2

Start-up, control with I/O and ID run

Contents of this chapter

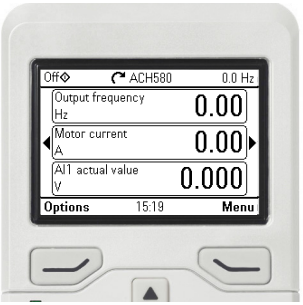
The chapter describes how to:

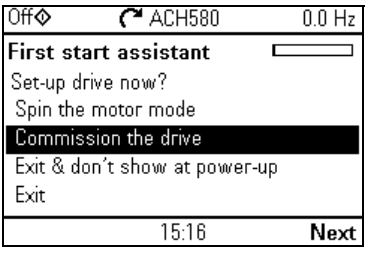
- perform the start-up
- start, stop, change the direction of the motor rotation and adjust the speed of the motor through the I/O interface
- perform an Identification run (ID run) for the drive.

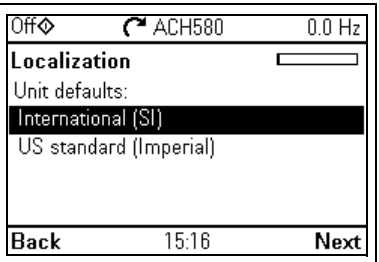
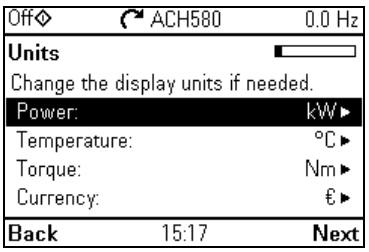
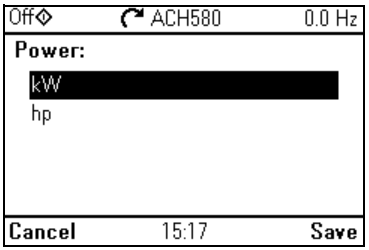
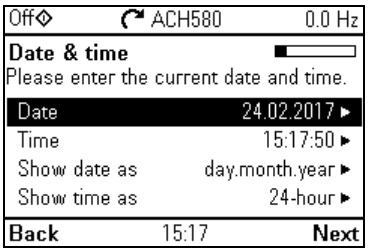
How to start up the drive

Note: Automatic selection of supply voltage is not supported in ACH580-31. You must select the supply voltage manually using parameter *95.01 Supply voltage*. Follow the instructions below.

How to start up the drive using the First start assistant on the Hand-Off-Auto control panel

Safety	
Do not start-up the drive unless you are a qualified electrician. Read and obey the instructions in chapter *Safety instructions* at the beginning of the *Hardware manual* of the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment	
☐ Check the installation. See chapter *Installation checklist* in the *Hardware manual* of the drive.	
☐ Make sure there is no active start on (DI1 in factory settings, that is, HVAC default). The drive will start up automatically at power-up if the external run command is on and the drive is in the external control mode. 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.	
Hints on using the assistant control panel	
The two commands at the bottom of the display (**Options** and **Menu** in the figure on the right), show the functions of the two softkeys and located below the display. The commands assigned to the softkeys vary depending on the context. Use keys ◄, ►, ▲ and ▼ to move the cursor and/or change values depending on the active view. Key ? shows a context-sensitive help page. For more information, see *ACX-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).	
1 – First start assistant guided settings: Language, motor nominal values, and date and time	
☐ Have the motor name plate data at hand. Power up the drive.	

☐	The First start assistant guides you through the first start-up. The assistant begins automatically. Wait until the control panel enters the view shown on the right. Select the language you want to use by highlighting it (if not already highlighted) and pressing (**OK**). **Note:** After you have selected the language, it takes a few minutes to download the language file to the control panel.	
☐	ACH580-31 drive: 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.	
☐	Select **Commission the drive** and press (**Next**).	

☐	Select the localization you want to use and press (**Next**).	
☐	Change the units shown on the panel if needed. • Go to the edit view of a selected row by pressing . • Scroll the view with and . Go to the next view by pressing (**Next**).	
☐	To select a value in an edit view: • Use and to select the value. Press (**Save**) to accept the new setting, or press (**Cancel**) to go back to the previous view without making changes.	
☐	Set the date and time as well as date and time display formats. • Go to the edit view of a selected row by pressing . • Scroll the view with and . Go to the next view by pressing (**Next**).	

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

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

ABB Motors CE

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

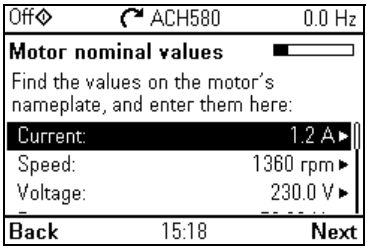
☐ Check that the motor data is correct. Values are predefined on the basis of the drive size but you should verify that they correspond to the motor.

Start with the motor type.

- Go to the edit view of a selected row by pressing (▶).
- Scroll the view with (▲) and (▼).

Motor nominal cos Φ and nominal torque are optional.

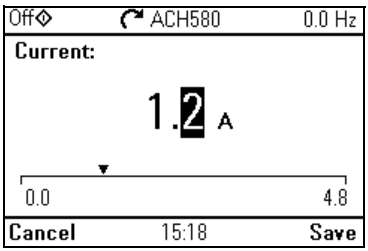
Press (—) (**Next**) to continue.



☐ To change a value in an edit view:

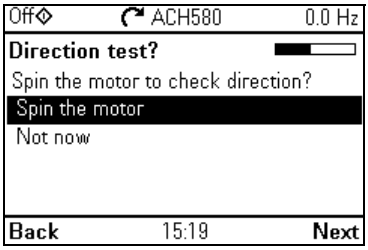
- Use (◀) and (▶) to move the cursor left and right.
- Use (▲) and (▼) to change the value.

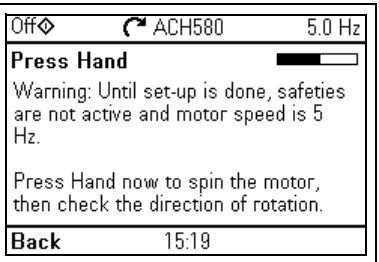
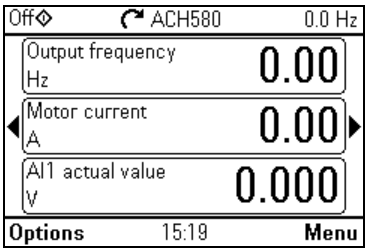
Press (—) (**Save**) to accept the new setting, or press (↩) (**Cancel**) to go back to the previous view without making changes.



☐ This step is optional, and requires rotating the motor. Do not do this if it could cause any risk, or if the mechanical set-up does not allow it.

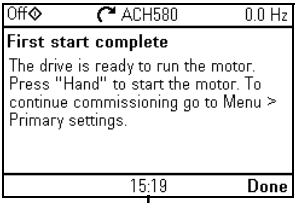
To do the direction test, select **Spin the motor** and press (—) (**Next**).



☐	Press the Hand key (Hand) on the panel to start the drive.	
☐	Check the direction of the motor. If it is forward, select **Yes, motor is spinning forward** and press (**Next**) to continue. If the direction is not forward, select **No, fix direction** and press (**Next**) to continue.	
☐	The first start is now complete and the drive is ready for use. Press (**Done**) to enter the Home view.	
☐	The Home view 1 monitoring the values of the selected signals is shown on the panel. There are eight different Home view displays. Home view 1 is the default Home view. You can browse them with keys and . See section *Home view displays* on page *47*.	

2 – Completion of commissioning

You can complete the commissioning in five different ways:



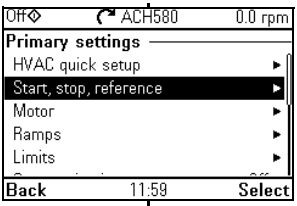
1 Run & set reference on the panel

Drive is now ready to be run in the Hand mode.

Press the Hand key  on the panel to start the motor.

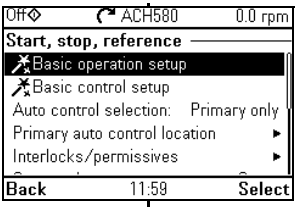
Set the reference on the panel.

2 Assistant commissioning

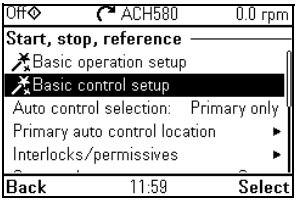


Complete the following two assistants.

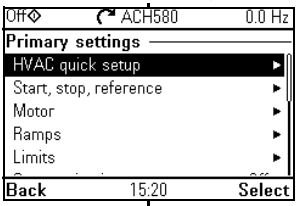
Ramps, limits, interlock, run permissive



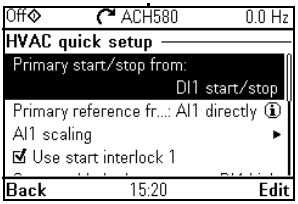
Start/stop, reference and scaling



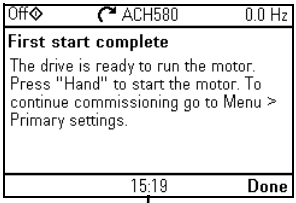
3 HVAC quick setup commissioning



Go through the items on the menu



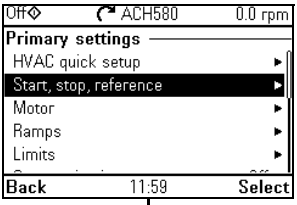
Options 4 and 5:



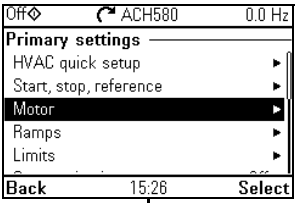
4

Commissioning with Primary settings

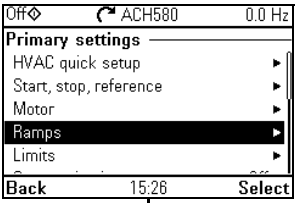
Set the start/stop and reference



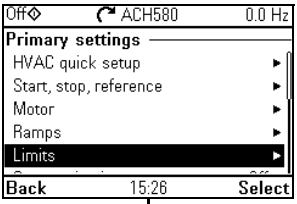
Set the motor data



Set the ramps



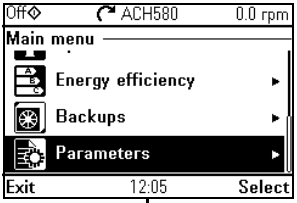
Set the limits

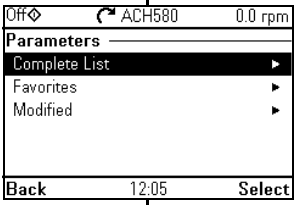


Continue with further adjustments, see section *Primary settings menu* on page *52*.

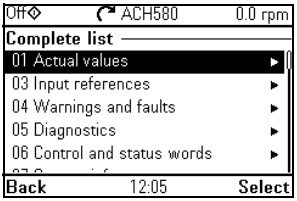
5

Commissioning with parameters. For advanced users only.





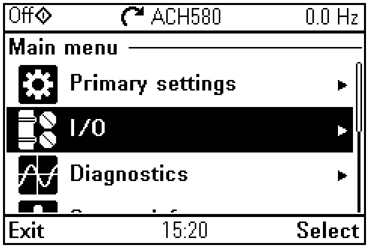
See chapter *Parameters* on page *323*.



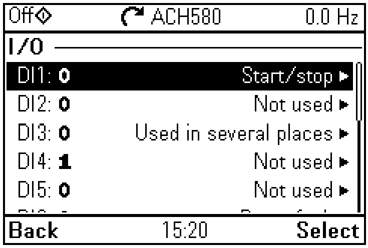
3 – Additional settings in the Primary settings menu – I/O menu

☐ After the additional adjustments, make sure that the actual I/O wiring matches the I/O use in the control program.

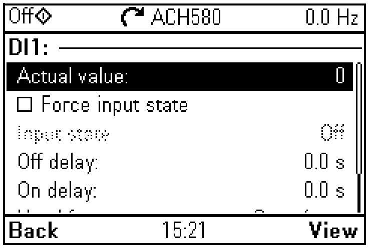
In the **Main** menu, select a **I/O** and press (**Select**) to enter the **I/O** menu.



☐ Select a the connection you want to check and press (**Select**) (or).

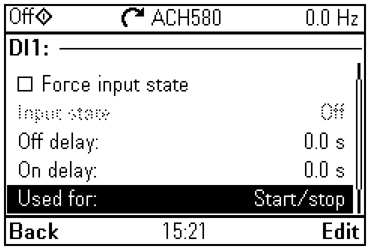


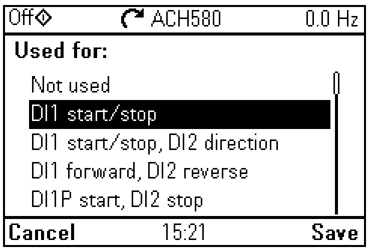
☐ To view the details of a parameter that cannot be adjusted via the **I/O** menu, press (**View**).

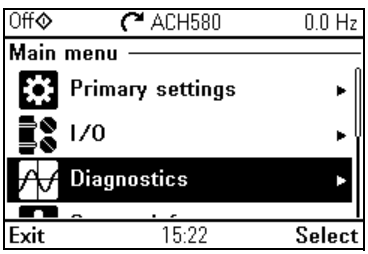
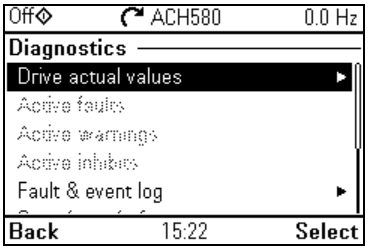


☐ To adjust the value of a parameter, press (**Edit**), adjust the value using , , and keys and press (**Save**). Note that the actual wiring must match the new value.

Go back to the **Main** menu by pressing (**Back**) repeatedly.



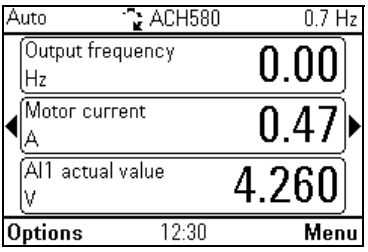
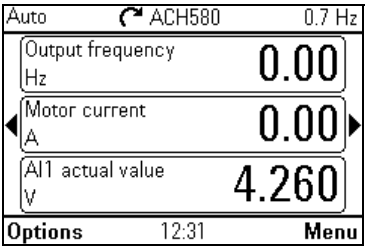


4 – Diagnostics menu		
☐	After making the additional adjustments and checking the I/O connections, use the **Diagnostics** menu to make sure that the setup is functioning correctly. In the **Main** menu, select **Diagnostics** and press (**Select**) (or ▶).	
☐	Select the diagnostics item you want to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

How to control the drive through the I/O interface

The table below describes how to operate 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.	
Make sure that the control connections are wired according to the connection diagram given for the HVAC default.	See section *HVAC default* on page *83*.
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	
Start by switching digital input DI1 on. The arrow starts rotating. It is dotted until the setpoint is reached. Regulate the drive output frequency (motor speed) by adjusting voltage of analog input AI. **Note:** If the drive will not start, check that the start interlock 1 (parameter *20.41*) is active (1). For the HVAC default, the start interlock 1 is connected to DI4 by default.	
Stopping the motor	
Switch digital input DI1 off. The arrow stops rotating.	

How to perform the ID run

The drive automatically estimates motor characteristics using *Standstill* ID run when the drive is started for the first time in vector control and after any motor parameter (group *99 Motor data*) is changed. This is valid when

- parameter *99.13 ID run requested* selection is *Standstill* and
- parameter *99.04 Motor control mode* selection is *Vector*.

In most applications there is no need to perform a separate ID run. The ID run should be selected manually if:

- vector control mode is used (parameter *99.04 Motor control mode* is set to *Vector*), and
- permanent magnet motor (PM) is used (parameter *99.03 Motor type* is set to *Permanent magnet motor*), or
- synchronous reluctance motor (SynRM) is used (parameter *99.03 Motor type* is set to *SynRM*), or
- drive operates near zero speed references, or
- operation at torque range above the motor nominal torque, over a wide speed range is needed.

Do the ID run with the ID run assistant by selecting **Menu > Primary settings > Motor > ID run** (see page *35*) or with parameter *99.13 ID run requested* (see page *39*).

Note: If motor parameters (*99 Motor data*) are changed after the ID run, it must be repeated.

Note: If you have already parameterized your application using the scalar motor control mode (*99.04 Motor control mode* is set to *Scalar*) and you need to change motor control mode to *Vector*,

- change the control mode to vector with the **Control mode** assistant (go to **Menu > Primary settings > Motor > Control mode)** and follow the instructions. The ID run assistant then guides you through the ID run.

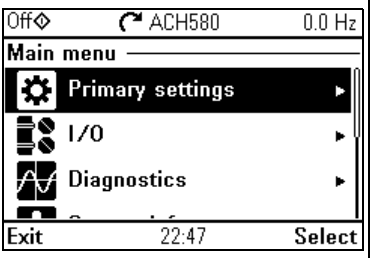
or

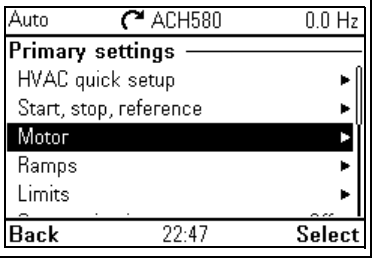
- set parameter *99.04 Motor control mode* to *Vector*, and
  - for I/O controlled drive, check parameters in groups *22 Speed reference selection*, *23 Speed reference ramp*, *12 Standard AI*, *30 Limits* and *46 Monitoring/scaling settings*.

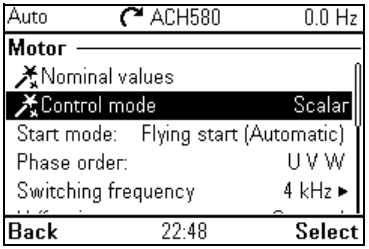
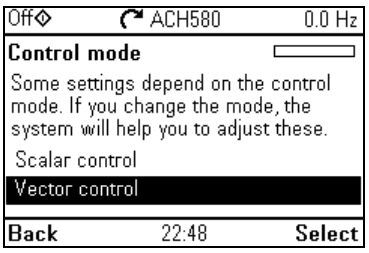
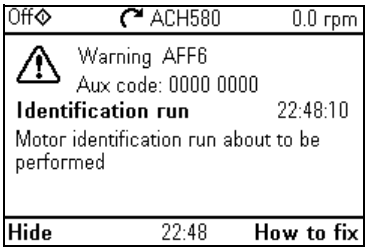
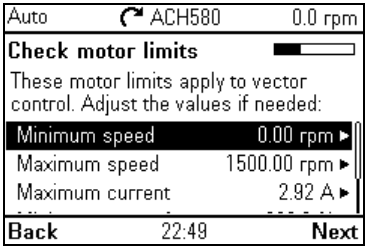
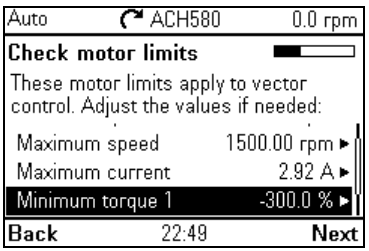
ID run procedure

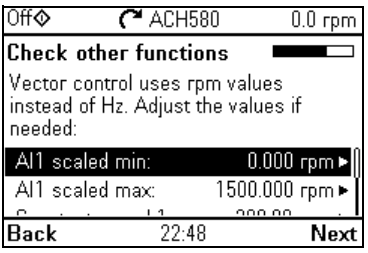
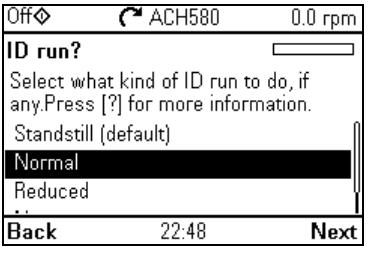
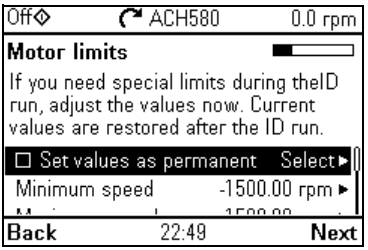
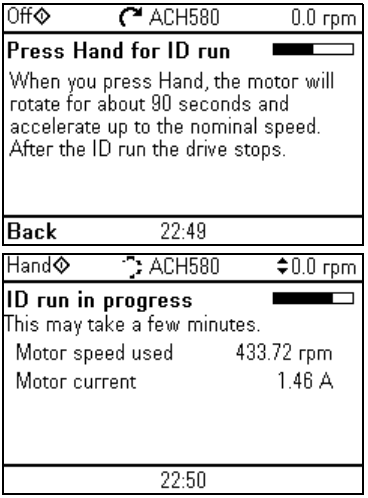
With the ID run assistant

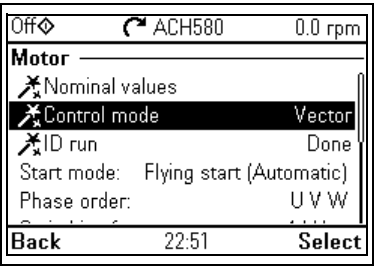
Pre-check	
⚠	**WARNING!** The motor will run at up to approximately 50…80% of the nominal speed during the ID run. The motor will rotate in the forward direction. **Make sure that it is safe to run the motor before performing the ID run!**
☐	De-couple the motor from the driven equipment
☐	Check that the values of the motor data parameters are equivalent to those on the motor nameplate.
☐	Check that the STO circuit is closed.
	The assistant will ask if you want to use temporary motor limits. They must meet the following conditions:
☐	Minimum speed ≤ 0 rpm
☐	Maximum speed = motor rated speed (Normal ID run procedure needs the motor to be run at 100% speed.)
☐	Maximum current > I_{HD}
☐	Maximum torque > 50%
☐	Make sure that the panel is in the Off mode control (text Off shown at the top left). Press the Off key (⏹) to switch to the Off mode.
ID run	
☐	Go to the **Main** menu by pressing (**Menu**) in the Home view. Select **Primary settings** and press (**Select**) (or ▶).
☐	Select **Motor** and press (**Select**) (or ▶).





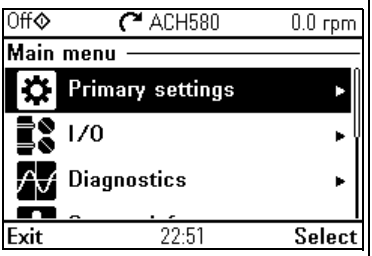
☐	If the control modes is scalar, select **Control mode** and press (**Select**) (or ▶) and continue to the next step.	
☐	Select **Vector control** and press (**Select**) (or ▶).	
☐	Warning message **Identification run** is shown. Press (**Hide**) to continue.	
☐	Check the motor speed limits. The following must be true: • Minimum speed ≤ 0 rpm • Maximum speed = motor rated speed.	
☐	Check the motor current as well as torque limits. The following must be true: • Maximum current > I_{HD} • Maximum torque > 50%. Press (**Next**).	

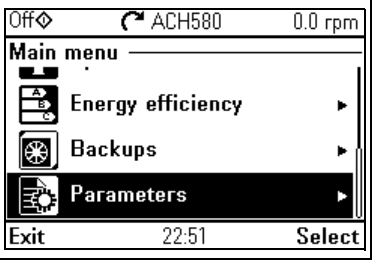
☐	Check AI1 scaling, see parameters *12.19 AI1 scaled at AI1 min* and *12.20 AI1 scaled at AI1 max*. Press (**Next**).	
☐	Select the type of ID run you want to do and press (**Next**).	
☐	Check the motor limits shown on the panel. If you need other limits during the ID run you can enter them here. The originals limits will be restored after the ID run, unless you select **Set values as permanent**. Press (**Next**).	
☐	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. See chapter *Fault tracing* on page *183* for more information.	

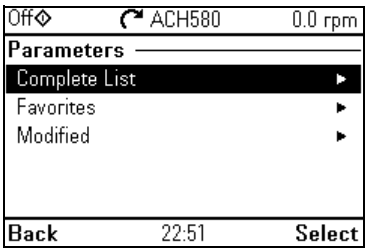
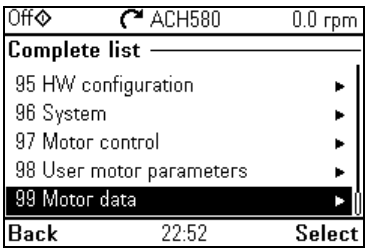
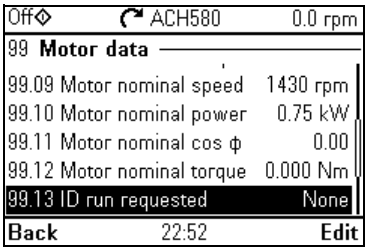
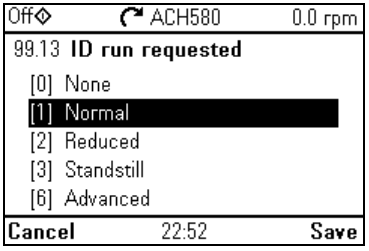
☐	After the ID run is completed, text **Done** is shown on row **ID run**.	

With parameter *99.13 ID run requested*

Pre-check	
	WARNING! The motor will run at up to approximately 50…80% of the nominal speed during the ID run. The motor will rotate in the forward direction. **Make sure that it is safe to run the motor before performing the ID run!**
☐	De-couple the motor from the driven equipment
☐	Check that the values of the motor data parameters are equivalent to those on the motor nameplate.
☐	Check that the STO circuit is closed.
	If parameter values (from group *10 Standard DI, RO* to group *99 Motor data*) are changed before the ID run, check that the new settings meet the following conditions:
☐	*30.11 Minimum speed* ≤ 0 rpm
☐	*30.12 Maximum speed* = motor rated speed (Normal ID run procedure needs the motor to be run at 100% speed.)
☐	*30.17 Maximum current* > I_{HD}
☐	*30.20 Maximum torque 1* > 50% or *30.24 Maximum torque 2* > 50%, depending on which torque limit set is in use according to parameter *30.18 Torq lim sel*.
	Check that signals
☐	run permissive (parameter *20.40 Run permissive*) is active
☐	Make sure that the panel is in the Off mode control (text Off shown at the top left). Press the Off key (◇) to switch to the Off mode.
ID run	
☐	Go to the **Main** menu by pressing (Menu) in the Home view. Press ▲.
☐	Select **Parameters** and press (Select) (or ▶).





☐	Select **Complete list** and press (**Select**) (or ▶).	
☐	Scroll the page with ▲ and ▼, and select parameter group **99 Motor data** and press (**Select**) (or ▶).	
☐	Scroll the page with ▲ and ▼, and select parameter **99.13 ID run requested** and press (**Select**) (or ▶).	
☐	Select the ID run type and press (**Save**) (or ▶).	

☐ Panel LED starts blinking green to indicate an active warning (*AFF6*).

The *AFF6* warning view is shown when no key has been pressed for one minute. Pressing (**How to fix**) shows text informing that the ID run will be done at the next start. You can hide the warning view by pressing (**Hide**).

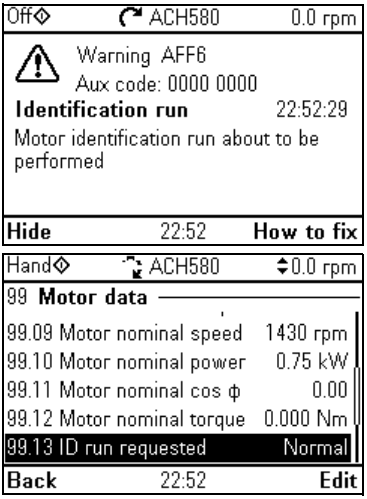
Press the Hand key ( ) to start the ID run.

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 the arrow is rotating at the top.

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. See chapter *Fault tracing* on page *183* for more information.



3

Control panel

Contents of this chapter

This chapter contains instructions for removing and reinstalling the assistant control panel and briefly describes its display, keys and key shortcuts. For more information, see *ACX-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).

Removing and reinstalling the control panel

To remove the control panel, press the retaining clip at the top (1a) and pull it forward from the top edge (1b).