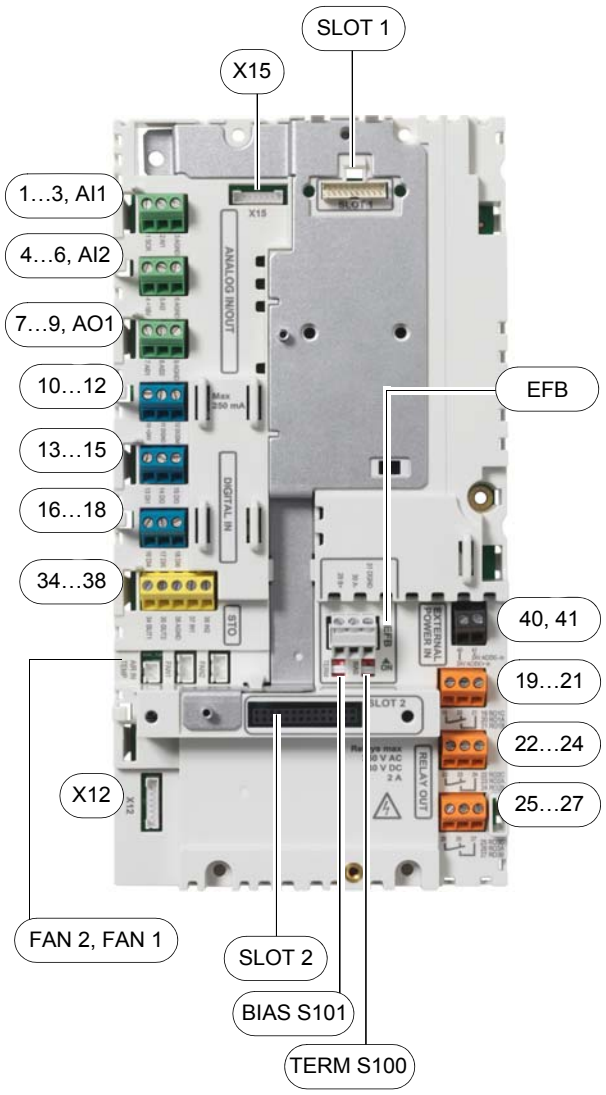


R6

7	Auxiliary cooling fan. For frame R3 in IP55 (UL Type 12 drives) only.	13	Clamps for securing the control cables mechanically
8	Clamps for securing the FSO wiring mechanically	14	Input power cable entry behind the 360-degree grounding clamps
9	Power cable connection terminals behind the shroud	15	Control cable entry (4pcs)
10	360-degree grounding clamps for power cable shields	16	DC cable entry
11	360-degree grounding clamps for control cable shields	17	Motor cable entry behind the 360-degree grounding clamps
12	Control unit with I/O cable connection terminals	-	-

The main cooling fan is at the top of the drive in frame R3 and at the bottom in frames R6 and R8.

The figure below shows the layout of the external control connection terminals of the drive.



SLOT 1	
Option slot 1 (fieldbus adapter modules)	
ANALOG IN/OUT	
1…3	Analog input 1
AI1	Current/Voltage selection switch for analog input 1
4…6	Analog input 2
AI2	Current/Voltage selection switch for analog input 2
7…9	Analog outputs
AO1	Current/Voltage selection switch for analog output 1

10…12	Auxiliary voltage output
DIGITAL IN	
13…18	Digital inputs
STO	
34…38	Safe torque off connection
FAN2	Internal fan 2 connection
FAN1	Internal fan 1 connection
X12	Panel port (control panel connection, wired at the factory to the control panel)
X15	Reserved to internal use.
EFB	
EIA/R5-485 fieldbus connector	
BIAS S101	Bias resistor switch
TERM S100	End termination switch
29…31	Connection terminals
SLOT 2	
Option slot 2 (I/O extension modules)	
40, 41	24 V AC/DC external power input
RO1 … R03	
19…21	Relay output 1 (RO1)
22…24	Relay output 2 (RO2)
25…27	Relay output 3 (RO3)

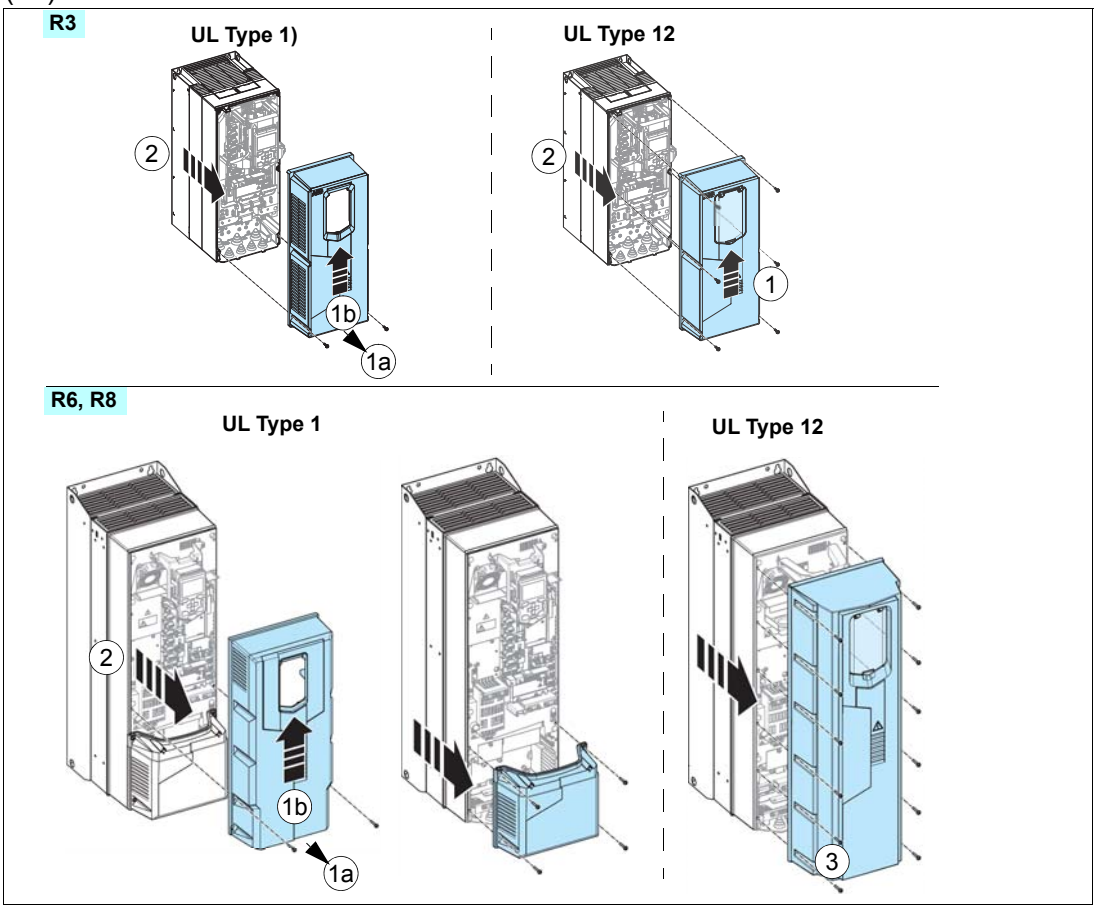
Control cable connection procedure

WARNING! Obey the instructions in chapter *Safety instructions* on page *2*. If you ignore them, injury or death, or damage to the equipment can occur.

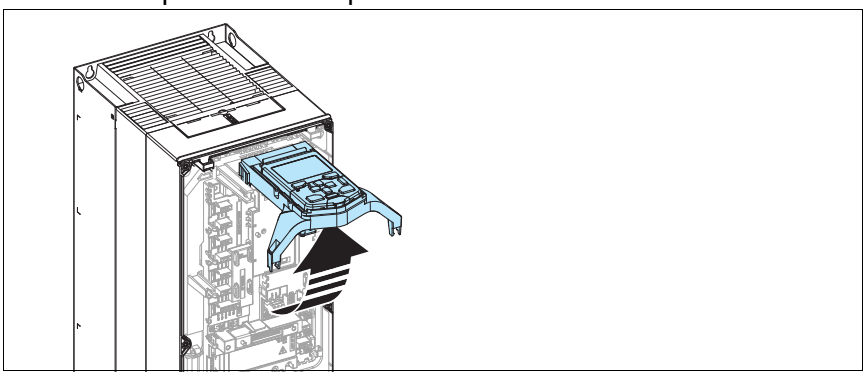
Stop the drive and do the steps in section *Precautions before electrical work* on page *3* before you start the work.

Remove the front cover(s) if not already removed. See page *29*.

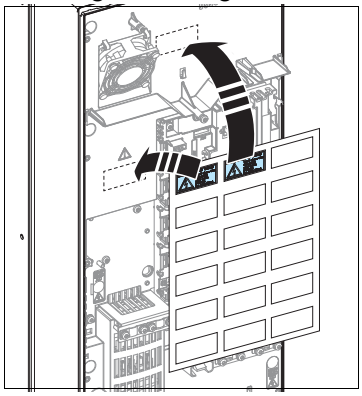
1. To remove the front cover, lift the cover from the bottom outwards (1a) and then up (1b).



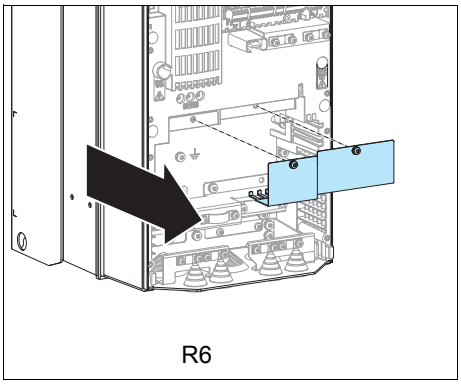
2. For frame R3, pull the control panel holder up.



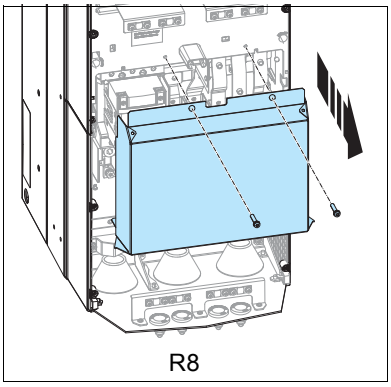
3. Attach the residual voltage warning sticker in the local language.



4. <u>For frames R6 and R8:</u> Remove the shroud on the power cable terminals,

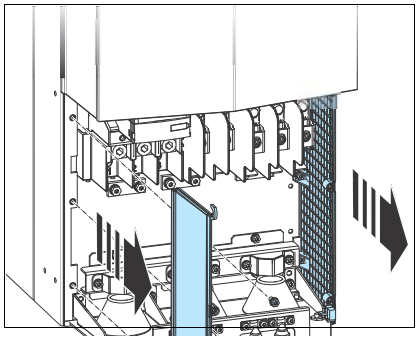


R6



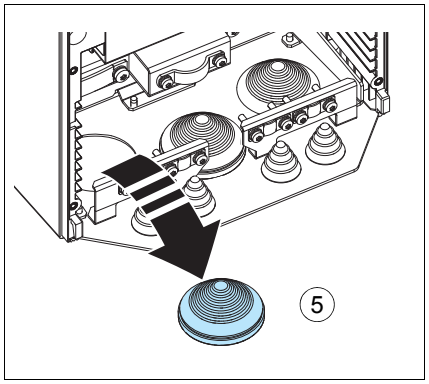
R8

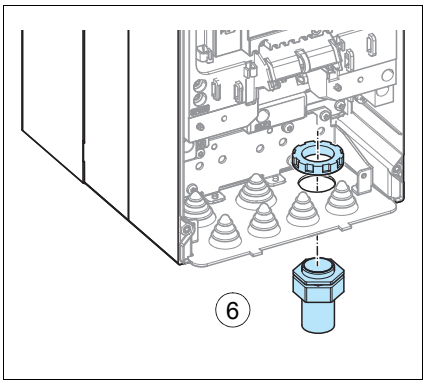
5. <u>For frame R8:</u> For easier installation, you can remove the side plates.



6. Remove the rubber grommets of the cables to be installed from the cable entry plate.

7. Attach the cable conduits to the bottom plate holes.





Cut an adequate hole into the rubber grommet and slide the grommet onto the cable. Slide the cable through a hole in the bottom plate and attach the grommet to the hole.

Route the cable as shown in the figures below.

Secure the cables inside the drive mechanically.

Ground the pair-cable shields and grounding wire at the grounding terminal (SCR) of the control unit.

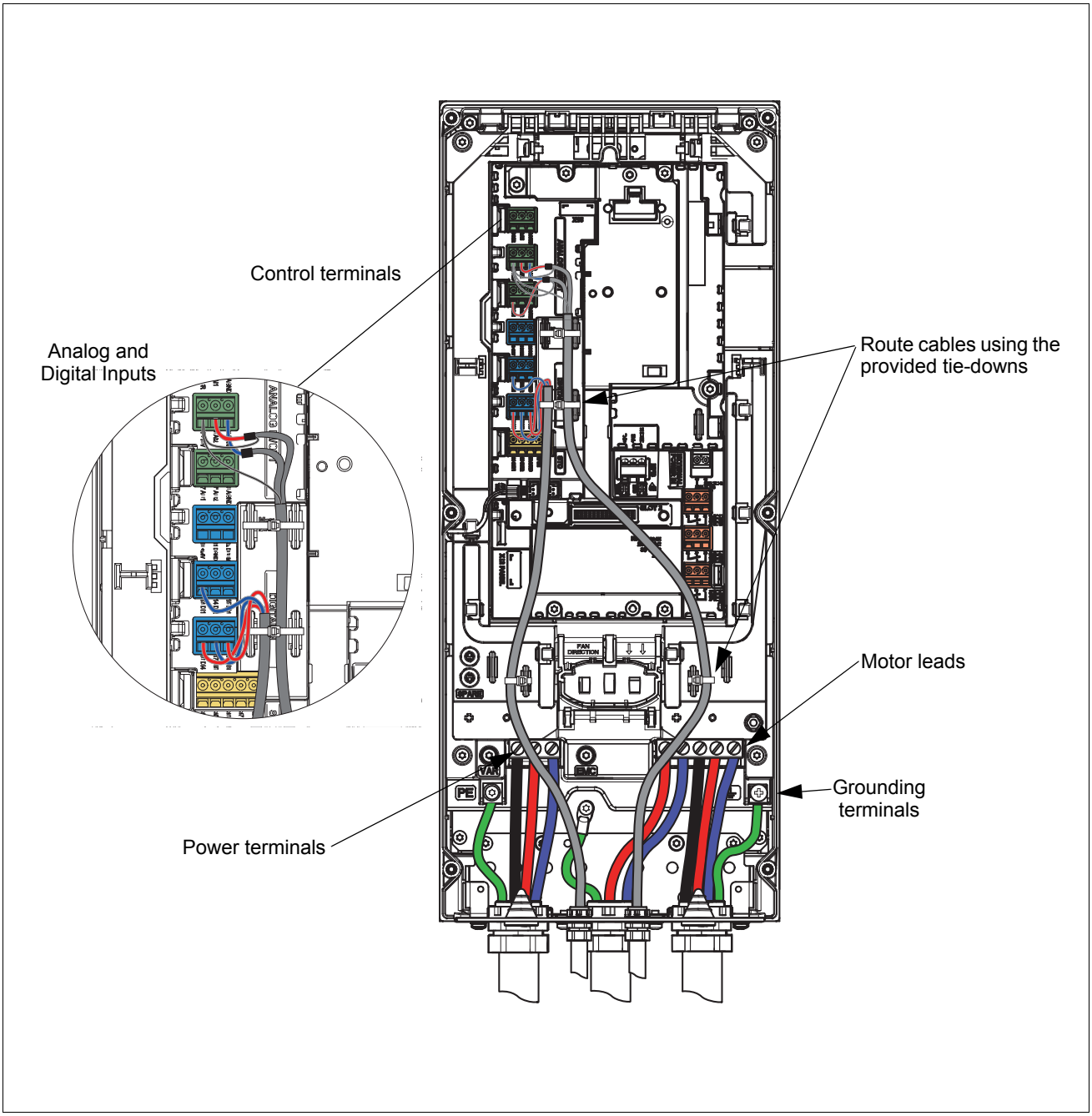
Connect the conductors to the appropriate terminals of the control unit (see page *31*-*32*) and tighten to 0.5…0.6 N·m (0.4 lbf·ft).

Note:

Leave the other ends of the control cable shields unconnected or ground them indirectly via a high-frequency capacitor with a few nanofarads, eg, 3.3 nF / 630 V. The shield can also be grounded directly at both ends if they are *in the same ground line* with no significant voltage drop between the end points.

Keep any signal wire pairs twisted as close to the terminals as possible. Twisting the wire with its return wire reduces disturbances caused by inductive coupling.

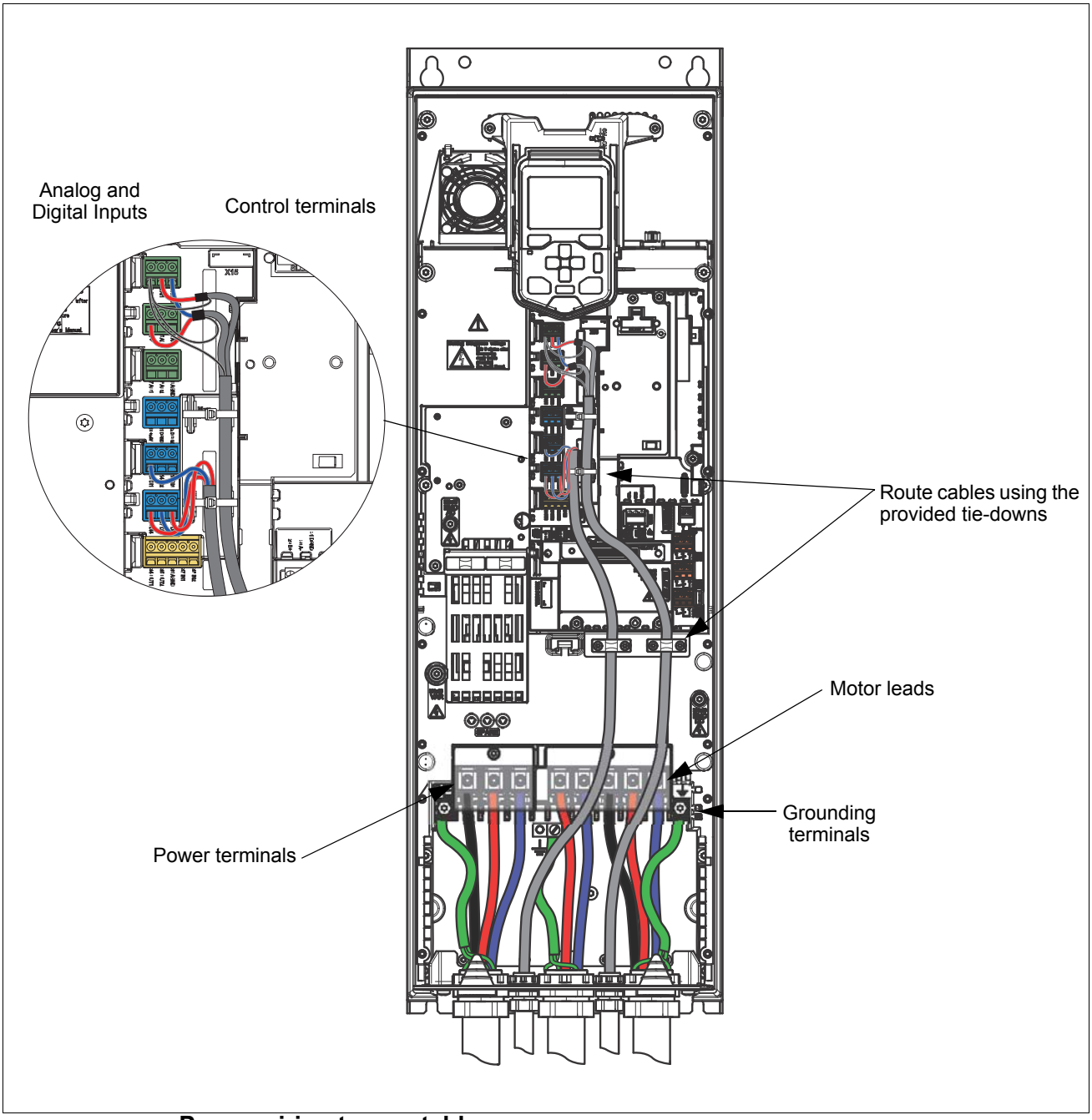
R3



Power wiring torque table

Frame size	R3	
	lb-ft	N•m
T1/U, T2/V, T3/W	2.6	3.5
L1, L2, L3	2.6	3.5
R+, R-	2.6	3.5
PE Ground	1.1	1.5

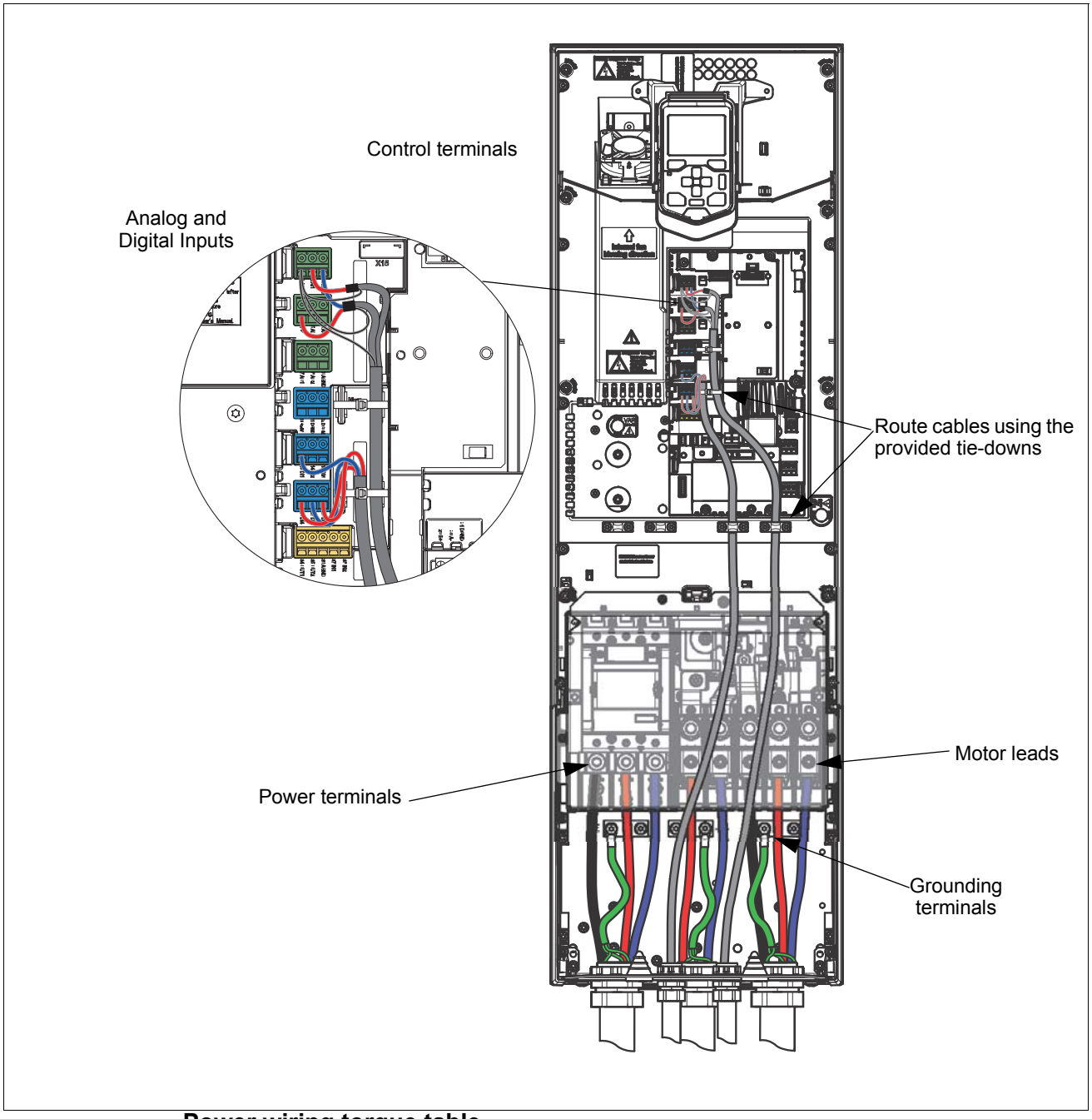
R6



Power wiring torque table

Frame size	R6	
	lb-ft	N•m
T1/U, T2/V, T3/W	22.1	30
L1, L2, L3	22.1	30
UDC+ and UDC-	22.1	30
PE Ground	7.2	9.8

R8



Power wiring torque table

Frame size	R8	
	lb-ft	N•m
T1/U, T2/V, T3/W	29.6	40
L1, L2, L3	29.6	40
UDC+ and UDC-	29.5	40
PE Ground	7.2	9.8

Wiring

Note: These are instructions for conduit wiring. For cable wiring, see the *ACH580 Hardware manual,* publication number *3AXD50000044839.*

Note: In US deliveries, options are already installed at the factory. If installing on site, see the appropriate option module manual for specific installation and wiring.

---

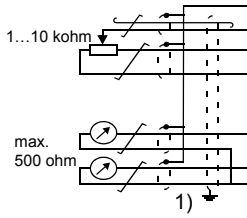
1. Install thin-wall conduit clamps for IP21/UL Type 1 or liquid-tight conduit connectors for IP55/UL Type 12 (not supplied). Type 12 has a Pressfit gasket.
2. Connect conduit runs for input power, motor and control cables to the conduit box. Ensure grommets (pointing down) are inserted into all unused holes.
3. Route the input power and motor wiring through separate conduits.
4. Strip wires.
5. Connect the motor and ground wires to the drive terminal. Tighten the screws to torques shown in the Power wiring torque table.

Note: If you connect only one conductor to the connector, we recommend that you put it under the upper pressure plate.

---

6. Connect the input power and ground wires to the drive terminal. Tighten the screws to torques shown in the Power wiring torque table.
7. If parallel cables are used, install the parallel power cables.
8. Reinstall the shroud on the power terminals and the conduit box side plates.
9. Route the control cables through the conduit (not the same conduit as either input power or motor wiring).
10. Strip the control cable sheathing and twist the copper shield into a pig-tail.
11. Refer to pages *31*. Connect the ground shield pig-tail for digital and analog I/O cables. (Ground only at drive end.)
12. Connect the ground shield pig-tail for Embedded fieldbus, EFB (EIA-485) cables at X5. (Ground only at drive end.)
13. Strip and connect the individual control wires to the drive terminals. Tighten the screws to torque table specifications on page *31*.

Default control connections for the HVAC default

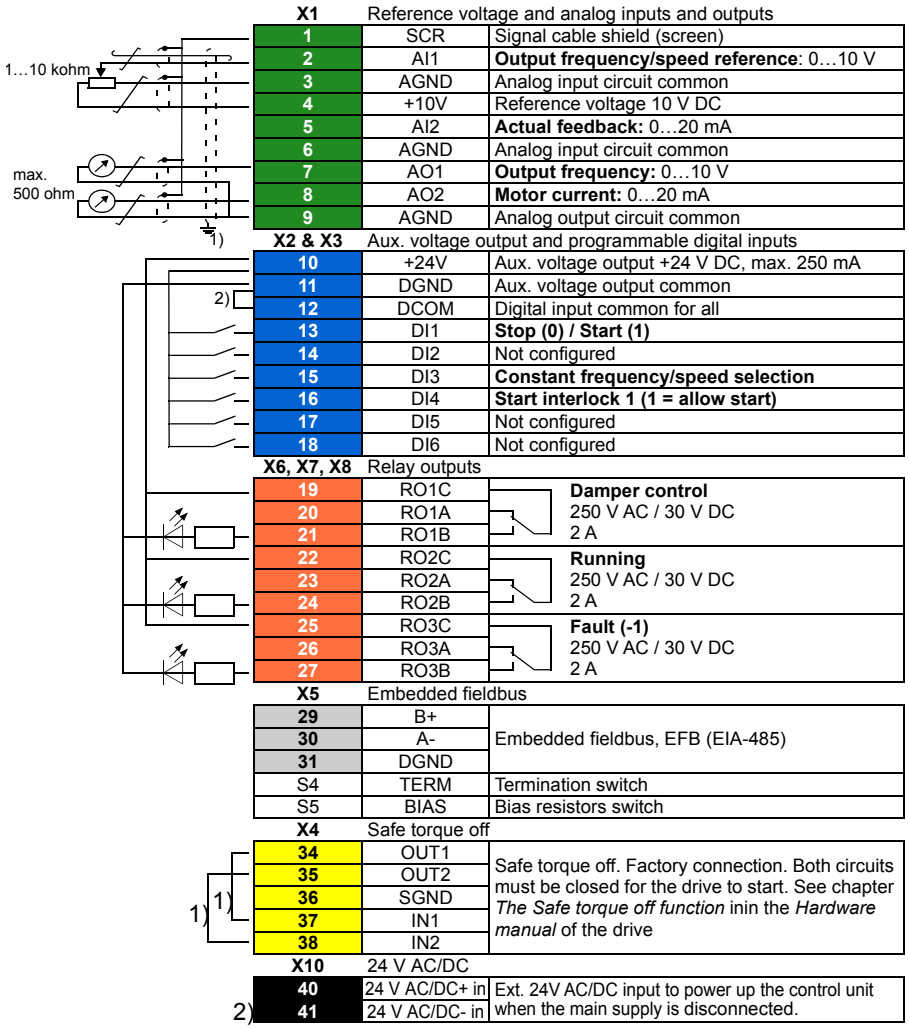


	X1	Reference voltage and analog inputs and outputs	
	1	SCR	Signal cable shield (screen)
	2	AI1	**Output frequency/speed reference**: 0…10 V[1)]
	3	AGND	Analog input circuit common
	4	+10V	Reference voltage 10 V DC
	5	AI2	**Actual feedback:** 0…10 V[1)]
	6	AGND	Analog input circuit common
	7	AO1	**Output 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	
2)	10	+24V	Aux. voltage output +24 V DC, max. 250 mA[2)]
	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**[3)]
	16	DI4	**Start interlock 1 (1 = allow start)**
	17	DI5	Not configured
	18	DI6	Not configured
	X6, X7, X8	Relay outputs	
	19	RO1C	**Damper control** 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	
2)	34	OUT1	Safe torque off. Factory connection. Both circuits must be closed for the drive to start. See chapter *The Safe torque off function* on page *295*.
	35	OUT2	
	36	SGND	
	37	IN1	
	38	IN2	
	X10	24 V AC/DC	
3)	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	

Notes:
1) Ground the outer shield of the cable 360 degrees under the grounding clamp on the grounding shelf for the control cables.
2) Connected with jumpers at the factory
3) Terminals 40 and 41 for external 24 V AC/DC input.
Terminal sizes:
R3: 24...14 AWG (0.2...2.5mm^2): Terminals +24V, DGND, DCOM, B+, A-, DGND, Ext. 24V
26...16 AWG (0.14...2.5mm^2): Terminals DI, AI, AO, AGND, RO, STO
R6...R8: 26...14 AWG (0.14...2.5mm^2) (all terminals)
Tightening torques: 0.4 lb-ft (0.5...0.6 Nm)

HVAC default direct I/O control	
Input Signals	*Output signals*
• Analog frequency/speed reference (AI1)	• Analog output AO1: Output frequency
• Start/stop selection (DI1)	• Analog output AO2: Motor current
• Constant speed/frequency selection (DI3)	• Relay output 1: Damper control
• Start interlock 1 (DI4)	• Relay output 2: Running
	• Relay output 3: Fault (-1)

Default control connections for the PID control, single motor



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…20 mA
6		AGND	Analog input circuit common
7		AO1	**Output frequency:** 0…10 V
8		AO2	**Motor 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	**Start interlock 1 (1 = allow start)**
17		DI5	Not configured
18		DI6	Not configured
X6, X7, X8		Relay outputs	
19		RO1C	**Damper control** 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* inin the *Hardware manual* of the drive
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	

Notes:
1) Connected with jumpers at the factory
2) Terminals 40 and 41 for external 24 V AC/DC input.

Terminal sizes:
R3: 24...14 AWG (0.2...2.5mm^2): Terminals +24V, DGND, DCOM, B+, A-, DGND, Ext. 24V
26...16 AWG (0.14...1.5mm^2): Terminals DI, AI, AO, AGND, RO, STO
R6...R8: 26...14 AWG (0.14...2.5mm^2) (all terminals)
Tightening torques: 0.4 lb-ft (0.5...0.6 Nm)

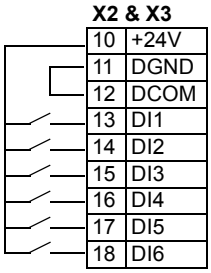
PID control, single motor	
Input signals	*Output signals*
• Setpoint selected from: control panel setpoint/constant setpoint /analog input (AI1)	• Analog output AO1: Output frequency
• PID feedback (AI2)	• Analog output AO2: Motor current
• Start/stop selection (DI1)	• Relay output 1: Damper control
• Constant speed/frequency selection (DI3)	• Relay output 2: Running
• Start interlock 1 (DI4)	• Relay output 3: Fault (-1)

Digital inputs; source and sink wiring

You can wire the digital input terminals for internal or external power supply in either a PNP or NPN configuration.

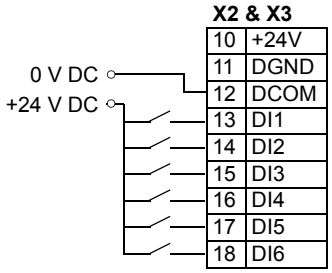
Internal +24 V power supply

PNP connection (source)



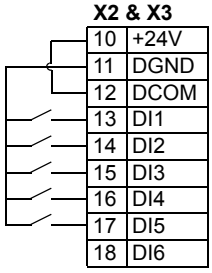
External +24 V power supply

PNP connection (source)



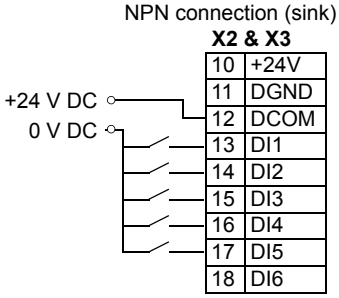
Internal +24 V power supply

NPN connection (sink)



External +24 V power supply

NPN connection (sink)



Note: DI6 is not supported in the NPN configuration.

WARNING! Do not connect the +24 V AC cable to the control board ground when the control board is powered using an external 24 V AC supply.

Communications

Terminals 29...31 provide Embedded fieldbus, EFB (EIA-485) connections used to control or monitor the drive from a fieldbus controller.

Switches

Switch	Description	Position	
S4 (TERM)	EFB link termination. Must be set to the terminated (ON) position when the drive is the first or last unit on the link.	ON TERM	Bus not terminated (**default**)
		ON TERM	Bus terminated

Switch	Description	Position	
S5 (BIAS)	Switches on the biasing voltages to the bus. One (and only one) device, preferably at the end of the bus must have the bias on.		Bias off (**default**)
			Bias on

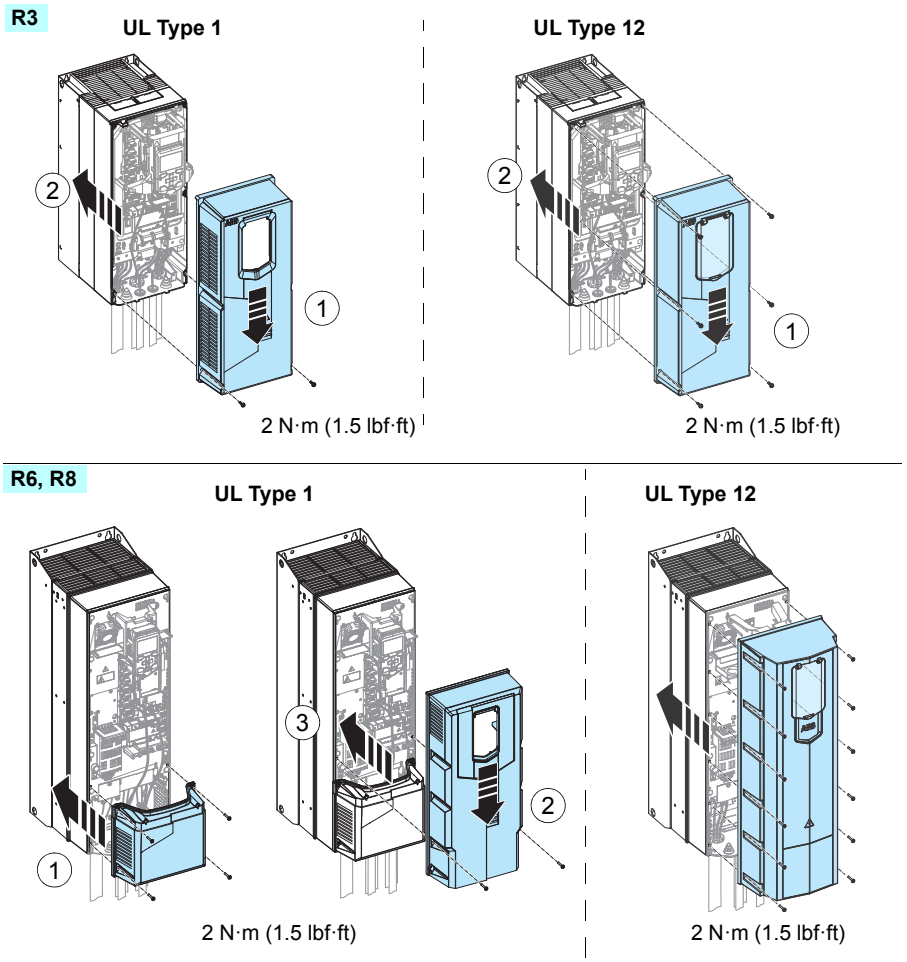
5. Check installation

Before applying power, perform the following checks.

☑	**Check that …**
☐	The ambient operating conditions meet the specification.
☐	If the drive will be connected to a corner-grounded TN system: The internal EMC filter is disconnected. (No metal screws.)
☐	If the drive will be connected to an IT (ungrounded) system: The internal EMC filter and the ground-to-phase varistor is disconnected. (No metal screws.)
☐	If the drive has not been powered (either in storage or unused) over one year: The electrolytic DC capacitors in the DC link of the drive have been reformed.
☐	There is an adequately sized protective earth (ground) conductor between the drive and the switchboard.
☐	There is an adequately sized protective earth (ground) conductor between the motor and the drive.
☐	All protective earth (ground) conductors have been connected to the appropriate terminals and the terminals have been tightened.
☐	The supply voltage matches the nominal input voltage of the drive. Check the type designation label.
☐	The input power cable has been connected to appropriate terminals, and the terminals have been properly tightened.
☐	Appropriate supply fuses and disconnector have been installed.
☐	The motor cable has been connected to appropriate terminals and the terminals have been tightened.
☐	The brake resistor cable (if present) has been connected to appropriate terminals, and the terminals have been tightened.
☐	The motor cable (and brake resistor cable, if present) have been properly wired through conduits.
☐	The control cables (if any) have been connected to the control board.
☐	There are no tools, foreign objects or dust from drilling inside the drive.
☐	Drive and motor connection box covers are in place.
☐	The motor and the driven equipment are ready for start-up.

6. Re-install cover(s)

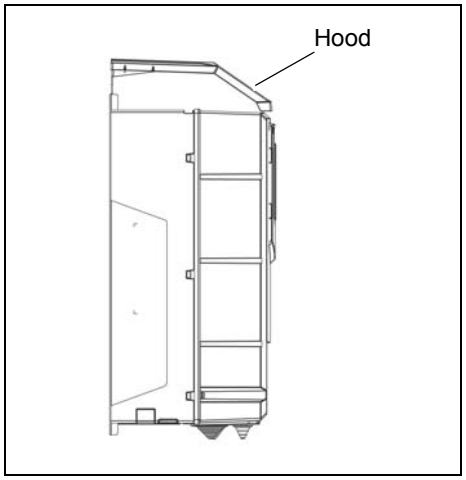
After installation, reinstall the covers.



7. Install hood, if applicable

IP 55/UL Type 12, Frame R1...R9

Install the hood by following the instructions provided with the hood kit.



8. Before Start-up

Prepare for start-up by reviewing the following information. The First start assistant walks you through the initial start-up procedure.

Motor data

The motor data on the ratings plate may differ from the defaults in the ACH580 Ultra-Low Harmonic Drives. The drive provides more precise control and better thermal protection if you enter the rating plate data.

Before start-up, gather the following from the motor ratings plate:

- Nominal motor current
- Nominal speed
- Voltage
- Nominal frequency
- Nominal power

Default configurations

After initial start-up, you will need to complete the commissioning. This will determine how the drive is controlled, let you make use of default configurations, and allow you to change specific parameters. See *2. Complete commissioning on page 42*.

The ACH580 Ultra-Low Harmonic Drives can be controlled by two default configurations.

HVAC default direct I/O control – Used for typical I/O controlled BMS applications.

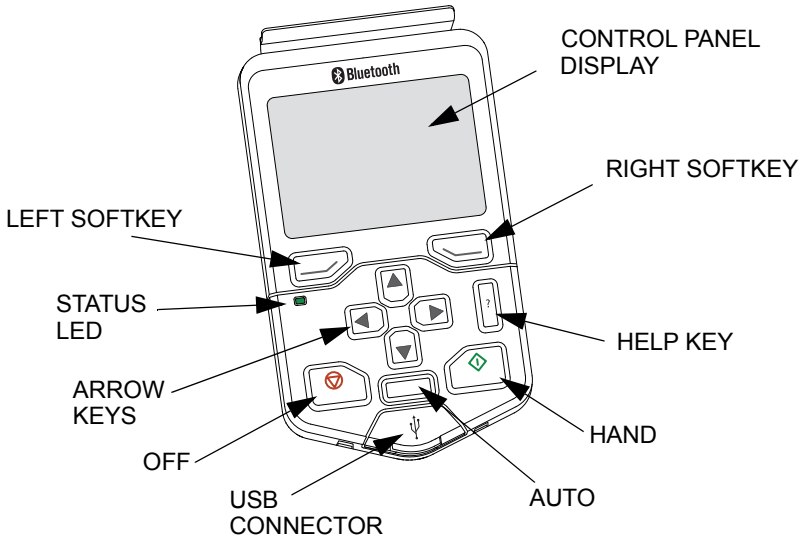
- In the Auto mode, this configuration uses a direct speed reference connected to analog input 1 (AI1).
- In the Hand/Off mode, the speed reference and start command are given through the control panel (operator keypad).
- See the *Default control connections for the HVAC default on page 31*.

PID control, single motor – Offers quick setup of PID control for keeping flow or pressure constant, requiring feedback from the process given by a feedback signal connected to analog input 2 (AI2).

- You can set a constant setpoint, or, in the Auto mode, you can specify the setpoint to come from analog input 1 (AI1) or from the control panel.
- In the Hand/Off mode, the speed reference and start command come from the control panel.
- In the Hand mode, the speed reference is the direct speed reference and a PID setpoint value.
- See the *Default control connections for the PID control, single motor on page 32*.

Operation

The ACH580 Ultra-Low Harmonic Drives HVAC control panel features:



Control panel features

Left softkey

The left softkey ( ) is usually used for exiting and canceling. Its function in a given situation is shown by the softkey selection in the bottom left corner of the display.

Holding down exits each view in turn until you are back in the Home view. This function does not work in special screens.

Right softkey

The right softkey ( ) is usually used for selecting, accepting and confirming. The function of the right softkey in a given situation is shown by the softkey selection in the bottom right corner of the display.

The arrow keys

The up and down arrow keys (and) are used to highlight selections in menus and selection lists, to scroll up and down on text pages, and to adjust values when, for example, setting the time, entering a passcode or changing a parameter value.

The left and right arrow keys (and) are used to move the cursor left and right in parameter editing and to move forward and backward in assistants. In menus, and function the same way as and , respectively.

Help

The help key ( ) opens a help page. The help page is context-sensitive, in other words, the content of the page is relevant to the menu or view in question.

Hand, Off and Auto

The ACH580 Ultra-Low Harmonic Drives can be in local or external control. The local control has two modes: Hand and Off.

Hand key ( ):

- In local control / Off mode: Starts the drive. The drive will switch to the Hand mode.
- In external control: Switches the drive to local control / Hand mode, keeping it running.

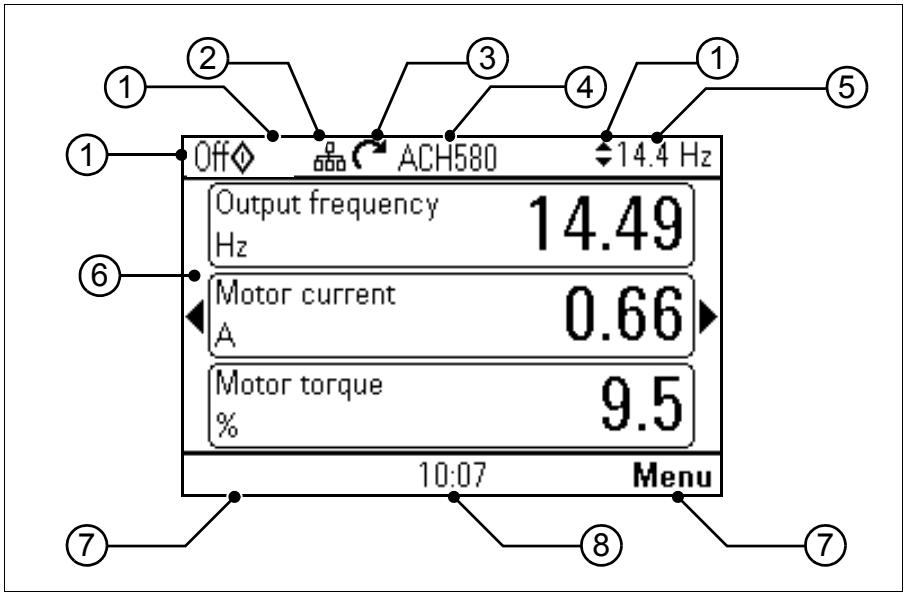
Off key ( ):

- Stops the drive and switches to the Off mode.

Auto key (Auto):

- In local control: The drive will switch to external control.

Control panel display



1. Control location and related icons
2. Panel bus
3. Status icon
4. Drive name
5. Reference value
6. Content area
7. Softkey selections
8. Clock

Note: Complete programming information is available in the *ACH580 HVAC Control Firmware manual*, publication number *3AXD50000027537*.

For initial start-up, follow steps 1 through 4 below.

WARNING! Do not start up the drive unless you are a qualified electrical professional.

Read and obey the instructions in chapter Safety instructions at the beginning of the manual. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

WARNING! Verify there is no active start command on drive terminal DI1 on power up, as this is default run command.

Check that the starting of the motor does not cause any danger.

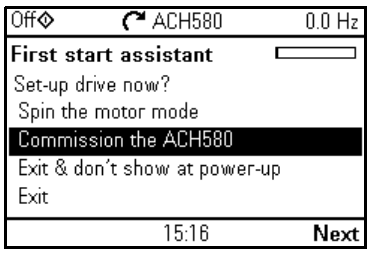
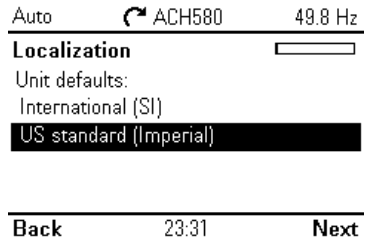
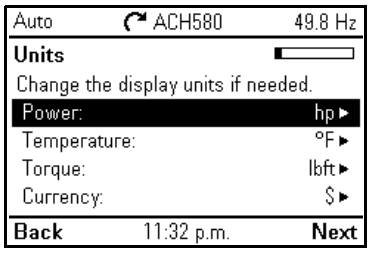
De-couple the driven machine if

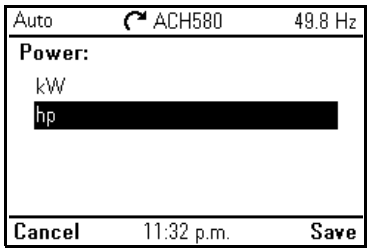
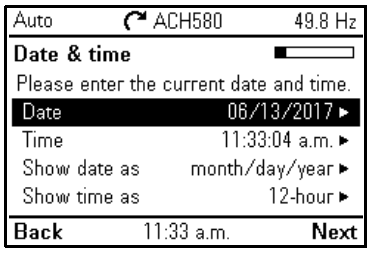
- there is a risk of damage in case of an incorrect direction of rotation, or
- a **Normal** ID run is required during the drive start-up, when the load torque is higher than 20% or the machinery is not able to withstand the nominal torque transient during the ID run.

Note: For additional E-Clipse bypass primary settings information please go to page 97.

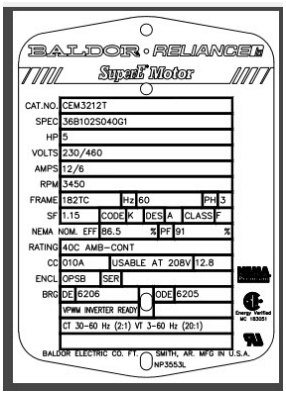
1. Make *First start assistant*-guided settings: Language, motor nominal values, and date and time

1	Have the motor name plate data at hand. Power up the drive.	
2	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. English is pre-loaded. To change the control panel, select the language you want to use by highlighting it and pressing (**OK**). **Note:** After you have selected the language, it takes a few minutes to download the language file to the control panel.	

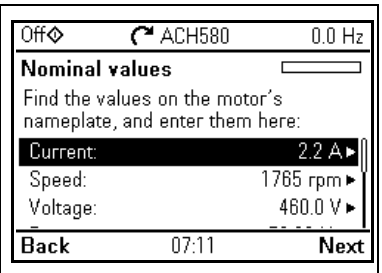
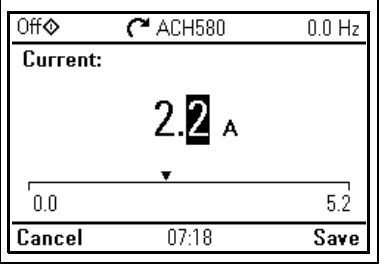
3	Select the supply voltage with parameter *95.01 Supply Voltage*: • In the First start assistant menu, select Exit and press (**Next**). • In the Home view, press **(Menu)** to enter the Main menu. • In the Main menu, go to **Parameters > Complete list > 95 HW configuration** by selecting the correct row and pressing **(Select)** repeatedly. • Select parameter *95.01 Supply voltage* and press **(Edit)**. • Select supply voltage **380…415 V** or **440…480 V** and press **(Save)**. • Go back to the Main menu by pressing **(Back)** repeatedly. • In the Main menu, select **First start assistant** and press **(Select)** to enter the First start assistant menu. • Continue with the following steps for commissioning the ACH580.	
4	Select **Commission the ACH580** and press (**Next**).	
5	Select the localization you want to use and press (**Next**).	
6	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**).	

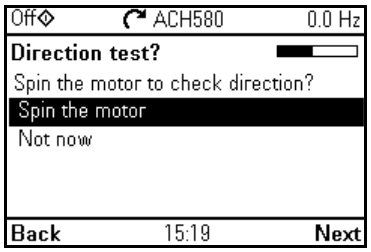
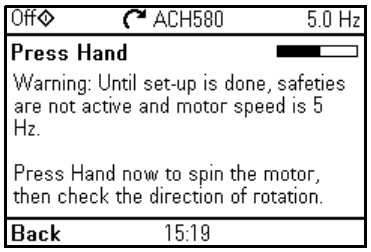
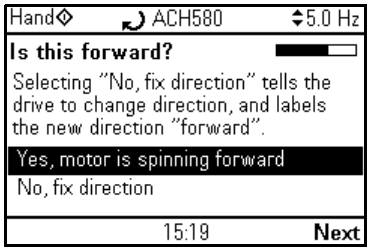
7	To select a value in an edit view: Use ▲ and ▼ to select the value. Press ◁ (**Save**) to accept the new setting, or press ▷ (**Cancel**) to go back to the previous view without making changes.	
8	Set the date and time as well as date and time display formats. Go to the edit view of a selected row by pressing ▶. Scroll the view with ▲ and ▼. Go to the next view by pressing ◁ (**Next**).	

Note: Enter the following values exactly as shown on the motor nameplate.



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

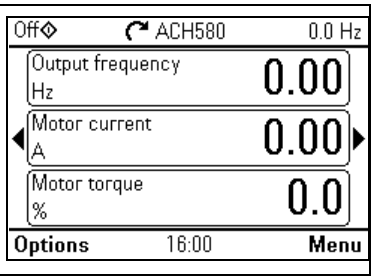
9	Check that the motor data is correct. Values are predefined on the basis of the drive size but you should verify that they correspond to the motor. Start with the motor type. Go to the edit view of a selected row by pressing ▶. Scroll the view with ▲ and ▼. Motor nominal cos Φ and nominal torque are optional. Press ◁ (**Next**) to continue.	
10	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.	

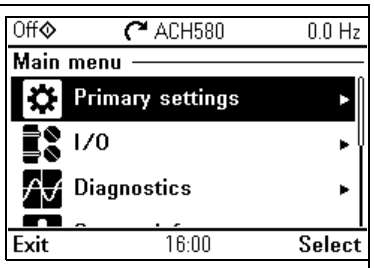
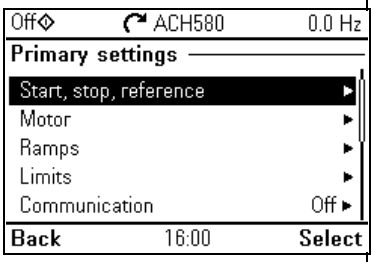
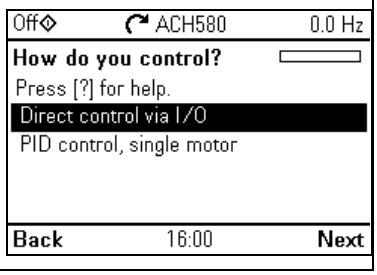
11	This step is optional, and requires rotating the motor. Do not do this if it could cause any risk, or if the mechanical setup does not allow it. To do the direction test, select **Spin the motor** and press (**Next**).	
12	Press the Hand key on the panel to start the drive.	
13	Check the direction 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.	
14	The first start is now complete and the drive is ready for use. Press (**Done**) to enter the Home view.	

2. Complete commissioning

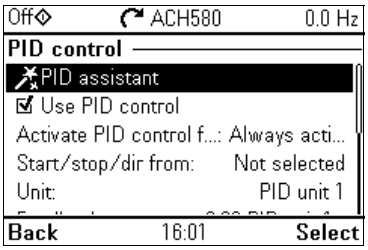
Default configurations — HVAC and PID Control

For more information on Default configurations, see pages *31*, *32* and *36*.

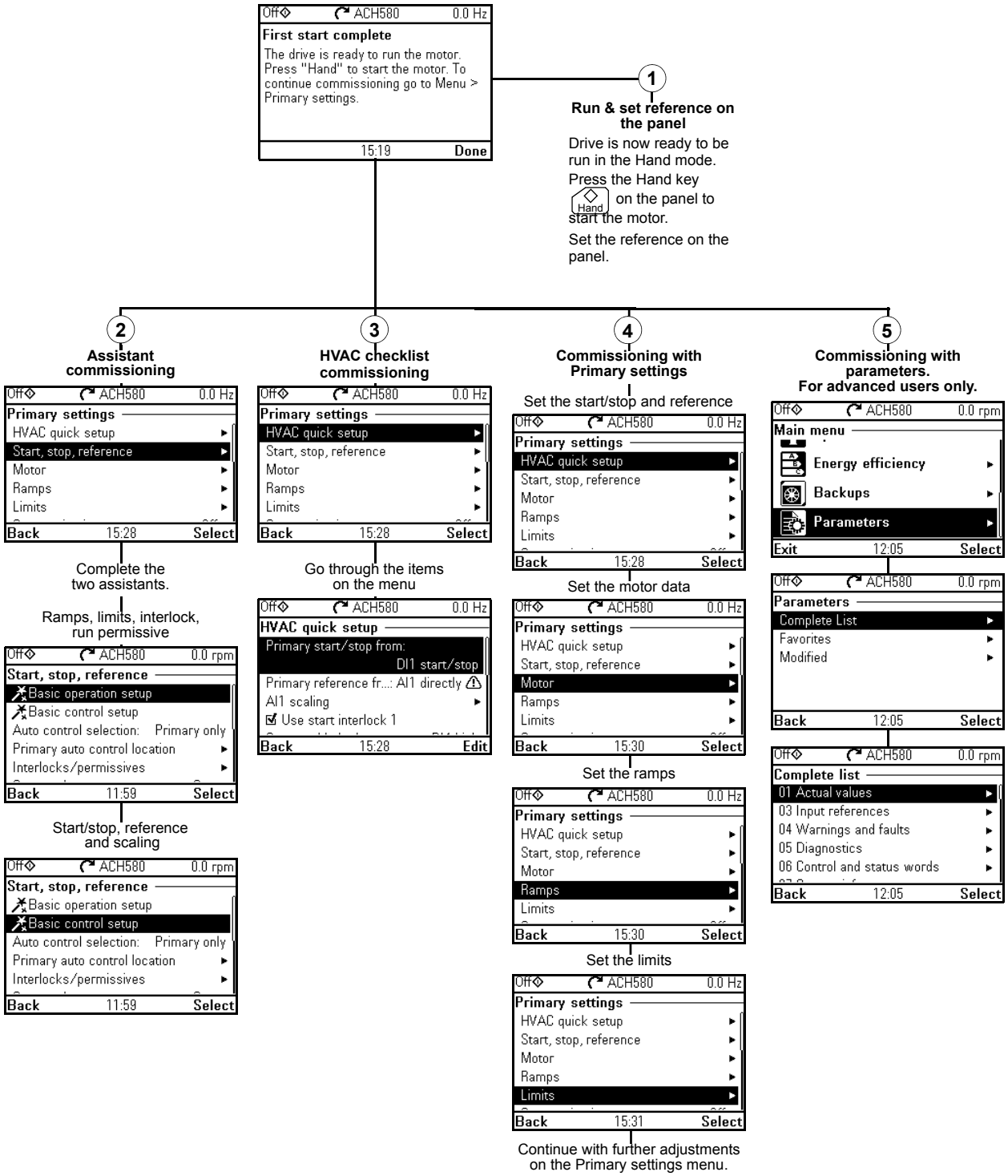
1	Press the Hand key to start the motor. The Home view is shown on the panel. Select **Menu** (press on the soft key under “Menu”).	

2	From the Main menu, select **Primary settings**.	
3	Select **Start, stop, reference** and **How do you control?**	
4	The default configurations are shown on the panel. For HVAC, press **Direct control via I/O**. For PID Control, press **PID control, single motor**.	

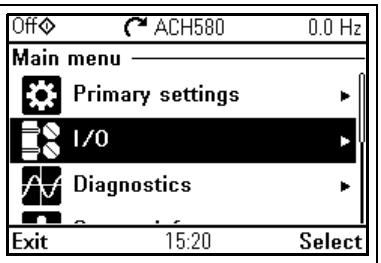
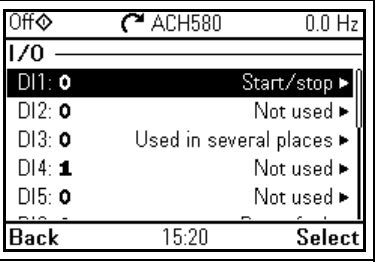
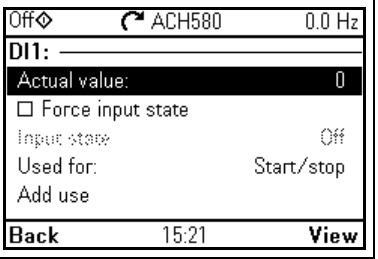
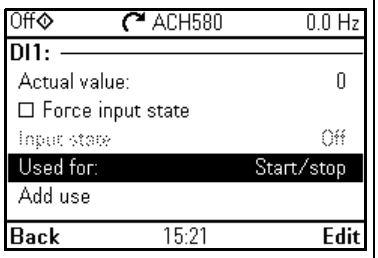
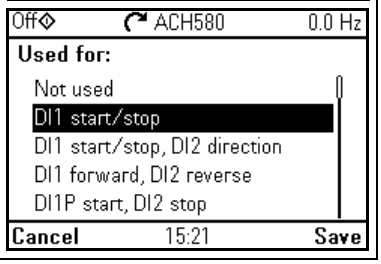
Note: You can adjust Process PI(D) in the PID control submenu of the Primary Settings menu after you have commissioned the drive to use PID control.



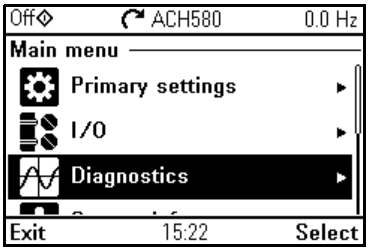
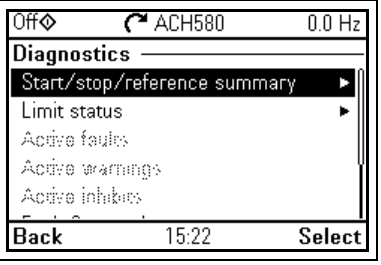
Other ways to complete commissioning



3. Make additional settings in the Primary settings menu – I/O menu

1	After the additional adjustments, make sure that the actual I/O wiring matches the I/O use in the control program. In the **Main** menu, select a **I/O** and press (**Select**) to enter the **I/O** menu.	
2	Select the connection you want to check and press (**Select**) (or ▶).	
3	To view the details of a parameter that cannot be adjusted via the **I/O** menu, press (**View**).	
4	To adjust the value of a parameter, press (**Edit**), adjust the value using ▲, ▼, ◀ and ▶ keys and press (**Save**). Note that the actual wiring must match the new value. Go back to the **Main** menu by pressing (**Back**) repeatedly.	 

4. Check setup with the Diagnostics menu

1	After making the additional adjustments and checking the I/O connections, use the **Diagnostics** menu to make sure that the setup is functioning correctly. In the **Main** menu, select **Diagnostics** and press (**Select**) (or ▶).	
2	Select the diagnostics item you want to view and press (**Select**). Return to the **Diagnostics** menu by pressing (**Back**).	

How to control the drive through the I/O interface

Instructions below are for operating the drive through the digital and analog inputs when:

- the motor start-up is performed, and
- the default parameter settings of the HVAC default configurations are in use.

Preliminary settings

If you need to change the direction of rotation, check that limits allow reverse direction. Check parameter group *30 Limits* and make sure that the minimum limit has a negative value and the maximum limit has a positive value.

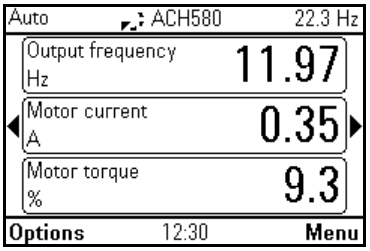
Note: Default settings only allow forward direction.

---

1. Make sure that the control connections are wired according to the connection diagram given for the HVAC default. See section *Default control connections for the HVAC default on page 31*.
2. Make sure that the drive is in external control. To switch to external control, press key Auto. In external control, the panel display shows text **Auto** at the top left.

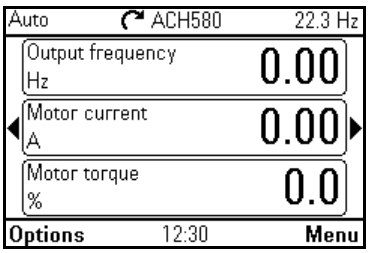
Starting and controlling the speed of the motor

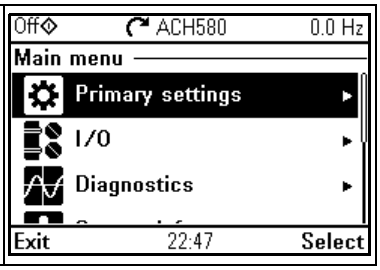
1. Start by switching digital input DI1 on. The arrow starts rotating. It is dotted until the setpoint is reached.
2. Regulate the drive output frequency (motor speed) by adjusting voltage of analog input AI1.

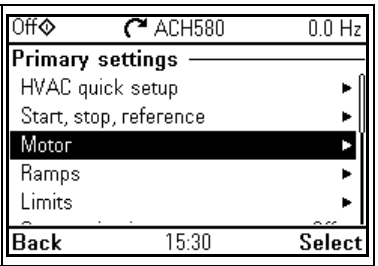
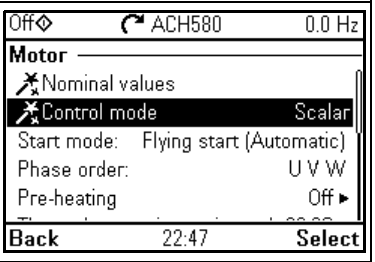
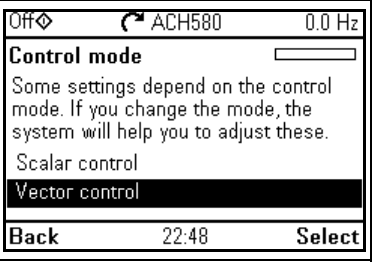
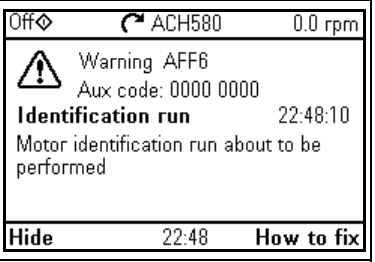
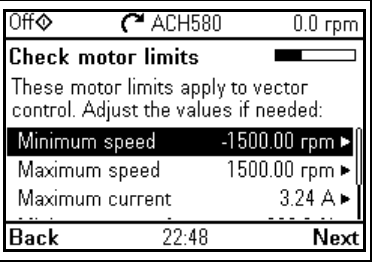
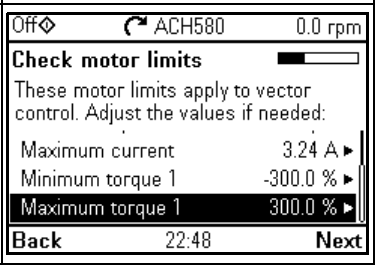


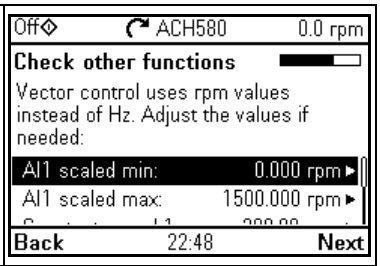
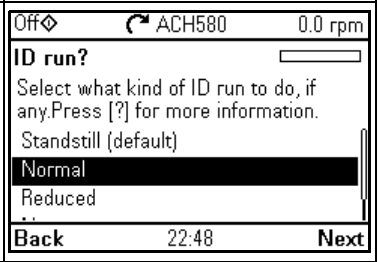
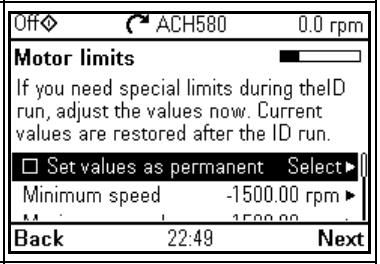
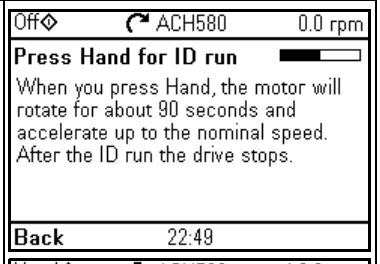
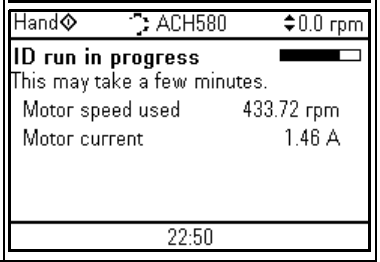
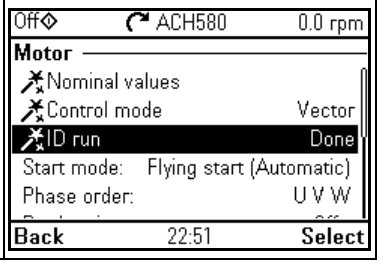
Stopping the motor

1. Switch digital input DI1 off. The arrow stops rotating.



1	Go to the **Main** menu by pressing (**Menu**) in the Home view. Select **Primary settings** and press (**Select**) (or).	

2	Select **Motor** and press (**Select**) (or ▶).	
3	If the control modes is scalar, select **Control mode** and press (**Select**) (or ▶) and continue to the next step.	
4	Select **Vector control** and press (**Select**) (or ▶).	
5	Warning message **Identification run** is shown for a moment.	
6	Check the motor speed limits. The following must be true: Minimum speed ≤ 0 rpm Maximum speed = motor rated speed.	
7	Check the motor current as well as torque limits. The following must be true: Maximum current > I_{HD} Maximum torque > 50%.	

8	Check AI1 scaling, see parameters *12.19 AI1 scaled at AI1 min* and *12.20 AI1 scaled at AI1 max*.	
9	Select the type of ID run you want to do and press (**Select**) (or).	
10	Check the motor limits shown on the panel. If you need other limits during the ID run you can enter them here. The originals limits will be restored after the ID run, unless you select **Set values as permanent**.	
11	Press the Hand key ( ) to start the ID run. In general, it is recommended not to press any control panel keys during the ID run. However, you can stop the ID run at any time by pressing the Off key ( ). During the ID run a progress view is shown. After the ID run is completed, text **ID run done** is shown. The LED stops blinking. If the ID run fails, fault *FF61 ID run* is shown.	 
12	After the ID run is completed, text **Done** is shown on row **ID run**.	

Diagnostics

Warning Messages

Note: The list also contains events that only appear in the Event log.

Code (hex)	Warning / Aux. code	Cause	What to do
64FF	Fault reset	A fault has been reset from the panel, Drive composer PC tool, fieldbus or I/O.	Event. Informative only.
A2B1	Overcurrent	Output current has exceeded internal fault limit. In addition to an actual overcurrent situation, this warning may also be caused by an earth fault or supply phase loss.	Check motor load. Check acceleration times in parameter group *23 Speed reference ramp* (speed control) or *28 Frequency reference chain* (frequency control). Also check parameters *46.01 Speed scaling*, *46.02 Frequency scaling* and *46.03 Torque scaling*. Check motor and motor cable (including phasing and delta/star connection). Check for an earth fault in motor or motor cables by measuring the insulation resistances of motor and motor cable. See chapter *Electrical installation*, section *Checking the insulation of the assembly* in the *Hardware manual* of the drive. Check there are no contactors opening and closing in motor cable. Check that the start-up data in parameter group *99 Motor data* corresponds to the motor rating plate. Check that there are no power factor correction capacitors or surge absorbers in motor cable.
A2B3	Earth leakage	Drive has detected load unbalance typically due to earth fault in motor or motor cable.	Check there are no power factor correction capacitors or surge absorbers in motor cable. Check for an earth fault in motor or motor cables by measuring the insulation resistances of motor and motor cable. See chapter *Electrical installation*, section *Checking the insulation of the assembly* in the *Hardware manual* of the drive. If an earth fault is found, fix or change the motor cable and/or motor. If no earth fault can be detected, contact your local ABB representative.

Code (hex)	Warning / Aux. code	Cause	What to do
A2B4	Short circuit	Short-circuit in motor cable(s) or motor.	Check motor and motor cable for cabling errors. Check motor and motor cable (including phasing and delta/star connection). Check for an earth fault in motor or motor cables by measuring the insulation resistances of motor and motor cable. See *Checking the insulation of the assembly on page 18*. Check there are no power factor correction capacitors or surge absorbers in motor cable.
A2BA	IGBT overload	Excessive IGBT junction to case temperature. This warning protects the IGBT(s) and can be activated by a short circuit in the motor cable.	Check motor cable. Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
A3A1	DC link overvoltage	Intermediate circuit DC voltage too high (when the drive is stopped).	Check the supply voltage setting (parameter *95.01 Supply voltage*). Note that the wrong setting of the parameter may cause the motor to rush uncontrollably, or may overload the brake chopper or resistor. Check the supply voltage. If the problem persists, contact your local ABB representative.
A3A2	DC link undervoltage	Intermediate circuit DC voltage too low (when the drive is stopped).	
A3AA	DC not charged	The voltage of the intermediate DC circuit has not yet risen to operating level.	
A490	Incorrect temperature sensor setup	Temperature cannot be supervised due to incorrect adapter setup.	Check the settings of temperature source parameters *35.11* and *35.21*.
A491	External temperature 1 (Editable message text)	Measured temperature 1 has exceeded warning limit.	Check the value of parameter *35.02 Measured temperature 1*. Check the cooling of the motor (or other equipment whose temperature is being measured). Check the value of *35.13 Temperature 1 warning limit*.
A492	External temperature 2 (Editable message text)	Measured temperature 2 has exceeded warning limit.	Check the value of parameter *35.03 Measured temperature 2*. Check the cooling of the motor (or other equipment whose temperature is being measured). Check the value of *35.23 Temperature 2 warning limit*.
A4A0	Control board temperature	Control board temperature is too high.	Check the auxiliary code. See actions for each code below.

Code (hex)	Warning / Aux. code	Cause	What to do
	(none)	Temperature above warning limit	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up.
	1	Thermistor broken	Contact an ABB service representative for control board replacement.
A4A1	IGBT overtemperature	Estimated drive IGBT temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
A4A9	Cooling	Drive module temperature is excessive.	Check ambient temperature. If it exceeds 40 °C/104 °F (IP21 frames R4…R9) or if it exceeds 50 °C /122 °F (IP21 frames R0…R9), ensure that load current does not exceed derated load capacity of drive. For all P55 frames, check the derating temperatures. See chapter *Technical data*, section *Derating* in the *Hardware manual* of the drive. Check drive module cooling air flow and fan operation. Check inside of cabinet and heatsink of drive module for dust pick-up. Clean whenever necessary.
A4B0	Excess temperature	Power unit module temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
A4B1	Excess temperature difference	High temperature difference between the IGBTs of different phases.	Check the motor cabling. Check cooling of drive module(s).
A4F6	IGBT temperature	Drive IGBT temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
A581	Fan	Cooling fan feedback missing.	Check the auxiliary code to identify the fan. Code **0** denotes main fan 1. Other codes (format XYZ): “X” specifies state code (**1:** ID run, **2:** normal). “Y” = 0, “Z” specifies the index of the fan (**1:** Main fan 1, **2:** Main fan 2, **3:** Main fan 3). Check fan operation and connection. Replace fan if faulty.

Code (hex)	Warning / Aux. code	Cause	What to do
A582	Auxiliary fan missing	An auxiliary cooling fan (IP55 internal fan) is stuck or disconnected.	Check the auxiliary code. Check the auxiliary fan and connection. Replace faulty fan. Make sure the front cover of the drive is in place and tightened. If the commissioning of the drive requires that the cover is off, this warning will be generated even if the corresponding fault is defeated. See fault *5081 Auxiliary fan broken* (page *79*).
A5A0	Safe torque off Programmable warning: *31.22 STO indication run/stop*	Safe torque off function is active, ie safety circuit signal(s) connected to connector STO is lost.	Check safety circuit connections. For more information, chapter *The Safe torque off function* in the *Hardware manual* of the drive and description of parameter *31.22 STO indication run/stop*. Check the value of parameter *95.04 Control board supply*.
A5EA	Measurement circuit temperature	Problem with internal temperature measurement of the drive.	Contact your local ABB representative.
A5EB	PU board powerfail	Power unit power supply failure.	Contact your local ABB representative.
A5ED	Measurement circuit ADC	Measurement circuit fault.	Contact your local ABB representative.
A5EE	Measurement circuit DFF	Measurement circuit fault.	Contact your local ABB representative.
A5EF	PU state feedback	State feedback from output phases does not match control signals.	Contact your local ABB representative.
A5F0	Charging feedback	Charging feedback signal missing.	Check the feedback signal coming from the charging system.
A682	Flash erase speed exceeded	The flash memory (in the memory unit) has been erased too frequently, compromising the lifetime of the memory.	Avoid forcing unnecessary parameter saves by parameter *96.07* or cyclic parameter writes (such as user logger triggering through parameters). Check the auxiliary code (format XYYY YZZZ). “X” specifies the source of warning (**1:** generic flash erase supervision). “ZZZ” specifies the flash subsector number that generated the warning.
A6A4	Motor nominal value	The motor parameters are set incorrectly.	Check the auxiliary code. See actions for each code below.
		The drive is not dimensioned correctly.	

Code (hex)	Warning / Aux. code	Cause	What to do
	0001	Slip frequency is too small.	Check the settings of the motor configuration parameters in groups 98 and 99. Check that the drive is sized correctly for the motor.
	0002	Synchronous and nominal speeds differ too much.	
	0003	Nominal speed is higher than synchronous speed with 1 pole pair.	
	0004	Nominal current is outside limits	
	0005	Nominal voltage is outside limits.	
	0006	Nominal power is higher than apparent power.	
	0007	Nominal power not consistent with nominal speed and torque.	
A6A5	No motor data	Parameters in group 99 have not been set.	Check that all the required parameters in group 99 have been set. **Note:** It is normal for this warning to appear during the start-up and continue until the motor data is entered.
A6A6	Voltage category unselected	The voltage category has not been defined.	Set voltage category in parameter *95.01 Supply voltage*.
A6A7	System time not set	System time is not set. Timed functions cannot be used and fault log dates are not correct.	Set the system time manually or connect the panel to the drive to synchronize the clock. If basic panel is used, synchronize the clock through the EFB or a fieldbus module. Set parameter *34.10 Timed functions enable* to *Not selected* to disable the timed functions if they are not used.
A6B0	User lock is open	The user lock is open, ie. user lock configuration parameters *96.100…96.102* are visible.	Close the user lock by entering an invalid pass code in parameter *96.02 Pass code*. See section *User lock*.
A6B1	User pass code not confirmed	A new user pass code has been entered in parameter *96.100* but not confirmed in *96.101*.	Confirm the new pass code by entering the same code in *96.101*. To cancel, close the user lock without confirming the new code. See section *User lock*.
A6D1	FBA A parameter conflict	The drive does not have a functionality requested by a PLC, or requested functionality has not been activated.	Check PLC programming. Check settings of parameter groups *50 Fieldbus adapter (FBA)*.

Code (hex)	Warning / Aux. code	Cause	What to do
A6E5	AI parametrization	The current/voltage hardware setting of an analog input does not correspond to parameter settings.	Check the event log for an auxiliary code. The code identifies the analog input whose settings are in conflict. Adjust either the hardware setting (on the drive control unit) or parameter *12.15*/*12.25*. **Note:** Control board reboot (either by cycling the power or through parameter *96.08 Control board boot*) is required to validate any changes in the hardware settings.
A6E6	ULC configuration	User load curve configuration error.	Check the auxiliary code (format XXXX ZZZZ). “ZZZZ” indicates the problem (see actions for each code below).
	0000	Speed points inconsistent.	Check that each speed point (parameters *37.11*…*37.15*) has a higher value than the previous point.
	0001	Frequency points inconsistent.	Check that each frequency point (*37.20*…*37.16*) has a higher value than the previous point.
	0002	Underload point above overload point.	Check that each overload point (*37.31*…*37.35*) has a higher value than the corresponding underload point (*37.21*…*37.25*).
	0003	Overload point below underload point.	
A780	Motor stall Programmable warning: *31.24 Stall function*	Motor is operating in stall region because of e.g. excessive load or insufficient motor power.	Check motor load and drive ratings. Check fault function parameters.
A792	Brake resistor wiring	Brake resistor short circuit or brake chopper control fault. For drive frames R6 or larger.	Check brake chopper and brake resistor connection. Ensure brake resistor is not damaged.
A793	BR excess temperature	Brake resistor temperature has exceeded warning limit defined by parameter *43.12 Brake resistor warning limit*.	Stop drive. Let resistor cool down. Check resistor overload protection function settings (parameter group *43 Brake chopper*). Check warning limit setting, parameter *43.12 Brake resistor warning limit*. Check that the resistor has been dimensioned correctly. Check that braking cycle meets allowed limits.
A794	BR data	Brake resistor data has not been given.	One or more of the resistor data settings (parameters *43.08*…*43.10*) is incorrect. The parameter is specified by the auxiliary code.
	0000 0001	Resistance value too low.	Check value of *43.10*.
	0000 0002	Thermal time constant not given.	Check value of *43.08*.

Code (hex)	Warning / Aux. code	Cause	What to do
	0000 0003	Maximum continuous power not given.	Check value of *43.09*.
A79C	BC IGBT excess temperature	Brake chopper IGBT temperature has exceeded internal warning limit.	Let chopper cool down. Check for excessive ambient temperature. Check for cooling fan failure. Check for obstructions in the air flow. Check the dimensioning and cooling of the cabinet. Check resistor overload protection function settings (parameters *43.06*…*43.10*). Check minimum allowed resistor value for the chopper being used. Check that braking cycle meets allowed limits. Check that drive supply AC voltage is not excessive.
A7AB	Extension I/O configuration failure	Installed CMOD module is not the same as configured.	Check that the installed module (shown by parameter *15.02 Detected extension module*) is the same as selected by parameter *15.01 Extension module type*.
A7C1	FBA A communication Programmable warning: *50.02 FBA A comm loss func*	Cyclical communication between drive and fieldbus adapter module A or between PLC and fieldbus adapter module A is lost.	Check status of fieldbus communication. See user documentation of fieldbus interface. Check settings of parameter groups *50 Fieldbus adapter (FBA)*, *51 FBA A settings*, *52 FBA A data in* and *53 FBA A data out*. Check cable connections. Check if communication master is able to communicate.
A7CE	EFB comm loss Programmable warning: *58.14 Communication loss action*	Communication break in embedded fieldbus (EFB) communication.	Check the status of the fieldbus master (online/offline/error etc.). Check cable connections to the EIA-485/X5 terminals 29, 30 and 31 on the control unit.
A7EE	Panel loss Programmable warning: *49.05 Communication loss action*	Control panel or PC tool selected as active control location for drive has ceased communicating.	Check PC tool or control panel connection. Check control panel connector. Check mounting platform if being used. Disconnect and reconnect the control panel.
A88F	Cooling fan	Maintenance timer limit exceeded.	Consider changing the cooling fan. Parameter *05.04 Fan on-time counter* shows the running time of the cooling fan.

Code (hex)	Warning / Aux. code	Cause	What to do
A8A0	AI supervision Programmable warning: *12.03 AI supervision function*	An analog signal is outside the limits specified for the analog input.	Check signal level at the analog input. Check the wiring connected to the input. Check the minimum and maximum limits of the input in parameter group *12 Standard AI*.
A8A1	RO life warning	The relay has changed states more than the recommended number of times.	Change the control board or stop using the relay output.
	0001	Relay output 1	Change the control board or stop using relay output 1.
	0002	Relay output 2	Change the control board or stop using relay output 2.
	0003	Relay output 3	Change the control board or stop using relay output 3.
A8A2	RO toggle warning	The relay output is changing states faster than recommended, eg. if a fast changing frequency signal is connected to it. The relay lifetime will be exceeded shortly.	Replace the signal connected to the relay output source with a less frequently changing signal.
	0001	Relay output 1	Select a different signal with parameter *10.24 RO1 source*.
	0002	Relay output 2	Select a different signal with parameter *10.27 RO2 source*.
	0003	Relay output 3	Select a different signal with parameter *10.30 RO3 source*.
A8B0	ABB Signal supervision 1 (Editable message text) Programmable warning: *32.06 Supervision 1 action*	Warning generated by the signal supervision function 1.	Check the source of the warning (parameter *32.07 Supervision 1 signal*).
A8B1	ABB Signal supervision 2 (Editable message text) Programmable warning: *32.16 Supervision 2 action*	Warning generated by the signal supervision function 2.	Check the source of the warning (parameter *32.17 Supervision 2 signal*).
A8B2	ABB Signal supervision 3 (Editable message text) Programmable warning: *32.26 Supervision 3 action*	Warning generated by the signal supervision function 3.	Check the source of the warning (parameter *32.27 Supervision 3 signal*).
A8B3	ABB Signal supervision 4 (Editable message text) Programmable warning: *32.36 Supervision 4 action*	Warning generated by the signal supervision function 4.	Check the source of the warning (parameter *32.37 Supervision 4 signal*).
A8B4	ABB Signal supervision 5 (Editable message text) Programmable warning: *32.46 Supervision 5 action*	Warning generated by the signal supervision function 5.	Check the source of the warning (parameter *32.47 Supervision 5 signal*).

Code (hex)	Warning / Aux. code	Cause	What to do
A8B5	ABB Signal supervision 6 (Editable message text) Programmable warning: *32.56 Supervision 6 action*	Warning generated by the signal supervision function 6.	Check the source of the warning (parameter *32.57 Supervision 6 signal*).
A8BE	ULC overload warning Programmable fault: *37.03 ULC overload actions*	Selected signal has exceeded the user overload curve.	Check for any operating conditions increasing the monitored signal (for example, the loading of the motor if the torque or current is being monitored). Check the definition of the load curve (parameter group *37 User load curve*).
A8BF	ULC underload warning Programmable fault: *37.04 ULC underload actions*	Selected signal has fallen below the user underload curve.	Check for any operating conditions decreasing the monitored signal (for example, loss of load if the torque or current is being monitored). Check the definition of the load curve (parameter group *37 User load curve*).
A981	External warning 1 (Editable message text) Programmable warning: *31.01 External event 1 source* *31.02 External event 1 type*	Fault in external device 1.	Check the external device. Check setting of parameter *31.01 External event 1 source*.
A982	External warning 2 (Editable message text) Programmable warning: *31.03 External event 2 source* *31.04 External event 2 type*	Fault in external device 2.	Check the external device. Check setting of parameter *31.03 External event 2 source*.
A983	External warning 3 (Editable message text) Programmable warning: *31.05 External event 3 source* *31.06 External event 3 type*	Fault in external device 3.	Check the external device. Check setting of parameter *31.05 External event 3 source*.
A984	External warning 4 (Editable message text) Programmable warning: *31.07 External event 4 source* *31.08 External event 4 type*	Fault in external device 4.	Check the external device. Check setting of parameter *31.07 External event 4 source*.

Code (hex)	Warning / Aux. code	Cause	What to do
A985	External warning 5 (Editable message text) Programmable warning: *31.09 External event 5 source* *31.10 External event 5 type*	Fault in external device 5.	Check the external device. Check setting of parameter *31.09 External event 5 source*.
AF80	INU-LSU comm loss Programmable warning: *60.79 INU-LSU comm loss function*	DDCS (fiber optic) communication between converters (for example, the inverter unit and the supply unit) is lost. Note that the inverter unit will continue operating based on the status information that was last received from the other converter.	Check status of other converter (parameters *06.36* and *06.39*). Check settings of parameter group *60 DDCS communication*. Check the corresponding settings in the control program of the other converter. Check cable connections. If necessary, replace cables.
AF85	Line side unit warning	The supply unit (or other converter) has generated a warning.	The auxiliary code specifies the original warning code in the supply unit control program. See chapter *Fault tracing* in *ACS880 IGBT supply control program firmware manual* (3AUA0000131562 [English]).
AF88	Season configuration warning	You have configured a season which starts before the previous season.	Configure the seasons with increasing start dates, see parameters *34.60 Season 1 start date*…*34.63 Season 4 start date*.
AF8C	Process PID sleep mode	The drive is entering sleep mode.	Informative warning. See section *Sleep and boost functions for process PID control*, and parameters *40.43*…*40.48*.
AFAA	Autoreset	A fault is about to be autoreset.	Informative warning. See the settings in parameter group *31 Fault functions*.
AFE1	Emergency stop (off2)	Drive has received an emergency stop (mode selection off2) command.	Check that it is safe to continue operation. Then return emergency stop push button to normal position. Restart drive. If the emergency stop was unintentional, check the source selected by parameter *21.05 Emergency stop source*.
AFE2	Emergency stop (off1 or off3)	Drive has received an emergency stop (mode selection off1 or off3) command.	
AFE9	Start delay	The start delay is active and the drive will start the motor after a predefined delay.	Informative warning. See parameter *21.22 Start delay*.
AFED	Run permissive	Run permissive is keeping the drive from running the motor.	Check the setting of (and source selected by) parameter *20.40 Run permissive*.
AFEE	Start interlock 1	Start interlock 1 is keeping the drive from starting.	Check the signal source selected for parameter *20.41 Start interlock 1*.

Code (hex)	Warning / Aux. code	Cause	What to do
AFEF	Start interlock 2	Start interlock 2 is keeping the drive from starting.	Check the signal source selected for parameter *20.42 Start interlock 2*.
AFF0	Start interlock 3	Start interlock 3 is keeping the drive from starting.	Check the signal source selected for parameter *20.43 Start interlock 3*.
AFF1	Start interlock 4	Start interlock 4 is keeping the drive from starting.	Check the signal source selected for parameter *20.44 Start interlock 4*.
AFF5	Override new start required	The Safe torque off function was active and has been reset while in Override.	A new start signal is required to start the drive again.
AFF6	Identification run	Motor ID run will occur at next start.	Informative warning.
AFF8	Motor heating active	Pre-heating is being performed	Informative warning. Motor pre-heating is active. Current specified by parameter *21.16 Pre-heating current* is being passed through the motor.
AFFE	Override active	Drive is in override mode.	Informative warning.
B5A0	STO event Programmable event: *31.22 STO indication run/stop*	Safe torque off function is active, ie. safety circuit signal(s) connected to connector STO is lost.	Informative warning. Check safety circuit connections. For more information, see chapter *The Safe torque off function* in the *Hardware manual* of the drive and description of parameter *31.22 STO indication run/stop*.
D501	No more available PFC motors	No more PFC motors can be started because they can be interlocked or in the Hand mode.	Check that there are no interlocked PFC motors, see parameters: *76.81…76.84*. If all motors are in use, the PFC system is not adequately dimensioned to handle the demand.
D502	All motors interlocked	All the motors in the PFC system are interlocked.	Check that there are no interlocked PFC motors, see parameters *76.81…76.84*.
D503	VSD controlled PFC motor interlocked	The motor connected to the drive is interlocked (unavailable).	Motor connected to the drive is interlocked and thus cannot be started. Remove the corresponding interlock to start the drive controlled PFC motor. See parameters *76.81…76.84*.

Fault messages

Code (hex)	Fault / Aux. code	Cause	What to do
1080	Backup/Restore timeout	Panel or PC tool has failed to communicate with the drive when backup was being made or restored.	Request backup or restore again.
1081	Rating ID fault	Drive software has not been able to read the rating ID of the drive.	Reset the fault to make the drive try to reread the rating ID. If the fault reappears, cycle the power to the drive. You may have to be repeat this. If the fault persists, contact your local ABB representative.
2310	Overcurrent	Output current has exceeded internal fault limit. In addition to an actual overcurrent situation, this fault may also be caused by an earth fault or supply phase loss.	Check motor load. Check acceleration times in parameter group *23 Speed reference ramp* (speed control) or *28 Frequency reference chain* (frequency control). Also check parameters *46.01 Speed scaling*, *46.02 Frequency scaling* and *46.03 Torque scaling*. Check motor and motor cable (including phasing and delta/star connection). Check there are no contactors opening and closing in motor cable. Check that the start-up data in parameter group 99 corresponds to the motor rating plate. Check that there are no power factor correction capacitors or surge absorbers in motor cable. Check for an earth fault in motor or motor cables by measuring the insulation resistances of motor and motor cable. See chapter *Electrical installation*, section *Checking the insulation of the assembly* in the *Hardware manual* of the drive.
2330	Earth leakage Programmable fault: *31.20 Earth fault*	Drive has detected load unbalance typically due to earth fault in motor or motor cable.	Check there are no power factor correction capacitors or surge absorbers in motor cable. Check for an earth fault in motor or motor cables by measuring the insulation resistances of motor and motor cable. Try running the motor in scalar control mode if allowed. (See parameter *99.04 Motor control mode*.) If no earth fault can be detected, contact your local ABB representative.

Code (hex)	Fault / Aux. code	Cause	What to do
2340	Short circuit	Short-circuit in motor cable(s) or motor	Check motor and motor cable for cabling errors. Check there are no power factor correction capacitors or surge absorbers in motor cable. Cycle the power to the drive.
2381	IGBT overload	Excessive IGBT junction to case temperature. This fault protects the IGBT(s) and can be activated by a short circuit in the motor cable.	Check motor cable. Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
3130	Input phase loss Programmable fault: *31.21 Supply phase loss*	Intermediate circuit DC voltage is oscillating due to missing input power line phase or blown fuse.	Check input power line fuses. Check for loose power cable connections. Check for input power supply imbalance.
3181	Wiring or earth fault Programmable fault: *31.23 Wiring or earth fault*	Incorrect input power and motor cable connection (ie. input power cable is connected to drive motor connection).	Check input power connections.
3210	DC link overvoltage	Excessive intermediate circuit DC voltage.	Check that overvoltage control is on (parameter *30.30 Overvoltage control*). Check that the supply voltage matches the nominal input voltage of the drive. Check the supply line for static or transient overvoltage. Check brake chopper and resistor (if present). Check deceleration time. Use coast-to-stop function (if applicable). Retrofit drive with brake chopper and brake resistor. Check that the brake resistor is dimensioned properly and the resistance is between acceptable range for the drive.
3220	DC link undervoltage	Intermediate circuit DC voltage is not sufficient because of a missing supply phase, blown fuse or fault in the rectifier bridge.	Check supply cabling, fuses and switchgear.
3381	Output phase loss Programmable fault: *31.19 Motor phase loss*	Motor circuit fault due to missing motor connection (all three phases are not connected).	Connect motor cable.

Code (hex)	Fault / Aux. code	Cause	What to do
4110	Control board temperature	Control board temperature is too high.	Check proper cooling of the drive. Check the auxiliary cooling fan.
4210	IGBT overtemperature	Estimated drive IGBT temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
4290	Cooling	Drive module temperature is excessive.	Check ambient temperature. If it exceeds 40 °C/104 °F (IP21 frames R4…R9) or if it exceeds 50 °C /122 °F (IP21 frames R0…R9), ensure that load current does not exceed derated load capacity of drive. For all P55 frames, check the derating temperatures. See chapter *Technical data*, section *Derating* in the *Hardware manual* of the drive. Check drive module cooling air flow and fan operation. Check inside of cabinet and heatsink of drive module for dust pick-up. Clean whenever necessary.
42F1	IGBT temperature	Drive IGBT temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
4310	Excess temperature	Power unit module temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against drive power.
4380	Excess temperature difference	High temperature difference between the IGBTs of different phases.	Check the motor cabling. Check cooling of drive module(s).
4981	External temperature 1 (Editable message text)	Measured temperature 1 has exceeded fault limit.	Check the value of parameter *35.02 Measured temperature 1*. Check the cooling of the motor (or other equipment whose temperature is being measured).
4982	External temperature 2 (Editable message text)	Measured temperature 2 has exceeded fault limit.	Check the value of parameter *35.03 Measured temperature 2*. Check the cooling of the motor (or other equipment whose temperature is being measured).
5080	Fan	Cooling fan feedback missing.	See *A581 Fan* (page *67*).

Code (hex)	Fault / Aux. code	Cause	What to do
5081	Auxiliary fan broken	An auxiliary cooling fan (connected to the fan connectors on the control unit) is stuck or disconnected.	Check the auxiliary code. Check auxiliary fan(s) and connection(s). Replace fan if faulty. Make sure the front cover of the drive is in place and tightened. If the commissioning of the drive requires th the cover is off, activate parameter *31.36 Aux fan fault bybass* within 2 min from control unit reboot to temporarily suppress the fault. Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power.
	0001	Auxiliary fan 1 broken.	
	0002	Auxiliary fan 2 broken.	
5090	STO hardware failure	STO hardware diagnostics has detected hardware failure.	Contact your local ABB representative for hardware replacement.
5091	Safe torque off Programmable fault: *31.22 STO indication run/stop*	Safe torque off function is active, ie. safety circuit signal(s) connected to connector STO is broken during start or run.	Check safety circuit connections. For more information, see chapter *The Safe torque off function* in the *Hardware manual* of the drive and description of parameter *31.22 STO indication run/stop*. Check the value of parameter *95.04 Control board supply*.
5092	PU logic error	Power unit memory has cleared.	Contact your local ABB representative.
5093	Rating ID mismatch	The hardware of the drive does not match the information stored in the memory. This may occur eg. after a firmware update.	Cycle the power to the drive. You may have to be repeat this.
5094	Measurement circuit temperature	Problem with internal temperature measurement of the drive.	Contact your local ABB representative.
5098	I/O communication loss	Internal standard I/O communication failure.	Try resetting the fault or reboot the drive.
50A0	Fan	Cooling fan stuck or disconnected.	Check fan operation and connection. Replace fan if faulty.
5682	Power unit lost	Connection between the drive control unit and the power unit is lost.	Check the connection between the control unit and the power unit.
5691	Measurement circuit ADC	Measurement circuit fault.	Contact your local ABB representative.
5692	PU board powerfail	Power unit power supply failure.	Contact your local ABB representative.

Code (hex)	Fault / Aux. code	Cause	What to do
5693	Measurement circuit DFF	Measurement circuit fault.	Contact your local ABB representative.
5696	PU state feedback	State feedback from output phases does not match control signals.	Contact your local ABB representative.
5697	Charging feedback	Charging feedback signal missing.	Check the feedback signal coming from the charging system
5698	Unknown PU fault	The power unit logic has generated a fault which is not known by the software.	Check the logic and software compatibility.
6181	FPGA version incompatible	Firmware and FPGA versions are incompatible.	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative
6306	FBA A mapping file	Fieldbus adapter A mapping file read error.	Contact your local ABB representative.
6481	Task overload	Internal fault.	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative
6487	Stack overflow	Internal fault.	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative
64A1	Internal file load	File read error.	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative
64A4	Rating ID fault	Rating ID load error.	Contact your local ABB representative.
64A6	Adaptive program	Error running the adaptive program.	Check the auxiliary code (format XXYY ZZZZ). “XX” specifies the number of the state (00=base program) and “YY” specifies the number of the function block (0000=generic error). ”ZZZZ” indicates the problem.
	000A	Program corrupted or block non-existent	Restore the template program or download the program to the drive.
	000C	Required block input missing	Check the inputs of the block.
	000E	Program corrupted or block non-existent	Restore the template program or download the program to the drive.
	0011	Program too large.	Remove blocks until the error stops.
	0012	Program is empty.	Correct the program and download it to the drive.

Code (hex)	Fault / Aux. code	Cause	What to do
	001C	A non-existing parameter or block is used in the program.	Edit the program to correct the parameter reference, or to use an existing block.
	001D	Parameter type invalid for selected pin.	Edit the program to correct the parameter reference.
	001E	Output to parameter failed because the parameter was write-protected.	Check the parameter reference in the program. Check for other sources affecting the target parameter.
	0023	Program file incompatible with current firmware version.	Adapt the program to current block library and firmware version.
	0024		
	Other	–	Contact your local ABB representative, quoting the auxiliary code.
64B1	Internal SSW fault	Internal fault.	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative.
64B2	User set fault	Loading of user parameter set failed because requested set does not exist set is not compatible with control program drive was switched off during loading.	Ensure that a valid user parameter set exists. Reload if uncertain.
64E1	Kernel overload	Operating system error.	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative.
64B1	Fault reset	A fault has been reset. The cause of the fault no longer exists and the fault reset has been requested and completed.	Informative fault.
6581	Parameter system	Parameter load or save failed.	Try forcing a save using parameter *96.07 Parameter save manually*. Retry.
6591	Backup/Restore timeout	During backup creating or restoring operation a panel or PC-tool has failed to communicate with the drive as part this operation.	Check panel or PC-tool communication and if it is still in backup or restore state.

Code (hex)	Fault / Aux. code	Cause	What to do
65A1	FBA A parameter conflict	The drive does not have a functionality requested by PLC, or requested functionality has not been activated.	Check PLC programming. Check settings of parameter groups *50 Fieldbus adapter (FBA)* and *51 FBA A settings*.
6681	EFB comm loss Programmable fault: *58.14 Communication loss action*	Communication break in embedded fieldbus (EFB) communication.	Check the status of the fieldbus master (online/offline/error etc.). Check cable connections to the EIA-485/X5 terminals 29, 30 and 31 on the control unit.
6682	EFB config file	Embedded fieldbus (EFB) configuration file could not be read.	Contact your local ABB representative.
6683	EFB invalid parameterization	Embedded fieldbus (EFB) parameter settings inconsistent or not compatible with selected protocol.	Check the settings in parameter group *58 Embedded fieldbus*.
6684	EFB load fault	Embedded fieldbus (EFB) protocol firmware could not be loaded.	Contact your local ABB representative.
		Version mismatch between EFB protocol firmware and drive firmware.	
6685	EFB fault 2	Fault reserved for the EFB protocol application.	Check the documentation of the protocol.
6686	EFB fault 3	Fault reserved for the EFB protocol application.	Check the documentation of the protocol.
6882	Text 32-bit table overflow	Internal fault.	Reset the fault. Contact your local ABB representative if the fault persists.
6885	Text file overflow	Internal fault.	Reset the fault. Contact your local ABB representative if the fault persists.
7081	Control panel loss Programmable fault: *49.05 Communication loss action*	Control panel or PC tool selected as active control location for drive has ceased communicating.	Check PC tool or control panel connection. Check control panel connector. Disconnect and reconnect the control panel.
7085	Incompatible option module	Fieldbus option module not supported.	Replace the module with a supported type.
7100	Excitation current	Excitation current feedback low or missing	
7121	Motor stall Programmable fault: *31.24 Stall function*	Motor is operating in stall region because of e.g. excessive load or insufficient motor power.	Check motor load and drive ratings. Check fault function parameters.

Code (hex)	Fault / Aux. code	Cause	What to do
7181	Brake resistor	Brake resistor broken or not connected.	Check that a brake resistor has been connected. Check the condition of the brake resistor. Check the dimensioning of the brake resistor.
7183	BR excess temperature	Brake resistor temperature has exceeded fault limit defined by parameter *43.11 Brake resistor fault limit*.	Stop drive. Let resistor cool down. Check resistor overload protection function settings (parameter group *43 Brake chopper*). Check fault limit setting, parameter *43.11 Brake resistor fault limit*. Check that braking cycle meets allowed limits.
7184	Brake resistor wiring	Brake resistor short circuit or brake chopper control fault.	Check brake chopper and brake resistor connection. Ensure brake resistor is not damaged.
7191	BC short circuit	Short circuit in brake chopper IGBT.	Ensure brake resistor is connected and not damaged. Check the electrical specifications of the brake resistor against chapter *Resistor braking* in the *Hardware manual* of the drive. Replace brake chopper (if replaceable).
7192	BC IGBT excess temperature	Brake chopper IGBT temperature has exceeded internal fault limit.	Let chopper cool down. Check for excessive ambient temperature. Check for cooling fan failure. Check for obstructions in the air flow. Check resistor overload protection function settings (parameter group *43 Brake chopper*). Check that braking cycle meets allowed limits. Check that drive supply AC voltage is not excessive.
7310	Overspeed	Motor is turning faster than highest allowed speed due to incorrectly set minimum/maximum speed, insufficient braking torque or changes in load when using torque reference.	Check minimum/maximum speed settings, parameters *30.11 Minimum speed* and *30.12 Maximum speed*. Check adequacy of motor braking torque. Check applicability of torque control. Check need for brake chopper and resistor(s).
73F0	Overfrequency	Maximum allowed output frequency exceeded.	Contact your local ABB representative.

Code (hex)	Fault / Aux. code	Cause	What to do
73B0	Emergency ramp failed	Emergency stop did not finish within expected time.	Check the settings of parameters *31.32 Emergency ramp supervision* and *31.33 Emergency ramp supervision delay*. Check the predefined ramp times (*23.11*…*23.15*[*23.12…23.13*] for mode Off1, *23.23* for mode Off3).
7510	FBA A communication Programmable fault: *50.02 FBA A comm loss func*	Cyclical communication between drive and fieldbus adapter module A or between PLC and fieldbus adapter module A is lost.	Check status of fieldbus communication. See user documentation of fieldbus interface. Check settings of parameter groups *50 Fieldbus adapter (FBA)*, *51 FBA A settings*, *52 FBA A data in* and *53 FBA A data out*. Check cable connections. Check if communication master is able to communicate.
7580	INU-LSU comm loss Programmable fault: *60.79 INU-LSU comm loss function*	DDCS communication between the inverter unit and the supply unit is lost.	Check status of the supply unit (parameter group *06 Control and status words*). Check settings of parameter group *60 DDCS communication*. Check the corresponding settings in the control program of the supply unit. Check cable connections. If necessary, replace cables.
7583	Line side unit faulted	The supply unit connected to the inverter unit has generated a fault.	The auxiliary code specifies the original fault code in the supply unit control program. See chapter *Fault tracing* in *ACS880 IGBT supply control program firmware manual* (3AUA0000131562 [English]).
7584	LSU charge failed	The supply unit was not ready (ie. the main contactor/breaker could not be closed) within expected time.	Check settings of parameter *94.10 LSU max charging time*. Check that parameter *60.71 INU-LSU communication port* is set to *DDCS via BC*. Check that the supply unit is enabled, allowed to start, and can be controlled by the inverter unit (eg. not in local control mode).
8001	ULC underload fault	User load curve: Signal has been too long under the underload curve.	See parameter *37.04 ULC underload actions*.
8002	ULC overload fault	User load curve: Signal has been too long over the overload curve.	See parameter *37.03 ULC overload actions*.

Code (hex)	Fault / Aux. code	Cause	What to do
80A0	AI supervision Programmable fault: *12.03 AI supervision function*	An analog signal is outside the limits specified for the analog input	Check signal level at the analog input. Check the auxiliary code. Check the wiring connected to the input. Check the minimum and maximum limits of the input in parameter group *12 Standard AI*.
	0001	AI1LessMIN	
	0002	AI1GreaterMAX	
	0003	AI2LessMIN.	
	0004	AI2GreaterMAX	
80B0	Signal supervision 1 (Editable message text) Programmable fault: *32.06 Supervision 1 action*	Fault generated by the signal supervision function 1.	Check the source of the fault (parameter *32.07 Supervision 1 signal*).
80B1	Signal supervision 2 (Editable message text) Programmable fault: *32.16 Supervision 2 action*	Fault generated by the signal supervision function 2.	Check the source of the fault (parameter *32.17 Supervision 2 signal*).
80B2	Signal supervision 3 (Editable message text) Programmable fault: *32.26 Supervision 3 action*	Fault generated by the signal supervision function 3.	Check the source of the fault (parameter *32.27 Supervision 3 signal*).
80B3	Signal supervision 4 (Editable message text) Programmable fault: *32.36 Supervision 4 action*	Fault generated by the signal supervision function 4.	Check the source of the fault (parameter *32.37 Supervision 4 signal*).
80B4	Signal supervision 5 (Editable message text) Programmable fault: *32.46 Supervision 5 action*	Fault generated by the signal supervision function 5.	Check the source of the fault (parameter *32.47 Supervision 5 signal*).
80B5	Signal supervision 6 (Editable message text) Programmable fault: *32.56 Supervision 6 action*	Fault generated by the signal supervision function 6.	Check the source of the fault (parameter *32.57 Supervision 6 signal*).
9081	External fault 1 (Editable message text) Programmable fault: *31.01 External event 1 source* *31.02 External event 1 type*	Fault in external device 1.	Check the external device. Check setting of parameter *31.01 External event 1 source*.
9082	External fault 2 (Editable message text) Programmable fault: *31.03 External event 2 source* *31.04 External event 2 type*	Fault in external device 2.	Check the external device. Check setting of parameter *31.03 External event 2 source*.

Code (hex)	Fault / Aux. code	Cause	What to do
9083	External fault 3 (Editable message text) Programmable fault: *31.05 External event 3 source 31.06 External event 3 type*	Fault in external device 3.	Check the external device. Check setting of parameter *31.05 External event 3 source*.
9084	External fault 4 (Editable message text) Programmable fault: *31.07 External event 4 source 31.08 External event 4 type*	Fault in external device 4.	Check the external device. Check setting of parameter *31.07 External event 4 source*.
9085	External fault 5 (Editable message text) Programmable fault: *31.09 External event 5 source 31.10 External event 5 type*	Fault in external device 5.	Check the external device. Check setting of parameter *31.09 External event 5 source*.
FA81	Safe torque off 1	Safe torque off function is active, ie. STO circuit 1 is broken.	Check safety circuit connections. For more information, see chapter *The Safe torque off function* in the *Hardware manual* of the drive and description of parameter *31.22 STO indication run/stop*. Check the value of parameter *95.04 Control board supply*.
FA82	Safe torque off 2	Safe torque off function is active, ie. STO circuit 2 is broken.	
FF61	ID run	Motor ID run was not completed successfully.	Check the nominal motor values in parameter group *99 Motor data*. Check that no external control system is connected to the drive. Cycle the power to the drive (and its control unit, if powered separately). Check that no operation limits prevent the completion of the ID run. Restore parameters to default settings and try again. Check that the motor shaft is not locked. Check the auxiliary code. The second number of the code indicates the problem (see actions for each code below).
	0001	Maximum current limit too low.	Check settings of parameters *99.06 Motor nominal current* and *30.17 Maximum current*. Make sure that *30.17 > 99.06*. Check that the drive is dimensioned correctly according to the motor.

Code (hex)	Fault / Aux. code	Cause	What to do
	0002	Maximum speed limit or calculated field weakening point too low.	Check settings of parameters *30.11 Minimum speed* *30.12 Maximum speed* *99.07 Motor nominal voltage* *99.08 Motor nominal frequency* *99.09 Motor nominal speed*. Make sure that *30.12* > (0.55 × *99.09*) > (0.50 × synchronous speed) *30.11* ≤ 0, and supply voltage ≥ (0.66 × *99.07*).
	0003	Maximum torque limit too low.	Check settings of parameter *99.12 Motor nominal torque*, and the torque limits in group *30 Limits*. Make sure that the maximum torque limit in force is greater than 100%.
	0004	Current measurement calibration did not finish within reasonable time	Contact your local ABB representative.
	0005…0008	Internal error.	Contact your local ABB representative.
	0009	(Asynchronous motors only) Acceleration did not finish within reasonable time.	Contact your local ABB representative.
	000A	(Asynchronous motors only) Deceleration did not finish within reasonable time.	Contact your local ABB representative.
	000B	(Asynchronous motors only) Speed dropped to zero during ID run.	Contact your local ABB representative.
	000C	(Permanent magnet motors only) First acceleration did not finish within reasonable time.	Contact your local ABB representative.
	000D	(Permanent magnet motors only) Second acceleration did not finish within reasonable time.	Contact your local ABB representative.
	000E…0010	Internal error.	Contact your local ABB representative.
	0011	(Synchronous reluctance motors only) Pulse test error.	Contact your local ABB representative.

Code (hex)	Fault / Aux. code	Cause	What to do
	0012	Motor too large for advanced standstill ID run.	Check that the motor and drive sizes are compatible. Contact your local ABB representative.
	0013	(Asynchronous motors only) Motor data error.	Check that the motor nominal value settings in the drive are the same as in the motor nameplate. Contact your local ABB representative.
FF63	STO diagnostics failure.	SW internal malfunction.	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power.
FF81	FB A force trip	A fault trip command has been received through fieldbus adapter A.	Check the fault information provided by the PLC.
FF8E	EFB force trip	A fault trip command has been received through the embedded fieldbus interface.	Check the fault information provided by the PLC.

Maintenance

WARNING! Read *Safety instructions* on page *3* before performing any maintenance on the equipment. Ignoring the safety instructions can cause injury or death.

Maintenance schedule

Recommended maintenance intervals and component replacements are based on specified operational and environmental conditions. ABB recommends annual drive inspections to ensure the highest reliability and optimum performance.

Note: Long term operation near the maximum specified ratings or environmental conditions may require shorter maintenance intervals for certain components. Consult your local ABB Service for maintenance recommendations at: *www.abb.com/searchchannels*

Description of symbols

Action	Description
I	**Inspection** (visual inspection and maintenance action if needed)
P	**Performance** of on/off-site work (commissioning, tests, measurements or other work)
R	**Replacement**

Recommended annual actions by the user

Action	Description
P	Quality of supply voltage
I	Spare parts
P	Capacitor reforming for spare drives and spare capacitors (page *84*)
I	Tightness of terminals
I	Dustiness, corrosion or temperature
P	Heat sink cleaning (page *75*)

Recommended maintenance actions by the user

Component	Years from start-up						
	3	6	9	12	15	18	21
Cooling							
Main cooling fan							
Main cooling fans			R			R	
Auxiliary cooling fan							
Auxiliary cooling fan			R			R	
Second auxiliary cooling fan (IP55, UL Type 12)			R			R	
Aging							
Control panel battery (real-time clock)			R			R	

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Heatsink

The heatsink fins accumulate dust from the cooling air. Since a dusty heatsink is less efficient at cooling the drive, overtemperature faults become more likely. In a “normal” environment (not dusty, not clean) check the heatsink annually, in a dusty environment check more often.

Clean the heatsink as follows (when necessary):

1. Remove power from drive. Wait 5 minutes and measure to confirm.
2. Remove the cooling fan(s) (see section *Fans* below).
3. Blow clean, dry, oil-free condensed air (not humid) from bottom to top and simultaneously use a vacuum cleaner at the air outlet to trap the dust.

   Note: If there is a risk of the dust entering adjoining equipment, perform the cleaning in another room.
4. Replace the cooling fan(s).
5. Restore power.

Fans

See section *Maintenance schedule* on page *74* for the fan replacement interval in average operation conditions.

In a speed-controlled fan, the speed of the fan matches the cooling needs. This increases the life span of the fan.

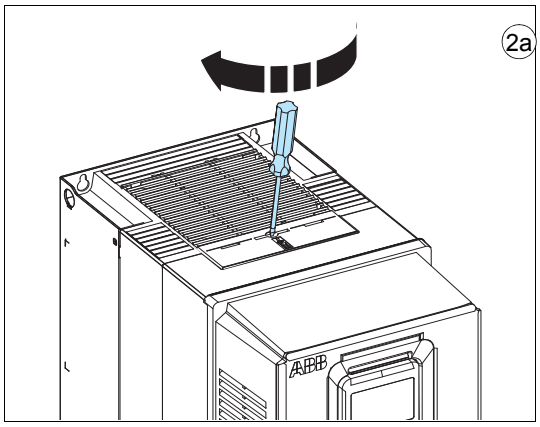
Main fans are speed controlled. When the drive is stopped, the main fan is kept running at low speed to cool the control unit. IP21 (UL Type 1) frames R6 and R8 and all IP55 (UL Type 12) frames have auxiliary fans that are not speed controlled and run all the time when the control unit is powered.

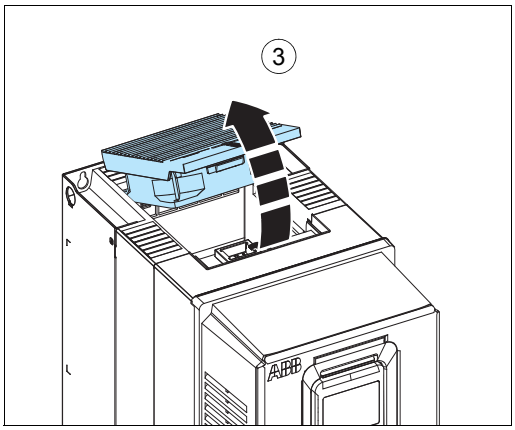
Replacement fans are available from the manufacturer. Do not use other than specified spare parts.

Replacing the main cooling fan, frame R3

WARNING! Obey the instructions in chapter *Safety instructions* on page *15*. If you ignore them, physical injury or death, or damage to the equipment can occur.

1. Stop the drive and disconnect it from the power line. Wait for 5 minutes and then make sure by measuring that there is no voltage. See section *Precautions before electrical work* on page *18* before you start the work.
2. To release the locking, turn clockwise with a screwdriver.
3. Turn the fan assembly off.
4. Install the new fan in reverse order.

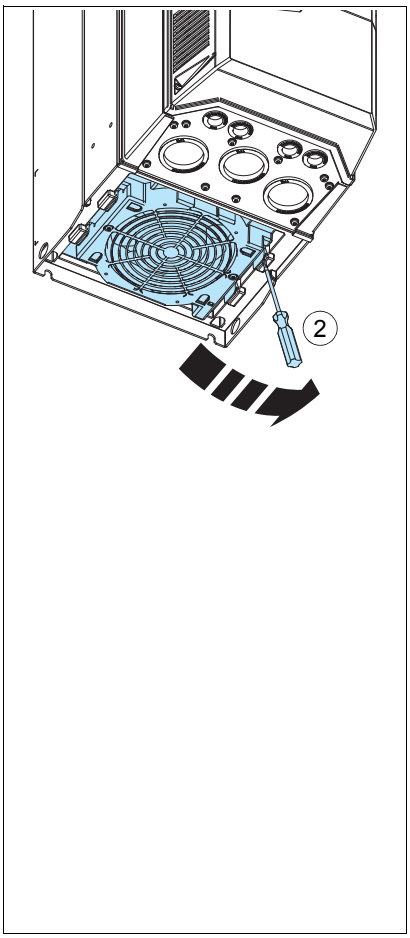


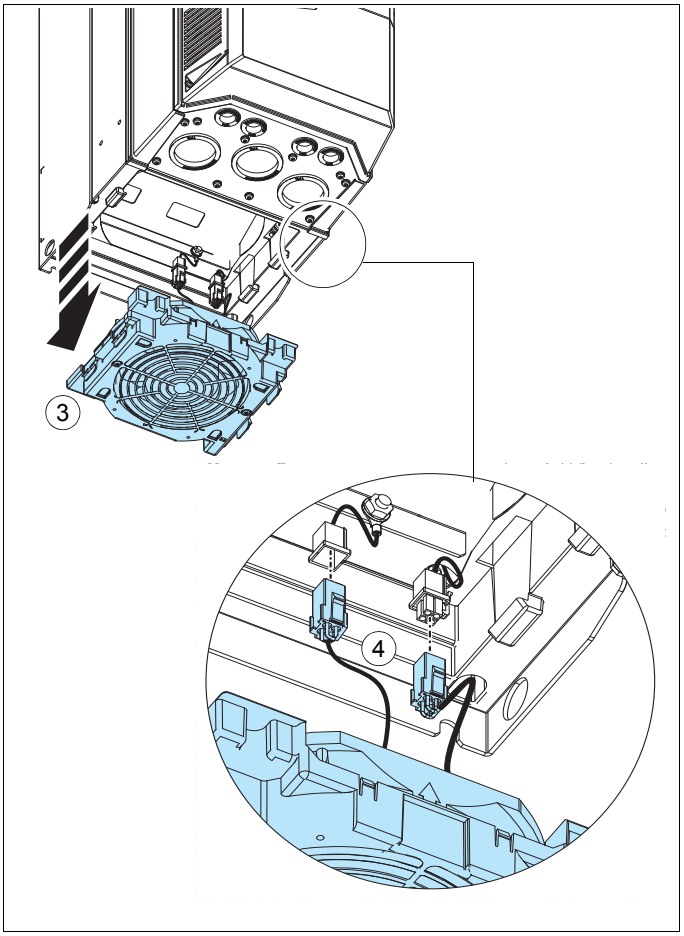


Replacing the main cooling fan, frame R6

WARNING! Obey the instructions in chapter *Safety instructions* on page *15*. If you ignore them, physical injury or death, or damage to the equipment can occur.

1. Stop the drive and disconnect it from the power line. Wait for 5 minutes and then make sure by measuring that there is no voltage. See section *Precautions before electrical work* on page *18* before you start the work.
2. Lever the fan assembly off the drive frame with for example a screwdriver (2a) and pull out the fan assembly (2b)
3. Pull the fan assembly down.
4. Unplug the fan power supply and grounding wires from the drive.
5. Install the new fan in reverse order.

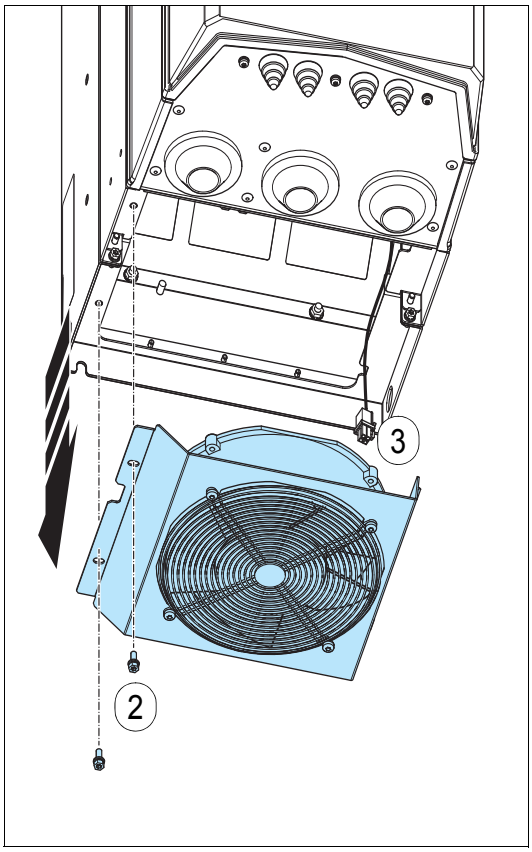


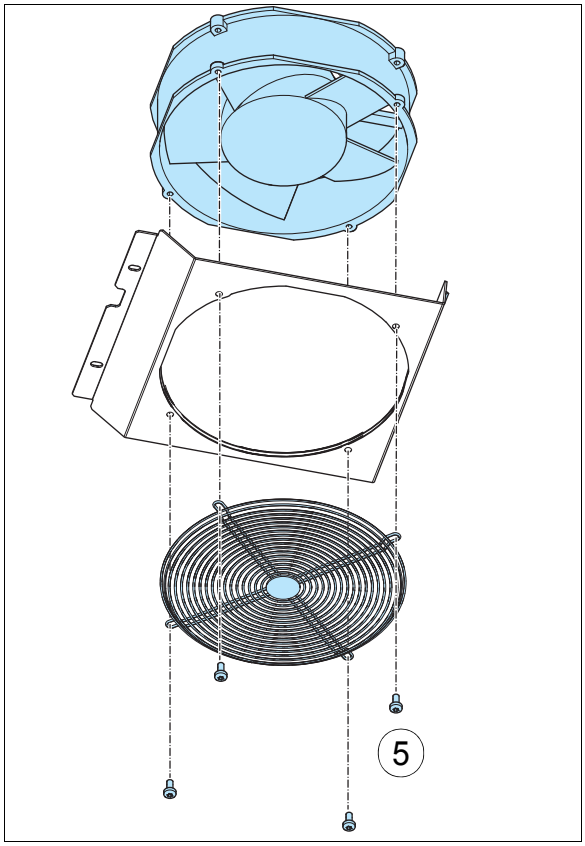


Replacing the main cooling fan, frame R8

WARNING! Obey the instructions in chapter *Safety instructions* on page *15*. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

1. Stop the drive and disconnect it from the power line. Wait for 5 minutes and then make sure by measuring that there is no voltage. See section *Precautions before electrical work* on page *18* before you start the work.
2. Undo the mounting screws of the fan assembly.
3. Unplug the fan power supply and grounding wires from the drive.
4. Pull the fan assembly down.
5. Undo the mounting screws of the fan.
6. Install the new fan in reverse order.



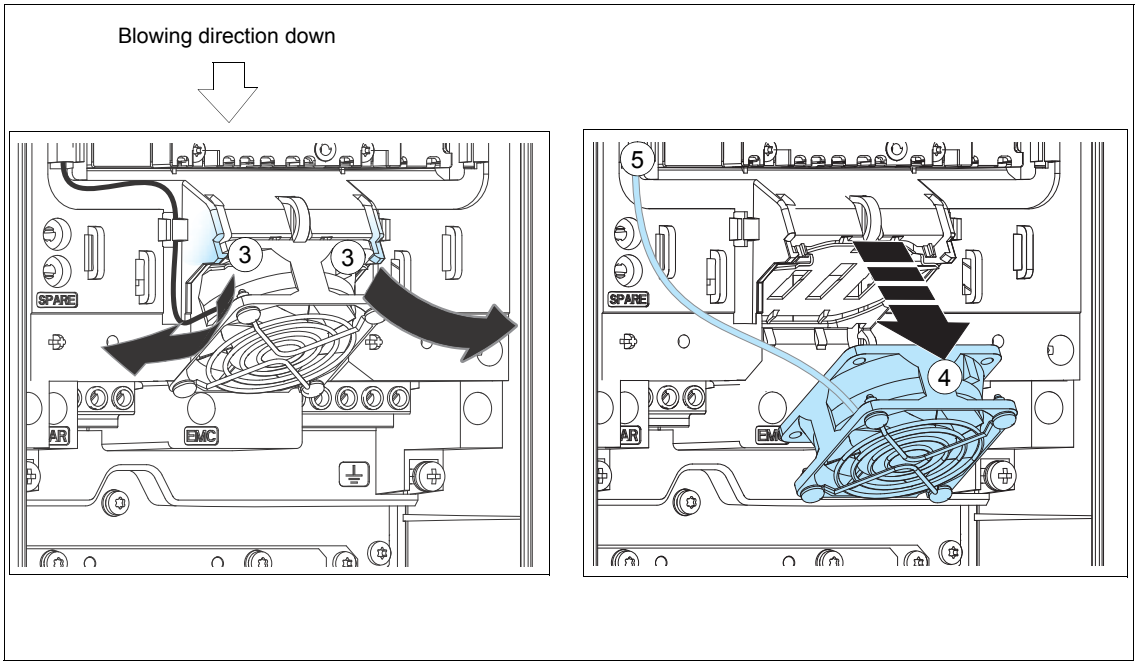


Replacing the auxiliary cooling fan, IP55 (UL Type 12) frame R3

WARNING! Obey the instructions in chapter *Safety instructions* on page *15*. If you ignore them, physical injury or death, or damage to the equipment can occur.

1. Stop the drive and disconnect it from the power line. Wait for 5 minutes and then make sure by measuring that there is no voltage. See section *Precautions before electrical work* on page *18* before you start the work.
2. Remove the front cover (see page *107*).
3. Release the retaining clips.
4. Lift the fan off.
5. Unplug fan power supply wires.
6. Install the new fan in reverse order.

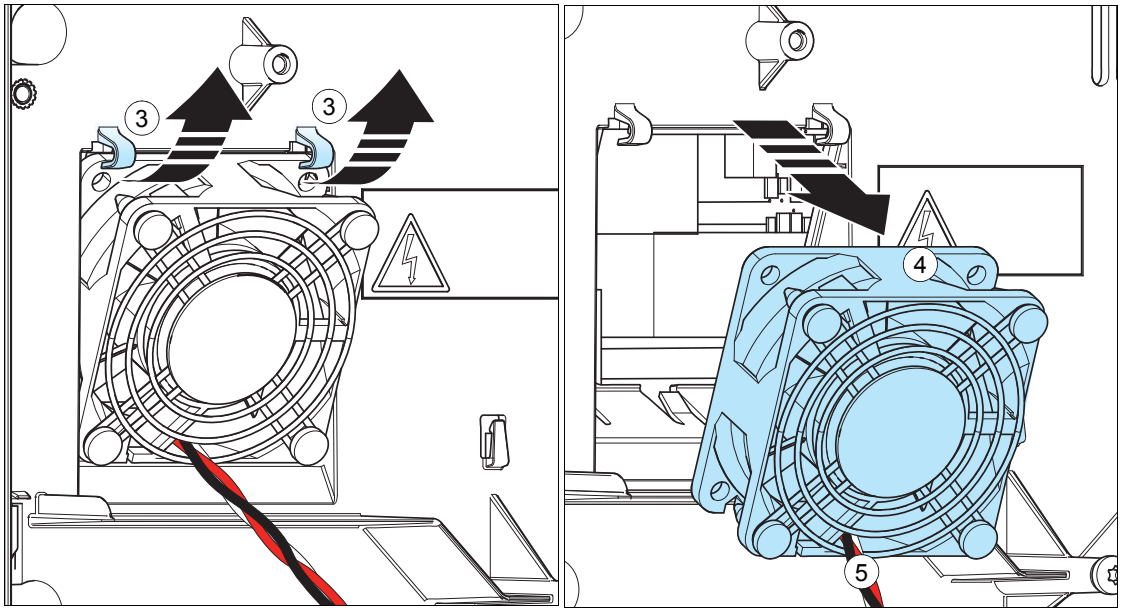
   Note: Make sure that the arrow on the fan points down.



Replacing the auxiliary cooling fan, frame R6

WARNING! Obey the instructions in chapter *Safety instructions* on page *15*. If you ignore them, physical injury or death, or damage to the equipment can occur.

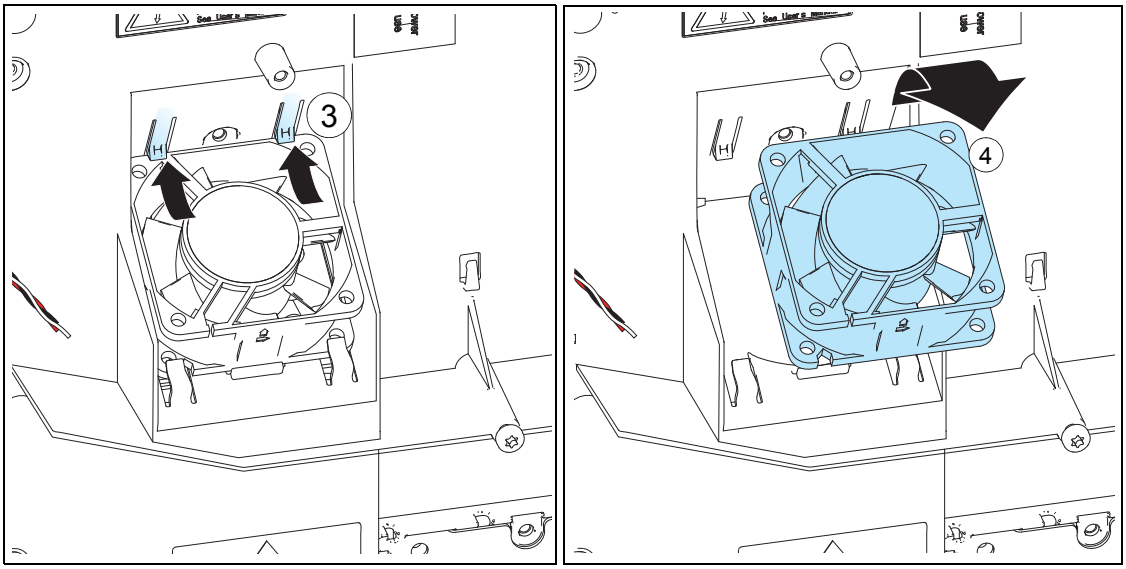
1. Stop the drive and disconnect it from the power line. Wait for 5 minutes and then make sure by measuring that there is no voltage. See section *Precautions before electrical work* on page *18* before you start the work.
2. Remove the upper front covers. See section *Connection procedure* on page *107*.
3. Release the retaining clips.
4. Lift the fan off.
5. Unplug fan power supply wires.
6. Remove the grille from the fan.
7. Install the new fan in reverse order.
8. **Note:** Make sure that the arrow on the fan points up.
9. Reinstall the front covers. See section *Reinstalling cover(s)* on page *149*.



Replacing the auxiliary cooling fan, frame R8

WARNING! Obey the instructions in chapter *Safety instructions* on page *15*. If you ignore them, physical injury or death, or damage to the equipment can occur.

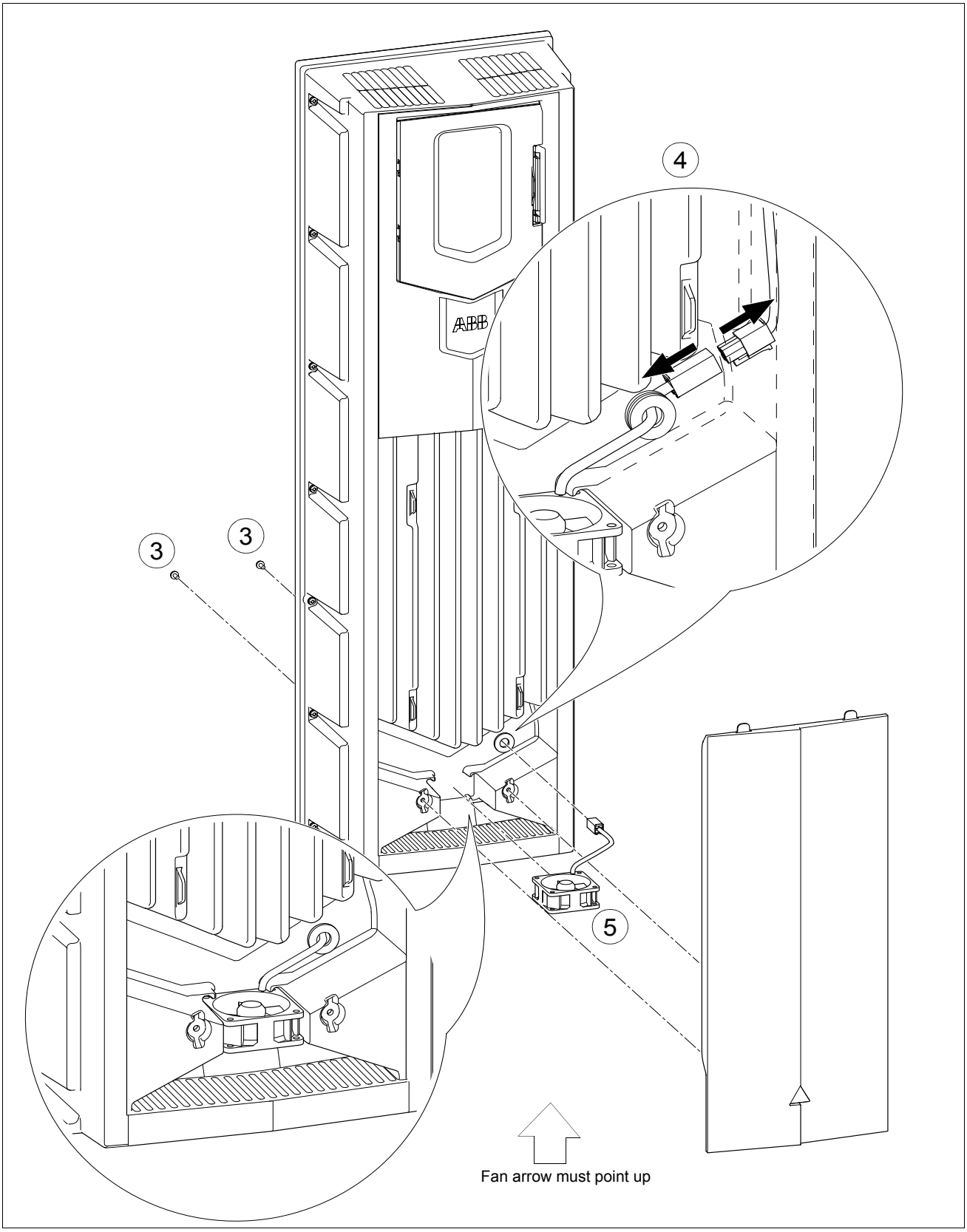
1. Stop the drive and disconnect it from the power line. Wait for 5 minutes and then make sure by measuring that there is no voltage. See section *Precautions before electrical work* on page *18* before you start the work.
2. Remove the upper front covers. See section *Connection procedure* on page *107*.
3. Release the retaining clips.
4. Lift the fan off.
5. Unplug fan power supply wires.
6. Remove the grille.
7. Install the new fan in reverse order.
8. **Note:** Make sure that the arrow on the fan points up.
9. Replace the front covers.



Replacing the second auxiliary cooling fan IP55 (UL Type 12), frame R8

WARNING! Obey the instructions in chapter *Safety instructions* on page *15*. If you ignore them, physical injury or death, or damage to the equipment can occur.

1. Stop the drive and disconnect it from the power line. Wait for 5 minutes and then make sure by measuring that there is no voltage. See section *Precautions before electrical work* on page *18* before you start the work.
2. Remove the IP55 front cover.
3. Remove the lower front cover from the IP55 cover.
4. Unplug the fan power supply wires.
5. Remove the fan.
6. Install the new fan in reverse order. Make sure that the arrow on the fan point up.


4
3
3
5
Fan arrow must point up

Capacitors

The drive intermediate DC circuit employs several electrolytic capacitors. Their lifespan depends on the operating time of the drive, loading and ambient temperature. Capacitor life can be prolonged by lowering the ambient temperature.

Capacitor failure is usually followed by damage to the drive and an input cable fuse failure, or a fault trip. Contact the manufacturer if capacitor failure is suspected. Replacements are available from the manufacturer. Do not use other than specified spare parts.

Reforming the capacitors

The capacitors must be reformed if the drive has not been powered (either in storage or unused) for a year or more. See on page 7 for how to find out the manufacturing date from the serial number.

For information on reforming the capacitors, see *Converter module capacitor reforming instructions* (3BFE64059629 [English]), available on the Internet (go to http://www.abb.com and enter the document code in the Search field).

Control panel

Cleaning

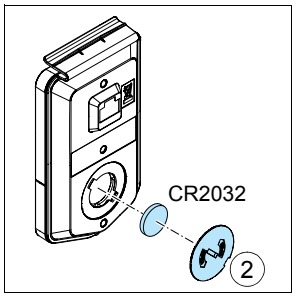
Use a soft damp cloth to clean the control panel. Avoid harsh cleaners which could scratch the display window.

Battery

A battery is used in all control panels to keep the clock operating in memory during power interruptions.

The expected life for the battery is greater than ten years. To remove the battery, use a coin to rotate the battery holder on the back of the control panel. Replace the battery with type CR2032.

Note: The battery is NOT required for any control panel or drive function, except the real-time clock.



ACH580-3BCR/BDR

Installation – drive

Follow the *Installation* instructions for the drive on page *8*. **Failure to observe the warnings and instructions may cause a malfunction or personal hazard.**

WARNING! Before you begin read *Safety instructions* on page *2*.

WARNING! Bypass configurations (ACH580-3BxR) do not support Safe Torque Off (STO) functionality.

Enclosure Designation	Horsepower Range by Voltage Rating
	480V
Bx1-31	5 to 15 HP
Bx2-32	20 to 60 HP
Bx12-31	5 to 15 HP
Bx12-32	20 to 60 HP

1) Wye connected networks

Installation – bypass

WARNING! When the ACH580 with E-Clipse Bypass is connected to the line power, the Motor Terminals T1, T2, and T3 may be live even if the motor is not running. Do not make any connections when the ACH580 with E-Clipse Bypass is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause serious injury or death.

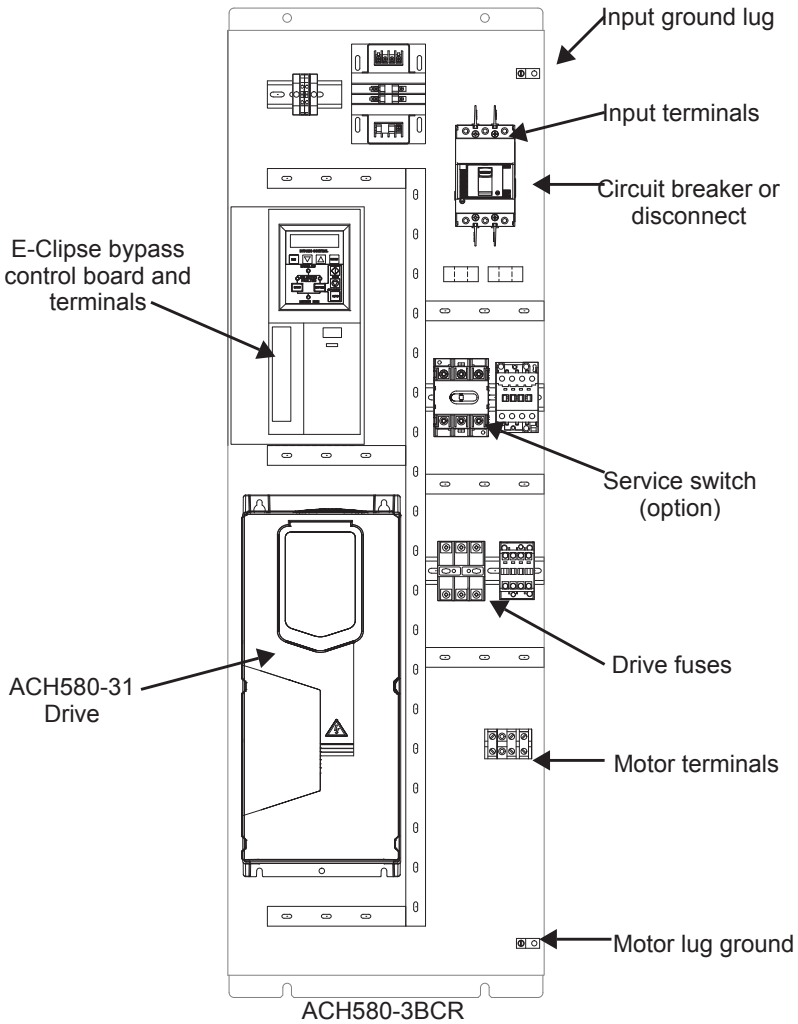
1. Install wiring – bypass

WARNING!

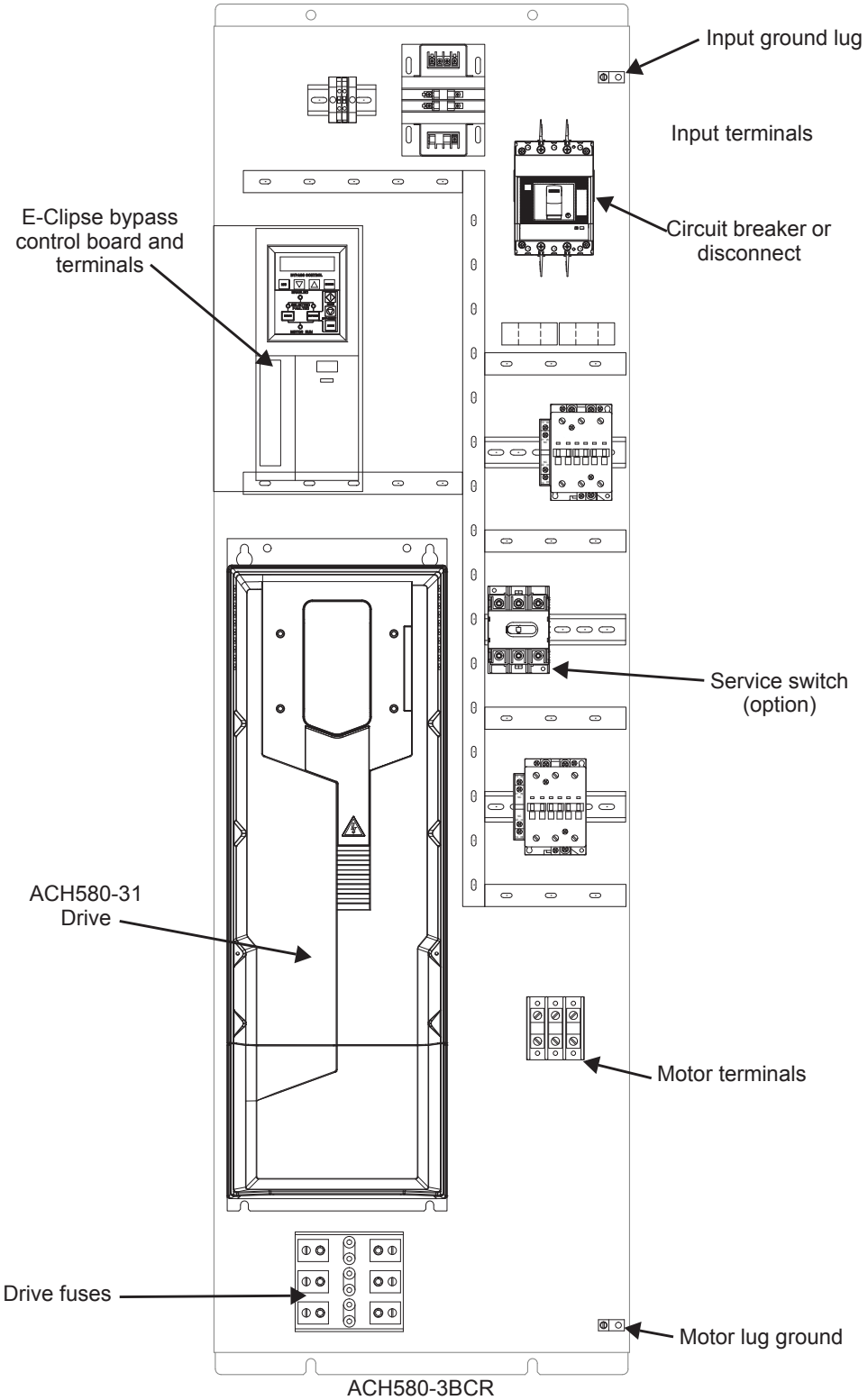
- Metal shavings or debris in the enclosure can damage electrical equipment and create a hazardous condition. Where parts, such as conduit plates require cutting or drilling, first remove the part. If that is not practical, cover nearby electrical components to protect them from all shavings or debris.
- Do not connect or disconnect input or output power wiring, or control wires, when power is applied.
- Never connect line voltage to drive output Terminals T1, T2, and T3.
- Do not make any voltage tolerance tests (Hi Pot or Megger) on any part of the unit. Disconnect motor wires before taking any measurements in the motor or motor wires.
- Make sure that power factor correction capacitors are not connected between the drive and the motor.

Connection diagrams – Box E-Clipse Bypass

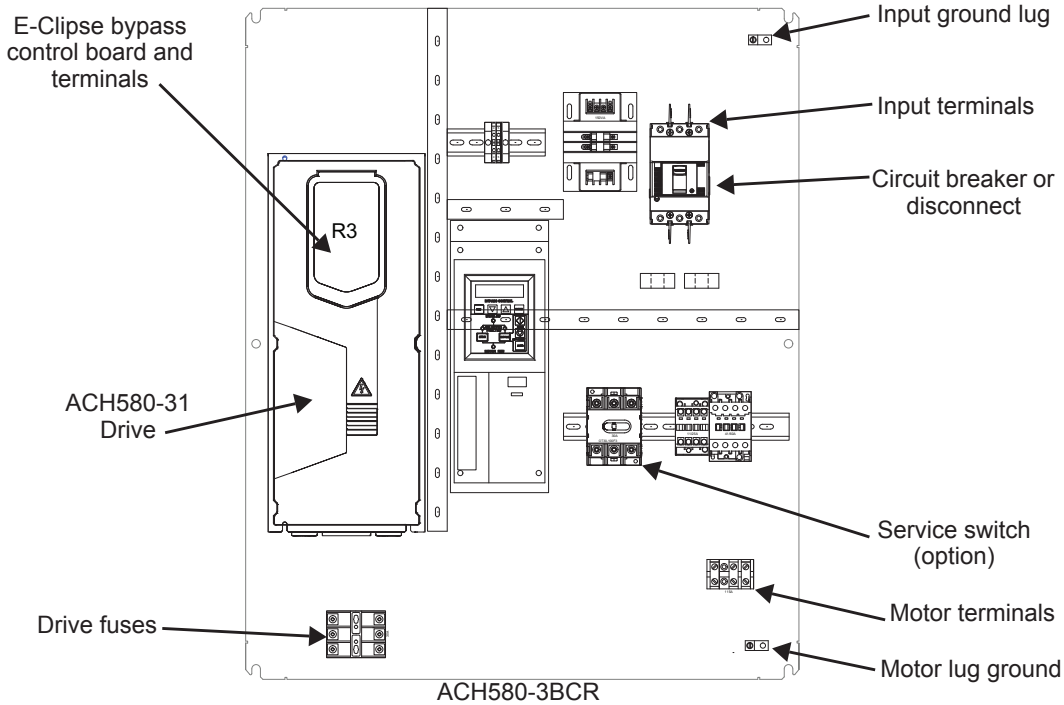
ACH580 Box E-Clipse Bypass units are configured for wiring access from the top (for UL Type 1 and 12). The following figures show the layout and connection points. For drive control wiring see pages *31*-*32*. Maintain appropriate separation of control and power wires.



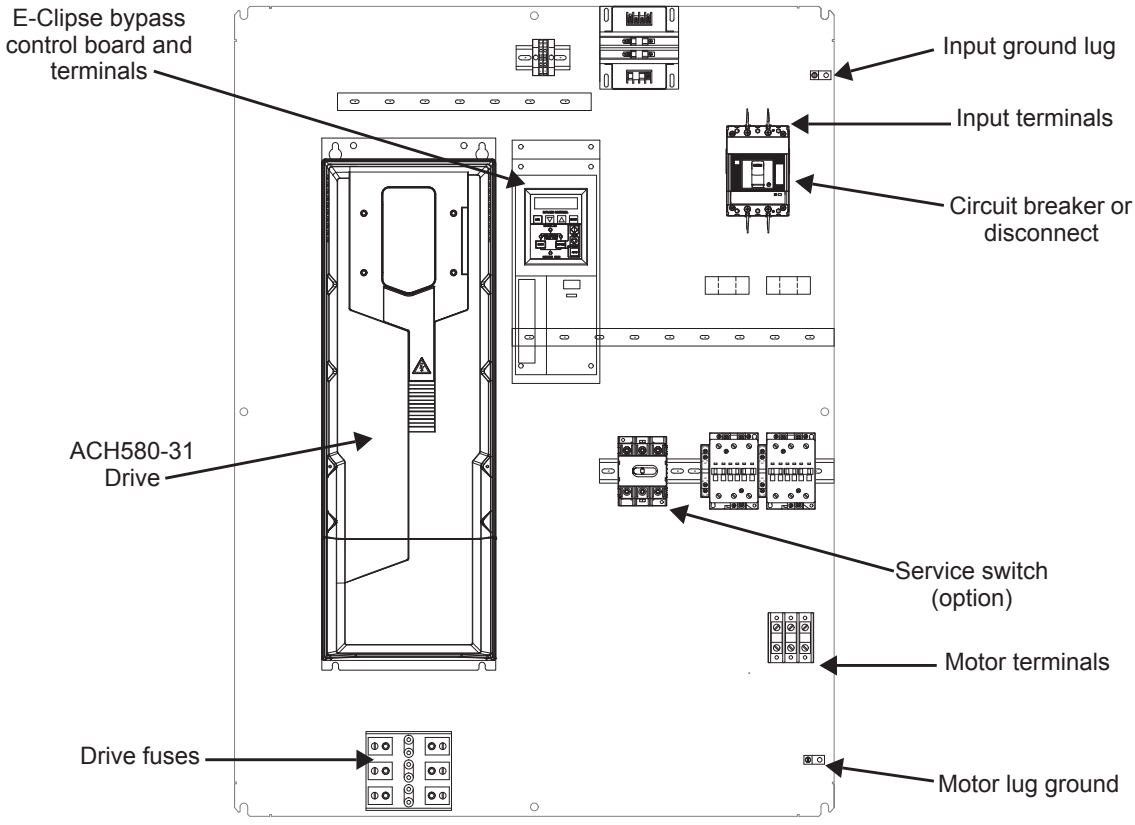
ACH580-3BCR
R3 5-15 HP Type 1



ACH580-3BCR
R6 20-60 HP Type 1



ACH580-3BCR
R3 5-15 HP Type 12



ACH580-3BCR
R6 20-60 HP Type 12

Power connections – Box E-Clipse Bypass configurations

Line input connections

Connect the input power to the terminals at the bottom of the disconnect switch or circuit breaker. Connect the equipment grounding conductor to the ground lug near the input power connection point.

Motor connections

Connect the motor cables to the terminals at the bottom of the bypass section. Connect the motor grounding conductor to the ground lug near the motor cable terminal block connection point.

Note: Route cables through the cable guides on the left side of the enclosure. Use separate conduits for input power and motor cables. Follow the guides to separate the cables from each other.

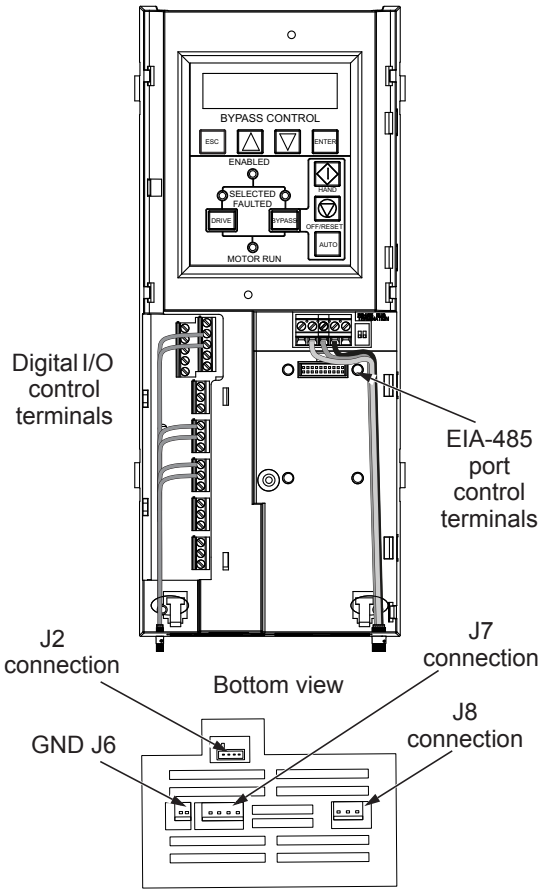
WARNING! Check the motor and motor wiring insulation before connecting the ACH580 to line power. Follow the procedure on page *16*. Before proceeding with the insulation resistance measurements, check that the ACH580 is disconnected from incoming line power. Failure to disconnect line power could result in death or serious injury.

Install the control wiring

Connect control wiring to terminal block X1 on the ACH580 control board and to terminal block X2 on the E-Clipse Bypass control board. For more information on these connections, refer to the following:

- X1 terminal block location and terminal data are defined in the *Installation* instructions for the drive on page *8*.
- X2 terminal block location is illustrated in the figures starting with on page *86*.
- X2 terminal data are provided in *Basic control connections for E-Clipse HVAC Default* on page *94*.
- Basic connections are described in the following paragraphs. Alternate configurations using the E-Clipse Bypass macro are described in the *ACH580 HVAC control program firmware manual*.
- On Terminal Block X1 inside the ACH580, analog inputs and outputs and additional digital input and relay output connections (AI1, AI2, AO1, AO2, DI1…DI6 and RO1…RO6) are available for use.

Note: The E-Clipse Bypass control circuitry uses serial communications connections (X1:29…X1:31) inside the ACH580. These connections are not available for any other purpose and must not be reconfigured.



Basic connections

The figure on page *94* shows the basic control connections for use with the E-Clipse Bypass HVAC Default macro. These connections are described in the following paragraphs.

In typical installations, only analog input wires connect to the ACH580 terminal block, with other control connections made on the E-Clipse Bypass control board.

Use wire ties to permanently affix control/communications wiring to the hooked wire race tie points provided, maintaining a minimum 6 mm (1/4 in.) spacing from power wiring.

Drive's power connection terminals

The following tables list the maximum power and motor cable terminal sizes for connections to an input circuit breaker or disconnect switch, a motor terminal block and ground lugs. The tables also list torque that should be applied when tightening the terminals.

Standard enclosure terminals maximum wire size and terminal torque values

Type Code[1, 3]	Nominal Output Ratings		Base Drive Frame Size	Maximum Wire Size and Terminal Torque			
	Drive Current	Package Power		Circuit Breaker UL Type 1 and 12 (NEMA 1 and 12)	Disconnect Switch UL Type 1 and 12 (NEMA 1 and 12)	Motor Terminals UL Type 1 and 2 (NEMA 1 and 2)	Ground Lugs UL Type 1 and 2 (NEMA 1 and 2
	A	HP					
480 Volts							
ACH580-3BxR-07A6-4	7.6	5	R3	#12 62 in-lbs	#10 55 in-lbs	#6 11-13 in-lbs	#4 35 in-lbs
ACH580-3BxR-012A-4	12	7.5	R3				
ACH580-3BxR-014A-4	14	10	R3	#10 62 in-lbs	#8 55 in-lbs		
ACH580-3BxR-023A-4	23	15	R3		#6 55 in-lbs		
ACH580-BxR-027A-4	27	20	R6	#8 62 in-lbs	#4 55 in-lbs	#1 35 in-lbs	#2 50 in-lbs
ACH580-BxR-034A-4	34	25	R6		#3 55 in-lbs		
ACH580-BxR-044A-4	44	30	R6				
ACH580-3BxR-052A-4	52	40	R6	#2 62 in-lbs	#2 55 in-lbs	#2/0 110 in-lbs	
ACH580-3BxR-065A-4	65	50	R6		#1 55 in-lbs		
ACH580-3BxR-077A-4	77	60	R6		#1/0 75 in-lbs		

1) "BxR" represents both BCR and BDR.
2) BCR is rated 600Y/347V unless otherwise specified. For use on a solidly grounded Wye source only.
3) BCR supports Delta network configuration.
4) BDR is rated 600Y/347V unless otherwise specified. For use on a solidly grounded Wye source only.

Branch circuit protection

Input power is connected to the ACH580 with E-Clipse Bypass through a door interlocked disconnect switch or circuit breaker. Neither of these inputs are fused. The branch circuit that provides power to the ACH580 with E-Clipse Bypass with disconnect switch must include appropriate motor branch circuit protective devices to provide short circuit and ground fault protection for the motor in the bypass mode.

When connected to a 480V power source, the ACH580 with E-Clipse Bypass with the circuit breaker option is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes.

Fuses

Note: The UL listed drive fuse in the table are provided in the purchased product.

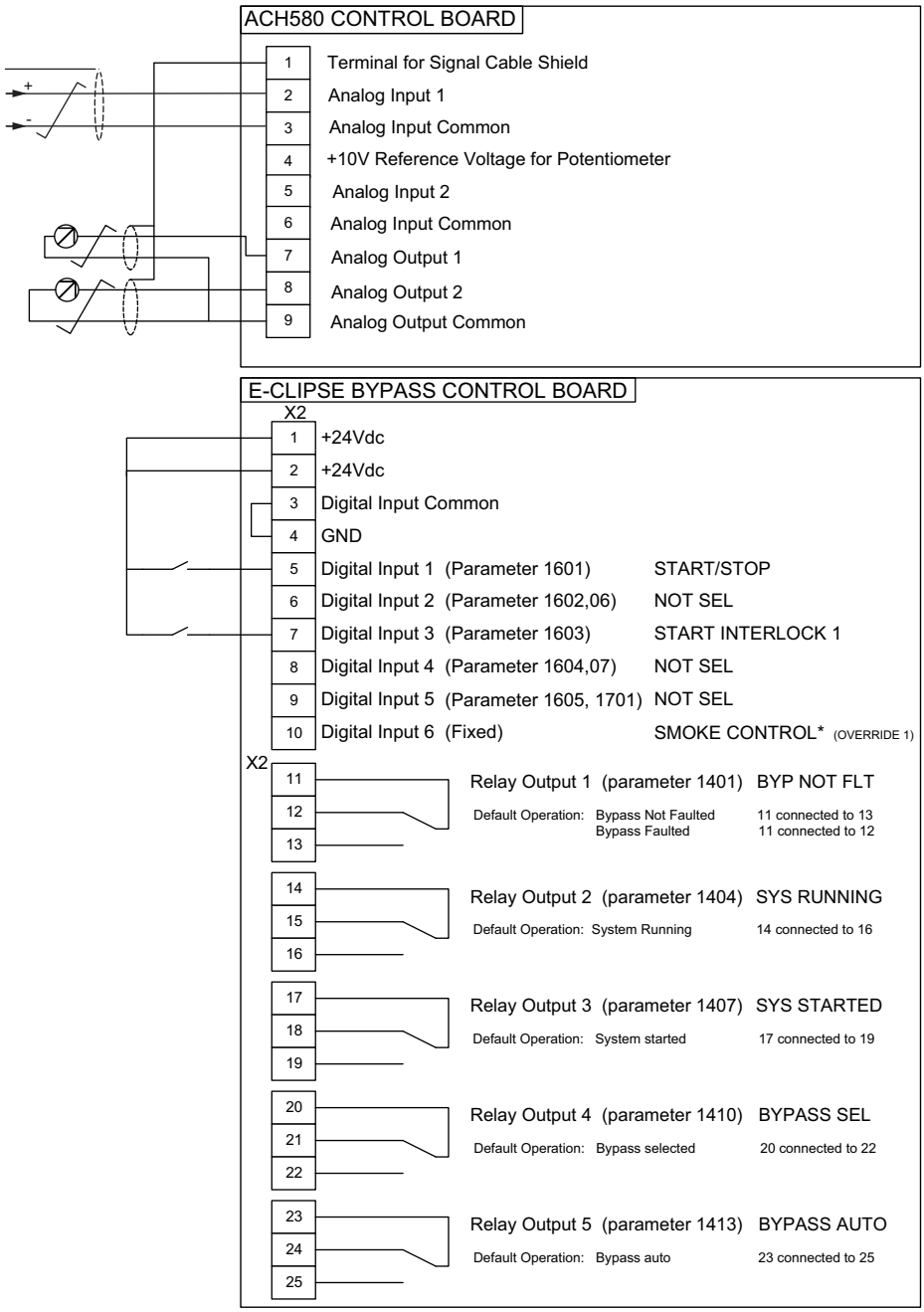
- Replacement fuses are required to be of the same class, current rating, and voltage rating. Fuses from other manufacturers can be used if they meet the specifications given in the table.
- Fuses with higher current rating than specified must not be used.

480 Volt fuses for box enclosures

Type Code	Nominal Output Ratings		Base Drive Frame Size	Internal Drive Fuse Rating	
	Drive Current	Package Power		Class	Max Current Rating
	A	HP			
480 Volts					
ACH580-3BxR-07A6-4	7.6	5	R3	Class CC	15A
ACH580-3BxR-012A-4	12	7.5	R3	Class CC	15A
ACH580-3BxR-014A-4	14	10	R3	Class CC	30A
ACH580-3BxR-023A-4	23	15	R3	Class CC	30A
ACH580-3BxR-027A-4	27	20	R6	Class T	40A
ACH580-3BxR-034A-4	34	25	R6	Class T	60A
ACH580-3BxR-044A-4	44	30	R6	Class T	60A
ACH580-3BxR-052A-4	52	40	R6	Class T	80A
ACH580-3BxR-065A-4	65	50	R6	Class T	90A
ACH580-3BxR-077A-4	77	60	R6	Class T	100A

1) "BxR" represents both BCR and BDR.

Basic control connections for E-Clipse HVAC Default



Parameters Changed Relative to E-Clipse HVAC Default

Parameter Number	Description	Setting

* Smoke Control (Override1) is a fixed input. Closing Digital Input 6 **will** place the E-Clipse Bypass in Smoke Control mode which may reassign the function of the other Digital Inputs. Refer to the Smoke Control (Override1) documentation.

2. Check installation – bypass

Control panel settings and checks

Apply power to the E-Clipse Bypass unit. The ACH580 Control Panel should show the operating status of the drive. If the E-Clipse Bypass Control Panel displays a PHASE SEQ (Phase Sequence) fault, remove power, wait at least 5 minutes and then swap any two input phase wires. If the motor is a standard 460 V, 60 Hz motor connected to a 480 V drive, the default parameter settings should be suitable for the initial tests described below. If the motor's rating is not 460 V, 60 Hz, the Motor Nominal Voltage and Motor Nominal Frequency parameters will need to be properly set before proceeding. Refer to the *ACH580 HVAC control program firmware manual* and set the parameters as required.

Note: The settings for ALL external serial communication between the ACH580 with E-Clipse Bypass and any Building Automation System are configured using the E-Clipse Bypass operator panel. DO NOT attempt to configure the external serial communication connection using the ACH580 operator panel!

The settings for internal communication between the ACH580 and the E-Clipse Bypass are configured at the factory and require no adjustment.

Drive Link recovery procedure

If the ACH580 Drive communication settings are unintentionally changed during setup a "Drive Link Fault", "Drive Link Error" or "Drive Setup" alarm may be displayed. Should this occur, accomplish the following steps in order.

Using the ACH580 Drive Keypad, set Parameter 9521 bit 5 to "Bypass present". This will automatically set up the ACH580 to support the bypass.

System check: motor connected to ACH580 with E-Clipse Bypass

After performing the control panel checks and setting the ACH580 Drive Start-up Data parameters, check the operation of the ACH580 Drive with E-Clipse Bypass with the motor connected as follows:

1. In order to prevent the motor from starting, the system should be in the Drive mode and the drive should be OFF when the power is disconnected at the end of the previous series of control panel settings and checks.
2. Disconnect and lock out power to the E-Clipse Bypass unit, wait at least five minutes before disconnecting power.
3. Connect the motor to the output terminals.

CAUTION: Be aware of the state of the contacts before applying power.

If the Advanced Override (Override 2) input contact is closed, the motor will start across the line as soon as power is applied.

If the Start Interlock and Run Permissive input contacts are closed and the Smoke Control (Override 1) input contact is closed, the motor will start across the line as soon as power is applied.

If the Start/Stop, Start Interlock and Run Permissive input contacts are closed and the system is in the Bypass mode and in either Hand or Auto, the motor will start across the line as soon as power is applied.

If the Start/Stop, Start Interlock and Run Permissive input contacts are closed and the system is in the Drive mode with the drive in either Hand or Auto mode, the motor will start on the drive as soon as power is applied.

In order to prevent the motor from running without disconnecting the motor, open the Run Permissive and Safety Interlock contacts on bypass control board terminals X2:2, X2:3 and X2:4 before applying power. Set the bypass to Drive mode and the drive to OFF.

---

4. Apply power to the E-Clipse Bypass unit. The ACH580 Control Panel display should be illuminated. On the bypass control panel, both the display and Enabled LED should be illuminated. If the Enabled LED is not illuminated solid green, check to see that closed contacts or jumpers connect terminal X2:3 to X2:4 and X2:2 to X2:7 on the bypass control board.
5. The Drive Selected LED should be illuminated. If not, press the Drive Select key to switch to Drive mode. Leave the system in the Drive mode when proceeding to the next step.
6. Press the Hand key on the ACH580 Control Panel. Press and hold the UP key until the motor just starts rotating.

Note: If the ACH580 Control Panel displays an Overcurrent, Short circuit or Earth leakage fault, disconnect and lock out power to the E-Clipse Bypass unit. Wait at least 5 minutes. Disconnect the motor leads from the E-Clipse Bypass unit and Megger each motor lead to ground to determine if the motor is good. Check the power leads from the Drive / Bypass to the motor for damaged or improper wiring. If the ACH580 Control Panel displays any other drive faults, correct the fault condition before proceeding to the next step.

CAUTION: Check motor rotation direction as soon as the motor begins to move. If motor does not rotate in the correct direction, shut down the drive, disconnect and lock out power to the drive and wait five minutes. Swap any two motor output wires (T1, T2, and T3). Incorrect motor rotation direction may cause equipment damage.

7. Increase the speed to 60 Hz or the highest safe operating speed.
8. Press the OFF key on the drive control panel. The motor should stop.

   If the drive does not operate according to these steps, refer to the *ACH580 HVAC control program firmware manual*.

   If the drive operates according to these steps, your ACH580 with E-Clipse Bypass is ready to use with preset or modified macro settings.

Note: The settings for ALL external serial communication between the ACH580 with E-Clipse Bypass and any Building Automation System are configured using the E-Clipse Bypass operator panel. DO NOT attempt to configure the external serial communication connection using the ACH580 operator panel!

The settings for internal communication between the ACH580 and the E-Clipse Bypass are configured at the factory and require no adjustment.

Note: On the ACH580 drive, Parameter 9521, bit 5 must be set for proper operation with the E Clipse Bypass. When this bit is set, the following ACH580 parameter values are set and write protected:

Parameter	Value
20.01 – Ext1 commands	14 – Embedded fieldbus
20.02 – Ext1 start trigger type	1 – Level
20.06 – Ext2 commands	14 – Embedded fieldbus
20.07 – Ext2 start trigger type	1 – Level
20.40 – Run permissive	15 – Embedded fieldbus
20.41 – Start interlock 1	15 – Embedded fieldbus
20.42 – Start interlock 2	1 – Not used
20.43 – Start interlock 3	1 – Not used
20.44 – Start interlock 4	1 – Not used
58.01 – Protocol	1 – Modbus RTU
58.04 – Baud rate	6 – 76.8kbits/s

Parameter	Value
58.05 – Parity	2 – 8 EVEN 1
58.25 – Control profile	5 – DCU profile
58.34 – Word order	0 – HI-LO

Refer to the *ACH580-01 Firmware manual* for programming instructions.

Note: Primary Settings and E-Clipse Bypass Not to be used to configure parameters above which include:

- Start/Stop
- Interlocks & Permissive
- Communications

Note: Run motor from drive before attempting bypass operation.

System check: motor disconnected from the ACH580 with E-Clipse Bypass

If you are familiar with the E-Clipse Bypass operation, you may skip the following section. Otherwise, after performing the system checks and setting the ACH580 Drive Start-up Data parameters, become familiar with the operation of the ACH580 Drive with E-Clipse Bypass without the motor connected as follows:

1. Disconnect and lock out power to the E-Clipse Bypass unit, wait at least five minutes after disconnecting power.
2. Disconnect the motor from the E-Clipse Bypass unit.
3. Apply power to the E-Clipse Bypass unit by turning on the branch circuit disconnect device and the bypass disconnect switch or circuit breaker.
4. The ACH580 Control Panel display should be illuminated. On the E-Clipse Bypass control panel, both the display and *Enabled* LED should be illuminated. If the *Enabled* LED is not illuminated solid green, check to see that closed contacts or jumpers connect terminal X2:3 to X2:4 and X2:2 to X2:7 on the bypass control board.
5. On the E-Clipse Bypass control panel, either the *Drive Selected* or *Bypass Selected* LED should be illuminated. Pressing the *Drive Select* or *Bypass Select* key should switch the bypass back and forth between the *Drive* mode and the *Bypass* mode as indicated by the LEDs above each button. Check that the bypass control panel switches the system between modes. Leave the system in the Bypass mode when proceeding to the next step.
6. Check to see that pressing the:
   - *Auto* key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate “*Bypass in Auto*”.
   - *Hand* key on the bypass control panel generates a Motor Phase Fault.
   - Under normal conditions (motor connected) pressing the *Hand* key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate “Hand #A Run”.

- *OFF* key on the bypass control panel causes the bottom line on the E-Clipse Bypass display to indicate “Off Stop”.

7. For Steps 8 through 14, ACH580 Drive Parameter 9904 must be set to “Scalar”. After successful completion of Step 13, Parameter 9904 may be set to “Vector” if very specific application requirements make it necessary to use this type of motor control. Operation using the “Vector” setting is unnecessary for control of almost all fan and pump applications. Refer to the *ACH580 Firmware manual* for details on setting parameters.
8. Press the *Drive Select* key on the E-Clipse Bypass
   - 2 control panel. The *Drive Select* LED should be illuminated.
9. Check to see that pressing the:
   - *Auto* key on the bypass control panel causes the E-Clipse Bypass display to indicate “*Bypass in Auto*”.
   - *Hand* key on the bypass control panel causes no change to the E-Clipse Bypass display.
   - *OFF* key on the bypass control panel causes the E-Clipse Bypass display to indicate “*Bypass in Off”.*
10. Press the *HAND* key on the drive control panel. Note that the top line of the control panel display indicates “HAND” and run as a clockwise rotating arrow. The *Drive Run* LED on the E-Clipse Bypass control panel should be illuminated.
11. Press the *UP* arrow on the drive control panel. Note that the speed reference indication in the top line of the drive control panel display increases from “0.0% SP.”
12. In the middle line of the drive control panel display, the output current indication should indicate “0.0 A.”
13. Press the *DOWN* arrow on the drive control panel until the speed and frequency indications return to “0.0.”
14. Press the *OFF* key on the drive control panel. Note that the bottom line of the drive control panel display indicates “Off.”

    If the ACH580 Drive and E-Clipse Bypass operate according to these steps, and you have familiarized yourself with their operation, disconnect and lock out power to prepare for the next test.

WARNING! Frame R3: Measure the voltage between the drive’s UDC+ terminal and grounding terminal (PE) with one multimeter. As there is no UDC- terminal, measure the voltage between the drive’s T1/U terminal and grounding terminal (PE) with another multimeter. Ensure the voltage difference between the two multimeters is near 0V.

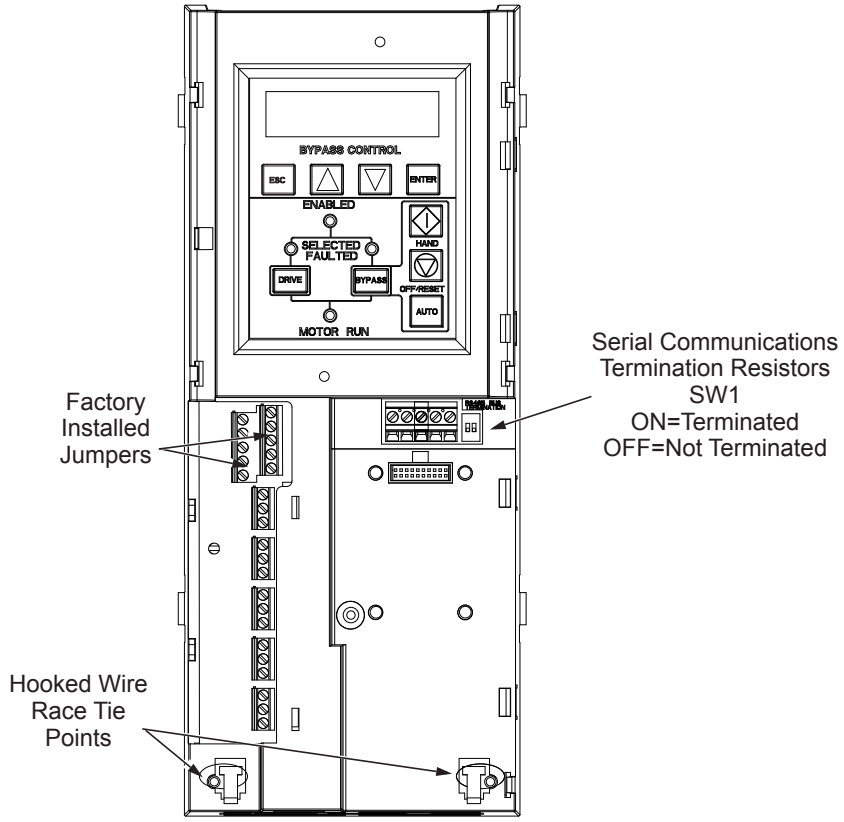
If the drive does not operate according to these steps, refer to the *ACH580 Hardware manual*.

3. Check jumpers and switches

The settings described in this section are factory set and, for most situations, do not require adjustment. However, it is a good practice to review these settings to confirm that they are appropriate for the configuration installed.

Jumper and switch locations

The figure below shows the locations of the SW1 DIP switch on the E-Clipse Bypass control board. The function and setting of this switch is explained in the following paragraph.



DIP switch settings

The DIP switch is used to configure the serial communications termination resistors.

To reduce noise on the serial communications network, terminate the EIA-485 network using 120 ohm resistors at both ends of the network. Use the DIP switches to connect or disconnect the on-board termination resistors. Both switches must be positioned in the ON or OFF position to correctly configure the termination resistors.

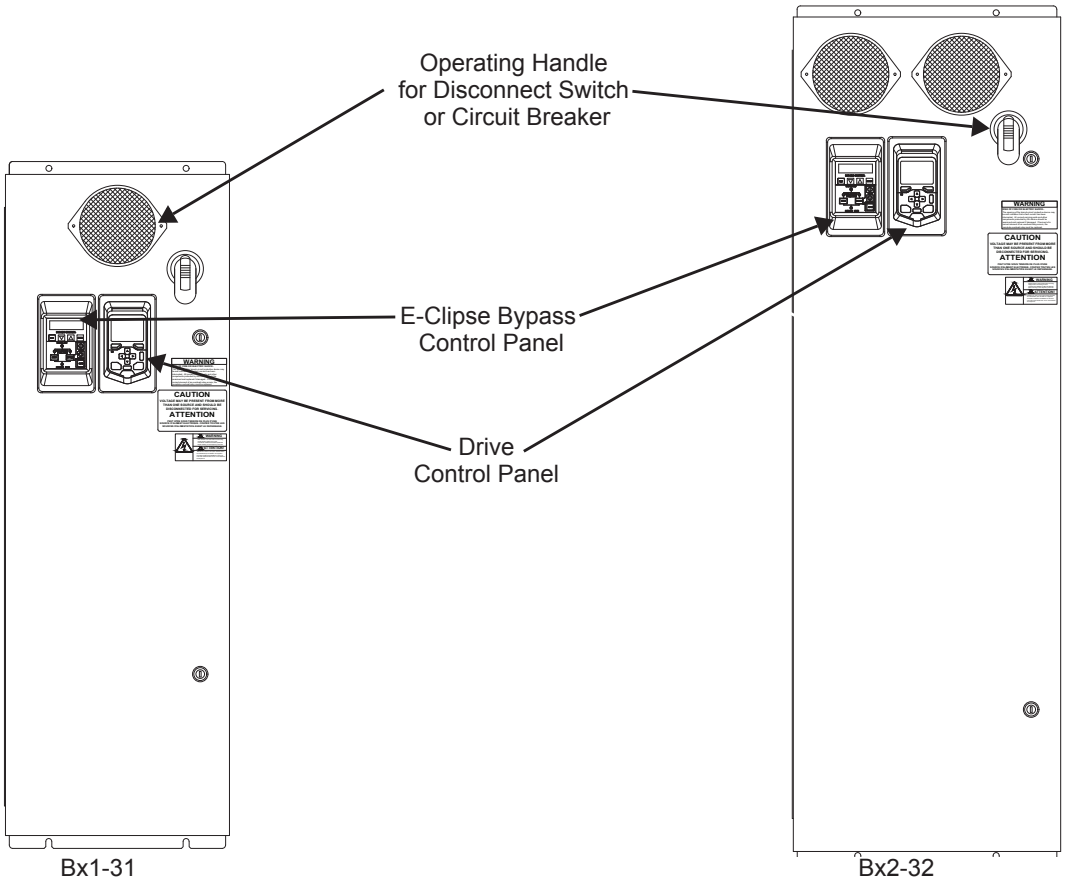
Operation

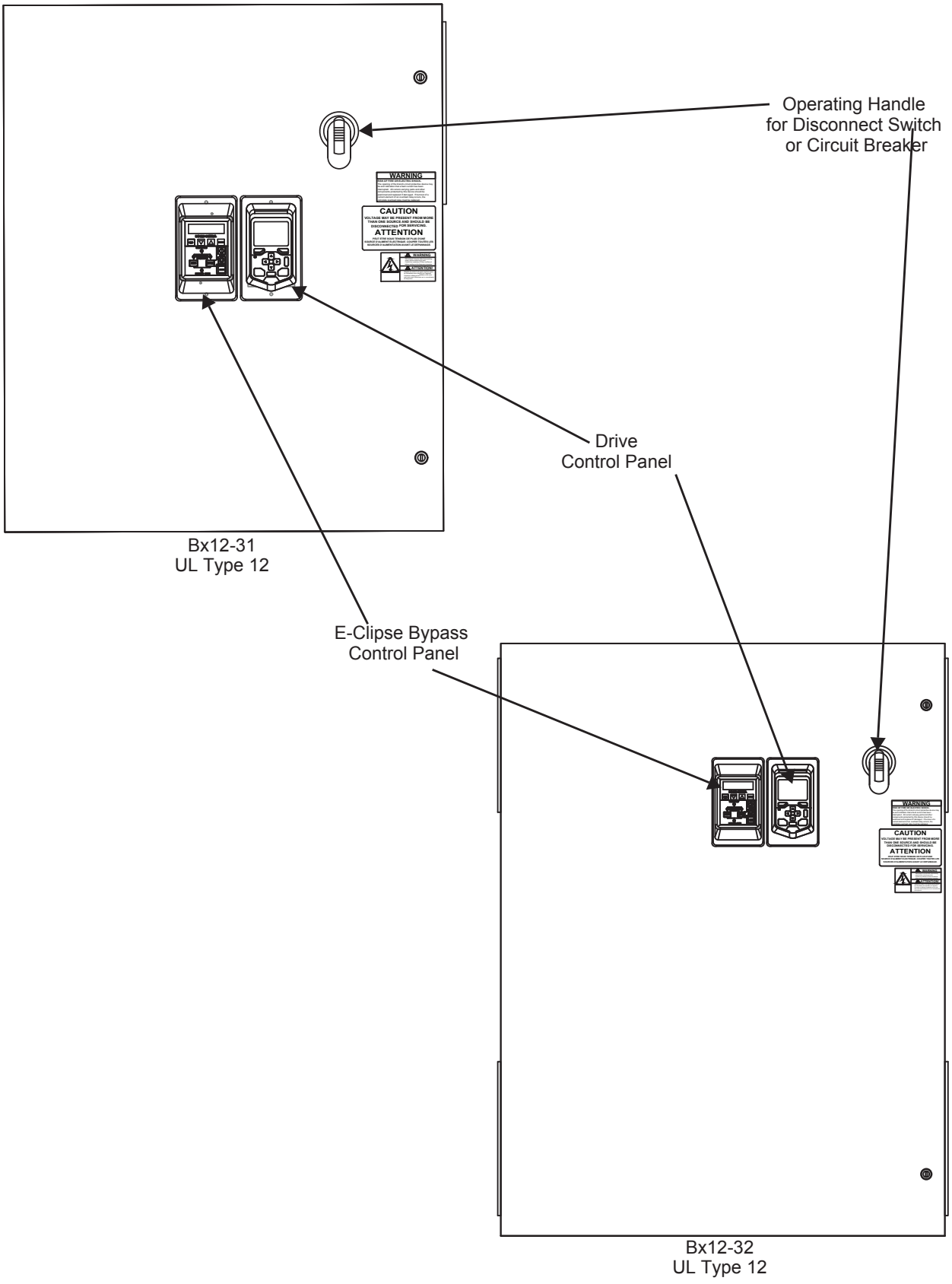
E-Clipse bypass configurations

The ACH580 with E-Clipse Bypass is an ACH580 AC adjustable frequency drive in an integrated UL Type 1 or UL Type 12 package with a bypass motor starter. The ACH580 with E-Clipse Bypass provides:

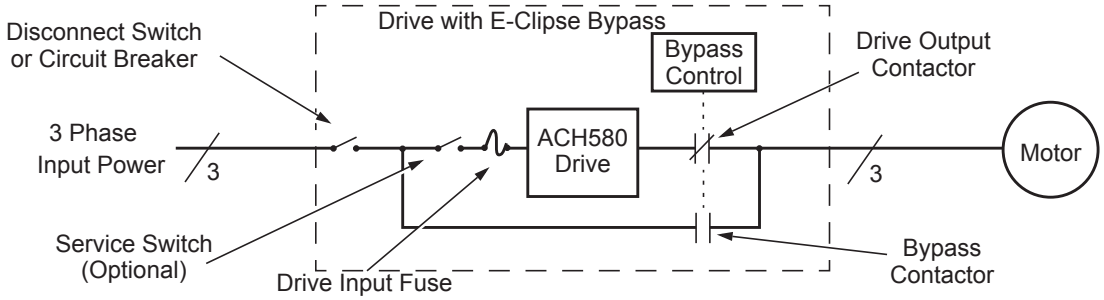
- Disconnect switch or circuit breaker with door mounted control lever. The lever can be padlocked in the OFF position (padlock not supplied).
- Bypass starter.
- Motor overload protection.
- Local operator panel with indicating lights and multifunction display.
- Provisions for external control connections.
- Embedded communications for major BMS protocols including BACnet, Johnson Controls International N2 and Modbus.
- Optional fieldbus adapters for connection to additional BMS protocols including LonWorks and Ethernet.
- Optional drive service switch (drive input disconnect), the functional equivalent of a three-contactor bypass arrangement.

The following shows the front view of the ACH580 Box E-Clipse Bypass configurations and identifies the major components.



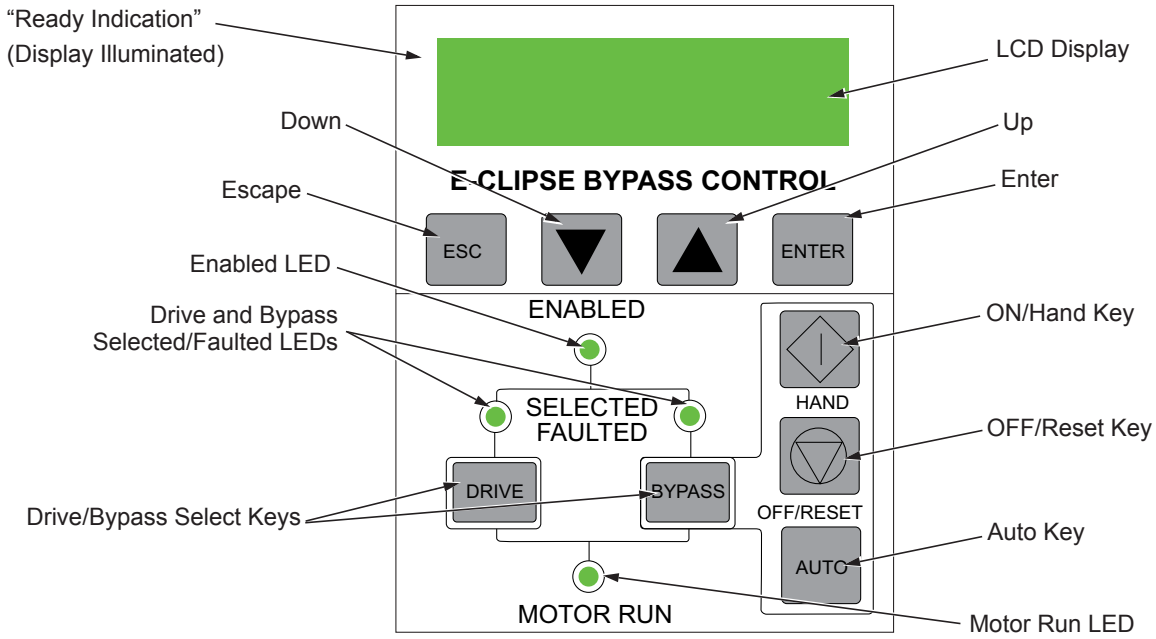

Operating Handle
for Disconnect Switch
or Circuit Breaker
Drive
Control Panel
E-Clipse Bypass
Control Panel
Bx12-31
UL Type 12
Bx12-32
UL Type 12

The following is a typical power diagram.



Bypass control

The bypass control panel features:



Ready (Power On) Indication

The *Ready (Power On) indication* is provided by the bypass control panel. The bypass control panel display will be illuminated and text will be displayed when the disconnect switch or circuit breaker is closed and control power is applied to the bypass.

Enabled LED

The *Enabled LED* is illuminated green under the following conditions:

- Both the Start Interlock(s) and Run Permissive contacts are closed.
- The Start Interlock contact(s) are closed with no Start command present.

The Enabled LED flashes green if the Run Permissive contact is open, the Safety Interlock contact(s) are closed, and Start command is present.

The Enabled LED is illuminated red when the Start Interlock contact(s) are open.

Motor Run LED

The *Motor Run LED* is illuminated green when the motor is running in either bypass mode or in drive mode. The Motor Run LED flashes green to indicate the system has been placed in an Override condition.

Bypass Faulted LED

The *Bypass Faulted LED* is illuminated or flashes red when the motor or bypass protection functions have shut down the bypass. The specific nature of the fault is indicated on the bypass control display. Refer to the *Diagnostics* section of this manual for more details.

Drive Selected LED

The *Drive Selected LED* is illuminated green when the drive has been selected as the power source for the motor and no drive fault is present.

Bypass Selected LED

The *Bypass Selected LED* is illuminated or flashes green when the bypass has been selected as the power source for the motor and no bypass fault is present.

Drive Faulted LED

The *Drive Faulted LED* is illuminated red when the bypass has lost its communications link with the drive or when the motor or drive protection functions have shut down the drive. The specific nature of the fault is indicated on the drive control panel display. Refer to the *Diagnostics* section on page *108* of the ACH580-UH User's Manual for more details.

Automatic Transfer

The *Automatic Transfer* indication is provided on the bypass control panel. The bypass control display will continuously flash an alarm to indicate the system has automatically transferred to Bypass after a Drive fault. The Bypass Selected LED flashes green when the system has automatically transferred to bypass operation. The bypass event log will also record this event.

Auto Indication

The *Auto Indication* is provided on the bypass control panel default display when the bypass control panel Auto key is pressed. Normally this indicates that the Auto Start contact or serial communications has been selected as the means for starting and stopping the motor in the bypass mode.

Off Indication

The *Off Indication* is provided on the bypass control panel default display when bypass control panel Off key is pressed.

Hand Indication

The *Hand Indication* is provided on the bypass control panel default display when the motor has been started manually in the bypass mode.

Drive Select Key

The *Drive Select Key* selects the drive as the power source for the motor.

Bypass Select Key

The *Bypass Select Key* selects the bypass as the power source for the motor.

Off/Reset Key

The *Off/Reset Key* may be used to manually stop the motor if the motor has been running on bypass power. The Off/Reset key also resets most bypass faults. It may take several minutes before the bypass can be reset after an overload trip. If a bypass fault condition is present the second press of this key places the bypass in the OFF mode.

Auto Key

The *Auto Key* selects the Auto Start contact or serial communications as the means for starting and stopping the motor in the bypass mode.

Hand Key

The *Hand Key* can be used to manually start the motor when the bypass has been selected as the power source for the motor.

Bypass control panel modes

The HVAC Bypass Control Panel has several different modes for configuring, operating and diagnosing the bypass. Select MENU and use the UP/DOWN buttons to select modes. The modes are:

- Default Display mode – Provides (HAND/OFF/AUTO) indication of the bypass operating control mode.
- Bypass Status mode – Provides status indications of the current system operating conditions.
- Start-Up Parameter Mode – Provides a list of parameters or operating conditions that may be configured or viewed during startup.
- Parameter List mode – Used to edit parameter values individually.
- Changed Parameter mode – Displays changed parameters.
- Bypass Fault Display mode – If there is an active bypass fault, the control panel will flash the fault number and fault diagnostic indication in English.
- Bypass Alarm Display mode – If there is an active bypass alarm, the control panel will flash the alarm number and alarm diagnostic indication in English.

Start-up by changing the parameters from the start-up list

To change the parameters, follow these steps:

1	The **Default Display** indicates the **Bypass Control** mode.		DRIVE SELECTED BYPASS IN OFF
2	Press **ENTER** to enter the **Main Menu.**	ENTER	*BYPASS STATUS STARTUP PARAMS
3	Select the **Startup Params** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	BYPASS STATUS *STARTUP PARAMS
4	Select the appropriate **Parameter** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	*1601 START/STOP 1613 BP DISABLE
5	Press the **Up/Down** arrows to change the **Parameter Value**.	▼ ▲	1601 START/STOP [1:DI1]
6	Press **ENTER** to store the modified value or press **ESC** to leave the **Parameter Edit** mode.	ENTER or ESC	*1601 START/STOP 1613 BP DISABLE
7	Press **ESC** to return to the **Main Menu**, and again to return to the. **Default Display**.	ESC	DRIVE SELECTED BYPASS IN OFF

Start-up by changing the parameters individually from the parameter list

To change the parameters, follow these steps:

1	The **Default Display** indicates the **Bypass Control** mode.		DRIVE SELECTED BYPASS IN OFF
2	Press **ENTER** to enter the **Main Menu.**	ENTER	*BYPASS STATUS STARTUP PARAMS
3	Select the **Parameter List** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	STARTUP PARAMS *PARAMETER LIST
4	Select the appropriate **Parameter Group** with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	14 RELAY OUT *16 SYSTEM CTRL
5	Select the appropriate **Parameter** in a group with the **Up/Down** arrows and press **ENTER**.	▼ ▲ ENTER	*1601 START/STOP 1602 PERMISSIVE

6	Press the **Up/Down** arrows to change the **Parameter Value**.		1601 START/STOP [1:DI1]
7	Press **ENTER** to store the modified value or press **ESC** to leave the **Parameter Edit** mode.	ENTER or ESC	*1601 START/STOP 1602 PERMISSIVE
8	Press **ESC** to return to the listing of **Parameter Groups**, and again to return to the **Main Menu**.	ESC ESC	*16 SYSTEM CTRL 17 OVERRIDE
9	Press **ESC** to return to the **Default Display** from the **Main Menu.**	ESC	DRIVE SELECTED BYPASS IN OFF

Note: In the Parameter Edit mode the current parameter value appears below the parameter name.

Note: To view the default parameter value, press the **Up/Down** arrows simultaneously. Press **Enter** to restore the default parameter value or press **ESC** to leave the **Parameter Edit** mode.

Diagnostics

Fault listing

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3001	COIL CURR FBK	RBCU is sensing abnormal current feedback when neither contactor should be energized	Defective component on RBCU	Change RBCU
3002	BYP CNTACT STUCK	M2 contactor indicates it is not prepared to move on a power up check of the contactor or after contact is commanded to open	Defective Contactor Defective RBCU	Disconnect incoming power from unit Check if contactor armature moves freely. If armature moves freely, then change the RBCU. If armature does not move freely, then change individual contactor (M2) or the complete assembly (RCSA-0x)
3003	DRV CNTACT STUCK	M1 contactor indicates it is not prepared to move on a power up check of the contactor or after contact is commanded to open	Defective Contactor Defective RBCU	Disconnect incoming power from unit Check if contactor armature moves freely. If armature moves freely, then change the RBCU. If armature does not move freely, then change individual contactor (M1) or the complete assembly (RCSA-0x)
3004	BYPASS COIL OPEN	M2 contactor will not close when commanded to do so	Loose J8 connector on RBCU (refer to page *91* for the J7 connector location) Loose wires on contactor terminals A1 and/or A2 Bad Output on RBCU Bad Contactor	Verify that J8 connector is firmly seated. (refer to page *91* for the J7 connector location) With incoming power disconnected, check for tightness of A1 and A2 terminals Swap RBCU Change Contactor/ Assembly
3005	DRIVE COIL OPEN	M1 contactor will not close when commanded to do so	Loose J8 connector on RBCU (refer to page *91* for the J7 connector location) Loose wires on contactor terminals A1 and/or A2 Bad Output on RBCU Bad Contactor	Verify that J8 connector is firmly seated. (refer to page *91* for the J7 connector location) With incoming power disconnected, check for tightness of A1 and A2 terminals Swap RBCU Change Contactor/ Assembly

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3006	UNDERVOLTAGE	Fault will be generated only if the drive is controlling the motor and the power to the bypass is removed before the drive shuts down. This fault is generated when the drive contactor opens while the drive is operating.	Loose J7 connector on RBCU unit (refer to page *91* for the J7 connector location) Loose input wiring Incoming power problems	Check that J7 connector is firmly seated in RBCU (refer to page *91* for the J7 connector location) Check tightness of incoming connections Check Parameter 0413 to view voltage level at time of trip Check upstream protection
3008	DRIVE AI2 LOSS	Only displayed when in Supervisory mode. Indicates that AI2 on the drive has failed.	Check connections on drive	Check connections on drive
3009	MTR OVERLOAD	Bypass opens on motor overload conditions defined in the drive	Drive Mode: Bad Motor Bad CTs Bad RBCU Bypass mode: Bad motor Bad CTs Bad RBCU Either mode: low input voltage	Check if overload condition exists Drive Mode: Refer to ACH580 manual for proper troubleshooting techniques Bypass Mode: Check that J2 connector is firmly seated in RBCU (refer to page *91* for the J7 connector location) Use clam p meter to verify mtr current vs. display in parameter 0101 Check input voltage
3010	INP PHASE A LOSS	Fault will be generated when the bypass contactor is requested to be closed and the RBCU does not sense voltage on Phase A	Loose J7 connector (refer to page *91* for the J7 connector location) Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector (refer to page *91* for the J7 connector location) Check yellow wire on input block Check incoming voltage, phase to ground
3011	INP PHASE B LOSS	Fault will be generated when the bypass contactor is requested to be closed and the RBCU does not sense voltage on Phase B	Loose J7 connector (refer to page *91* for the J7 connector location) Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector (refer to page *91* for the J7 connector location) Check black wire on input block Check incoming voltage, phase to ground

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3012	INP PHASE C LOSS	Fault will be generated when the bypass contactor is requested to be closed and the RBCU does not sense voltage on Phase C	Loose J7 connector (refer to page *91* for the J7 connector location) Loose wiring on Contactor assembly. Blown upstream fuse	Check J7 connector (refer to page *91* for the J7 connector location) Check red on input block Check incoming voltage, phase to ground
3013	DRIVE 1ST START	Fault generated if attempting to close the bypass contactor with out running the bypass in drive mode first.	NA	Run bypass unit in drive mode before attempting bypass mode
3014	COIL POW SUPPLY	Coil power supply has failed to reach rated voltage	Internal failure on RBCU unit Shorted contactor coil	Cycle power on bypass unit. If contactor coil is shorted, fault 3023 or 3024 will be generated. If 3023 or 3024 is generated, replace respective contactor If 3023 or 3024 is not generated on power up, replace RBCU unit.
3016	EARTH FAULT	Declared if attempting to close the bypass contactor when the drive has earth fault declared	Earth fault in motor	Refer to the fault code A2B3 on page *50*.
3017	MTR UNDERLOAD	If motor power(%) level falls below minimum power level establish in parameter 3003 for the time (s) set in parameter 3002 fault will be generated. Parameter 3003 is a percentage of motor power as defined in the drive via parameter 9909. Fault only applies to bypass mode	Broken belt	Check load Reset bypass keypad Check fault code A780 on page *55*, for further action
3018	MAX CYCLE FAULT	Supervisory Mode only. Declared if bypass contactor is closed by supervisory control 16 times within a 1 hour period.	High and low levels of hysteresis band are too tight	Check parameters 3202-3205. Increase time delays on parameters 3204 and 3205
3019	DRIVE LINK FAULT	Supervisory Mode Only. Fault generated if RS-485 link between drive and bypass stops communicating.	Bad cable/connection between drive and bypass. Drive parameter 95.21, bit 5 not set for “Bypass present”	Proper seating of cable in drive and RBCU (connector J3) Check that drive parameter 95.21, bit 5 = “Bypass present” Check drive Group 58 Follow DriveLink recovery procedure

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3020	PHASE SEQ	Sequence of 3 phase voltage input is such that bypass operation will result in motor rotation opposite of drive forward operation.	Phase sequence unknown at time of wiring	Swap any two of the three input wires to the bypass unit
3021	PH A CURR FBK	Fault is generated when current in Phase A is detected and the bypass contactor is open	Loose CT connection Bad RBCU Bad CT	Check J2 connector for proper seating Check connector on Current Assembly Replace RBCU Replace RCSA unit
3022	PH C CURR FBK	Fault is generated when current in Phase C is detected and the bypass contactor is open	Loose CT connection Bad RBCU Bad CT	Check J2 connector for proper seating Check connector on Current Assembly Replace RBCU Replace RCSA unit
3023	BYP COIL SHORTED	Coil characteristics are checked only on power up and coil current is greater than allowable values	Shorted contactor coil Shorted/damaged cable Bad RBCU	Replace RBCU Replace RCSA unit
3024	DRV COIL SHORTED	Coil characteristics are checked only on power up and coil current is greater than allowable values	Shorted contactor coil Shorted/damaged cable Bad RBCU	Replace RBCU Replace RCSA unit
3027	INVALID SUB ASM	Contactor assembly as recorded in the RBCU unit does not match drive information communicated via 485 link	RBCU unit from a different size bypass used to replace a defective RBCU. Parameters not matched after Firmware change.	Contact ABB at 1-800-HELP-365 Option 4
3028	EXT COMM LOSS	Time between fieldbus messages has exceeded timeout interval set with parameter 3005	Incorrect Communication settings in Group 51 & 53. Poor Connections Noise on Communication Line	Check Group 51 & 58 Tighten Connections Check Communication Cable Grounding
3029	EFB CONFIG FILE	Error reading configuration file for embedded fieldbus	Internal Startup error	Cycle Power Replace RBCU
3030	FORCE TRIP	Fault trip forced by external fieldbus	Overriding Control System tripped E-Clipse unit via fieldbus.	Check Overriding Control System

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3031 ... 3033	EFB 1...EFB 3	Fault code reserved for embedded fieldbus.	For Bacnet: Device object instances for the drive and or bypass are set greater than 4194302 in parameters 5011 5017 and or 5311 5317 respectively	Check Parameters 5011, 5017 and/or 5811, 5817
3034	MTR PHASE	Detects open motor phase. Detection is done by current transformers in bypass unit.	Internal problem Cable problem Motor problem	Check wiring in E-Clipse Unit Check motor cabling Check Motor Check if 3006 is Disabled
3037	PCB TEMP	RBCU unit has reached 190 degrees Fahrenheit, 88 degrees Celsius	Cabinet cooling has failed Ambient conditions too high Bad RBCU unit	Stop drive and let cool down and restart Add additional cooling Replace RBCU
3038	NO DRIVE DATA	No drive data available	Bypass not able to extract drive data on initial power up due to: Bad cable/connection between drive and bypass. Drive parameter 95.21, bit 5 not set for “Bypass present”	Proper seating of cable in drive and RBCU (connector J3) Check that drive parameter 95.21, bit 5 = “Bypass present” Check drive Group 58 Follow DriveLink recovery procedure then cycle power to bypass.
3039	FBA PAR CONF	Non embedded fieldbus has detected an error in Group 51 parameters	Incorrect settings in Group 51	Verify Group 51 parameters
3101	SFLASH CORRUPT	Internal checksum error	NA	Cycle power Replace RBCU Upgrade firmware
3102	PMAP FILE	Parameter file is corrupt		Cycle Power Contact ABB with information that preceded fault
3201	T1 OVERLOAD	T1 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3202	T2 OVERLOAD	T2 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU

Fault Code	Fault Name In Panel	Fault	Possible Cause	Corrective Action
3203	T3 OVERLOAD	T3 program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3204	STACK OVERFLOW	Program cycle is overloaded	NA	Contact ABB with information that proceeded fault Cycle Power Replace RBCU
3205	UNKNOWN CB	Bypass control board type is unknown.	NA	Contact ABB with information that proceeded fault
3206	UNKNOWN DRIVE	Drive reports rating not found in bypass software	Drive does not match drives configured in bypass RBCU	Replace RBCU or reload with most current firmware
3207	UNKNOWN BYPASS	NA	NA	Replace RBCU or load most current firmware Contact ABB at 1-800-HELP-365 option 4 Replace RBCU or load most current firmware

Warning listing

The following table lists the warnings by code number and describes each.

Warning Code	Warning Name In Panel	Warning	Possible Cause	Corrective Action
4001	INP PHASE A LOSS	Warning will occur in drive mode. In bypass, warning will occur if bypass contactor has not closed. Unit will trip on Fault 3010 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check yellow wire on input block Check incoming voltage, phase to ground
4002	INP PHASE B LOSS	Warning will occur in drive mode. In bypass, warning will occur if bypass contactor has not closed. Unit will trip on Fault 3011 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check black wire on input block Check incoming voltage, phase to ground
4003	INP PHASE C LOSS	Warning will occur in drive mode. In bypass, warning will occur if bypass contactor has not closed. Unit will trip on Fault 3012 if the bypass contactor is closed	Loose J8 connector Loose wiring on Contactor assembly. Blown upstream fuse	Check J8 connector Check red wire on input block Check incoming voltage, phase to ground
4004	AUTO TRANSFER	Message is displayed when the drive faults and the bypass switches to bypass mode as configured in Parameter 1608	Drive fault	Check drive
4005	EXT COMM ERR	Time between fieldbus messages has exceeded timeout interval set with parameter 3005	Incorrect Communication settings in Group 51 & 53. Poor Connections Noise on Communication Line	Check Group 51 & 58 Tighten Connections Check Communication Cable Grounding
4006	Selected by PAR 1620: PERMISSIVE DAMPER END SWITCH VALVE OPENING PRE-LUBE CYCLE	Warning will occur when start order is given and the “Permissive” is not present	Permissive condition is not satisfied. Bad 24v supply Bad digital input	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 for status of digital input
4007	PCB TEMP	RBCU unit reached 181 degrees Fahrenheit, 83 degrees Celsius	Cabinet cooling has failed Ambient conditions too high Bad RBCU unit	Stop drive and let cool down and restart Add additional cooling Replace RBCU

Warning Code	Warning Name In Panel	Warning	Possible Cause	Corrective Action
4008	DRIVE SETUP	Warning generated when configuration of drive is such that bypass can not properly control the drive. Specifically, drive parameters 10.01, 10.02, 16.01, 16.08	Incorrect parameters settings	Check that drive parameter 95.21, bit 5 = “Bypass present”
4009	BYPASS RUN DELAY	Warning is generated when a bypass start command is issued and there is non zero time value in bypass parameter 1614	NA	NA
4010	MTR OVERLOAD	Bypass warning if motor overload conditions exist as defined in the drive	Drive Mode: Bad Motor Bad CTs Bad RBCU Bypass mode: Bad motor Bad CTs Bad RBCU Either mode: low input voltage	Drive Mode: Refer to ACH580 manual for proper troubleshooting techniques Bypass Mode: Check that J2 connector is firmly seated in RBCU Check input voltage Does overload condition exist?
4011	MTR UNDERLOAD	Warning comes at half the time of a mtr underload fault. See fault 3017 for further text	NA	Parameter 3002 is the time Parameter 3003 is the level
4012	BYPASS DISABLED	Warning will be generated if parameter 1613 is set to “Disable”	NA	NA
4013	DRIVE LINK ERROR	Same as Fault 3019 however will occur when not in supervisory mode	Bad cable between drive and bypass Drive parameter 95.21, bit 5 not set for “Bypass present”	Proper seating of cable in drive and RBCU (connector J3) Check that drive parameter 95.21, bit 5 = “Bypass present” Follow DriveLink recovery procedure
4014	DRIVE TEST	Warning is generated when bypass parameter 1617 is set to “enable”	NA	NA
4015	START DRIVE 1ST	Message displayed on initial “out of box” power up sequence	NA	Run drive in Hand

Warning Code	Warning Name In Panel	Warning	Possible Cause	Corrective Action
4016	INP VOLTAGE LOW	3-Phase input voltage has not reached a sufficient level to enable editing of parameters via the keypad. This message is generated within a few seconds of power up	NA	Loose J7 connector Low input voltage. Incoming voltage has not reached at least 155 VAC within a few seconds of powerup
4019	OVERRIDE 1	Warning is generated when override 1 is active	NA	Check Parameter 0103 and 0104 for digital input status
4020	OVRD2 BYP	Warning is generated when override 2 is active and the bypass is controlling the motor	NA	Check Parameter 0103 and 0104 for digital input status
4021	Selected by PAR 1621 INTERLOCK 1 VIBRATION SWITCH FIRESTAT FREEZESTAT OVERPRESSURE VIBRATION TRIP SMOKE ALARM SAFETY OPEN LOW SUCTION PRES	Warning will occur when start order is given and the “Permissive” is not present	Permissive condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4022	Selected by PAR 1622 INTERLOCK 2 VIBRATION SWITCH ... LOW SUCTION PRES	Warning will occur when start order is given and the “Permissive” is not present	Permissive condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4023	Selected by PAR 1623 INTERLOCK 3 VIBRATION SWITCH ... LOW SUCTION PRES	Warning will occur when start order is given and the “Permissive” is not present	Permissive condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input

Warning Code	Warning Name In Panel	Warning	Possible Cause	Corrective Action
4024	Selected by PAR 1624 INTERLOCK 4 VIBRATION SWITCH ... LOW SUCTION PRES	Warning will occur when start order is given and the “Permissive” is not present	Permissive condition is not satisfied. Bad 24v supply Bad digital input 24 V common is not tied to Digital input common on bypass when using external 24 v supply	Check 24 Volts on RBCU unit Check for 24 volts on respective DI when condition is satisfied Check Parameter 0103 For status of digital input
4025	LOCAL DISABLED	Warning is displayed if MODE LOCK (16.29) is set to AUTO MODE and the Hand or Off key is pressed		
4026	AUTO DISABLED	This warning is displayed if MODE LOCK (1629) is set to LOCAL MODE and the Auto key is pressed.		
4027	COMM CONFIG ERR	Warning is displayed if the drive and bypass MAC addresses are equal or invalid.	E-Clipse parameters 5002 (BP MAC ID) & 5802 (DV MAC ID) are set to the same value	Change MAC address to unique values
4028	FBA PAR CONF	Non embedded fieldbus has detected an error in Group 51 parameters		Verify Group 51 parameters
4029	DRIVE FAULTED	The drive is faulted.		Reset drive
4030	OVRD2 VFD	Warning is generated when override 2 is active and the drive is controlling the motor	NA	Check Parameter 0103 and 0104 for digital input status
4031	OVRD2 STOP	Warning is generated when override 2 is active and both the bypass and drive output contactors are deenergized	NA	Check Parameter 0103 and 0104 for digital input status

Bypass status listing

Bypass Status (16 Characters)	Condition	Description
DRIVE/BYPASS?	DRIVE SELECTED BYPASS SELECTED	Displays which one is selected, drive or bypass
SAFETIES?	OPEN CLOSED	Displays if safeties (=INTERLOCK 1 and/ or INTERLOCK 2) have been applied, or if they are missing
RUN PERMISSIVES?	OPEN CLOSED	Displays if PERMISSIVE is present or not
START REQUEST?	NOT PRESENT PRESENT	Displays if start request has been applied to the system
AUTO TRANSFER?	NOT TRANSFERRED TRANSFERRED	Displays if the system is in Auto Transfer state or not. Does not reflect to PAR 16.08 AUTO XFER value itself
BYP OVERRIDE 1?	NOT ACTIVATED ACTIVATED	Status of Override 1
BYP OVERRIDE 2?	NOT ACTIVATED ACTIVATED	Status of Override 2
DRIVE FAULTED?	NO YES	Displays if drive is faulted or not
BYPASS FAULTED?	NO YES	Displays if bypass is faulted or not
SYSTEM STARTED?	NO YES	Displays if system is started or not
SYSTEM RUNNING?	NO YES	Displays if system is running or not
BYPASS WARNINGS?	NO WARNINGS WARNING ACTIVE	Displays if there is an active warning(s) in bypass or not
HAND/OFF/AUTO?	OFF MODE HAND MODE AUTO MODE	Displays operating mode of the bypass - OFF, HAND or AUTO

Error messages

#	Error Message	Description
1	CAN'T EDIT PAR IS READ ONLY	Try to save value (=press the ENTER key in Parameter Edit State) of a read-only parameter. E.g. try to change value PAR 01.02 INPUT VOLT
2	CAN'T EDIT WHEN STARTED	Try to change value of a parameter, which is allowed to be changed only when system is not started. E.g. PAR 16.02 PERMISSIVE
3	CAN'T EDIT UP+DOWN ONLY	Try to change value of a "reset only" parameter other than zero. UP+DOWN buttons must be pressed simultaneously for requesting default value of the PAR on the display (value zero), and after that ENTER pressed for saving it (reset the parameter). E.g. PAR 04.01 LAST FAULT
4	CAN'T EDIT INP VOLTAGE LOW	Input voltage too low. Changing of parameters prohibited since system cannot save values to nv-mem w/ insufficient voltage.
5	CAN'T EDIT PAR IS HIDDEN	Try to save value (=press the ENTER key in Parameter Edit State) of a hidden parameter. Should not be possible. If hidden parameters are turned visible, this message is not given.
6	CAN'T EDIT UNDER LO-LIMIT	Try to save value which is over LO-LIMIT of the parameter. Should not be possible when changing parameters from control panel.
7	CAN'T EDIT UNDER HI-LIMIT	Try to save value which is over HI-LIMIT of the parameter. Should not be possible when changing parameters from control panel.
8	CAN'T EDIT ENUM VAL ONLY	Try to save value which is out of enumerated value list. Should not be possible when changing parameters from control panel.
9	CAN'T EDIT NO DEFAULT	Try to request default value (=press UP and DOWN buttons simultaneously) for a parameter which is defined not to have a default value. Should not be possible when changing parameters from control panel.
10	CAN'T EDIT TRY AGAIN.	Parameter system is busy, e.g. application macro change is in process at the same time when someone is trying to save a value for a parameter. Should not be possible when changing parameters from control panel.

Maintenance

See *Maintenance* for the ACH580-31 on page *74* and PCR, PDR on page *125*.

ACH580-3PCR/3PDR

Installation

This information is unique to ACH580 input disconnect configurations (3PCR or 3PDR). The ACH580 with input disconnect is an ACH580 AC adjustable frequency drive packaged with an input disconnect switch or circuit breaker. Refer to the *Installation* instructions on page *8*, for all other information. **Failure to observe the warnings and instructions may cause a malfunction or personal hazard.**

WARNING! Before you begin read *Safety instructions* on page *2*.

WARNING! When the ACH580 with input disconnect is connected to the line power, the motor terminals T1, T2, and T3 are live even if the motor is not running. Do not make any connections when the ACH580 with input disconnect is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause serious injury or death.

1. Install wiring

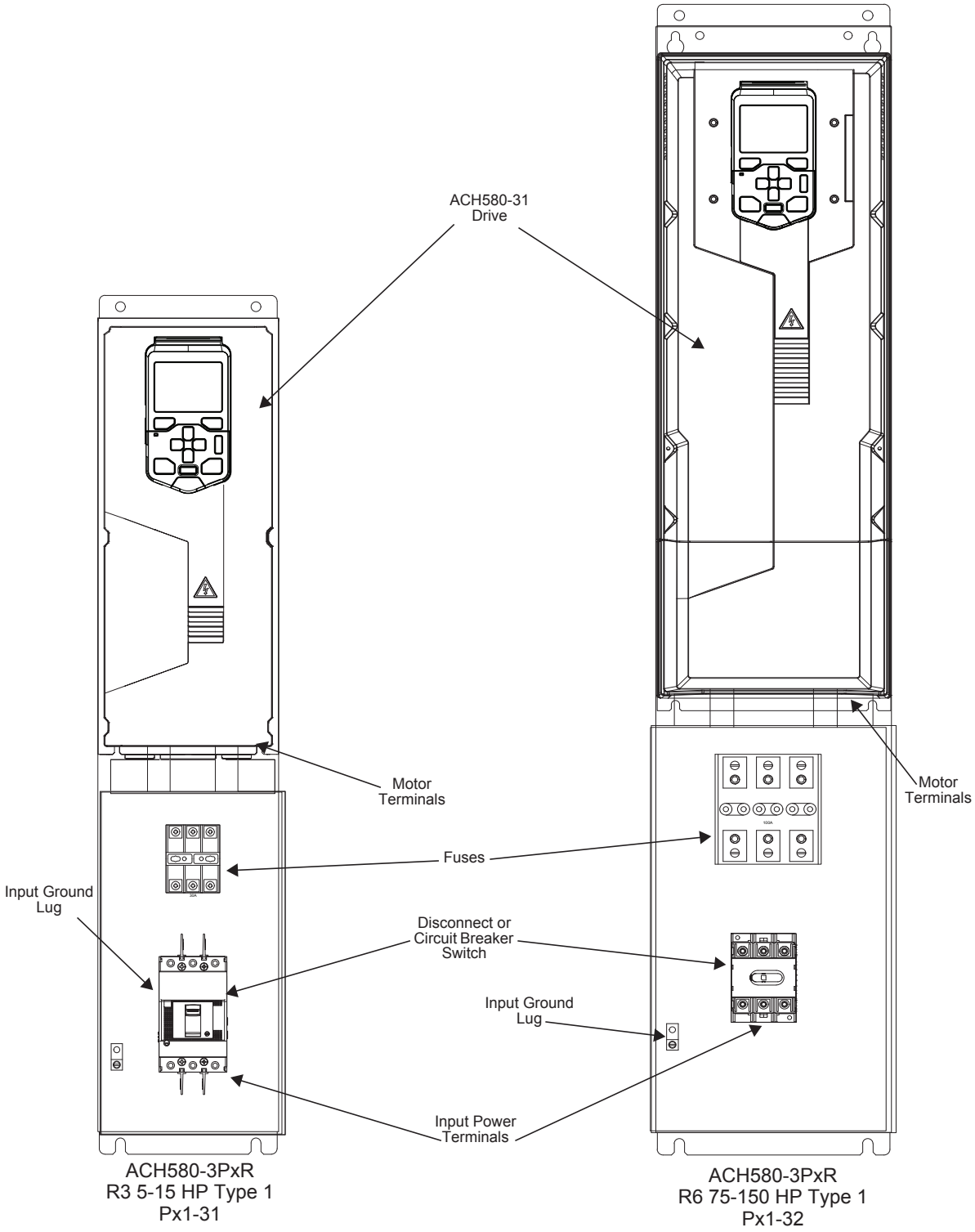
WARNING!

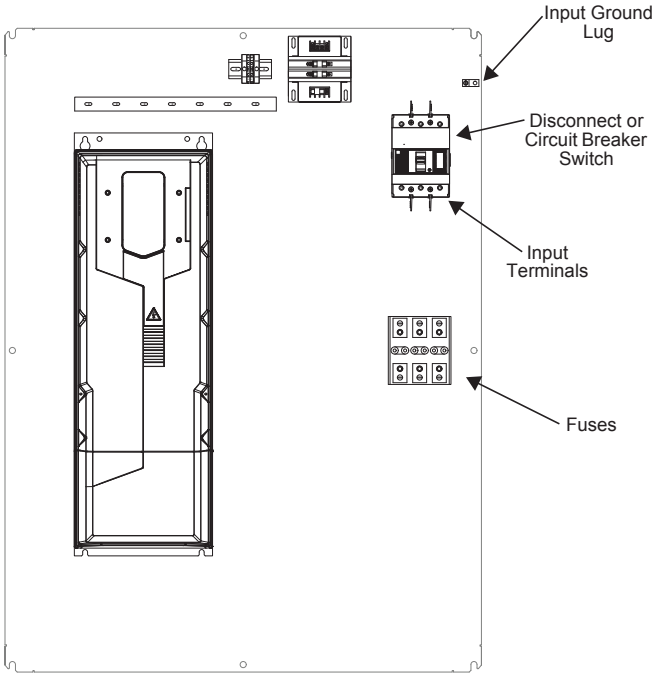
- Metal shavings or debris in the enclosure can damage electrical equipment and create a hazardous condition. Where parts, such as conduit plates require cutting or drilling, first remove the part. If that is not practical, cover nearby electrical components to protect them from all shavings or debris.
- Do not connect or disconnect input or output power wiring, or control wires, when power is applied.
- Never connect line voltage to drive output Terminals T1, T2, and T3.
- Do not make any voltage tolerance tests (Hi Pot or Megger) on any part of the unit. Disconnect motor wires before taking any measurements in the motor or motor wires.
- Make sure that power factor correction capacitors are not connected between the drive and the motor.

Enclosure Designation	Horsepower Range by Voltage Range
	480V
Px1-31	5 to 15 HP
Px1-32	20 to 60 HP
Px12-31	5 to 15 HP
Px12-32	20 to 60 HP

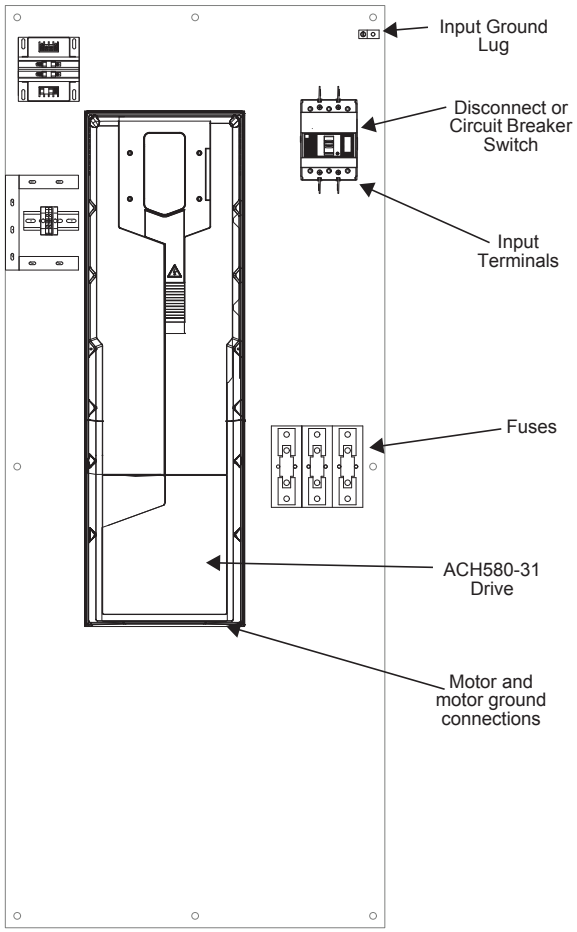
Connection diagrams – Box Packaged Drive with input disconnect

Type 1 units are configured for bottom entry and bottom exit wiring access, Type 12 units are configured for top entry and bottom exit. The following figures show the layout and wiring connection points. For drive control wiring see pages *31*-*23*.





ACH580-3PxR
R3 5-15 HP Type 12
Px12-31



ACH580-3PxR
R6 20-60 HP Type 12
Px12-32

Fuses

Note: The UL listed drive fuses in the table are provided in the purchased product.

- Replacement fuses are required to be of the same class, current rating, and voltage rating. Fuses from other fuse manufacturers can be used if they meet the specifications given in the table.
- Fuses with higher current rating than specified must not be used.

480 Volt fuses

Type Code	Nominal Output Ratings		Base Drive Frame Size	Internal Drive Fuse Rating	
	Drive Current	Package Power		Class	Max Current Rating
	A	HP			
480 Volts					
ACH580-3PxR-07A6-4	7.6A	5	R3	Class CC	15A
ACH580-3PxR-012A-4	12A	7.5	R3	Class CC	15A
ACH580-3PxR-014A-4	14A	10	R3	Class CC	30A
ACH580-3PxR-023A-4	23A	15	R3	Class CC	30A
ACH580-3PxR-027A-4	27A	20	R6	Class T	40A
ACH580-3PxR-034A-4	34A	25	R6	Class T	60A
ACH580-3PxR-044A-4	44A	30	R6	Class T	60A
ACH580-3PxR-052A-4	52A	40	R6	Class T	80A
ACH580-3PxR-065A-4	65A	50	R6	Class T	90A
ACH580-3PxR-077A-4	77A	60	R6	Class T	100A

1) “PxR” represents both PCR and PDR.

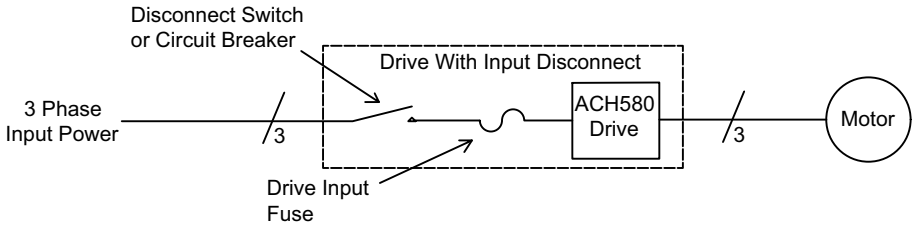
Operation

This information is unique to ACH580 input disconnect configurations (PCR or PDR). Refer to the *Operation* instructions on page *37* for all other information.

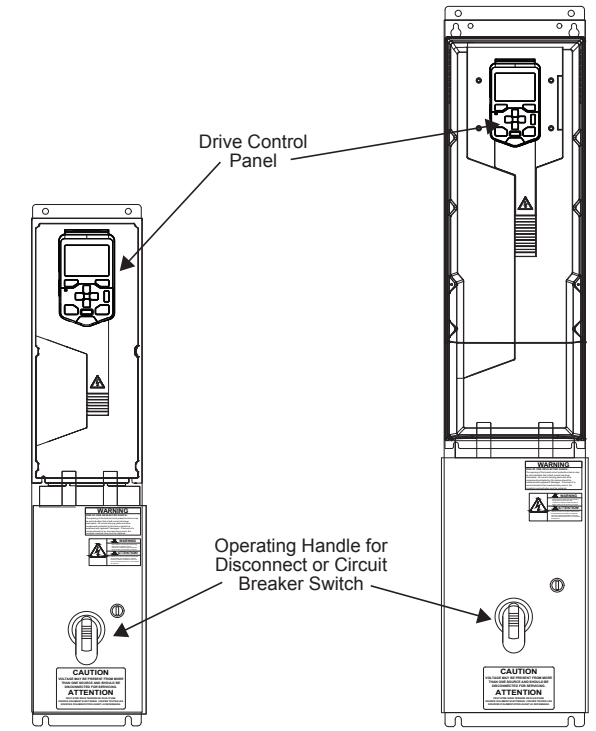
Input disconnect configuration

The ACH580-31 with input disconnect is an ACH580-31 AC adjustable frequency drive packaged with an input disconnect switch or circuit breaker, and with a door interlocked, external operating handle. The operating handle can be padlocked in the OFF position (padlock not supplied). Enclosure options are UL Type 1 and UL Type 12 (NEMA 1 and NEMA 12).

The following is a typical power diagram.

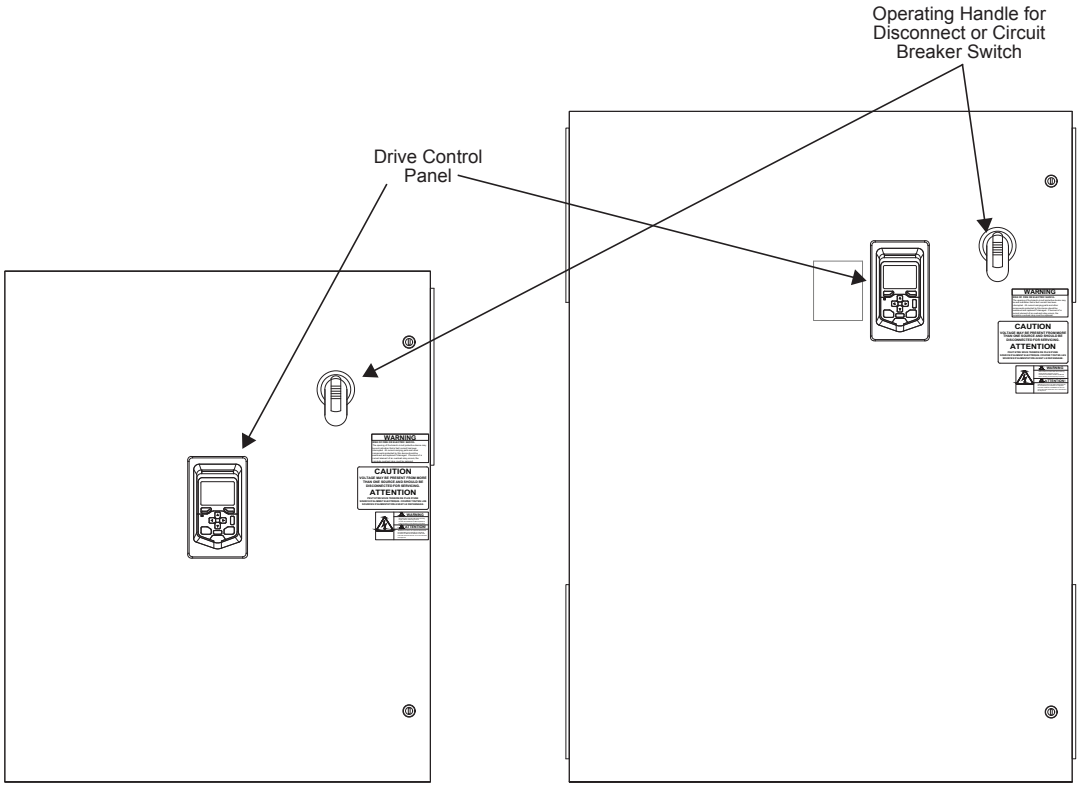


The following shows the front view of the ACH580 Box Packaged Drive configurations and identifies the major components.



ACH580-3PxR
R3 5-15 HP
Type 1
Px1-31

ACH580-3PxR
R6 20-60 HP
Type 1
Px1-32



ACH580-3PxR R3 5-15 HP Type 12
Px12-31

ACH580-3PxR R6 20-60 HP Type 12
Px12-32

Maintenance

Maintenance intervals

If installed in an appropriate environment, the drive requires very little maintenance. This table lists the routine maintenance intervals recommended by ABB for ACH580 enclosures in addition to the intervals on page *74* and *108*.

Maintenance	Configuration	Interval	Instruction
Check/replace inlet air filter	Hinged door, wall mount, UL Type / NEMA 12 enclosures	Check every 3 months. Replace as needed.	*Diagnostics* on page *50*.

Diagnostics

Refer to the *Diagnostics* instructions on page *50*.

Complete ACH580 Drive Parameter List

GROUP 1
Actual values
1.01 Motor speed used
1.02 Motor speed estimated
1.03 Motor speed %
1.06 Output frequency
1.07 Motor current
1.08 Motor current % of motor nom
1.09 Motor current % of drive nom
1.10 Motor torque
1.11 DC voltage
1.13 Output voltage
1.14 Output power
1.15 Output power % of motor nom
1.16 Output power % of drive nom
1.17 Motor shaft power
1.18 Inverter GWh counter
1.19 Inverter MWh counter
1.20 Inverter kWh counter
1.24 Flux actual %
1.30 Nominal torque scale
1.31 Ambient temperature
1.50 Current hour kWh
1.51 Previous hour kWh
1.52 Current day kWh
1.53 Previous day kWh
1.54 Cumulative inverter energy
1.55 Inverter GWh counter (resettable)
1.56 Inverter MWh counter (resettable)
1.57 Inverter kWh counter (resettable)
1.58 Cumulative inverter energy (resettable)
1.61 Abs motor speed used
1.62 Abs motor speed %
1.63 Abs output frequency
1.64 Abs motor torque
1.65 Abs output power
1.66 Abs output power % motor nom
1.67 Abs output power % drive nom
1.68 Abs motor shaft power
1.102 Line current
1.104 Active current
1.106 Reactive current
1.108 Grid frequency
1.109 Grid voltage
1.110 Grid apparent power
1.112 Grid power
1.114 Grid reactive power
1.116 LSU cos Phi
1.164 LSU nominal power

GROUP 3
Input references
3.01 Panel reference
3.02 Panel reference remote
3.05 FB A reference 1
3.06 FB A reference 2
3.09 EFB reference 1
3.10 EFB reference 2

GROUP 4
Warnings and faults
4.01 Tripping fault
4.02 Active fault 2
4.03 Active fault 3
4.06 Active warning 1
4.07 Active warning 2
4.08 Active warning 3
4.11 Latest fault
4.12 2nd latest fault
4.13 3rd latest fault
4.16 Latest warning
4.17 2nd latest warning
4.18 3rd latest warning
4.40 Event word 1
4.41 Event word 1 bit 0 code
4.43 Event word 1 bit 1 code
4.45 Event word 1 bit 2 code
4.47 Event word 1 bit 3 code
4.49 Event word 1 bit 4 code
4.51 Event word 1 bit 5 code
4.53 Event word 1 bit 6 code
4.55 Event word 1 bit 7 code
4.57 Event word 1 bit 8 code
4.59 Event word 1 bit 9 code
4.61 Event word 1 bit 10 code
4.63 Event word 1 bit 11 code
4.65 Event word 1 bit 12 code
4.67 Event word 1 bit 13 code
4.69 Event word 1 bit 14 code
4.71 Event word 1 bit 15 code

GROUP 5
Diagnostics
5.01 On-time counter
5.02 Run-time counter
5.03 Hours run
5.04 Fan on-time counter
5.10 Control board temperature
5.11 Inverter temperature
5.22 Diagnostic word 3
5.111 Line converter temperature
5.121 MCB closing counter

GROUP 6
Control and status words
6.01 Main control word
6.11 Main status word
6.16 Drive status word 1
6.17 Drive status word 2
6.18 Start inhibit status word
6.19 Speed control status word
6.20 Constant speed status word
6.21 Drive status word 3
6.22 HVAC status word
6.30 MSW bit 11 selection
6.31 MSW bit 12 selection
6.32 MSW bit 13 selection
6.33 MSW bit 14 selection
6.36 LSU Status word
6.39 Internal state machine LSU CW
6.116 LSU drive status word 1
6.118 LSU start inhibit status word

GROUP 7
System info
7.03 Drive rating id
7.04 Firmware name
7.05 Firmware version
7.06 Loading package name
7.07 Loading package version
7.11 Cpu usage
7.25 Customization package name
7.26 Customization package version
7.30 Adaptive program status
7.31 AP sequence state
7.106 LSU loading package name
7.107 LSU loading package version

GROUP 10
Standard DI, RO
10.02 DI delayed status
10.03 DI force selection
10.04 DI forced data
10.21 RO status
10.22 RO force selection
10.23 RO forced data
10.24 RO1 source
10.25 RO1 ON delay
10.26 RO1 OFF delay
10.27 RO2 source
10.28 RO2 ON delay
10.29 RO2 OFF delay
10.30 RO3 source
10.31 RO3 ON delay
10.32 RO3 OFF delay
10.99 RO/DIO control word
10.101 RO1 toggle counter
10.102 RO2 toggle counter
10.103 RO3 toggle counter

GROUP 11
Standard DIO, FI, FO
11.21 DI5 configuration
11.38 Freq in 1 actual value
11.39 Freq in 1 scaled value
11.42 Freq in 1 min
11.43 Freq in 1 max
11.44 Freq in 1 at scaled min
11.45 Freq in 1 at scaled max

GROUP 12
Standard AI
12.02 AI force selection
12.03 AI supervision function
12.04 AI supervision selection
12.11 AI1 actual value
12.12 AI1 scaled value
12.13 AI1 forced value
12.15 AI1 unit selection
12.16 AI1 filter time
12.17 AI1 min
12.18 AI1 max
12.19 AI1 scaled at AI1 min
12.20 AI1 scaled at AI1 max
12.21 AI2 actual value
12.22 AI2 scaled value
12.23 AI2 forced value
12.25 AI2 unit selection
12.26 AI2 filter time
12.27 AI2 min
12.28 AI2 max
12.29 AI2 scaled at AI2 min
12.30 AI2 scaled at AI2 max
12.101 AI1 percent value
12.102 AI2 percent value

GROUP 13
Standard AO
13.02 AO force selection
13.11 AO1 actual value
13.12 AO1 source
13.13 AO1 forced value
13.15 AO1 unit selection
13.16 AO1 filter time
13.17 AO1 source min
13.18 AO1 source max
13.19 AO1 out at AO1 src min
13.20 AO1 out at AO1 src max
13.21 AO2 actual value
13.22 AO2 source
13.23 AO2 forced value
13.26 AO2 filter time
13.27 AO2 source min
13.28 AO2 source max
13.29 AO2 out at AO2 src min
13.30 AO2 out at AO2 src max
13.91 AO1 data storage
13.92 AO2 data storage

GROUP 15
I/O extension module
15.01 Extension module type
15.02 Detected extension module
15.03 DI status
15.04 RO/DO status
15.05 RO/DO force selection
15.06 RO/DO forced data
15.07 RO4 source
15.08 RO4 ON delay
15.09 RO4 OFF delay
15.10 RO5 source
15.11 RO5 ON delay
15.12 RO5 OFF delay
15.22 DO1 configuration
15.23 DO1 source
15.24 DO1 ON delay
15.25 DO1 OFF delay
15.32 Freq out 1 actual value
15.33 Freq out 1 source
15.34 Freq out 1 src min
15.35 Freq out 1 src max
15.36 Freq out 1 at src min
15.37 Freq out 1 at src max

GROUP 19
Operation mode
19.01 Actual operation mode
19.11 Ext1/Ext2 selection
19.18 HAND/OFF disable source
19.19 HAND/OFF disable action

GROUP 20
Start/stop/direction
20.01 Ext1 commands
20.02 Ext1 start trigger type
20.03 Ext1 in1 source
20.04 Ext1 in2 source
20.05 Ext1 in3 source
20.06 Ext2 commands
20.07 Ext2 start trigger type
20.08 Ext2 in1 source
20.09 Ext2 in2 source
20.10 Ext2 in3 source
20.21 Direction
20.40 Run permissive
20.41 Start interlock 1
20.42 Start interlock 2
20.43 Start interlock 3
20.44 Start interlock 4
20.45 Start interlock stop mode

GROUP 21
Start/stop mode
21.01 Start mode
21.02 Magnetization time
21.03 Stop mode
21.04 Emergency stop mode
21.05 Emergency stop source
21.06 Zero speed limit
21.07 Zero speed delay
21.08 DC current control
21.09 DC hold speed
21.10 DC current reference
21.11 Post magnetization time
21.14 Pre-heating input source
21.16 Pre-heating current
21.18 Auto restart time
21.19 Scalar start mode
21.21 DC hold frequency
21.22 Start delay
21.23 Smooth start
21.24 Smooth start current
21.25 Smooth start speed
21.26 Torque boost current
21.30 Speed compensated stop mode
21.31 Speed comp stop delay
21.32 Speed comp stop threshold
21.34 Force auto restart

GROUP 22
Speed reference selection
22.01 Speed ref unlimited
22.11 Ext1 speed ref1
22.12 Ext1 speed ref2
22.13 Ext1 speed function
22.18 Ext2 speed ref1
22.19 Ext2 speed ref2
22.20 Ext2 speed function
22.21 Constant speed function
22.22 Constant speed sel1
22.23 Constant speed sel2
22.24 Constant speed sel3
22.26 Constant speed 1
22.27 Constant speed 2
22.28 Constant speed 3
22.29 Constant speed 4
22.30 Constant speed 5
22.31 Constant speed 6
22.32 Constant speed 7
22.41 Speed ref safe
22.51 Critical speed function
22.52 Critical speed 1 low
22.53 Critical speed 1 high
22.54 Critical speed 2 low
22.55 Critical speed 2 high
22.56 Critical speed 3 low
22.57 Critical speed 3 high
22.71 Motor potentiometer function
22.72 Motor potentiometer initial value
22.73 Motor potentiometer up source
22.74 Motor potentiometer down source
22.75 Motor potentiometer ramp time
22.76 Motor potentiometer min value
22.77 Motor potentiometer max value
22.80 Motor potentiometer ref act
22.86 Speed reference act 6
22.87 Speed reference act 7

GROUP 23
Speed reference ramp
23.01 Speed ref ramp input
23.02 Speed ref ramp output
23.11 Ramp set selection
23.12 Acceleration time 1
23.13 Deceleration time 1
23.14 Acceleration time 2

23.15 Deceleration time 2
23.23 Emergency stop time
23.28 Variable slope enable
23.29 Variable slope rate

GROUP 24
Speed reference conditioning
24.01 Used speed reference
24.02 Used speed feedback
24.03 Speed error filtered
24.04 Speed error inverted
24.11 Speed correction
24.12 Speed error filter time

GROUP 25
Speed control
25.01 Torque reference speed control
25.02 Speed proportional gain
25.03 Speed integration time
25.04 Speed derivation time
25.05 Derivation filter time
25.06 Acc comp derivation time
25.07 Acc comp filter time
25.15 Proportional gain em stop
25.53 Torque prop reference
25.54 Torque integral reference
25.55 Torque deriv reference
25.56 Torque acc compensation

GROUP 28
Frequency reference chain
28.01 Frequency ref ramp input
28.02 Frequency ref ramp output
28.11 Ext1 frequency ref1
28.12 Ext1 frequency ref2
28.13 Ext1 frequency function
28.15 Ext2 frequency ref1
28.16 Ext2 frequency ref2
28.17 Ext2 frequency function
28.21 Constant frequency function
28.22 Constant frequency sel1
28.23 Constant frequency sel2
28.24 Constant frequency sel3
28.26 Constant frequency 1
28.27 Constant frequency 2
28.28 Constant frequency 3
28.29 Constant frequency 4
28.30 Constant frequency 5
28.31 Constant frequency 6
28.32 Constant frequency 7
28.41 Frequency ref safe
28.51 Critical frequency function
28.52 Critical frequency 1 low
28.53 Critical frequency 1 high
28.54 Critical frequency 2 low
28.55 Critical frequency 2 high
28.56 Critical frequency 3 low
28.57 Critical frequency 3 high
28.71 Freq ramp set selection
28.72 Freq acceleration time 1
28.73 Freq deceleration time 1
28.74 Freq acceleration time 2
28.75 Freq deceleration time 2
28.76 Freq ramp in zero source
28.92 Frequency ref act 3
28.96 Frequency ref act 7
28.97 Frequency ref unlimited

GROUP 30
Limits
30.01 Limit word 1
30.02 Torque limit status
30.11 Minimum speed
30.12 Maximum speed
30.13 Minimum frequency
30.14 Maximum frequency
30.17 Maximum current
30.18 Torq lim sel
30.19 Minimum torque 1
30.20 Maximum torque 1
30.21 Min torque 2 source
30.22 Max torque 2 source
30.23 Minimum torque 2
30.24 Maximum torque 2
30.26 Power motoring limit
30.27 Power generating limit
30.30 Overvoltage control
30.31 Undervoltage control
30.101 LSU limit word 1
30.102 LSU limit word 2
30.103 LSU limit word 3
30.104 LSU limit word 4
30.148 LSU minimum power limit
30.149 LSU maximum power limit

GROUP 31
Fault functions
31.01 External event 1 source
31.02 External event 1 type
31.03 External event 2 source
31.04 External event 2 type
31.05 External event 3 source
31.06 External event 3 type
31.07 External event 4 source
31.08 External event 4 type
31.09 External event 5 source
31.10 External event 5 type
31.11 Fault reset selection
31.12 Autoreset selection
31.13 Selectable fault
31.14 Number of trials
31.15 Total trials time
31.16 Delay time
31.19 Motor phase loss
31.20 Earth fault
31.21 Supply phase loss
31.22 STO indication run/stop
31.23 Wiring or earth fault
31.24 Stall function
31.25 Stall current limit
31.26 Stall speed limit
31.27 Stall frequency limit
31.28 Stall time
31.30 Overspeed trip margin
31.32 Emergency ramp supervision
31.33 Emergency ramp supervision delay
31.36 Aux fan fault bypass
31.120 LSU earth fault
31.121 LSU supply phase loss

GROUP 32
Supervision
32.01 Supervision status
32.05 Supervision 1 function
32.06 Supervision 1 action
32.07 Supervision 1 signal
32.08 Supervision 1 filter time
32.09 Supervision 1 low
32.10 Supervision 1 high
32.11 Supervision 1 hysteresis
32.15 Supervision 2 function
32.16 Supervision 2 action
32.17 Supervision 2 signal
32.18 Supervision 2 filter time
32.19 Supervision 2 low
32.20 Supervision 2 high
32.21 Supervision 2 hysteresis
32.25 Supervision 3 function
32.26 Supervision 3 action
32.27 Supervision 3 signal
32.28 Supervision 3 filter time
32.29 Supervision 3 low
32.30 Supervision 3 high
32.31 Supervision 3 hysteresis
32.35 Supervision 4 function
32.36 Supervision 4 action
32.37 Supervision 4 signal
32.38 Supervision 4 filter time
32.39 Supervision 4 low
32.40 Supervision 4 high
32.41 Supervision 4 hysteresis
32.45 Supervision 5 function
32.46 Supervision 5 action
32.47 Supervision 5 signal
32.48 Supervision 5 filter time
32.49 Supervision 5 low
32.50 Supervision 5 high
32.51 Supervision 5 hysteresis
32.55 Supervision 6 function
32.56 Supervision 6 action
32.57 Supervision 6 signal
32.58 Supervision 6 filter time
32.59 Supervision 6 low
32.60 Supervision 6 high
32.61 Supervision 6 hysteresis

GROUP 34
Timed functions
34.01 Timed functions status
34.02 Timer status
34.04 Season/exception day status
34.10 Timed functions enable
34.11 Timer 1 configuration
34.12 Timer 1 start time
34.13 Timer 1 duration
34.14 Timer 2 configuration
34.15 Timer 2 start time
34.16 Timer 2 duration
34.17 Timer 3 configuration
34.18 Timer 3 start time
34.19 Timer 3 duration
34.20 Timer 4 configuration
34.21 Timer 4 start time
34.22 Timer 4 duration
34.23 Timer 5 configuration
34.24 Timer 5 start time
34.25 Timer 5 duration
34.26 Timer 6 configuration
34.27 Timer 6 start time
34.28 Timer 6 duration
34.29 Timer 7 configuration
34.30 Timer 7 start time
34.31 Timer 7 duration
34.32 Timer 8 configuration
34.33 Timer 8 start time
34.34 Timer 8 duration
34.35 Timer 9 configuration
34.36 Timer 9 start time
34.37 Timer 9 duration
34.38 Timer 10 configuration
34.39 Timer 10 start time
34.40 Timer 10 duration
34.41 Timer 11 configuration
34.42 Timer 11 start time
34.43 Timer 11 duration
34.44 Timer 12 configuration
34.45 Timer 12 start time
34.46 Timer 12 duration
34.60 Season 1 start date
34.61 Season 2 start date
34.62 Season 3 start date
34.63 Season 4 start date
34.70 Number of active exceptions
34.71 Exception types
34.72 Exception 1 start
34.73 Exception 1 length
34.74 Exception 2 start
34.75 Exception 2 length
34.76 Exception 3 start
34.77 Exception 3 length
34.78 Exception day 4
34.79 Exception day 5
34.80 Exception day 6
34.81 Exception day 7
34.82 Exception day 8
34.83 Exception day 9
34.84 Exception day 10
34.85 Exception day 11
34.86 Exception day 12
34.87 Exception day 13
34.88 Exception day 14
34.89 Exception day 15
34.90 Exception day 16
34.100 Timed function 1
34.101 Timed function 2
34.102 Timed function 3
34.110 Boost time function
34.111 Boost time activation source
34.112 Boost time duration

GROUP 35
Motor thermal protection
35.01 Motor estimated temperature
35.02 Measured temperature 1
35.03 Measured temperature 2
35.11 Temperature 1 source
35.12 Temperature 1 fault limit
35.13 Temperature 1 warning limit
35.14 Temperature 1 AI source
35.21 Temperature 2 source
35.22 Temperature 2 fault limit
35.23 Temperature 2 warning limit
35.24 Temperature 2 AI source
35.50 Motor ambient temperature
35.51 Motor load curve
35.52 Zero speed load
35.53 Break point
35.54 Motor nominal temperature rise
35.55 Motor thermal time constant

GROUP 36
Load analyzer
36.01 PVL signal source
36.02 PVL filter time
36.06 AL2 signal source
36.07 AL2 signal scaling
36.09 Reset loggers
36.10 PVL peak value
36.11 PVL peak date
36.12 PVL peak time
36.13 PVL current at peak
36.14 PVL DC voltage at peak
36.15 PVL speed at peak
36.16 PVL reset date
36.17 PVL reset time
36.20 AL1 0 to 10%
36.21 AL1 10 to 20%
36.22 AL1 20 to 30%
36.23 AL1 30 to 40%
36.24 AL1 40 to 50%
36.25 AL1 50 to 60%
36.26 AL1 60 to 70%
36.27 AL1 70 to 80%
36.28 AL1 80 to 90%
36.29 AL1 over 90%
36.40 AL2 0 to 10%
36.41 AL2 10 to 20%
36.42 AL2 20 to 30%
36.43 AL2 30 to 40%
36.44 AL2 40 to 50%
36.45 AL2 50 to 60%
36.46 AL2 60 to 70%
36.47 AL2 70 to 80%
36.48 AL2 80 to 90%
36.49 AL2 over 90%
36.50 AL2 reset date
36.51 AL2 reset time

GROUP 37
User load curve
37.01 ULC output status word
37.02 ULC supervision signal
37.03 ULC overload actions
37.04 ULC underload actions
37.11 ULC speed table point 1
37.12 ULC speed table point 2
37.13 ULC speed table point 3
37.14 ULC speed table point 4
37.15 ULC speed table point 5
37.16 ULC frequency table point 1
37.17 ULC frequency table point 2
37.18 ULC frequency table point 3
37.19 ULC frequency table point 4
37.20 ULC frequency table point 5
37.21 ULC underload point 1
37.22 ULC underload point 2
37.23 ULC underload point 3
37.24 ULC underload point 4
37.25 ULC underload point 5
37.31 ULC overload point 1
37.32 ULC overload point 2
37.33 ULC overload point 3
37.34 ULC overload point 4
37.35 ULC overload point 5
37.41 ULC overload timer
37.42 ULC underload timer

GROUP 40
Process PID set 1
40.01 Process PID output actual
40.02 Process PID feedback actual
40.03 Process PID setpoint actual
40.04 Process PID deviation actual
40.06 Process PID status word
40.07 Process PID operation mode
40.08 Set 1 feedback 1 source
40.09 Set 1 feedback 2 source
40.10 Set 1 feedback function
40.11 Set 1 feedback filter time
40.14 Set 1 setpoint scaling
40.15 Set 1 output scaling
40.16 Set 1 setpoint 1 source
40.17 Set 1 setpoint 2 source
40.18 Set 1 setpoint function
40.19 Set 1 internal setpoint sel1
40.20 Set 1 internal setpoint sel2
40.21 Set 1 internal setpoint 1
40.22 Set 1 internal setpoint 2
40.23 Set 1 internal setpoint 3
40.24 Set 1 internal setpoint 0
40.26 Set 1 setpoint min
40.27 Set 1 setpoint max
40.28 Set 1 setpoint increase time
40.29 Set 1 setpoint decrease time
40.30 Set 1 setpoint freeze enable
40.31 Set 1 deviation inversion
40.32 Set 1 gain
40.33 Set 1 integration time
40.34 Set 1 derivation time
40.35 Set 1 derivation filter time
40.36 Set 1 output min
40.37 Set 1 output max
40.38 Set 1 output freeze enable
40.39 Set 1 deadband range

40.40 Set 1 deadband delay
40.43 Set 1 sleep level
40.44 Set 1 sleep delay
40.45 Set 1 sleep boost time
40.46 Set 1 sleep boost step
40.47 Set 1 wake-up deviation
40.48 Set 1 wake-up delay
40.49 Set 1 tracking mode
40.50 Set 1 tracking ref selection
40.57 PID set1/set2 selection
40.58 Set 1 increase prevention
40.59 Set 1 decrease prevention
40.60 Set 1 PID activation source
40.61 Setpoint scaling actual
40.62 PID internal setpoint actual
40.70 Compensated setpoint
40.71 Set 1 compensation input source
40.72 Set 1 compensation input 1
40.73 Set 1 compensated output 1
40.74 Set 1 compensation input 2
40.75 Set 1 compensated output 2
40.76 Set 1 compensation non-linearity
40.80 Set 1 PID output min source
40.81 Set 1 PID output max source
40.89 Set 1 setpoint multiplier
40.90 Set 1 feedback multiplier
40.91 Feedback data storage
40.92 Setpoint data storage
40.96 Process PID output %
40.97 Process PID feedback %
40.98 Process PID setpoint %
40.99 Process PID deviation %

GROUP 41
Process PID set 2
41.08 Set 2 feedback 1 source
41.09 Set 2 feedback 2 source
41.10 Set 2 feedback function
41.11 Set 2 feedback filter time
41.14 Set 2 setpoint scaling
41.15 Set 2 output scaling
41.16 Set 2 setpoint 1 source
41.17 Set 2 setpoint 2 source
41.18 Set 2 setpoint function
41.19 Set 2 internal setpoint sel1
41.20 Set 2 internal setpoint sel2
41.21 Set 2 internal setpoint 1
41.22 Set 2 internal setpoint 2
41.23 Set 2 internal setpoint 3
41.24 Set 2 internal setpoint 0
41.26 Set 2 setpoint min
41.27 Set 2 setpoint max
41.28 Set 2 setpoint increase time
41.29 Set 2 setpoint decrease time
41.30 Set 2 setpoint freeze enable
41.31 Set 2 deviation inversion
41.32 Set 2 gain
41.33 Set 2 integration time
41.34 Set 2 derivation time
41.35 Set 2 derivation filter time
41.36 Set 2 output min
41.37 Set 2 output max
41.38 Set 2 output freeze enable
41.39 Set 2 deadband range
41.40 Set 2 deadband delay
41.43 Set 2 sleep level
41.44 Set 2 sleep delay
41.45 Set 2 sleep boost time
41.46 Set 2 sleep boost step
41.47 Set 2 wake-up deviation
41.48 Set 2 wake-up delay
41.49 Set 2 tracking mode
41.50 Set 2 tracking ref selection
41.58 Set 2 increase prevention
41.59 Set 2 decrease prevention
41.71 Set 2 compensation input source
41.72 Set 2 compensation input 1
41.73 Set 2 compensated output 1
41.74 Set 2 compensation input 2
41.75 Set 2 compensated output 2
41.76 Set 2 compensation non-linearity
41.80 Set 2 PID output min source
41.81 Set 2 PID output max source
41.89 Set 2 setpoint multiplier
41.90 Set 2 feedback multiplier

GROUP 43
Brake chopper
43.01 Braking resistor temperature
43.06 Brake chopper function
43.07 Brake chopper run permissive
43.08 Brake resistor thermal tc
43.09 Brake resistor Pmax cont
43.10 Brake resistance
43.11 Brake resistor fault limit
43.12 Brake resistor warning limit

GROUP 45
Energy efficiency
45.01 Saved GW hours
45.02 Saved MW hours
45.03 Saved kW hours
45.04 Saved energy
45.05 Saved money x1000
45.06 Saved money
45.07 Saved amount
45.08 CO2 reduction in kilotons
45.09 CO2 reduction in tons
45.10 Total saved CO2
45.11 Energy optimizer
45.12 Energy tariff 1
45.13 Energy tariff 2
45.14 Tariff selection
45.18 CO2 conversion factor
45.19 Comparison power
45.21 Energy calculations reset
45.24 Hourly peak power value
45.25 Hourly peak power time
45.26 Hourly total energy (resettable)
45.27 Daily peak power value (resettable)
45.28 Daily peak power time
45.29 Daily total energy (resettable)
45.30 Last day total energy
45.31 Monthly peak power value (resettable)
45.32 Monthly peak power date
45.33 Monthly peak power time
45.34 Monthly total energy (resettable)
45.35 Last month total energy
45.36 Lifetime peak power value
45.37 Lifetime peak power date
45.38 Lifetime peak power time

GROUP 46
Monitoring/scaling settings
46.01 Speed scaling
46.02 Frequency scaling
46.03 Torque scaling
46.04 Power scaling
46.05 Current scaling
46.06 Speed ref zero scaling
46.11 Filter time motor speed
46.12 Filter time output frequency
46.13 Filter time motor torque
46.14 Filter time power
46.21 At speed hysteresis
46.22 At frequency hysteresis
46.31 Above speed limit
46.32 Above frequency limit
46.41 kWh pulse scaling

GROUP 47
Data storage
47.01 Data storage 1 real32
47.02 Data storage 2 real32
47.03 Data storage 3 real32
47.04 Data storage 4 real32
47.11 Data storage 1 int32
47.12 Data storage 2 int32
47.13 Data storage 3 int32
47.14 Data storage 4 int32
47.21 Data storage 1 int16
47.22 Data storage 2 int16
47.23 Data storage 3 int16
47.24 Data storage 4 int16

GROUP 49
Panel port communication
49.01 Node ID number
49.03 Baud rate
49.04 Communication loss time
49.05 Communication loss action
49.06 Refresh settings

GROUP 50
Fieldbus adapter (FBA)
50.01 FBA A enable
50.02 FBA A comm loss func
50.03 FBA A comm loss t out
50.04 FBA A ref1 type
50.05 FBA A ref2 type
50.06 FBA A SW sel
50.07 FBA A actual 1 type
50.08 FBA A actual 2 type
50.09 FBA A SW transparent source
50.10 FBA A act1 transparent source
50.11 FBA A act2 transparent source
50.12 FBA A debug mode
50.13 FBA A control word
50.14 FBA A reference 1
50.15 FBA A reference 2
50.16 FBA A status word
50.17 FBA A actual value 1
50.18 FBA A actual value 2

GROUP 51
FBA A settings
51.01 FBA A type
51.02 FBA A Par2
51.03 FBA A Par3
51.04 FBA A Par4
51.05 FBA A Par5
51.06 FBA A Par6
51.07 FBA A Par7
51.08 FBA A Par8
51.09 FBA A Par9
51.10 FBA A Par10
51.11 FBA A Par11
51.12 FBA A Par12
51.13 FBA A Par13
51.14 FBA A Par14
51.15 FBA A Par15
51.16 FBA A Par16
51.17 FBA A Par17
51.18 FBA A Par18
51.19 FBA A Par19
51.20 FBA A Par20
51.21 FBA A Par21
51.22 FBA A Par22
51.23 FBA A Par23
51.24 FBA A Par24
51.25 FBA A Par25
51.26 FBA A Par26
51.27 FBA A par refresh
51.28 FBA A par table ver
51.29 FBA A drive type code
51.30 FBA A mapping file ver
51.31 D2FBA A comm status
51.32 FBA A comm SW ver
51.33 FBA A appl SW ver

GROUP 52
FBA A data in
52.01 FBA A data in1
52.02 FBA A data in2
52.03 FBA A data in3
52.04 FBA A data in4
52.05 FBA A data in5
52.06 FBA A data in6
52.07 FBA A data in7
52.08 FBA A data in8
52.09 FBA A data in9
52.10 FBA A data in10
52.11 FBA A data in11
52.12 FBA A data in12

GROUP 53
FBA A data out
53.01 FBA data out1
53.02 FBA data out2
53.03 FBA data out3
53.04 FBA data out4
53.05 FBA data out5
53.06 FBA data out6
53.07 FBA data out7
53.08 FBA data out8
53.09 FBA data out9
53.10 FBA data out10
53.11 FBA data out11
53.12 FBA data out12

GROUP 58
Embedded fieldbus
58.01 Protocol enable
58.02 Protocol ID
58.03 Node address
58.04 Baud rate
58.05 Parity
58.06 Communication control
58.07 Communication diagnostics
58.08 Received packets
58.09 Transmitted packets
58.10 All packets
58.11 UART errors
58.12 CRC errors
58.13 Token counter
58.14 Communication loss action
58.15 Communication loss mode
58.16 Communication loss time
58.17 Transmit delay
58.18 EFB control word
58.19 EFB status word
58.25 Control profile
58.26 EFB ref1 type
58.27 EFB ref2 type
58.28 EFB act1 type
58.29 EFB act2 type
58.31 EFB act1 transparent source
58.32 EFB act2 transparent source
58.33 Addressing mode
58.34 Word order
58.40 Device object ID
58.41 Max master
58.42 Max info frames
58.43 Max APDU retries
58.44 APDU timeout
58.45 Device network usage
58.46 Token loop time
58.101 Data I/O 1
58.102 Data I/O 2
58.103 Data I/O 3
58.104 Data I/O 4
58.105 Data I/O 5
58.106 Data I/O 6
58.107 Data I/O 7
58.114 Data I/O 14

GROUP 60
DDCS communication
60.71 INU-LSU communication port
60.78 INU-LSU comm loss timeout
60.79 INU-LSU comm loss function

GROUP 61
D2D and DDCS transmit data
61.201 INU-LSU data set 10 data 1 value
61.202 INU-LSU data set 10 data 2 value
61.203 INS-LSU data set 10 data 3 value

GROUP 62
D2D and DDCS receive data
62.201 INU-LSU data set 11 data 1 value

GROUP 70
Override
70.01 Override status
70.02 Override enable
70.03 Override activation source
70.04 Override reference source
70.05 Override direction
70.06 Override frequency
70.07 Override speed
70.10 Override enables selection
70.20 Override fault handling
70.21 Override auto reset trials
70.22 Override auto reset time
70.40 Override Log 1 Start Date
70.41 Override Log 1 Start Time
70.42 Override Log 1 End Date
70.43 Override Log 1 End Time
70.44 Override Log 1 Fault 1
70.45 Override Log 1 Fault 2
70.46 Override Log 1 Fault 3
70.47 Override Log 1 Warning 1
70.48 Override Log 1 Warning 2
70.49 Override Log 1 Warning 3
70.50 Override Log 2 Start Date
70.51 Override Log 2 Start Time
70.52 Override Log 2 End Date
70.53 Override Log 2 End Time
70.54 Override Log 2 Fault 1
70.55 Override Log 2 Fault 2
70.56 Override Log 2 Fault 3
70.57 Override Log 2 Warning 1
70.58 Override Log 2 Warning 2
70.59 Override Log 2 Warning 3
70.60 Override Log 3 Start Date
70.61 Override Log 3 Start Time
70.62 Override Log 3 End Date
70.63 Override Log 3 End Time
70.64 Override Log 3 Fault 1
70.65 Override Log 3 Fault 2
70.66 Override Log 3 Fault 3
70.67 Override Log 3 Warning 1
70.68 Override Log 3 Warning 2

70.69 Override Log 3 Warning 3

GROUP 71
External PID1
71.01 External PID act value
71.02 Feedback act value
71.03 Setpoint act value
71.04 Deviation act value
71.06 PID status word
71.07 PID operation mode
71.08 Feedback 1 source
71.11 Feedback filter time
71.14 Setpoint scaling
71.15 Output scaling
71.16 Setpoint 1 source
71.19 Internal setpoint sel1
71.20 Internal setpoint sel2
71.21 Internal setpoint 1
71.22 Internal setpoint 2
71.23 Internal setpoint 3
71.26 Setpoint min
71.27 Setpoint max
71.31 Deviation inversion
71.32 Gain
71.33 Integration time
71.34 Derivation time
71.35 Derivation filter time
71.36 Output min
71.37 Output max
71.38 Output freeze enable
71.39 Deadband range
71.40 Deadband delay
71.58 Increase prevention
71.59 Decrease prevention
71.62 Internal setpoint actual

GROUP 72
External PID2
72.01 External PID act value
72.02 Feedback act value
72.03 Setpoint act value
72.04 Deviation act value
72.06 PID status word
72.07 PID operation mode
72.08 Feedback 1 source
72.11 Feedback filter time
72.14 Setpoint scaling
72.15 Output scaling
72.16 Setpoint 1 source
72.19 Internal setpoint sel1
72.20 Internal setpoint sel2
72.21 Internal setpoint 1
72.22 Internal setpoint 2
72.23 Internal setpoint 3
72.26 Setpoint min
72.27 Setpoint max
72.31 Deviation inversion
72.32 Gain
72.33 Integration time
72.34 Derivation time
72.35 Derivation filter time
72.36 Output min
72.37 Output max
72.38 Output freeze enable
72.39 Deadband range
72.40 Deadband delay
72.58 Increase prevention
72.59 Decrease prevention
72.62 Internal setpoint actual

GROUP 73
External PID3
73.01 External PID act value
73.02 Feedback act value
73.03 Setpoint act value
73.04 Deviation act value
73.06 PID status word
73.07 PID operation mode
73.08 Feedback 1 source
73.11 Feedback filter time
73.14 Setpoint scaling
73.15 Output scaling
73.16 Setpoint 1 source
73.19 Internal setpoint sel1
73.20 Internal setpoint sel2
73.21 Internal setpoint 1
73.22 Internal setpoint 2
73.23 Internal setpoint 3
73.26 Setpoint min
73.27 Setpoint max
73.31 Deviation inversion
73.32 Gain
73.33 Integration time
73.34 Derivation time
73.35 Derivation filter time
73.36 Output min
73.37 Output max
73.38 Output freeze enable
73.39 Deadband range
73.40 Deadband delay
73.58 Increase prevention
73.59 Decrease prevention
73.62 Internal setpoint actual

GROUP 74
External PID4
74.01 External PID act value
74.02 Feedback act value
74.03 Setpoint act value
74.04 Deviation act value
74.06 PID status word
74.07 PID operation mode
74.08 Feedback 1 source
74.11 Feedback filter time
74.14 Setpoint scaling
74.15 Output scaling
74.16 Setpoint 1 source
74.19 Internal setpoint sel1
74.20 Internal setpoint sel2
74.21 Internal setpoint 1
74.22 Internal setpoint 2
74.23 Internal setpoint 3
74.26 Setpoint min
74.27 Setpoint max
74.31 Deviation inversion
74.32 Gain
74.33 Integration time
74.34 Derivation time
74.35 Derivation filter time
74.36 Output min
74.37 Output max
74.38 Output freeze enable
74.39 Deadband range
74.40 Deadband delay
74.58 Increase prevention
74.59 Decrease prevention
74.62 Internal setpoint actual

GROUP 76
PFC configuration
76.01 PFC status
76.02 Multipump system status
76.11 Pump/fan status 1
76.12 Pump/fan status 2
76.13 Pump/fan status 3
76.14 Pump/fan status 4
76.21 Multipump configuration
76.25 Number of motors
76.26 Min number of motors allowed
76.27 Max number of motors allowed
76.30 Start point 1
76.31 Start point 2
76.32 Start point 3
76.41 Stop point 1
76.42 Stop point 2
76.43 Stop point 3
76.55 Start delay
76.56 Stop delay
76.57 PFC speed hold on
76.58 PFC speed hold off
76.59 PFC contactor delay
76.60 PFC ramp acceleration time
76.61 PFC ramp deceleration time
76.70 Autochange
76.71 Autochange interval
76.72 Maximum wear imbalance
76.73 Autochange level
76.74 Autochange auxiliary PFC
76.81 PFC 1 interlock
76.82 PFC 2 interlock
76.83 PFC 3 interlock
76.84 PFC 4 interlock
76.95 Regulator bypass control

GROUP 77
PFC maintenance and monitoring
77.10 PFC runtime change
77.11 Pump/fan 1 running time
77.12 Pump/fan 2 running time
77.13 Pump/fan 3 running time
77.14 Pump/fan 4 running time

GROUP 80
Flow calculation
80.01 Actual flow
80.02 Actual flow percentage
80.11 Flow feedback 1 source
80.12 Flow feedback 2 source
80.13 Flow feedback function
80.14 Flow feedback multiplier
80.15 Maximum flow
80.16 Motor cos ϕ

GROUP 94
LSU control
94.01 LSU control
94.02 LSU panel communication
94.10 LSU max charging time
94.11 LSU stop delay
94.22 User DC voltage reference
94.32 User reactive power reference

GROUP 95
HW configuration
95.01 Supply voltage
95.02 Adaptive voltage limits
95.03 Estimated AC supply voltage
95.04 Control board supply
95.15 Special HW settings
95.20 HW options word 1
95.21 HW options word 2

GROUP 96
System
96.01 Language
96.02 Pass code
96.03 Access level status
96.04 Macro select
96.05 Macro active
96.06 Parameter restore
96.07 Parameter save manually
96.08 Control board boot
96.10 User set status
96.11 User set save/load
96.12 User set I/O mode in1
96.13 User set I/O mode in2
96.16 Unit selection
96.20 Time sync primary source
96.51 Clear fault and event logger
96.70 Disable adaptive program
96.100 Change user pass code
96.101 Confirm user pass code
96.102 User lock functionality
96.108 LSU control board boot

GROUP 97
Motor control
97.01 Switching frequency reference
97.02 Minimum switching frequency
97.03 Slip gain
97.04 Voltage reserve
97.05 Flux braking
97.08 Optimizer minimum torque
97.09 Switching frequency mode
97.10 Signal injection
97.11 TR tuning
97.13 IR compensation
97.15 Motor model temperature adaptation
97.16 Stator temperature factor
97.17 Rotor temperature factor
97.20 U/F Ratio

GROUP 98
User motor parameters
98.01 User motor model mode
98.02 Rs user
98.03 Rr user
98.04 Lm user
98.05 SigmaL user
98.06 Ld user
98.07 Lq user
98.08 PM flux user
98.09 Rs user SI
98.10 Rr user SI
98.11 Lm user SI
98.12 SigmaL user SI
98.13 Ld user SI
98.14 Lq user SI

GROUP 99
Motor data
99.03 Motor type
99.04 Motor control mode
99.06 Motor nominal current
99.07 Motor nominal voltage
99.08 Motor nominal frequency
99.09 Motor nominal speed
99.10 Motor nominal power
99.11 Motor nominal cos ϕ
99.12 Motor nominal torque
99.13 ID run requested
99.14 Last ID run performed
99.15 Motor polepairs calculated
99.16 Motor phase order

For E-Clipse Bypass

GROUP 01
ACTUAL DATA
01.01 MOTOR CURR
01.02 INPUT VOLT
01.03 DI STATUS
01.04 RO STATUS
01.05 PCB TEMP
01.06 KW HOURS
01.07 COMM RO
01.08 RUN TIME
01.09 ON TIME 1
01.10 ON TIME 2
01.11 A-B VOLT
01.12 B-C VOLT
01.13 C-A VOLT
01.14 MWH SAVED
01.15 COST SAVED
01.16 CO2 SAVED
01.17 KWH SAVE L
01.18 KWH SAVE H

GROUP 03
STATUS
03.01 FBUS CW 1
03.03 FBUS SW 1
03.05 FLT WORD 1
03.06 FLT WORD 2
03.07 FLT WORD 3
03.08 WRN WORD 1
03.09 WRN WORD 2

GROUP 04
FAULT LOG
04.01 LAST FAULT
04.02 F1 TIME 1
04.03 F1 TIME 2
04.04 F1 VOLTAGE
04.05 F1 CURRENT
04.06 F1 EVENT 1
04.07 F1 E1 TIME
04.08 F1 EVENT 2
04.09 F1 E2 TIME
04.10 FAULT 2
04.11 F2 TIME 1
04.12 F2 TIME 2
04.13 F2 VOLTAGE
04.14 F2 CURRENT
04.15 F2 EVENT 1
04.16 F2 E1 TIME
04.17 F2 EVENT 2
04.18 F2 E2 TIME
04.19 FAULT 3
04.20 FAULT 4
04.21 FAULT 5

GROUP 05
EVENT LOG
05.01 LAST EVENT
05.02 E1 TIME 1
05.03 E1 TIME 2
05.04 EVENT 2
05.05 E2 TIME 1
05.06 E2 TIME 2
05.07 EVENT 3
05.08 E3 TIME 1
05.09 E3 TIME 2
05.10 EVENT 4
05.11 E4 TIME 1
05.12 E4 TIME 2

GROUP 14
RELAY OUT
14.01 RO1 SELECT
14.02 R1 ON DLY
14.03 R1 OFF DLY
14.04 RO2 SELECT
14.05 R2 ON DLY
14.06 R2 OFF DLY
14.07 RO3 SELECT
14.08 R3 ON DLY
14.09 R3 OFF DLY
14.10 RO4 SELECT
14.11 R4 ON DLY
14.12 R4 OFF DLY
14.13 RO5 SELECT
14.14 R5 ON DLY
14.15 R5 OFF DLY

GROUP 16
SYSTEM CTRL
16.01 START/STOP
16.02 PERMISSIVE
16.03 INTERLOCK 1
16.04 INTERLOCK 2
16.05 INTERLOCK 3
16.06 INTERLOCK 4
16.07 RESET SRC
16.08 AUTO XFR
16.09 OC TRANSFR
16.10 OV TRANSFR
16.11 UV TRANSFR
16.12 AI TRANSFR
16.13 BP DISABLE
16.14 BP RUN DLY
16.15 SAVE PARAM
16.16 DISP ALRMS
16.17 DRIVE TEST
16.18 PASS CODE
16.19 PAR LOCK
16.20 PERMIS TXT
16.21 INTLK1 TXT
16.22 INTLK2 TXT
16.23 INTLK3 TXT
16.24 INTLK4 TXT
16.25 COMM CTRL
16.26 MODE LOCK
16.27 COST/KWH
16.28 LEARN MODE
16.29 LEARN TIME
16.30 REVERSE REQ
16.31 DRV/BYPASS
16.40 PASS SET
16.41 PASS CNFRM
16.42 ABB ACCESS
16.43 FB LOCK
16.44 DNLD LOCK

GROUP 17
OVERRIDE 2
17.01 OVERRIDE 2
17.02 PERMIS OVR
17.03 INTLK1 OVR
17.04 INTLK2 OVR
17.06 INTLK4 OVR
17.07 FAULTS OVR
17.08 OVRD2 MODE

GROUP 30
FLT FUNCTION
30.01 UL ACTION
30.02 UL TIME
30.03 UL TRIP %
30.04 COMM LOSS
30.05 COMM TIME
30.06 PHASE LOSS
30.07 PHASE SEQ

GROUP 32
SUPERV CTRL
32.01 SUPER CTRL
32.02 START LVL
32.03 STOP LEVEL
32.04 START DLY
32.05 STOP DLY
32.06 FBK LOSS

GROUP 33
INFORMATION
33.01 FW VERSION
33.02 PT VERSION
33.03 LP VERSION
33.04 CB VERSION
33.05 TEST DATE
33.06 DRIVE TYPE
33.07 SUB ASMBLY
33.08 PLANT CODE
33.09 MFG DATE
33.10 UNIT NUM

GROUP 50
BYPASS EFB
50.03 BP MAC ID
50.13 TOKEN CNT
50.40 BP OB ID L
50.99 BP OB ID H

GROUP 51
EXT COMM MOD
51.01 FBA TYPE
51.02 FBA PAR 2
51.03 FBA PAR 3
51.04 FBA PAR 4
51.05 FBA PAR 5
51.06 FBA PAR 6
51.07 FBA PAR 7
51.08 FBA PAR 8
51.09 FBA PAR 9
51.10 FBA PAR 10
51.11 FBA PAR 11
51.12 FBA PAR 12
51.13 FBA PAR 13
51.14 FBA PAR 14
51.15 FBA PAR 15
51.16 FBA PAR 16
51.17 FBA PAR 17
51.18 FBA PAR 18
51.19 FBA PAR 19
51.20 FBA PAR 20
51.21 FBA PAR 21
51.22 FBA PAR 22
51.23 FBA PAR 23
51.24 FBA PAR 24
51.25 FBA PAR 25
51.26 FBA PAR 26
51.27 REFRESH
51.28 FBA PAR 28
51.29 FBA PAR 29
51.30 FBA PAR 30
51.31 FBA STATUS
51.32 FBA PAR 32
51.33 FBA PAR 33

GROUP 52
FBA DATA IN
52.01 DATA IN 1
52.02 DATA IN 2
52.03 DATA IN 3
52.04 DATA IN 4
52.05 DATA IN 5
52.06 DATA IN 6
52.07 DATA IN 7
52.08 DATA IN 8
52.09 DATA IN 9
52.10 DATA IN 10

GROUP 53
FBA DATA OUT
53.01 DATA OUT 1
53.02 DATA OUT 2
53.03 DATA OUT 3
53.04 DATA OUT 4
53.05 DATA OUT 5
53.06 DATA OUT 6
53.07 DATA OUT 7
53.08 DATA OUT 8
53.09 DATA OUT 9
53.10 DATA OUT10

GROUP 58
DRIVE EFB
58.02 DV PROT ID
58.03 DV MAC ID
58.04 BAUD RATE
58.05 EFB PARITY
58.07 DV STATUS
58.08 DV OK MSG
58.11 UART ERROR
58.12 DV CRC ERR
58.13 TOKEN CNT
58.17 TX DELAY
58.18 EFB CNTRL
58.19 EFB STAT
58.25 PROFILE
58.40 DV OB ID L
58.41 MAX MASTER
58.42 MAX INF FR
58.99 DV OB ID H
58.100 DB REV
58.105 DV IO 5
58.106 DV IO 6
58.107 DV IO 7
58.108 DV IO 8
58.109 DV IO 9
58.110 DV IO 10
58.111 DV IO 11
58.112 DV IO 12

GROUP 98
OPTIONS
98.02 COMM PROT SEL

GROUP 99
STARTUP DATA
99.02 B.P. MACRO

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ABB Inc.
16250 West Glendale Drive
New Berlin, WI 53151
USA
Telephone +1 800 752-0696
Fax +1 262 785-0397
Internet www.abb.com/drives