

Quick start-up guide for ACS880 drives with primary control program

About this guide

This guide describes the basic start-up sequence of an ACS880 drive equipped with the primary control program. Complete documentation of the drive firmware can be found in *Firmware manual* (see list of manuals on the inside of the front cover).

In this guide, the drive is set up using the ACS-AP-I control panel. The start-up sequence can also be carried out using the Drive composer PC tool.

Before you start

Ensure that the drive has been mechanically and electrically installed as described in the appropriate *Quick installation guide* and/or *Hardware manual*.

Safety





























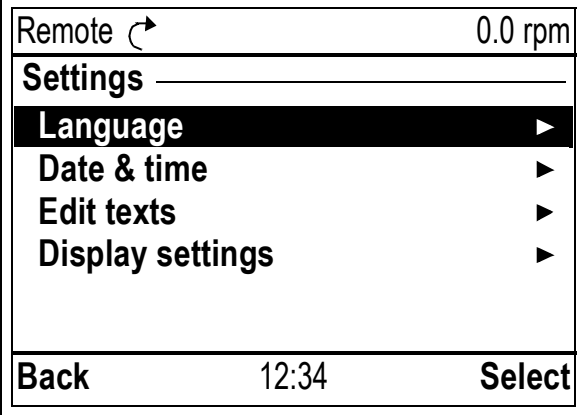

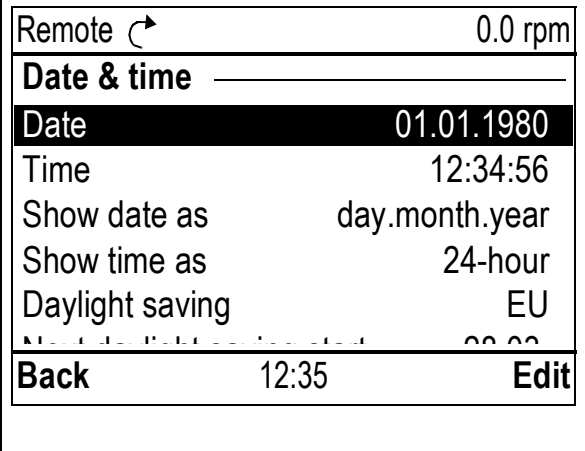

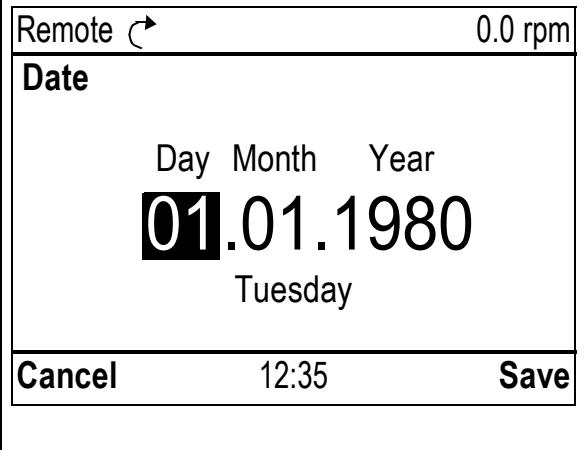
WARNING! All electrical installation and maintenance work on the drive should be carried out by qualified electricians only.

Never work on the drive, the braking chopper circuit, the motor cable or the motor when power is applied to the drive. Always ensure by measuring that no voltage is actually present.

Start-up

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Safety																	
	The start-up may only be carried out by a qualified electrician. The safety instructions must be followed during the start-up procedure. See the safety instructions on the first pages of the appropriate <i>Hardware manual</i> .																
<input type="checkbox"/>	Check the installation. See the installation checklist in the appropriate <i>Hardware manual</i> .																
<input type="checkbox"/>	<p>Check that the starting of the motor does not cause any danger.</p> <p>De-couple the driven machine if</p> <ul style="list-style-type: none"> • 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. 																
1 – Power-up, date and time settings																	
<input type="checkbox"/> Power up the drive. <p>Note: It is normal that warning messages appear at various points along the start-up process. To hide a message and to resume the start-up process, press .</p> <p>Hide any warnings now to enter the Home view (shown on the right).</p> <p>The two commands at the bottom of the display (in this case, Options and Menu), show the functions of the two softkeys  and  located below the display. The commands assigned to the softkeys vary depending on the context.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">Remote </td> <td style="text-align: right;">0.0 rpm</td> </tr> <tr> <td style="text-align: left;">Motor speed used rpm</td> <td style="text-align: right; font-size: 24px;">0.00</td> </tr> <tr> <td style="text-align: left;">◀ Motor current A</td> <td style="text-align: right; font-size: 24px;">0.00 ▶</td> </tr> <tr> <td style="text-align: left;">Motor torque % %</td> <td style="text-align: right; font-size: 24px;">0.0</td> </tr> <tr> <td style="text-align: left;">Options</td> <td style="text-align: center;">12:34</td> </tr> <tr> <td style="text-align: right;">Menu</td> <td></td> </tr> </table>	Remote 	0.0 rpm	Motor speed used rpm	0.00	◀ Motor current A	0.00 ▶	Motor torque % %	0.0	Options	12:34	Menu					
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Menu																	
<input type="checkbox"/> In the Home view, press  (Menu). The main Menu (right) appears.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">Remote </td> <td style="text-align: right;">0.0 rpm</td> </tr> <tr> <td colspan="2">Menu</td> </tr> <tr> <td style="text-align: left;"> Parameters</td> <td style="text-align: right;">▶</td> </tr> <tr> <td style="text-align: left;"> Assistants</td> <td style="text-align: right;">▶</td> </tr> <tr> <td style="text-align: left;"> Energy efficiency</td> <td style="text-align: right;">▶</td> </tr> <tr> <td style="text-align: left;"> Event log</td> <td style="text-align: right;">▶</td> </tr> <tr> <td style="text-align: left;">Exit</td> <td style="text-align: center;">12:34</td> </tr> <tr> <td style="text-align: right;">Select</td> <td></td> </tr> </table>	Remote 	0.0 rpm	Menu		 Parameters	▶	 Assistants	▶	 Energy efficiency	▶	 Event log	▶	Exit	12:34	Select	
Remote 	0.0 rpm																
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 Parameters	▶																
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
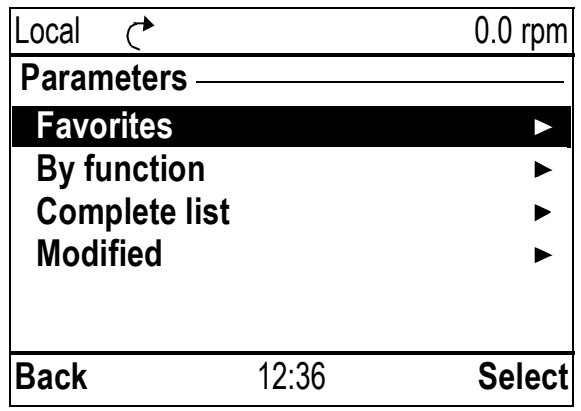




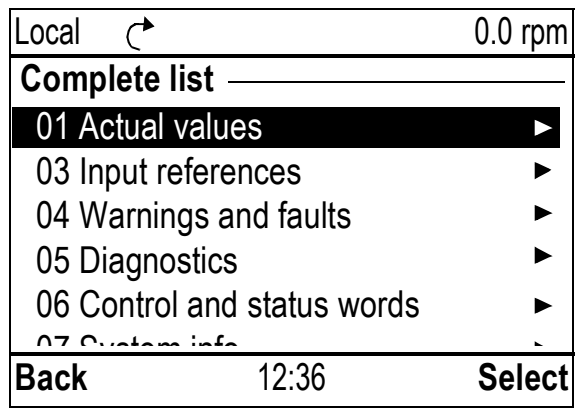



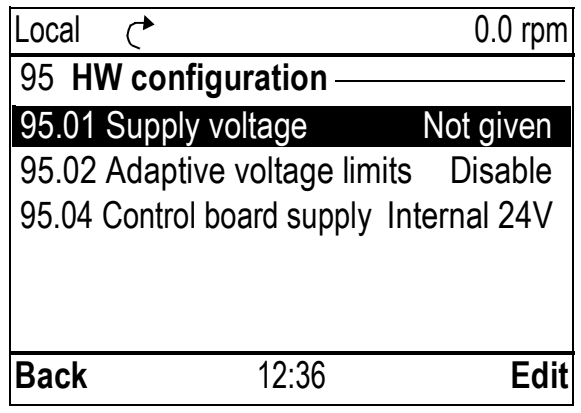


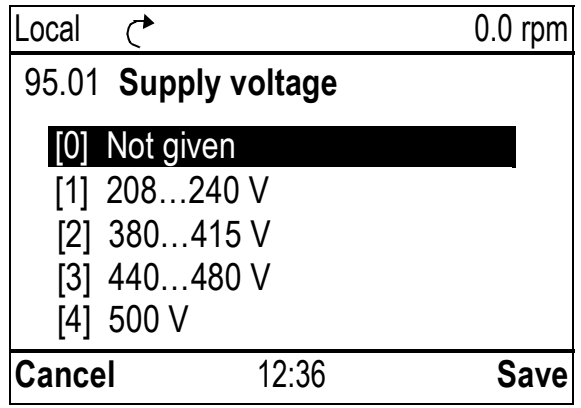

<input type="checkbox"/>	<p>Highlight Settings on the menu using  and  and press  (Select).</p>	
<input type="checkbox"/>	<p>In the Settings menu, highlight Date & time (if not already highlighted) and press  (Select).</p>	
<input type="checkbox"/>	<p>In the Date & time menu, highlight Date (if not already highlighted) and press  (Select).</p>	

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<input type="checkbox"/> <p>Set the correct date:</p> <ul style="list-style-type: none"> • Use and to move the cursor left and right. • Use and to change the value. • Press (Save) to accept the new setting. <p>Check/adjust all the remaining settings in the Date & time menu.</p> <p>The Show clock setting determines whether the time is shown at all times in the bottom pane of the display.</p> <p>After you have made the settings, press (Back or Exit) repeatedly until the Home view (right) reappears.</p>	
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2 – Supply voltage and motor data settings

<input type="checkbox"/> <p>Switch to local control to ensure that external control is disabled by pressing the key. Local control is indicated by the text “Local” in the top pane.</p>	
<input type="checkbox"/> <p>Open the main Menu by pressing (Menu).</p>	

<input type="checkbox"/>	<p>Highlight Parameters and press  (Select).</p>	 <p>Local  0.0 rpm</p> <p>Parameters _____</p> <p>Favorites ▶</p> <p>By function ▶</p> <p>Complete list ▶</p> <p>Modified ▶</p> <hr/> <p>Back 12:36 Select</p>
<input type="checkbox"/>	<p>Highlight Complete list using  and  and press  (Select).</p> <p>A listing of parameter groups is displayed.</p>	 <p>Local  0.0 rpm</p> <p>Complete list _____</p> <p>01 Actual values ▶</p> <p>03 Input references ▶</p> <p>04 Warnings and faults ▶</p> <p>05 Diagnostics ▶</p> <p>06 Control and status words ▶</p> <p>07 System info ▶</p> <hr/> <p>Back 12:36 Select</p>
<input type="checkbox"/>	<p>Highlight parameter group 95 HW configuration and press  (Select).</p> <p>Note that the list wraps around in either direction between groups 99 and 01. In this case, it is quicker to use  to locate group 95 on the list.</p> <p>After selecting a group, a listing of parameters within the group is displayed.</p>	 <p>Local  0.0 rpm</p> <p>95 HW configuration _____</p> <p>95.01 Supply voltage Not given</p> <p>95.02 Adaptive voltage limits Disable</p> <p>95.04 Control board supply Internal 24V</p> <hr/> <p>Back 12:36 Edit</p>
<input type="checkbox"/>	<p>Highlight parameter 95.01 Supply voltage (if not already highlighted) and press  (Edit).</p> <p>The available parameter settings are listed.</p>	 <p>Local  0.0 rpm</p> <p>95.01 Supply voltage</p> <p>[0] Not given</p> <p>[1] 208...240 V</p> <p>[2] 380...415 V</p> <p>[3] 440...480 V</p> <p>[4] 500 V</p> <hr/> <p>Cancel 12:36 Save</p>

<input type="checkbox"/> Highlight the correct setting on the list and press (Save).	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> Local 0.0 rpm </div> <div style="border-bottom: 1px solid black; padding: 2px;"> 95 HW configuration </div> <div style="border-bottom: 1px solid black; padding: 2px;"> 95.01 Supply voltage 380...415 V </div> <div style="border-bottom: 1px solid black; padding: 2px;"> 95.02 Adaptive voltage limits Disable </div> <div style="border-bottom: 1px solid black; padding: 2px;"> 95.04 Control board supply Internal 24V </div> <div style="display: flex; justify-content: space-between; border-top: 1px solid black; padding-top: 2px;"> Back 12:36 Edit </div> </div>
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<input type="checkbox"/> Press (Back) to display the list of parameter groups again. Select parameter group 99 Motor data , and set parameter 99.03 Motor type .	
<input type="checkbox"/> Set parameter 99.04 Motor ctrl mode . DTC = Direct torque control; Scalar DTC is suitable for most cases. Scalar mode is recommended if <ul style="list-style-type: none"> the nominal current of the motor is less than 1/6 of the nominal current of the drive, the drive is used for test purposes with no motor connected, or the drive controls multiple motors and the number of motors connected is variable. 	

Refer to the motor nameplate for the following parameter settings. Whenever possible, enter the values exactly as shown on the motor nameplate.





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

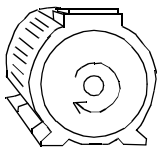
ABB Motors									
3 ~ motor		M2AA 200 MLA 4							
IEC 200 M/L 55									
No									
Ins.cl. F					IP 55				
V	Hz	kW	r/min	A	cos φ	IA/IN	t _{E/s}		
690 Y	50	30	1475	32.5	0.83				
400 D	50	30	1475	56	0.83				
660 Y	50	30	1470	34	0.83				
380 D	50	30	1470	59	0.83				
415 D	50	30	1475	54	0.83				
440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

Example of a nameplate of a permanent magnet motor:

ABB Motors									
3 ~ motor		M2BJ 280SMB 10 B3							
S1 SPEC INSUL. No 3424522									
JK-21640-1					Ins.cl. F IP 55				
V	Hz	kW	r/min	A	cos φ	IA/IN	t _{E/s}		
400 D	50	55	600	103	0.97				
Prod. code 2GBJ285220-ADA405445477									
6316/C3		6316/C3		630kg					
IEC 34-1									

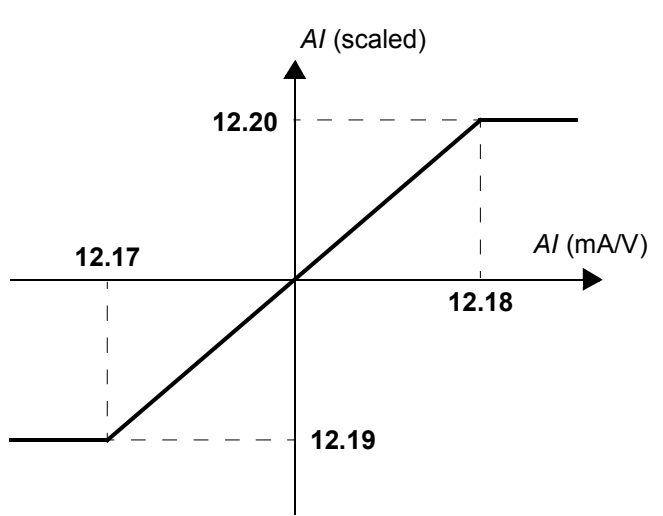
<input type="checkbox"/> 99.06 Motor nominal current The allowable range is <ul style="list-style-type: none"> in DTC mode: $1/6 \times I_{Hd} \dots 2 \times I_{Hd}$ of the drive in Scalar mode: $0 \dots 2 \times I_{Hd}$ Note: With numerical parameter values: <ul style="list-style-type: none"> Use and to change the value of a digit. Use and to move the cursor left and right. Press (Save) to enter the value. 	
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Make the following parameter settings in the same manner.			
<input type="checkbox"/>	<p>99.07 Motor nominal voltage</p> <p>The allowable range is $1/6 \times U_N \dots 2 \times U_N$ of the drive.</p> <p>With permanent magnet motors, the nominal voltage is the BackEMF voltage at nominal speed. If the voltage is given in volt/rpm (eg. 60 V per 1000 rpm), the voltage at a nominal speed of 3000 rpm is $3 \times 60 \text{ V} = 180 \text{ V}$. Note that nominal voltage is not the same as equivalent DC motor voltage (EDCM) given by some manufacturers. The nominal voltage can be calculated by dividing the EDCM voltage by 1.7 (or square root of 3).</p>		
<input type="checkbox"/>	<p>99.08 Motor nominal frequency</p> <p>With permanent magnet motors, if the nominal frequency is not shown on the nameplate, it can be calculated using the following formula:</p> $f = n \times p / 60$ <p>where n = nominal motor speed, p = number of pole pairs.</p>		
<input type="checkbox"/>	99.09 Motor nominal speed		
<input type="checkbox"/>	99.10 Motor nominal power		
<input type="checkbox"/>	<p>99.11 Motor nominal cosφii</p> <p>99.12 Motor nominal torque</p> <p>These values are not required, but can be entered to improve control accuracy. If not known, leave at 0.</p>		
<input type="checkbox"/>	<p>99.13 Identification run request</p> <p>This parameter selects the mode of the identification run (DTC motor control mode only).</p> <p> WARNING! The identification run modes marked thus * will run the motor in the forward direction (see below for details). Make sure it is safe to run the motor before choosing any of these modes.</p> <p>*Normal mode should be selected whenever possible. The driven machinery must be de-coupled from the motor if</p> <ul style="list-style-type: none"> • the load torque is higher than 20%, or • the machinery is not able to withstand the nominal torque transient during the identification run. <p>*Reduced mode should be selected if the mechanical losses are higher than 20%, ie. the load cannot be de-coupled, or full flux is required to keep the motor brake open (eg. with conical motors).</p> <p>The Standstill mode should be selected if neither the *Normal or *Reduced mode can be used. Notes:</p> <ul style="list-style-type: none"> • This mode cannot be used with a permanent magnet motor if the load torque is higher than 20% of nominal. • Mechanical brake is not opened by the logic for the identification run. 		
<input type="checkbox"/>	Ensure that the Safe torque off and emergency stop circuits (if present) are closed.		
<input type="checkbox"/>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Start the identification run by pressing the  (Start) button.</td> <td style="width: 50%;">A warning will indicate that the identification run is in progress.</td> </tr> </table>	Start the identification run by pressing the  (Start) button.	A warning will indicate that the identification run is in progress.
Start the identification run by pressing the  (Start) button.	A warning will indicate that the identification run is in progress.		

<input type="checkbox"/>	<p>Check that the motor runs in the correct direction (forward direction shown below).</p>  <p>The identification run has completed when the drive stops and the value of parameter 99.13 reverts to “No”.</p> <p>If the motor ran in the wrong direction, correct the motor cabling or adjust parameter 99.16 Phase order.</p>
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3 – Control signal settings

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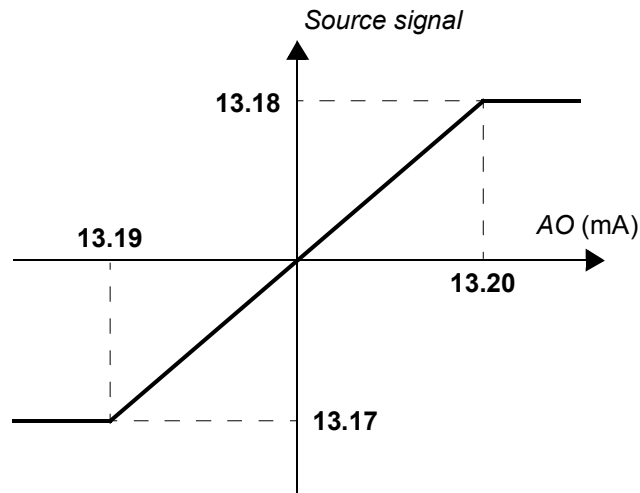
<input type="checkbox"/>	<p>Check the positions of jumpers J1 and J2 on the control unit of the drive. These jumpers determine whether analog inputs AI1 and AI2 are current or voltage.</p> <p>Check/adjust the following parameters.</p>
<input type="checkbox"/>	<p>20.01 Ext1 commands</p> <p>By default, the drive starts/stops according to the status of digital input DI1 (0 = Stop, 1 = Start). DI2 determines the direction of rotation (0 = Forward, 1 = Reverse).</p> <p>If other sources are required, change the value accordingly. The sources In1...In3 are defined by parameters 20.03...20.05.</p>
<input type="checkbox"/>	<p>12.15 AI1 unit selection</p> <p>Set this to either mA or V corresponding to the setting of jumper J1.</p>
<input type="checkbox"/>	<p>12.17 AI1 min 12.18 AI1 max 12.19 AI1 scaled at AI1 min 12.20 AI1 scaled at AI1 max</p> <p>The default input for speed reference is analog input AI1. (This is controlled by the parameters in group 22.)</p> <p>Parameters 12.17 and 12.18 set the low and high limits of the analog input signal. Scaling parameters 12.19 and 12.20 define the internal signal levels that correspond to these limits as follows:</p>  <p>The corresponding parameters for analog input AI2 are 12.27...12.30.</p>



- 13.12 AO1 source**
- 13.17 AO1 source min**
- 13.18 AO1 source max**
- 13.19 AO1 out at AI1 src min**
- 13.20 AO1 out at AI1 src max**

Parameter **13.12** selects the source for analog output AO1 (by default, motor speed in rpm).

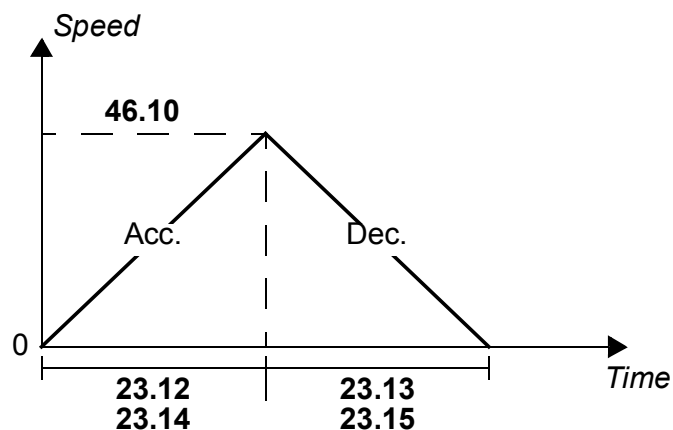
Parameters **13.17** and **13.18** set low and high source signal values that correspond to the actual analog output values defined by parameters **13.19** and **13.20**.








- 46.10 Speed scaling**
- 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**

You can define two different sets of acceleration/deceleration ramps. The source that switches between the two sets is selected by parameter **23.11**.

Each acceleration/deceleration time set in parameters **23.12**...**23.15** refers to the time it takes for the drive to accelerate or decelerate between 0 and scaling speed (parameter **46.10**).



<input type="checkbox"/>	<p>30.11 Minimum speed 30.12 Maximum speed 30.17 Maximum current 30.19 Minimum torque 30.20 Maximum torque</p> <p>Check, and set if necessary, the limits for motor speed, current and torque.</p>
<input type="checkbox"/>	<p>Start the drive with a positive (forward) speed reference:</p> <ul style="list-style-type: none"> • From control panel (Local control): In the Home view, press  (Options), select Reference, adjust the reference using the , , , and  keys, press Save, and press the Start button. • From I/O: In Remote control, adjust analog input AI1 (reference), switch digital input DI2 to 0 (forward), and switch digital input DI1 to 1 (start).