ABB industry specific drives for water and wastewater

Start-up guide
ACQ810-04 drive modules

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List of related manuals

Drive hardware manuals and guides	Code (English)
ACQ810-04 drive modules (1.1…45 kW, 1…60 hp) hardware manual	*3AUA0000055160*
ACQ810-04 drive modules (55…160 kW, 75…200 hp) hardware manual	*3AUA0000055161*
ACQ810-04 drive modules (200 to 500 kW, 300 to 700 hp) hardware manual	*3AUA0000120538*

Drive firmware manuals and guides	
ACQ810-04 drive modules start-up guide	*3AUA0000055159* *)
ACQ810 standard pump control program firmware manual	*3AUA0000055144*

Option manuals and guides	
ACS-CP-U control panel IP54 mounting platform kit (+J410) installation guide	*3AUA0000049072* *)
Manuals and quick guides for I/O extension modules, fieldbus adapters, etc.	*)

*) Delivered as a printed copy with the drive or optional equipment.

You can find manuals and other product documents in PDF format on the Internet. See section *Document library on the Internet* on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.

ACQ810 manuals

Start-up guide – ACQ810-04

About this guide

This guide contains the very basic information about the start-up of the ACQ810-04 drive modules using Factory macro. Complete documentation can be found in appropriate *Hardware manual* and *Firmware manual*, see list of manuals inside front cover.

Safety instructions

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

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

Introduction

■ Factory default

Application macros are pre-defined parameter settings that can be used as a basis for user applications. This guide deals with the Factory default macro which is suitable for a single pump application. Information on other macros is available in the *Firmware manual*.
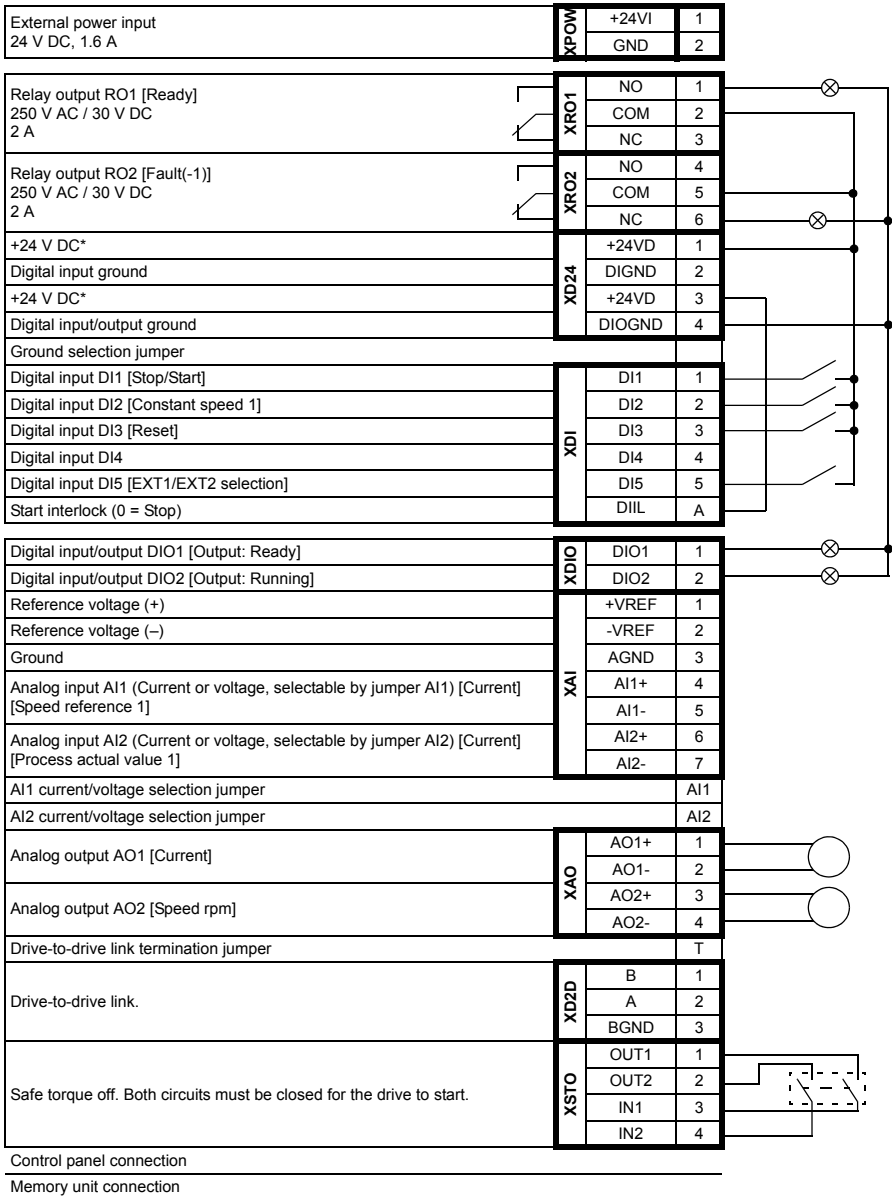
The Factory default macro is used in applications where drive controls a single pump system. The system can contain, for example, one ACQ810-04 drive, one pump and one sensor. Sensor measures typically water flow or pressure, and it is located in the output of the pump.

By default, the process reference (set point) is set to 40%, but it can also be changed to, for example, analog input AI1. Process actual value or feedback signal should be connected to analog input AI2. Start command is given through the digital input DI1.

Sleep function is also activated to optimize the energy efficiency of the installation. By default, the drive is stopped if the motor speed is below 20% of the motor nominal for longer than 60 seconds.

Connecting the control cables

■ Default I/O connection diagram

External power input 24 V DC, 1.6 A	**XPOW**	+24VI	1	
		GND	2	
Relay output RO1 [Ready] 250 V AC / 30 V DC 2 A	**XRO1**	NO	1	⊗
		COM	2	
		NC	3	
Relay output RO2 [Fault(-1)] 250 V AC / 30 V DC 2 A	**XRO2**	NO	4	
		COM	5	
		NC	6	⊗
+24 V DC*	**XD24**	+24VD	1	
Digital input ground		DIGND	2	
+24 V DC*		+24VD	3	
Digital input/output ground		DIOGND	4	
Ground selection jumper				
Digital input DI1 [Stop/Start]	**XDI**	DI1	1	
Digital input DI2 [Constant speed 1]		DI2	2	
Digital input DI3 [Reset]		DI3	3	
Digital input DI4		DI4	4	
Digital input DI5 [EXT1/EXT2 selection]		DI5	5	
Start interlock (0 = Stop)		DIIL	A	
Digital input/output DIO1 [Output: Ready]	**XDIO**	DIO1	1	⊗
Digital input/output DIO2 [Output: Running]		DIO2	2	⊗
Reference voltage (+)	**XAI**	+VREF	1	
Reference voltage (–)		-VREF	2	
Ground		AGND	3	
Analog input AI1 (Current or voltage, selectable by jumper AI1) [Current] [Speed reference 1]		AI1+	4	
		AI1-	5	
Analog input AI2 (Current or voltage, selectable by jumper AI2) [Current] [Process actual value 1]		AI2+	6	
		AI2-	7	
AI1 current/voltage selection jumper			AI1	
AI2 current/voltage selection jumper			AI2	
Analog output AO1 [Current]	**XAO**	AO1+	1	
		AO1-	2	
Analog output AO2 [Speed rpm]		AO2+	3	
		AO2-	4	
Drive-to-drive link termination jumper			T	
Drive-to-drive link.	**XD2D**	B	1	
		A	2	
		BGND	3	
Safe torque off. Both circuits must be closed for the drive to start.	**XSTO**	OUT1	1	
		OUT2	2	
		IN1	3	
		IN2	4	
Control panel connection				
Memory unit connection				

Notes:

[Default setting with ACQ810 standard pump control program (Factory macro). See the *Firmware manual* for other macros.]

*Total maximum current: 200 mA

The wiring shown is for demonstrative purposes only. For further information of the usage of the connectors and jumpers, see appropriate *Hardware manual*.
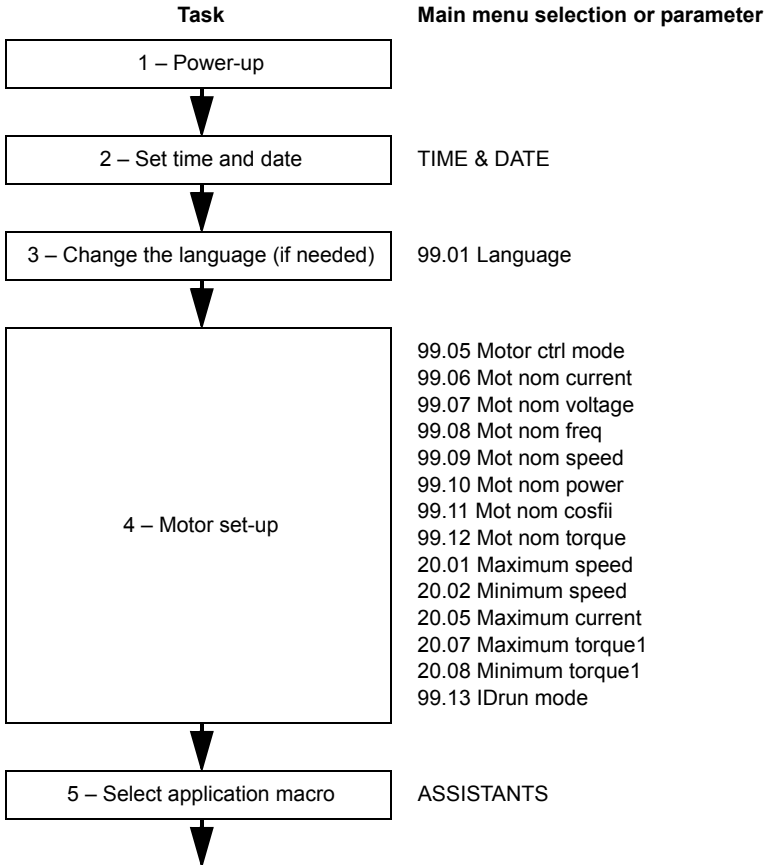
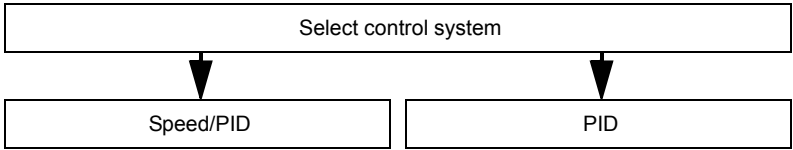## Wire sizes and tightening torques:

XPOW, XRO1, XRO2, XD24: 0.5 … 2.5 mm^2 (24…12 AWG). Torque: 0.5 N·m (5 lbf·in)
XDI, XDIO, XAI, XAO, XD2D, XSTO: 0.5 … 1.5 mm^2 (28…14 AWG). Torque: 0.3 N·m (3 lbf·in)

Start-up flowchart

This flowchart describes start-up procedure in short. For more information on each task, see section *Start-up* on page *8*.

Task	Main menu selection or parameter
1 – Power-up	
2 – Set time and date	TIME & DATE
3 – Change the language (if needed)	99.01 Language
4 – Motor set-up	99.05 Motor ctrl mode 99.06 Mot nom current 99.07 Mot nom voltage 99.08 Mot nom freq 99.09 Mot nom speed 99.10 Mot nom power 99.11 Mot nom cosfii 99.12 Mot nom torque 20.01 Maximum speed 20.02 Minimum speed 20.05 Maximum current 20.07 Maximum torque1 20.08 Minimum torque1 99.13 IDrun mode
5 – Select application macro	ASSISTANTS

Select control system

Speed/PID	PID

Parameters in Single pump macro (Factory default):

12.01 Ext1/Ext2 sel	
10.02 Ext1 start in1	
21.01 Speed ref1 sel	
13.01 AI1 filt time	
13.02 AI1 max	
13.03 AI1 min	
13.04 AI1 max scale	
13.05 AI1 min scale	
19.01 Speed scaling	19.01 Speed scaling
22.02 Acc time	22.02 Acc time
22.03 Dec time	22.03 Dec time
26.02 Const speed sel1	26.02 Const speed sel1
26.06 Const speed1	26.06 Const speed1
10.05 Ext2 start in1	10.05 Ext2 start in1
28.02 Act val 1 src	28.02 Act val 1 src
28.06 Act unit sel	28.06 Act unit sel
28.05 Act max val	28.05 Act max val
13.08 AI2 min	13.08 AI2 min
13.07 AI2 max	13.07 AI2 max
13.10 AI2 min scale	13.10 AI2 min scale
13.09 AI2 max scale	13.09 AI2 max scale
29.02 Setpoint 1 src	29.02 Setpoint 1 src
29.04 Internal set 1	29.04 Internal set 1
27.12 PID gain	27.12 PID gain
27.13 PID integ time	27.13 PID integ time
77.01 Sleep mode sel	77.01 Sleep mode sel
77.02 Sleep int sel	77.02 Sleep int sel
77.03 Sleep level	77.03 Sleep level
77.04 Sleep delay	77.04 Sleep delay
77.08 Wake up mode sel	77.08 Wake up mode sel
77.10 Wake up level	77.10 Wake up level
77.11 Wake up delay	77.11 Wake up delay

Start-up

	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 *Hardware manual*.
☐	Check the installation. See the installation checklist in the appropriate *Hardware manual*.
☐	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.

	1 – Power-up, control panel basics	
☐	Power up the drive. After a few moments, the panel shows the Output mode (right).	REM ↻ 0.00rpm 0.00 Hz 0.00 A 0.0 % DIR MENU
☐	Switch to local control to ensure that external control is disabled by pressing the (LOC/REM) key on the control panel. Local control is indicated by the text "LOC" on the top row on the display. The two boxes on the bottom row of the display indicate the function of the two soft keys ⌐ and ⌐. The contents of the boxes depend on the visible menu choices.	LOC ↻ 0.00rpm 0.00 Hz 0.00 A 0.0 % DIR MENU
☐	Press ⌐ (MENU) to access the Main menu. Within any menu, the desired selection is highlighted. Press the ▲ and ▼ keys to make a new choice; activate by pressing ⌐ (ENTER). The Main menu is the starting point for the procedures described below.	LOC ↻ MAIN MENU ——— 1 **PARAMETERS** ASSISTANTS CHANGED PAR EXIT ENTER

	2 – Setting time and date	

☐	In the Main menu, highlight TIME & DATE option and press ENTER.	`LOC ↻ MAIN MENU────1`
		PARAMETERS
		`ASSISTANTS`
		`CHANGED PAR`
		`EXIT │ 00:00 │ ENTER`
		
		`LOC ↻ TIME & DATE──1`
		CLOCK VISIBILITY
		`TIME FORMAT`
		`DATE FORMAT`
		`SET TIME`
		`SET DATE`
		`EXIT │ 00:00 │ SEL`

☐	Specify the time format. Select TIME FORMAT on the menu, press ▽ (SEL) and select a suitable format with keys △ and ▽.
	Press ▽ (SEL) to save or ▽ (CANCEL) to cancel your changes.
		`LOC ↻ TIME FORMAT───1`
		24-hour
		`12-hour`
		
		`CANCEL │ 00:00 │ SEL`

☐	Specify the date format. Select DATE FORMAT on the menu, press ▽ (SEL) and select a suitable format.
	Press ▽ (OK) to save or ▽ (CANCEL) to cancel your changes.
		`LOC ↻ DATE FORMAT───1`
		`dd.mm.yy`
		`mm/dd/yy`
		dd.mm.yyyy
		`mm/dd/yyyy`
		`CANCEL │ 00:00 │ OK`

☐	Set the time. Select SET TIME on the menu and press ▽ (SEL).
	Specify the hours with keys △ and ▽, and press ▽ (OK).
	Then specify the minutes. Press ▽ (OK) to save or ▽ (CANCEL) to cancel your changes.
		`LOC ↻ SET TIME──────`
		
		15`:41`
		
		`CANCEL │        │ OK`

☐	Set the date. Select SET DATE on the menu and press ▽ (SEL).
	Specify the first part of the date (day or month depending on the selected date format) with keys △ and ▽, and press ▽ (OK). Repeat for the second part. After specifying the year, press ▽ (OK). To cancel your changes, press ▽ (CANCEL).
		`LOC ↻ SET DATE──────`
		
		19`.07.2009`
		
		`CANCEL │ 00:00 │ OK`

3 – Adjusting parameter values

	Notes: • At any point, press ◁ (CANCEL or EXIT) to return to the previous level. • By default, not all parameters are visible. Set parameter *16.21 Menu selection* to *Long* to make all parameters visible.

To adjust a parameter within an assistant:

• Use the △ and ▽ keys to adjust the setting. Press SAVE to accept the setting shown and to proceed to the next parameter.

To adjust a parameter at any other time:

• In the Main menu, highlight PARAMETERS and press ▽ (ENTER).

• Use △ and ▽ to browse the list of parameter groups. Highlight the desired group and press ▽ (SEL) to display the parameters within that group.

• Highlight a parameter and press ▽ (EDIT) to adjust the setting.

• Use △ and ▽ to adjust the setting. Press SAVE to accept the setting shown. Press EXIT twice to return to the Main menu.

Notes for more complicated edits:

• With parameters that define a digital source, the **Const** setting can be used to fix the value to constant 1 (C.TRUE) or 0 (C.FALSE).

• With parameters that define an analog or digital source, the **Pointer** setting can be used to freely choose any parameter value (analog) or a specific bit of a packed boolean parameter (digital) as the source:

  • With an analog source, the parameter group and parameter index have to be specified. After selecting the group, press NEXT to move to the index setting.

  The text below the cursor reflects the present setting.

  After setting the index, press SAVE to accept the value. Press CANCEL at any point to discard any changes and to return to the parameter list.

```
LOC ↻ PAR EDIT
1501 AO1 src
     P.01.06
0106 Motor torque
 CANCEL          SAVE
```

  • With a digital source, the parameter group, parameter index, and bit number are specified. After setting an item, press NEXT to move to the next.
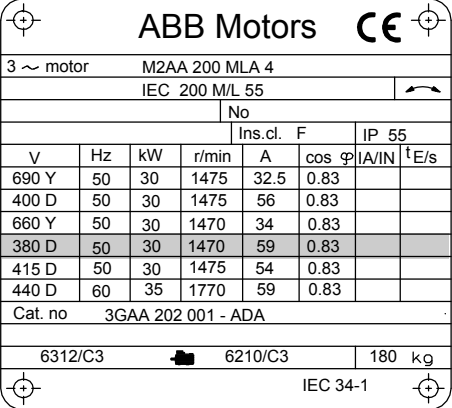
  The text below the cursor reflects the current setting.

  After the bit number is set, press SAVE to accept the value. Press CANCEL at any point to discard any changes and to return to the parameter list.
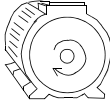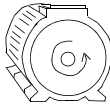
```
LOC ↻ PAR EDIT
1002 Ext1 start in1
    P.02.01.00
0201 DI status
 CANCEL          NEXT
```
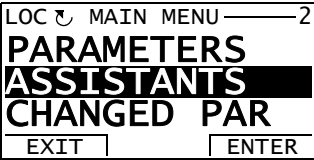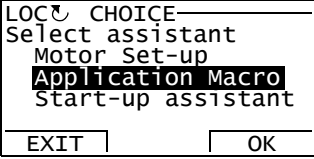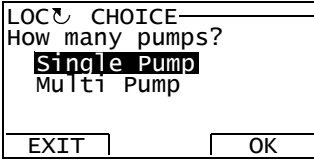
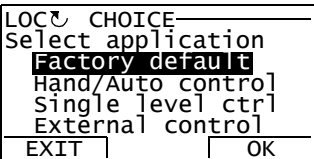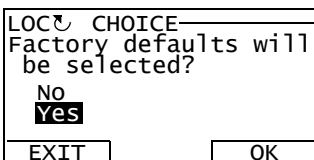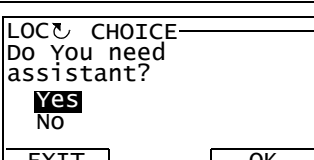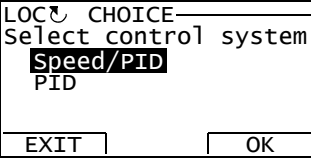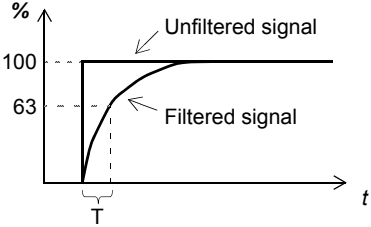| 4 – Changing the language	
	By default, the language of the text shown is English. If desired, the language can be changed as follows.

☐	In the Main menu, make sure PARAMETERS is highlighted, and press ENTER.	`LOC ↻ MAIN MENU————1`
		PARAMETERS
		ASSISTANTS
		CHANGED PAR
		`EXIT        ENTER`

☐	Navigate to parameter group **99 Start-up data** and press SEL. Note that the list will wrap around in either direction between groups 99 and 01 – it is quicker to press ⬆ for group 99.	`LOC ↻ PAR GROUPS———99`
		`99 Start-up data`
		`01 Actual values`
		`02 I/O values`
		`03 Control values`
		`04 Appl values`
		`EXIT          SEL`

☐	Make sure parameter "9901 Language" is highlighted and press EDIT.	`LOC ↻ PARAMETERS———`
		`9901 Language`
		`         English`
		`9905 Motor ctrl mode`
		`9906 Mot nom current`
		`9907 Mot nom voltage`
		`EXIT         EDIT`

☐	Select the desired language and press SAVE.
	Note: Other languages are not supported by the time of publishing this guide.
	Press EXIT twice to return to the Main menu.
		`LOC ↻ PAR EDIT———`
		`9901 Language`
		English
		`[0809 hex]`
		`CANCEL        SAVE`

5 – Motor set-up	
☐	Ensure you have the motor nameplate at hand.	

☐	In the Main menu, highlight ASSISTANTS and press ENTER.	`LOC ↻ MAIN MENU————1`
		PARAMETERS
		ASSISTANTS
		CHANGED PAR
		`EXIT        ENTER`

☐	Highlight **Motor Set-up** and press OK.
	The assistant will guide you through the motor set-up.
		`LOC↻ CHOICE———`
		`Select assistant`
		`  Motor Set-up`
		`  Application Macro`
		`  Start-up assistant`
		`EXIT          OK`

☐	Select the motor control mode. DTC is suitable for most cases. Scalar mode is recommended if • 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.	*99.05 Motor ctrl mode*
	Enter the motor data from the motor nameplate. Asynchronous motor nameplate example:	**Note:** Set the motor data to exactly the same value as on the motor nameplate. For example, if the motor nominal speed is 1470 rpm on the nameplate, setting the value of parameter *99.09 Mot nom speed* to 1500 rpm results in incorrect operation of the drive. If D (delta) data is chosen, then connect the motor in delta. If Y (star) data is selected, then connect the motor in star.

Asynchronous motor nameplate example:

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

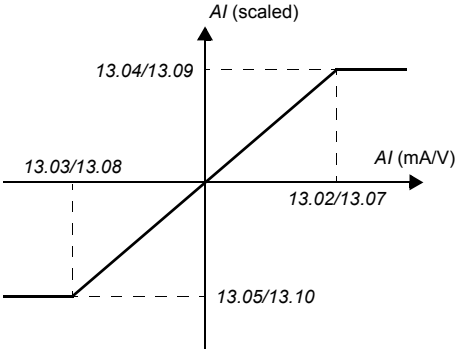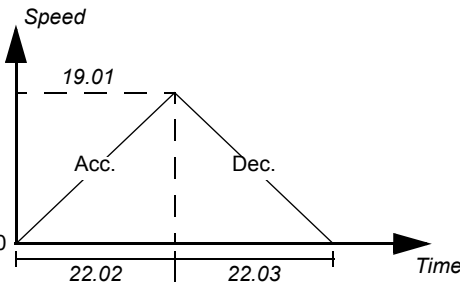|		
☐	• motor nominal current Allowed range: approximately $1/6 \times I_{2n} \ldots 2 \times I_{2n}$ of the drive ($0 \ldots 2 \times I_{2nd}$ if parameter *99.05 Motor ctrl mode = Scalar*).	*99.06 Mot nom current*
☐	• motor nominal voltage Allowed range: $1/6 \times U_N \ldots 2 \times U_N$ of the drive. (U_N refers to the highest voltage in each nominal voltage range). Note that the nominal voltage is not equal to the equivalent DC motor voltage (E.D.C.M.) value given by some motor manufacturers. The nominal voltage can be calculated by dividing the E.D.C.M. voltage by 1.7 (= square root of 3).	*99.07 Mot nom voltage*
☐	• motor nominal frequency	*99.08 Mot nom freq*
☐	• motor nominal speed	*99.09 Mot nom speed*
☐	• motor nominal power	*99.10 Mot nom power*

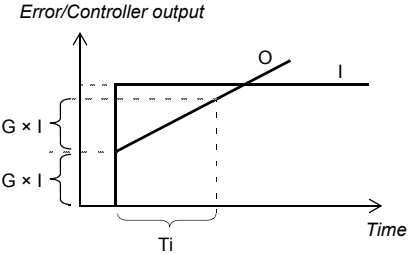|		
	The following motor data parameters can be set to improve control accuracy. If not known, set the values to 0.	
☐	• motor nominal cosφ	*99.11 Mot nom cosfii*
☐	• motor nominal shaft torque	*99.12 Mot nom torque*
	The following parameters define operation limits to protect the driven equipment.	
☐	• maximum speed For the Normal and Reduced ID runs (see below), this value should be higher than 55% of the motor nominal speed defined earlier.	*20.01 Maximum speed*
☐	• minimum speed For the Normal and Reduced ID runs (see below), this value should be less than or equal to 0 rpm.	*20.02 Minimum speed*
☐	• maximum current This value should be equal to or higher than the motor nominal current defined earlier.	*20.05 Maximum current*
☐	• maximum torque This value should be at least 100% of motor nominal torque defined earlier.	*20.07 Maximum torque1*
☐	• minimum torque	*20.08 Minimum torque1*
☐	The question "Do you want to perform id-run now?" is displayed. The ID run (identification run) will identify the characteristics of the motor for optimum control. If you do not wish to perform the ID run at this point, select **No** to complete the Motor Set-up firmware assistant. If you wish to perform the ID run, continue with the following steps BEFORE selecting **Yes**.	
	⚠ **WARNING!** With Normal or Reduced ID run the motor will run at up to approximately 50…100% of the nominal speed during the ID run. ENSURE THAT IT IS SAFE TO RUN THE MOTOR BEFORE PERFORMING THE ID RUN!	

☐	Check the direction of rotation of the motor. During the run (Normal or Reduced), the motor will rotate in the forward direction.	When drive output phases U2, V2 and W2 are connected to the corresponding motor terminals: forward direction reverse direction
☐	Ensure that the Start interlock (DIIL) is activated with +24 V and that the Safe torque off and emergency stop circuits (if present) are closed.	
☐	Select **Yes** and press OK.	
☐	Select the ID run method. The ID run will be performed at the next start of the drive. Use **NORMAL ID** run with a synchronous reluctance motor. **Note:** The driven machinery must be de-coupled from the motor with Normal ID run: • if the load torque is higher than 20%, or • if the machinery is not able to withstand the nominal torque transient during the ID run. The **REDUCED ID** run should be selected instead of the Normal ID run if the mechanical losses are higher than 20%, in other words, the motor cannot be de-coupled from the driven equipment, or full flux is required to keep the motor brake open (conical motor). The **STANDSTILL ID** run should be selected only if the Normal or Reduced ID run is not possible due to the restrictions caused by the connected mechanics. **Notes:** • The motor shaft must NOT be locked and the load torque must be < 20% during Normal or Reduced ID run. • The ID run cannot be performed if parameter *99.05 Motor ctrl mode = Scalar*.	*99.13 IDrun mode*

☐	Start the motor (by pressing the START button) to activate the ID run. ID run is indicated by alarm ID-RUN on the panel display. The alarm will disappear when the ID run stops.	Alarm: ID-RUN
	After the text "Done ok!" appears on the control panel, press OK to complete the motor set-up.	

	Firmware assistants	
	The start-up procedures described below make use of firmware assistants. These routines guide the user through the essential parameter settings.	
	6 – Application macro selection	
☐	In the Main menu, highlight ASSISTANTS and press ENTER.	LOC ↻ MAIN MENU──────2 **PARAMETERS** **ASSISTANTS** **CHANGED PAR** ⎿EXIT⏌ ⎿ENTER⏌

☐	Highlight **Application Macro** and press OK.
	Application macros are pre-defined parameter settings that can be used as a basis for user applications.
		LOC↻ CHOICE───────
		Select assistant
		  Motor Set-up
		  Application Macro
		  Start-up assistant
		⎿EXIT⏌ ⎿OK⏌

☐	Highlight one of the macros and press OK.
	Single pump macro (Factory default) is introduced in this guide. More information on the macros is available in the *Firmware manual*.
		LOC↻ CHOICE───────
		How many pumps?
		  Single Pump
		  Multi Pump
		
		⎿EXIT⏌ ⎿OK⏌

☐	Highlight application and press OK.	LOC↻ CHOICE───────
		Select application
		  Factory default
		  Hand/Auto control
		  Single level ctrl
		  External control
		⎿EXIT⏌ ⎿OK⏌

☐	Highlight **Yes** and press OK.
	Parameter defaults for the macro are applied.
		LOC↻ CHOICE───────
		Factory defaults will
		 be selected?
		  No
		  Yes
		⎿EXIT⏌ ⎿OK⏌

☐	If you want to continue by using assistant, select **Yes**. If not, select **No**.	LOC↻ CHOICE───────
		Do You need
		assistant?
		  Yes
		  No
		⎿EXIT⏌ ⎿OK⏌

	Highlight the control system and press OK.	LOC CHOICE
☐	Speed/PID control system switches between Speed and PID modes. Speed mode uses speed reference, PID mode uses PID logic. Speed/PID control system is intended for speed control applications, PID control system for process control applications.	Select control system Speed/PID PID EXIT OK
	Assistant starts to go through the parameter settings related to this selection.	

Speed/PID		
☐	Define the signal source to switch between external control locations EXT1 and EXT2.	*12.01 Ext1/Ext2 sel*
☐	Program parameter 10.02 to choose the source of the start signal in Speed mode.	*10.02 Ext1 start in1*
☐	Select the source of the speed reference signal in Speed mode.	*21.01 Speed ref1 sel*
☐	Define the filter time constant for the analog input.	*13.01 AI1 filt time*

$$O = I \times (1 - e^{-t/T})$$

I = filter input (step)
O = filter output
t = time
T = filter time constant

☐	Define the maximum and minimum values for the analog input AI1. Define the scaled values that correspond to the maximum and minimum values defined at the previous step. This is useful if full speed is required at lower analog input values. *AI* (scaled) 13.04/13.09 13.03/13.08　　　　　*AI* (mA/V) 　　　　　13.02/13.07 13.05/13.10	*13.02 AI1 max* *13.03 AI1 min* *13.04 AI1 max scale* *13.05 AI1 min scale*
☐	Define the speed scaling used for the acceleration/deceleration time. Define the acceleration/deceleration time. The diagram below shows the effect of parameter *19.01 Speed scaling* on the acceleration/deceleration time. *Speed* 19.01 Acc.　　Dec. 0 　22.02　　22.03　　*Time*	*19.01 Speed scaling* *22.02 Acc time* *22.03 Dec time*
☐	Set the constant speed selector source.	*26.02 Const speed sel1*
☐	Enter the constant speed.	*26.06 Const speed1*
☐	Select the signal source for external control location 2 (EXT2).	*10.05 Ext2 start in1*

☐	Set the parameters for the process actual value: • source of process actual value 1 • unit for both process actual value and process set point. Typically the measured quantity is selected. • actual value scaling. The setting equals 100% of process set point and is typically set to the value that corresponds to the top end of the sensor range.	*28.02 Act val 1 src* *28.06 Act unit sel* *28.05 Act max val*
☐	Define the maximum and minimum values and the scaled values for the analog input AI2. For reference, see AI1 settings and the diagram on page *18*.	*13.08 AI2 min* *13.07 AI2 max* *13.10 AI2 min scale* *13.09 AI2 max scale*
☐	Set process reference (set point) parameters: • source of process set point 1 • process set point 1 when parameter 29.02 is set to Int set 1.	 *29.02 Setpoint 1 src* *29.04 Internal set 1*
☐	Set process PID control parameters. PID controller is used to control process variables such as pressure, flow or fluid level. In process PID control, a process reference (set point) is connected to the drive instead of a speed reference. An actual value (process feedback) is also brought back to the drive. The process PID control adjusts the drive speed in order to keep the measured process quantity (actual value) at the desired level (set point). *Error/Controller output* I = controller input (error) O = controller output G = gain Ti = integration time	*27.12 PID gain* *27.13 PID integ time*

☐	Set sleep function parameters to save energy during the sleep time. The sleep function detects slow motor rotation and stops the unnecessary pumping after the sleep delay has passed.	*77.01 Sleep mode sel* *77.02 Sleep int sel* *77.03 Sleep level* *77.04 Sleep delay* *77.08 Wake up mode sel* *77.10 Wake up level* *77.11 Wake up delay*
	Motor Speed t_d = Sleep delay (77.04) t_{wd} = Wake-up delay (77.11) $t<t_d$ t_d t_{wd} Sleep level (77.03) SLEEP MODE *Time* STOP START	
	After the text "Done ok!" appears on the control panel, press OK to complete the firmware assistant.	

<table>
<tr><td colspan="3" align="center">**PID**</td></tr>
<tr><td>☐</td><td>Define the speed scaling used for the acceleration/ deceleration time. Define the acceleration/ deceleration time. See the diagram on page *18*.</td><td>*19.01 Speed scaling*
22.02 Acc time
22.03 Dec time</td></tr>
<tr><td>☐</td><td>Set the constant speed selector source.</td><td>*26.02 Const speed sel1*</td></tr>
<tr><td>☐</td><td>Enter the constant speed.</td><td>*26.06 Const speed1*</td></tr>
<tr><td>☐</td><td>Select the signal source for external control location 2 (EXT2).</td><td>*10.05 Ext2 start in1*</td></tr>
<tr><td>☐</td><td>Set the parameters for the process actual value:
• source of process actual value 1
• unit for both process actual value and process set point. Typically the measured quantity is selected.
• actual value scaling. The setting equals 100% of process set point and is typically set to the value that corresponds to the top end of the sensor range.</td><td>
28.02 Act val 1 src
28.06 Act unit sel

28.05 Act max val</td></tr>
<tr><td>☐</td><td>Define the maximum and minimum values and the scaled values for the analog input AI2. For reference, see AI1 settings and the diagram on page *18*.</td><td>*13.08 AI2 min*
13.07 AI2 max
13.10 AI2 min scale
13.09 AI2 max scale</td></tr>
<tr><td>☐</td><td>Set process reference (set point) parameters:
• source of process set point 1
• process set point 1 when parameter 29.02 is set to Int set 1.</td><td>
29.02 Setpoint 1 src
29.04 Internal set 1</td></tr>
<tr><td>☐</td><td>Set process PID control parameters. See the diagram on page *19*.</td><td>*27.12 PID gain*
27.13 PID integ time</td></tr>
<tr><td>☐</td><td>Set sleep function parameters to save energy during the sleep time. See the diagram on page *20*.</td><td>*77.01 Sleep mode sel*
77.02 Sleep int sel
77.03 Sleep level
77.04 Sleep delay
77.08 Wake up mode sel
77.10 Wake up level
77.11 Wake up delay</td></tr>
<tr><td></td><td colspan="2">After the text "Done ok!" appears on the control panel, press OK to complete the firmware assistant.</td></tr>
</table>

UL checklist

- The ACQ810-04 drive module (IP20 frame sizes A to E; IP00 frame size G1/G2; UL Open Type) is to be used in a heated, indoor controlled environment. The drive must be installed in clean air according to enclosure classification. Cooling air must be clean, free from corrosive materials and electrically conductive dust. See appropriate *Hardware manual* for detailed specifications.

- The maximum ambient air temperature is 40 °C (104 °F) at rated current. The current is derated for 40 to 55 °C (104 to 131 °F) with frame sizes A to G1/G2.

- The cables located within the motor circuit must be rated for at least 75 °C (167 °F) in UL-compliant installations.

- The input cable must be protected with fuses or circuit breakers. Circuit breakers must not be used without fuses in the USA. Suitable IEC (class gG for all frame sizes; class aR for frame sizes E and G1/G2) and UL (class T for frame sizes A to E; class L for frame size G1/G2 excluding ACQ810-04-377A-4 and ACQ810-04-480A-4) fuses are listed in the *Technical data* section of the *Hardware manual*. For suitable circuit breakers, contact your local ABB representative.

- For installation in the United States, branch circuit protection must be provided in accordance with the National Electrical Code (NEC) and any applicable local codes. To fulfill this requirement, use the UL classified fuses.

- For installation in Canada, branch circuit protection must be provided in accordance with the Canadian Electrical Code and any applicable provincial codes. To fulfill this requirement, use the UL classified fuses.

- The drive provides overload protection in accordance with the National Electrical Code (NEC).

Further information

Product and service inquiries

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

Product training

For information on ABB product training, navigate to www.abb.com/drives and select *Training courses*.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Go to www.abb.com/drives and select *Document Library – Manuals feedback form (LV AC drives)*.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet. Go to www.abb.com/drives and select *Document Library.* You can browse the library or enter selection criteria, for example a document code, in the search field.

Contact us

www.abb.com/drives
www.abb.com/drivespartners