

4 Programming

4.1 Local Control Panel (LCP)

The frequency converter can be programmed from the LCP or from a PC via the RS485 COM port by installing the MCT 10 Set-up Software. Refer to *chapter 1.2 Additional Resources* for more details about the software.

The LCP is divided into 4 functional sections.

- A. Display
- B. Menu key
- C. Navigation keys and indicator lights
- D. Operation keys and indicator lights

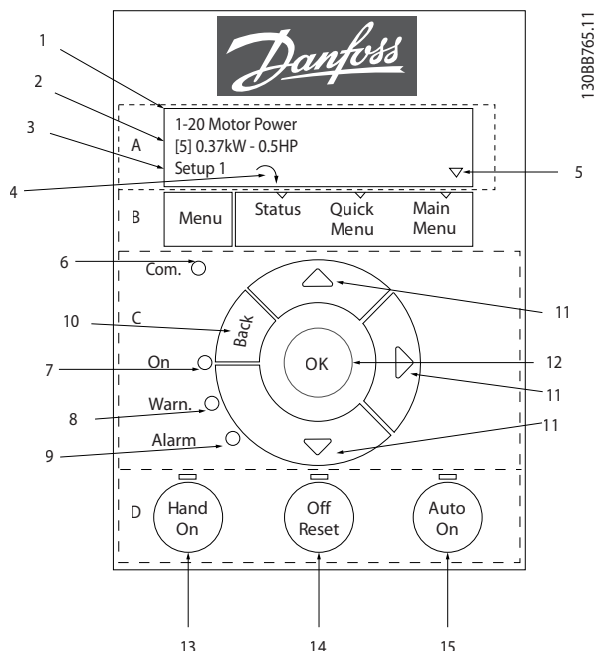


Illustration 4.1 Local Control Panel (LCP)

A. Display

The LCD-display is illuminated with 2 alphanumeric lines. All data is shown on the LCP.

Illustration 4.1 describes the information that can be read from the display.

1	Parameter number and name.
2	Parameter value.
3	Set-up number shows the active set-up and the edit set-up. If the same set-up acts as both active and edit set-up, only that set-up number is shown (factory setting). When active and edit set-up differ, both numbers are shown in the display (set-up 12). The number flashing, indicates the edit set-up.
4	Motor direction is shown to the bottom left of the display – indicated by a small arrow pointing either clockwise or counterclockwise.
5	The triangle indicates if the LCP is in Status, Quick Menu, or Main Menu.

Table 4.1 Legend to Illustration 4.1, Part I

B. Menu key

Press [Menu] to select among Status, Quick Menu, or Main Menu.

C. Navigation keys and indicator lights

6	Com. LED: Flashes during bus communication.
7	Green LED/On: Control section is working correctly.
8	Yellow LED/Warn.: Indicates a warning.
9	Flashing Red LED/Alarm: Indicates an alarm.
10	[Back]: For moving to the previous step or layer in the navigation structure.
11	[▲] [▼] [▶]: For navigating among parameter groups and parameters, and within parameters. They can also be used for setting local reference.
12	[OK]: For selecting a parameter and for accepting changes to parameter settings.

Table 4.2 Legend to Illustration 4.1, Part II

D. Operation keys and indicator lights

	[Hand On]: Starts the motor and enables control of the frequency converter via the LCP.
13	NOTICE [2] Coast inverse is the default option for parameter 5-12 Terminal 27 Digital Input. If there is no 24 V supply to terminal 27, [Hand On] does not start the motor. Connect terminal 12 to terminal 27.
14	[Off/Reset]: Stops the motor (Off). If in alarm mode, the alarm is reset.
15	[Auto On]: The frequency converter is controlled either via control terminals or serial communication.

Table 4.3 Legend to Illustration 4.1, Part III

4.2 Set-up Wizard

The built-in wizard menu guides the installer through the set-up of the frequency converter in a clear and structured manner for open-loop applications, closed-loop applications, and quick motor settings.

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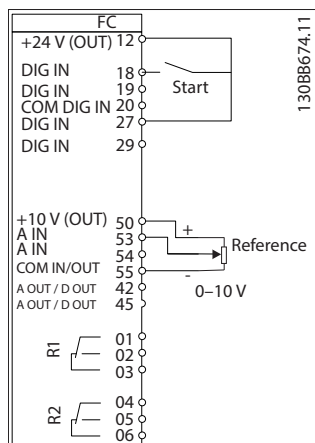


Illustration 4.2 Frequency Converter Wiring

The wizard is shown after power-up until any parameter has been changed. The wizard can always be accessed again through the quick menu. Press [OK] to start the wizard. Press [Back] to return to the status view.

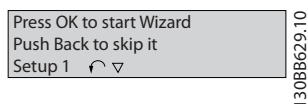


Illustration 4.3 Start-up/Quit Wizard

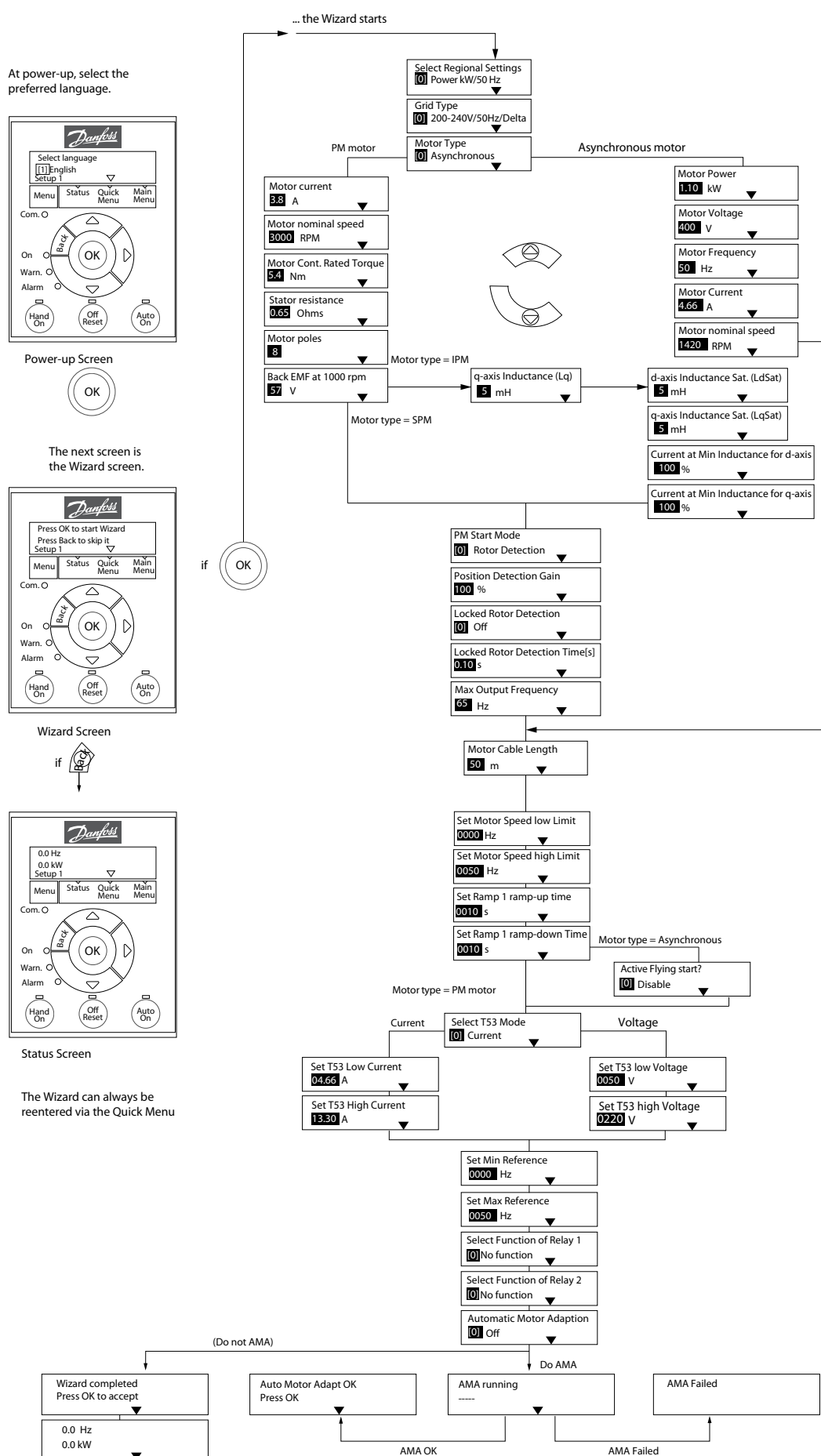


Illustration 4.4 Set-up Wizard for Open-loop Applications

Set-up Wizard for Open-loop Applications

Parameter	Option	Default	Usage
Parameter 0-03 Regional Settings	[0] International [1] US	[0] International	–
Parameter 0-06 GridType	[0] 200–240 V/50 Hz/IT-grid [1] 200–240 V/50 Hz/Delta [2] 200–240 V/50 Hz [10] 380–440 V/50 Hz/IT-grid [11] 380–440 V/50 Hz/Delta [12] 380–440 V/50 Hz [20] 440–480 V/50 Hz/IT-grid [21] 440–480 V/50 Hz/Delta [22] 440–480 V/50 Hz [30] 525–600 V/50 Hz/IT-grid [31] 525–600 V/50 Hz/Delta [32] 525–600 V/50 Hz [100] 200–240 V/60 Hz/IT-grid [101] 200–240 V/60 Hz/Delta [102] 200–240 V/60 Hz [110] 380–440 V/60 Hz/IT-grid [111] 380–440 V/60 Hz/Delta [112] 380–440 V/60 Hz [120] 440–480 V/60 Hz/IT-grid [121] 440–480 V/60 Hz/Delta [122] 440–480 V/60 Hz [130] 525–600 V/60 Hz/IT-grid [131] 525–600 V/60 Hz/Delta [132] 525–600 V/60 Hz	Size related	Select the operating mode for restart after reconnection of the frequency converter to mains voltage after power-down.

Parameter	Option	Default	Usage
Parameter 1-10 Motor Construction	*[0] Asynchron [1] PM, non-salient SPM [3] PM, salient IPM	[0] Asynchron	Setting the parameter value might change these parameters: - Parameter 1-01 Motor Control Principle. - Parameter 1-03 Torque Characteristics. - Parameter 1-08 Motor Control Bandwidth. - Parameter 1-14 Damping Gain. - Parameter 1-15 Low Speed Filter Time Const. - Parameter 1-16 High Speed Filter Time Const. - Parameter 1-17 Voltage filter time const. - Parameter 1-20 Motor Power. - Parameter 1-22 Motor Voltage. - Parameter 1-23 Motor Frequency. - Parameter 1-24 Motor Current. - Parameter 1-25 Motor Nominal Speed. - Parameter 1-26 Motor Cont. Rated Torque. - Parameter 1-30 Stator Resistance (Rs). - Parameter 1-33 Stator Leakage Reactance (Xl). - Parameter 1-35 Main Reactance (Xh). - Parameter 1-37 d-axis Inductance (Ld). - Parameter 1-38 q-axis Inductance (Lq). - Parameter 1-39 Motor Poles. - Parameter 1-40 Back EMF at 1000 RPM. - Parameter 1-44 d-axis Inductance Sat. (LdSat). - Parameter 1-45 q-axis Inductance Sat. (LqSat). - Parameter 1-46 Position Detection Gain. - Parameter 1-48 Current at Min Inductance for d-axis. - Parameter 1-49 Current at Min Inductance for q-axis. - Parameter 1-66 Min. Current at Low Speed. - Parameter 1-70 Start Mode. - Parameter 1-72 Start Function. - Parameter 1-73 Flying Start. - Parameter 1-80 Function at Stop. - Parameter 1-82 Min Speed for Function at Stop [Hz]. - Parameter 1-90 Motor Thermal Protection. - Parameter 2-00 DC Hold/Motor Preheat Current. - Parameter 2-01 DC Brake Current. - Parameter 2-02 DC Braking Time. - Parameter 2-04 DC Brake Cut In Speed. - Parameter 2-10 Brake Function. - Parameter 4-14 Motor Speed High Limit [Hz]. - Parameter 4-19 Max Output Frequency. - Parameter 4-58 Missing Motor Phase Function. - Parameter 14-65 Speed Derate Dead Time Compensation.

Parameter	Option	Default	Usage
Parameter 1-20 Motor Power	0.12–110 kW/0.16–150 hp	Size related	Enter the motor power from the nameplate data.
Parameter 1-22 Motor Voltage	50–1000 V	Size related	Enter the motor voltage from the nameplate data.
Parameter 1-23 Motor Frequency	20–400 Hz	Size related	Enter the motor frequency from the nameplate data.
Parameter 1-24 Motor Current	0.01–10000.00 A	Size related	Enter the motor current from the nameplate data.
Parameter 1-25 Motor Nominal Speed	50–9999 RPM	Size related	Enter the motor nominal speed from the nameplate data.
Parameter 1-26 Motor Cont. Rated Torque	0.1–1000.0 Nm	Size related	This parameter is available when <i>parameter 1-10 Motor Construction</i> is set to options that enable permanent magnet motor mode. NOTICE Changing this parameter affects the settings of other parameters.
Parameter 1-29 Automatic Motor Adaption (AMA)	See <i>parameter 1-29 Automatic Motor Adaption (AMA)</i> .	Off	Performing an AMA optimizes motor performance.
Parameter 1-30 Stator Resistance (Rs)	0.000–99.990 Ω	Size related	Set the stator resistance value.
Parameter 1-37 d-axis Inductance (Ld)	0.000–1000.000 mH	Size related	Enter the value of the d-axis inductance. Obtain the value from the permanent magnet motor datasheet. The d-axis inductance cannot be found by performing an AMA.
Parameter 1-38 q-axis Inductance (Lq)	0.000–1000.000 mH	Size related	Enter the value of the q-axis inductance.
Parameter 1-39 Motor Poles	2–100	4	Enter the number of motor poles.
Parameter 1-40 Back EMF at 1000 RPM	10–9000 V	Size related	Line-line RMS back EMF voltage at 1000 RPM.
Parameter 1-42 Motor Cable Length	0–100 m	50 m	Enter the motor cable length.
Parameter 1-44 d-axis Inductance Sat. (LdSat)	0.000–1000.000 mH	Size related	This parameter corresponds to the inductance saturation of Ld. Ideally, this parameter has the same value as <i>parameter 1-37 d-axis Inductance (Ld)</i> . However, if the motor supplier provides an induction curve, enter the induction value, which is 200% of the nominal current.
Parameter 1-45 q-axis Inductance Sat. (LqSat)	0.000–1000.000 mH	Size related	This parameter corresponds to the inductance saturation of Lq. Ideally, this parameter has the same value as <i>parameter 1-38 q-axis Inductance (Lq)</i> . However, if the motor supplier provides an induction curve, enter the induction value, which is 200% of the nominal current.
Parameter 1-46 Position Detection Gain	20–200%	100%	Adjusts the height of the test pulse during position detection at start.
Parameter 1-48 Current at Min Inductance for d-axis	20–200%	100%	Enter the inductance saturation point.
Parameter 1-49 Current at Min Inductance for q-axis	20–200%	100%	This parameter specifies the saturation curve of the d- and q-inductance values. From 20–100% of this parameter, the inductances are linearly approximated due to <i>parameter 1-37 d-axis Inductance (Ld)</i> , <i>parameter 1-38 q-axis Inductance (Lq)</i> , <i>parameter 1-44 d-axis Inductance Sat. (LdSat)</i> , and <i>parameter 1-45 q-axis Inductance Sat. (LqSat)</i> .
Parameter 1-70 Start Mode	[0] Rotor Detection [1] Parking	[1] Parking	Select the PM motor start mode.

Parameter	Option	Default	Usage
Parameter 1-73 Flying Start	[0] Disabled [1] Enabled	[0] Disabled	Select [1] Enabled to enable the frequency converter to catch a motor spinning due to mains drop-out. Select [0] Disabled if this function is not required. When this parameter is set to [1] Enabled, parameter 1-71 Start Delay and parameter 1-72 Start Function are not functional. Parameter 1-73 Flying Start is active in VVC ⁺ mode only.
Parameter 3-02 Minimum Reference	-4999.000–4999.000	0	The minimum reference is the lowest value obtainable by summing all references.
Parameter 3-03 Maximum Reference	-4999.000–4999.000	50	The maximum reference is the lowest obtainable by summing all references.
Parameter 3-41 Ramp 1 Ramp Up Time	0.05–3600.00 s	Size related	If asynchronous motor is selected, the ramp-up time is from 0 to rated parameter 1-23 Motor Frequency. If PM motor is selected, the ramp-up time is from 0 to parameter 1-25 Motor Nominal Speed.
Parameter 3-42 Ramp 1 Ramp Down Time	0.05–3600.00 s	Size related	For asynchronous motors, the ramp-down time is from rated parameter 1-23 Motor Frequency to 0. For PM motors, the ramp-down time is from parameter 1-25 Motor Nominal Speed to 0.
Parameter 4-12 Motor Speed Low Limit [Hz]	0.0–400.0 Hz	0 Hz	Enter the minimum limit for low speed.
Parameter 4-14 Motor Speed High Limit [Hz]	0.0–400.0 Hz	100 Hz	Enter the maximum limit for high speed.
Parameter 4-19 Max Output Frequency	0.0–400.0 Hz	100 Hz	Enter the maximum output frequency value. If parameter 4-19 Max Output Frequency is set lower than parameter 4-14 Motor Speed High Limit [Hz], parameter 4-14 Motor Speed High Limit [Hz] is set equal to parameter 4-19 Max Output Frequency automatically.
Parameter 5-40 Function Relay	See parameter 5-40 Function Relay.	[9] Alarm	Select the function to control output relay 1.
Parameter 5-40 Function Relay	See parameter 5-40 Function Relay.	[5] Drive running	Select the function to control output relay 2.
Parameter 6-10 Terminal 53 Low Voltage	0.00–10.00 V	0.07 V	Enter the voltage that corresponds to the low reference value.
Parameter 6-11 Terminal 53 High Voltage	0.00–10.00 V	10 V	Enter the voltage that corresponds to the high reference value.
Parameter 6-12 Terminal 53 Low Current	0.00–20.00 mA	4 mA	Enter the current that corresponds to the low reference value.
Parameter 6-13 Terminal 53 High Current	0.00–20.00 mA	20 mA	Enter the current that corresponds to the high reference value.
Parameter 6-19 Terminal 53 mode	[0] Current [1] Voltage	[1] Voltage	Select if terminal 53 is used for current or voltage input.
Parameter 30-22 Locked Rotor Protection	[0] Off [1] On	[0] Off	–
Parameter 30-23 Locked Rotor Detection Time [s]	0.05–1 s	0.10 s	–

Table 4.4 Set-up Wizard for Open-loop Applications

Set-up Wizard for Closed-loop Applications

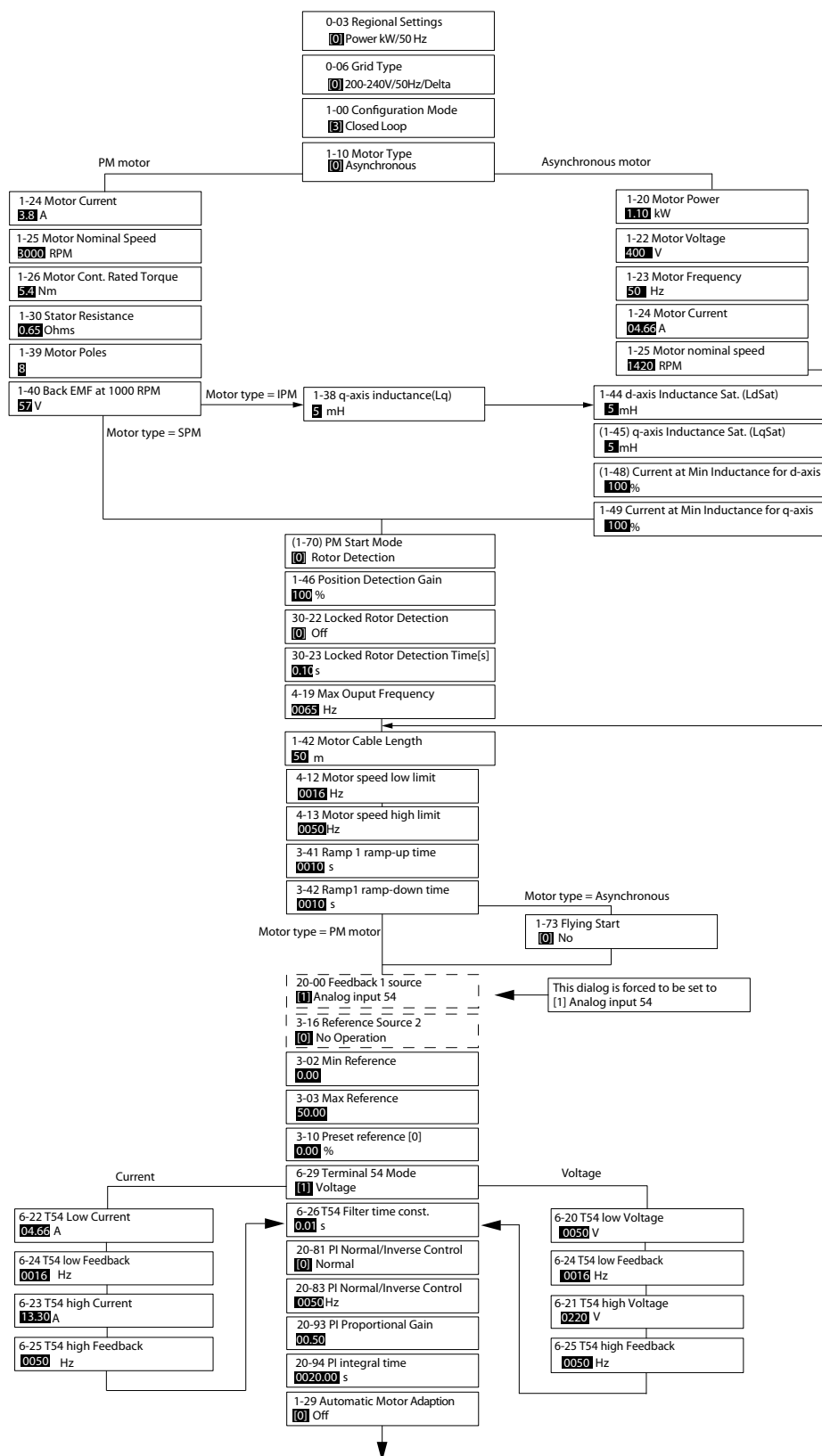


Illustration 4.5 Set-up Wizard for Closed-loop Applications

Parameter	Range	Default	Usage
<i>Parameter 0-03 Regional Settings</i>	<i>[0] International [1] US</i>	<i>[0] International</i>	–
<i>Parameter 0-06 GridType</i>	<i>[0]–[132] see Table 4.4.</i>	<i>Size selected</i>	Select the operating mode for restart after reconnection of the frequency converter to mains voltage after power-down.
<i>Parameter 1-00 Configuration Mode</i>	<i>[0] Open loop [3] Closed loop</i>	<i>[0] Open loop</i>	Select <i>[3] Closed loop</i> .

Parameter	Range	Default	Usage
Parameter 1-10 Motor Construction	*[0] Asynchron [1] PM, non-salient SPM [3] PM, salient IPM	[0] Asynchron	Setting the parameter value might change these parameters: - Parameter 1-01 Motor Control Principle. - Parameter 1-03 Torque Characteristics. - Parameter 1-08 Motor Control Bandwidth. - Parameter 1-14 Damping Gain. - Parameter 1-15 Low Speed Filter Time Const. - Parameter 1-16 High Speed Filter Time Const. - Parameter 1-17 Voltage filter time const. - Parameter 1-20 Motor Power. - Parameter 1-22 Motor Voltage. - Parameter 1-23 Motor Frequency. - Parameter 1-24 Motor Current. - Parameter 1-25 Motor Nominal Speed. - Parameter 1-26 Motor Cont. Rated Torque. - Parameter 1-30 Stator Resistance (Rs). - Parameter 1-33 Stator Leakage Reactance (Xl). - Parameter 1-35 Main Reactance (Xh). - Parameter 1-37 d-axis Inductance (Ld). - Parameter 1-38 q-axis Inductance (Lq). - Parameter 1-39 Motor Poles. - Parameter 1-40 Back EMF at 1000 RPM. - Parameter 1-44 d-axis Inductance Sat. (LdSat). - Parameter 1-45 q-axis Inductance Sat. (LqSat). - Parameter 1-46 Position Detection Gain. - Parameter 1-48 Current at Min Inductance for d-axis. - Parameter 1-49 Current at Min Inductance for q-axis. - Parameter 1-66 Min. Current at Low Speed. - Parameter 1-70 Start Mode. - Parameter 1-72 Start Function. - Parameter 1-73 Flying Start. - Parameter 1-80 Function at Stop. - Parameter 1-82 Min Speed for Function at Stop [Hz]. - Parameter 1-90 Motor Thermal Protection. - Parameter 2-00 DC Hold/Motor Preheat Current. - Parameter 2-01 DC Brake Current. - Parameter 2-02 DC Braking Time. - Parameter 2-04 DC Brake Cut In Speed. - Parameter 2-10 Brake Function. - Parameter 4-14 Motor Speed High Limit [Hz]. - Parameter 4-19 Max Output Frequency. - Parameter 4-58 Missing Motor Phase Function. - Parameter 14-65 Speed Derate Dead Time Compensation.

Parameter	Range	Default	Usage
Parameter 1-20 Motor Power	0.09–110 kW	Size related	Enter the motor power from the nameplate data.
Parameter 1-22 Motor Voltage	50–1000 V	Size related	Enter the motor voltage from the nameplate data.
Parameter 1-23 Motor Frequency	20–400 Hz	Size related	Enter the motor frequency from the nameplate data.
Parameter 1-24 Motor Current	0–10000 A	Size related	Enter the motor current from the nameplate data.
Parameter 1-25 Motor Nominal Speed	50–9999 RPM	Size related	Enter the motor nominal speed from the nameplate data.
Parameter 1-26 Motor Cont. Rated Torque	0.1–1000.0 Nm	Size related	This parameter is available when <i>parameter 1-10 Motor Construction</i> is set to options that enable permanent magnet motor mode. NOTICE Changing this parameter affects the settings of other parameters.
Parameter 1-29 Automatic Motor Adaption (AMA)		Off	Performing an AMA optimises motor performance.
Parameter 1-30 Stator Resistance (Rs)	0–99.990 Ω	Size related	Set the stator resistance value.
Parameter 1-37 d-axis Inductance (Ld)	0.000–1000.000 mH	Size related	Enter the value of the d-axis inductance. Obtain the value from the permanent magnet motor datasheet. The d-axis inductance cannot be found by performing an AMA.
Parameter 1-38 q-axis Inductance (Lq)	0.000–1000.000 mH	Size related	Enter the value of the q-axis inductance.
Parameter 1-39 Motor Poles	2–100	4	Enter the number of motor poles.
Parameter 1-40 Back EMF at 1000 RPM	10–9000 V	Size related	Line-line RMS back EMF voltage at 1000 RPM.
Parameter 1-42 Motor Cable Length	0–100 m	50 m	Enter the motor cable length.
Parameter 1-44 d-axis Inductance Sat. (LdSat)	0.000–1000.000 mH	Size related	This parameter corresponds to the inductance saturation of Ld. Ideally, this parameter has the same value as <i>parameter 1-37 d-axis Inductance (Ld)</i> . However, if the motor supplier provides an induction curve, enter the induction value, which is 200% of the nominal current.
Parameter 1-45 q-axis Inductance Sat. (LqSat)	0.000–1000.000 mH	Size related	This parameter corresponds to the inductance saturation of Lq. Ideally, this parameter has the same value as <i>parameter 1-38 q-axis Inductance (Lq)</i> . However, if the motor supplier provides an induction curve, enter the induction value, which is 200% of the nominal current.
Parameter 1-46 Position Detection Gain	20–200%	100%	Adjusts the height of the test pulse during position detection at start.
Parameter 1-48 Current at Min Inductance for d-axis	20–200%	100%	Enter the inductance saturation point.
Parameter 1-49 Current at Min Inductance for q-axis	20–200%	100%	This parameter specifies the saturation curve of the d- and q-inductance values. From 20–100% of this parameter, the inductances are linearly approximated due to <i>parameter 1-37 d-axis Inductance (Ld)</i> , <i>parameter 1-38 q-axis Inductance (Lq)</i> , <i>parameter 1-44 d-axis Inductance Sat. (LdSat)</i> , and <i>parameter 1-45 q-axis Inductance Sat. (LqSat)</i> .
Parameter 1-70 Start Mode	[0] Rotor Detection [1] Parking	[1] Parking	Select the PM motor start mode.
Parameter 1-73 Flying Start	[0] Disabled [1] Enabled	[0] Disabled	Select [1] Enabled to enable the frequency converter to catch a spinning motor in, for example, fan applications. When PM is selected, this parameter is enabled.

Parameter	Range	Default	Usage
Parameter 3-02 Minimum Reference	-4999.000–4999.000	0	The minimum reference is the lowest value obtainable by summing all references.
Parameter 3-03 Maximum Reference	-4999.000–4999.000	50	The maximum reference is the highest value obtainable by summing all references.
Parameter 3-10 Preset Reference	-100–100%	0	Enter the setpoint.
Parameter 3-41 Ramp 1 Ramp Up Time	0.05–3600.0 s	Size related	Ramp-up time from 0 to rated <i>parameter 1-23 Motor Frequency</i> for asynchronous motors. Ramp-up time from 0 to <i>parameter 1-25 Motor Nominal Speed</i> for PM motors.
Parameter 3-42 Ramp 1 Ramp Down Time	0.05–3600.0 s	Size related	Ramp-down time from rated <i>parameter 1-23 Motor Frequency</i> to 0 for asynchronous motors. Ramp-down time from <i>parameter 1-25 Motor Nominal Speed</i> to 0 for PM motors.
Parameter 4-12 Motor Speed Low Limit [Hz]	0.0–400.0 Hz	0.0 Hz	Enter the minimum limit for low speed.
Parameter 4-14 Motor Speed High Limit [Hz]	0.0–400.0 Hz	100 Hz	Enter the minimum limit for high speed.
Parameter 4-19 Max Output Frequency	0.0–400.0 Hz	100 Hz	Enter the maximum output frequency value. If <i>parameter 4-19 Max Output Frequency</i> is set lower than <i>parameter 4-14 Motor Speed High Limit [Hz]</i> , <i>parameter 4-14 Motor Speed High Limit [Hz]</i> is set equal to <i>parameter 4-19 Max Output Frequency</i> automatically.
Parameter 6-20 Terminal 54 Low Voltage	0.00–10.00 V	0.07 V	Enter the voltage that corresponds to the low reference value.
Parameter 6-21 Terminal 54 High Voltage	0.00–10.00 V	10.00 V	Enter the voltage that corresponds to the high reference value.
Parameter 6-22 Terminal 54 Low Current	0.00–20.00 mA	4.00 mA	Enter the current that corresponds to the low reference value.
Parameter 6-23 Terminal 54 High Current	0.00–20.00 mA	20.00 mA	Enter the current that corresponds to the high reference value.
Parameter 6-24 Terminal 54 Low Ref./Feedb. Value	-4999–4999	0	Enter the feedback value that corresponds to the voltage or current set in <i>parameter 6-20 Terminal 54 Low Voltage/parameter 6-22 Terminal 54 Low Current</i> .
Parameter 6-25 Terminal 54 High Ref./Feedb. Value	-4999–4999	50	Enter the feedback value that corresponds to the voltage or current set in <i>parameter 6-21 Terminal 54 High Voltage/parameter 6-23 Terminal 54 High Current</i> .
Parameter 6-26 Terminal 54 Filter Time Constant	0.00–10.00 s	0.01	Enter the filter time constant.
Parameter 6-29 Terminal 54 mode	[0] Current [1] Voltage	[1] Voltage	Select if terminal 54 is used for current or voltage input.
Parameter 20-81 PI Normal/Inverse Control	[0] Normal [1] Inverse	[0] Normal	Select [0] Normal to set the process control to increase the output speed when the process error is positive. Select [1] Inverse to reduce the output speed.
Parameter 20-83 PI Start Speed [Hz]	0–200 Hz	0 Hz	Enter the motor speed to be attained as a start signal for commencement of PI control.
Parameter 20-93 PI Proportional Gain	0.00–10.00	0.01	Enter the process controller proportional gain. Quick control is obtained at high amplification. However, if amplification is too high, the process may become unstable.
Parameter 20-94 PI Integral Time	0.1–999.0 s	999.0 s	Enter the process controller integral time. Obtain quick control through a short integral time, though if the integral time is too short, the process becomes unstable. An excessively long integral time disables the integral action.
Parameter 30-22 Locked Rotor Protection	[0] Off [1] On	[0] Off	–

Parameter	Range	Default	Usage
Parameter 30-23 Locked Rotor Detection Time [s]	0.05–1.00 s	0.10 s	–

Table 4.5 Set-up Wizard for Closed-loop Applications
Motor set-up

The motor set-up wizard guides users through the needed motor parameters.

Parameter	Range	Default	Usage
Parameter 0-03 Regional Settings	[0] International [1] US	0	–
Parameter 0-06 GridType	[0]–[132] see Table 4.4.	Size related	Select the operating mode for restart after reconnection of the frequency converter to mains voltage after power-down.

Parameter	Range	Default	Usage
Parameter 1-10 Motor Construction	*[0] Asynchron [1] PM, non-salient SPM [3] PM, salient IPM	[0] Asynchron	Setting the parameter value might change these parameters: - Parameter 1-01 Motor Control Principle. - Parameter 1-03 Torque Characteristics. - Parameter 1-08 Motor Control Bandwidth. - Parameter 1-14 Damping Gain. - Parameter 1-15 Low Speed Filter Time Const. - Parameter 1-16 High Speed Filter Time Const. - Parameter 1-17 Voltage filter time const. - Parameter 1-20 Motor Power. - Parameter 1-22 Motor Voltage. - Parameter 1-23 Motor Frequency. - Parameter 1-24 Motor Current. - Parameter 1-25 Motor Nominal Speed. - Parameter 1-26 Motor Cont. Rated Torque. - Parameter 1-30 Stator Resistance (Rs). - Parameter 1-33 Stator Leakage Reactance (X1). - Parameter 1-35 Main Reactance (Xh). - Parameter 1-37 d-axis Inductance (Ld). - Parameter 1-38 q-axis Inductance (Lq). - Parameter 1-39 Motor Poles. - Parameter 1-40 Back EMF at 1000 RPM. - Parameter 1-44 d-axis Inductance Sat. (LdSat). - Parameter 1-45 q-axis Inductance Sat. (LqSat). - Parameter 1-46 Position Detection Gain. - Parameter 1-48 Current at Min Inductance for d-axis. - Parameter 1-49 Current at Min Inductance for q-axis. - Parameter 1-66 Min. Current at Low Speed. - Parameter 1-70 Start Mode. - Parameter 1-72 Start Function. - Parameter 1-73 Flying Start. - Parameter 1-80 Function at Stop. - Parameter 1-82 Min Speed for Function at Stop [Hz]. - Parameter 1-90 Motor Thermal Protection. - Parameter 2-00 DC Hold/Motor Preheat Current. - Parameter 2-01 DC Brake Current. - Parameter 2-02 DC Braking Time. - Parameter 2-04 DC Brake Cut In Speed. - Parameter 2-10 Brake Function. - Parameter 4-14 Motor Speed High Limit [Hz]. - Parameter 4-19 Max Output Frequency. - Parameter 4-58 Missing Motor Phase Function. - Parameter 14-65 Speed Derate Dead Time Compensation.

Parameter	Range	Default	Usage
Parameter 1-20 Motor Power	0.12–110 kW/0.16–150 hp	Size related	Enter the motor power from the nameplate data.
Parameter 1-22 Motor Voltage	50–1000 V	Size related	Enter the motor voltage from the nameplate data.
Parameter 1-23 Motor Frequency	20–400 Hz	Size related	Enter the motor frequency from the nameplate data.
Parameter 1-24 Motor Current	0.01–10000.00 A	Size related	Enter the motor current from the nameplate data.
Parameter 1-25 Motor Nominal Speed	50–9999 RPM	Size related	Enter the motor nominal speed from the nameplate data.
Parameter 1-26 Motor Cont. Rated Torque	0.1–1000.0 Nm	Size related	This parameter is available when <i>parameter 1-10 Motor Construction</i> is set to options that enable permanent magnet motor mode. NOTICE Changing this parameter affects the settings of other parameters.
Parameter 1-30 Stator Resistance (Rs)	0–99.990 Ω	Size related	Set the stator resistance value.
Parameter 1-37 d-axis Inductance (Ld)	0.000–1000.000 mH	Size related	Enter the value of the d-axis inductance. Obtain the value from the permanent magnet motor datasheet. The d-axis inductance cannot be found by performing an AMA.
Parameter 1-38 q-axis Inductance (Lq)	0.000–1000.000 mH	Size related	Enter the value of the q-axis inductance.
Parameter 1-39 Motor Poles	2–100	4	Enter the number of motor poles.
Parameter 1-40 Back EMF at 1000 RPM	10–9000 V	Size related	Line-line RMS back EMF voltage at 1000 RPM.
Parameter 1-42 Motor Cable Length	0–100 m	50 m	Enter the motor cable length.
Parameter 1-44 d-axis Inductance Sat. (LdSat)	0.000–1000.000 mH	Size related	This parameter corresponds to the inductance saturation of Ld. Ideally, this parameter has the same value as <i>parameter 1-37 d-axis Inductance (Ld)</i> . However, if the motor supplier provides an induction curve, enter the induction value, which is 200% of the nominal current.
Parameter 1-45 q-axis Inductance Sat. (LqSat)	0.000–1000.000 mH	Size related	This parameter corresponds to the inductance saturation of Lq. Ideally, this parameter has the same value as <i>parameter 1-38 q-axis Inductance (Lq)</i> . However, if the motor supplier provides an induction curve, enter the induction value, which is 200% of the nominal current.
Parameter 1-46 Position Detection Gain	20–200%	100%	Adjusts the height of the test pulse during position detection at start.
Parameter 1-48 Current at Min Inductance for d-axis	20–200%	100%	Enter the inductance saturation point.
Parameter 1-49 Current at Min Inductance for q-axis	20–200%	100%	This parameter specifies the saturation curve of the d- and q-inductance values. From 20–100% of this parameter, the inductances are linearly approximated due to <i>parameter 1-37 d-axis Inductance (Ld)</i> , <i>parameter 1-38 q-axis Inductance (Lq)</i> , <i>parameter 1-44 d-axis Inductance Sat. (LdSat)</i> , and <i>parameter 1-45 q-axis Inductance Sat. (LqSat)</i> .
Parameter 1-70 Start Mode	[0] Rotor Detection [1] Parking	[1] Parking	Select the PM motor start mode.
Parameter 1-73 Flying Start	[0] Disabled [1] Enabled	[0] Disabled	Select [1] Enabled to enable the frequency converter to catch a spinning motor.
Parameter 3-41 Ramp 1 Ramp Up Time	0.05–3600.0 s	Size related	Ramp-up time from 0 to rated <i>parameter 1-23 Motor Frequency</i> .

Parameter	Range	Default	Usage
Parameter 3-42 Ramp 1 Ramp Down Time	0.05–3600.0 s	Size related	Ramp-down time from rated <i>parameter 1-23 Motor Frequency</i> to 0.
Parameter 4-12 Motor Speed Low Limit [Hz]	0.0–400.0 Hz	0.0 Hz	Enter the minimum limit for low speed.
Parameter 4-14 Motor Speed High Limit [Hz]	0.0–400.0 Hz	100.0 Hz	Enter the maximum limit for high speed.
Parameter 4-19 Max Output Frequency	0.0–400.0 Hz	100.0 Hz	Enter the maximum output frequency value. If <i>parameter 4-19 Max Output Frequency</i> is set lower than <i>parameter 4-14 Motor Speed High Limit [Hz]</i> , <i>parameter 4-14 Motor Speed High Limit [Hz]</i> is set equal to <i>parameter 4-19 Max Output Frequency</i> automatically.
Parameter 30-22 Locked Rotor Protection	[0] Off [1] On	[0] Off	–
Parameter 30-23 Locked Rotor Detection Time [s]	0.05–1.00 s	0.10 s	–

Table 4.6 Motor Set-up Wizard Settings

Changes made

The changes made function lists all parameters changed from default settings.

- The list shows only parameters that have been changed in the current edit set-up.
- Parameters that have been reset to default values are not listed.
- The message *Empty* indicates that no parameters have been changed.

Changing parameter settings

1. To enter the Quick Menu, press the [Menu] key until the indicator in the display is placed above Quick Menu.
2. Press [▲] [▼] to select the wizard, closed-loop set-up, motor set-up, or changes made.
3. Press [OK].
4. Press [▲] [▼] to browse through the parameters in the Quick Menu.
5. Press [OK] to select a parameter.
6. Press [▲] [▼] to change the value of a parameter setting.
7. Press [OK] to accept the change.
8. Press either [Back] twice to enter Status, or press [Menu] once to enter the Main Menu.

The main menu accesses all parameters

1. Press the [Menu] key until the indicator in the display is placed above Main Menu.
2. Press [▲] [▼] to browse through the parameter groups.
3. Press [OK] to select a parameter group.
4. Press [▲] [▼] to browse through the parameters in the specific group.

5. Press [OK] to select the parameter.

6. Press [▲] [▼] to set/change the parameter value.

4.3 Parameter List

0-0*	Operation / Display	1-43	Motor Cable Length Feet	3-8*	Other Ramps	6-15	Terminal 53 High Ref./Feedb. Value	8-80	Bus Message Count
0-0*	Basic Settings	1-44	d-axis Inductance Sat. (LdSat)	3-80	Jog Ramp Time	6-16	Terminal 53 Filter Time Constant	8-81	Bus Error Count
0-01	Language	1-45	q-axis Inductance Sat. (LqSat)	3-81	Quick Stop Ramp Time	6-19	Terminal 53 mode	8-82	Slave Messages Rcvd
0-03	Regional Settings	1-46	Position Detection Gain	4-1*	Limits / Warnings	6-2*	Analog Input 54	8-83	Slave Error Count
0-04	Operating State at Power-up	1-48	Current at Min Inductance for d-axis	4-1*	Motor Limits	6-20	Terminal 54 Low Voltage	8-84	Slave Messages Sent
0-06	GridType	1-49	Current at Min Inductance for q-axis	4-10	Motor Speed Direction	6-21	Terminal 54 High Voltage	8-85	Slave Timeout Errors
0-07	Auto DC Braking	1-5*	Load Indep. Setting	4-12	Motor Speed Low Limit [Hz]	6-22	Terminal 54 Low Current	8-88	Reset FC port Diagnostics
0-1*	Set-up Operations	1-50	Motor Magnetisation at Zero Speed	4-14	Motor Speed High Limit [Hz]	6-23	Terminal 54 High Current	8-9*	Bus Feedback
0-10	Active Set-up	1-52	Min Speed Normal Magnetising [Hz]	4-18	Current Limit	6-24	Terminal 54 Low Ref./Feedb. Value	8-94	Bus Feedback 1
0-11	Programming Set-up	1-55	U/f Characteristic - F	4-19	Max Output Frequency	6-25	Terminal 54 High Ref./Feedb. Value	8-95	Bus Feedback 2
0-12	Link Setups	1-56	U/f Characteristic - F	4-4*	Adj. Warnings 2	6-26	Terminal 54 Filter Time Constant	13-3*	Smart Logic
0-3*	LCP Custom Readout	1-6*	Load Depen. Setting	4-40	Warning Freq. Low	6-29	Terminal 54 mode	13-0*	SLC Settings
0-30	Custom Readout Unit	1-62	Slip Compensation	4-41	Warning Freq. High	6-7*	Analog/Digital Output 45	13-00	SL Controller Mode
0-31	Custom Readout Min Value	1-63	Slip Compensation Time Constant	4-5*	Adj. Warnings	6-70	Terminal 45 Mode	13-01	Start Event
0-32	Custom Readout Max Value	1-64	Resonance Dampening	4-50	Warning Current Low	6-71	Terminal 45 Analog Output	13-02	Stop Event
0-37	Display Text 1	1-65	Resonance Dampening Time Constant	4-51	Warning Current High	6-72	Terminal 45 Digital Output	13-03	Reset SLC
0-38	Display Text 2	1-66	Min. Current at Low Speed	4-54	Warning Reference Low	6-73	Terminal 45 Output Min Scale	13-1*	Comparators
0-39	Display Text 3	1-7*	Start Adjustments	4-55	Warning Reference High	6-74	Terminal 45 Output Max Scale	13-10	Comparator Operand
0-40	LCP Keypad	1-70	Start Mode	4-56	Warning Feedback Low	6-76	Terminal 45 Output Bus Control	13-11	Comparator Operator
0-40	[Hand on] Key on LCP	1-71	Start Delay	4-57	Warning Feedback High	6-9*	Analog/Digital Output 42	13-12	Comparator Value
0-42	[Auto on] Key on LCP	1-72	Start Function	4-58	Missing Motor Phase Function	6-90	Terminal 42 Mode	13-2*	Timers
0-44	[Off/Reset] Key on LCP	1-73	Flying Start	4-6*	Speed Bypass	6-91	Terminal 42 Analog Output	13-20	SL Controller Timer
0-5*	Copy/Save	1-8*	Stop Adjustments	4-61	Bypass Speed From [Hz]	6-92	Terminal 42 Digital Output	13-4*	Logic Rules
0-50	LCP Copy	1-80	Function at Stop	4-63	Bypass Speed To [Hz]	6-93	Terminal 42 Output Min Scale	13-40	Logic Rule Boolean 1
0-51	Set-up Copy	1-82	Min Speed for Function at Stop [Hz]	4-64	Semi-Auto Bypass Set-up	6-96	Terminal 42 Output Max Scale	13-41	Logic Rule Operator 1
0-6*	Password	1-88	AC Brake Gain	5-*	Digital In/Out	6-96	Terminal 42 Output Bus Control	13-42	Logic Rule Boolean 2
0-60	Main Menu Password	1-9*	Motor Temperature	5-0*	Digital I/O mode	8-*	Comm. and Options	13-43	Logic Rule Operator 2
0-61	Access to Main Menu w/o Password	1-90	Motor Thermal Protection	5-00	Digital Input Mode	8-0*	General Settings	13-44	Logic Rule Boolean 3
1-1*	Load and Motor	1-93	Thermistor Source	5-03	Digital Input 29 Mode	8-01	Control Site	13-5*	States
1-0*	General Settings	2-*	Brakes	5-1*	Digital Inputs	8-02	Control Source	13-51	SL Controller Event
1-00	Configuration Mode	2-0*	DC-Brake	5-10	Terminal 18 Digital Input	8-03	Control Timeout Time	13-52	SL Controller Action
1-01	Motor Control Principle	2-00	DC Hold/Motor Preheat Current	5-11	Terminal 19 Digital Input	8-04	Control Timeout Function	14-*	Special Functions
1-03	Torque Characteristics	2-01	DC Brake Current	5-12	Terminal 27 Digital Input	8-3*	FC Port Settings	14-0*	Inverter Switching
1-06	Clockwise Direction	2-02	DC Braking Time	5-13	Terminal 29 Digital Input	8-30	Protocol	14-01	Switching Frequency
1-08	Motor Control Bandwidth	2-04	DC Brake Cut In Speed	5-3*	Digital Outputs	8-31	Address	14-03	Overmodulation
1-1*	Motor Selection	2-06	Parking Current	5-34	On Delay, Digital Output	8-32	Baud Rate	14-07	Dead Time Compensation Level
1-10	Motor Construction	2-07	Parking Time	5-35	Off Delay, Digital Output	8-33	Parity / Stop Bits	14-08	Damping Gain Factor
1-14	Damping Gain	2-1*	Brake Energy Funct.	5-4*	Relays	8-35	Minimum Response Delay	14-09	Dead Time Bias Current Level
1-15	Low Speed Filter Time Const.	2-10	Brake Function	5-40	Function Relay	8-36	Maximum Response Delay	14-1*	Mains Failure
1-16	High Speed Filter Time Const.	2-16	AC Brake, Max current	5-41	On Delay, Relay	8-37	Maximum Inter-char delay	14-10	Mains Failure
1-17	Voltage filter time const.	2-17	Over-voltage Control	5-42	Off Delay, Relay	8-4*	FC MC protocol set	14-11	Mains Fault Voltage Level
1-2*	Motor Data	2-19	Over-voltage Gain	5-5*	Pulse Input	8-42	PCD Write Configuration	14-12	Response to Mains Imbalance
1-20	Motor Power	3-*	Reference Limits	5-50	Term. 29 Low Frequency	8-43	PCD Read Configuration	14-2*	Reset Functions
1-22	Motor Voltage	3-0*	Minimum Reference	5-51	Term. 29 High Frequency	8-5*	Digital/Bus	14-20	Reset Mode
1-23	Motor Frequency	3-02	Maximum Reference	5-52	Term. 29 Low Ref./Feedb. Value	8-50	Coasting Select	14-21	Automatic Restart Time
1-24	Motor Current	3-03	Maximum Reference	5-53	Term. 29 High Ref./Feedb. Value	8-51	Quick Stop Select	14-22	Operation Mode
1-25	Motor Nominal Speed	3-1*	References	5-9*	Bus Controlled	8-52	DC Brake Select	14-27	Action At Inverter Fault
1-26	Motor Cont. Rated Torque	3-10	Preset Reference	5-90	Digital & Relay Bus Control	8-53	Start Select	14-29	Service Code
1-29	Automatic Motor Adaption (AMA)	3-11	Jog Speed [Hz]	6-*	Analog In/Out	8-54	Reversing Select	14-3*	Current Limit Ctrl.
1-30	Adv. Motor Data	3-14	Preset Relative Reference	6-0*	Analog I/O Mode	8-55	Set-up Select	14-30	Current Lim Ctrl, Proportional Gain
1-33	Stator Resistance (Rs)	3-15	Reference 1 Source	6-00	Live Zero Timeout Time	8-56	Preset Reference Select	14-31	Current Lim Ctrl, Integration Time
1-33	Stator Leakage Reactance (X1)	3-16	Reference 2 Source	6-01	Live Zero Timeout Function	8-57	BACnet	14-32	Current Lim Ctrl, Filter Time
1-35	Main Reactance (Xh)	3-17	Reference 3 Source	6-02	Fire Mode Live Zero Timeout Function	8-70	BACnet Device Instance	14-4*	Energy Optimising
1-37	d-axis Inductance (Ld)	3-4*	Ramp 1	6-1*	Analog Input 53	8-72	M5/TP Max Masters	14-40	VT Level
1-38	q-axis Inductance (Lq)	3-41	Ramp 1 Ramp Up Time	6-10	Terminal 53 Low Voltage	8-73	"I am" Service	14-41	AEO Minimum Magnetisation
1-39	Motor Poles	3-42	Ramp 1 Ramp Down Time	6-11	Terminal 53 High Voltage	8-74	Initialisation Password	14-44	d-axis current optimization for IPM
1-4*	Adv. Motor Data II	3-5*	Ramp 2	6-12	Terminal 53 Low Current	8-75	Protocol Firmware version	14-5*	Environment
1-40	Back EMF at 1000 RPM	3-51	Ramp 2 Ramp Up Time	6-13	Terminal 53 High Current	8-79	FC Port Diagnostics	14-50	RFI Filter
1-42	Motor Cable Length	3-52	Ramp 2 Ramp Down Time	6-14	Terminal 53 Low Ref./Feedb. Value	8-8*		14-51	DC-Link Voltage Compensation

14-52 Fan Control	16-27 Power Filtered [hp]	20-93 PI Proportional Gain
14-53 Fan Monitor	16-3* Drive Status	20-94 PI Integral Time
14-55 Output Filter	16-30 DC Link Voltage	20-97 PI Feed Forward Factor
14-6* Auto Derate	16-34 Heatsink Temp.	22-0* Appl. Functions
14-61 Function at Inverter Overload	16-35 Inverter Thermal	22-0* Miscellaneous
14-63 Min Switch Frequency	16-36 Inv. Nom. Current	22-01 Power Filter Time
14-64 Dead Time Compensation Zero Current Level	16-37 Inv. Max. Current	22-02 Sleepmode CL Control Mode
14-65 Speed Derate Dead Time Compensation	16-38 SL Controller State	22-2* No-Flow Detection
14-9* Fault Settings	16-5* Ref. & Feeds	22-23 No-Flow Function
14-90 Fault Level	16-50 External Reference	22-24 No-Flow Delay
15-0* Drive Information	16-52 Feedback[Unit]	22-3* No-Flow Power Tuning
15-0* Operating Data	16-54 Feedback 1 [Unit]	22-30 No-Flow Power
15-00 Operating hours	16-6* Inputs & Outputs	22-31 Power Correction Factor
15-01 Running Hours	16-60 Digital Input	22-33 Low Speed [Hz]
15-02 kWh Counter	16-61 Terminal 53 Setting	22-34 Low Speed Power [kW]
15-03 Power Up's	16-62 Analog input 53	22-37 High Speed [Hz]
15-04 Over Temp's	16-63 Terminal 54 Setting	22-38 High Speed Power [kW]
15-05 Over Volts	16-64 Analog output 54	22-4* Sleep Mode
15-06 Reset kWh Counter	16-65 Analog output 42 [mA]	22-40 Minimum Run Time
15-07 Reset Running Hours Counter	16-66 Digital Output	22-41 Minimum Sleep Time
15-3* Alarm Log	16-67 Pulse input 29 [Hz]	22-43 Wake-Up Speed [Hz]
15-30 Alarm Log: Error Code	16-71 Relay output	22-44 Wake-Up Ref./FB Diff
15-31 InternalFaultReason	16-72 Counter A	22-45 Setpoint Boost
15-4* Drive Identification	16-73 Counter B	22-46 Maximum Boost Time
15-40 FC Type	16-8* Fieldbus & FC Port	22-47 Sleep Speed [Hz]
15-41 Power Section	16-86 FC Port REF 1	22-48 Sleep Delay Time
15-42 Voltage	16-9* Diagnosis Readouts	22-49 Wake-Up Delay Time
15-43 Software Version	16-90 Alarm Word	22-6* Broken Belt Detection
15-44 Ordered TypeCode	16-91 Alarm Word 2	22-60 Broken Belt Function
15-45 Actual Typecode String	16-92 Warning Word	22-61 Broken Belt Torque
15-46 Drive Ordering No	16-93 Warning Word 2	22-62 Broken Belt Delay
15-48 LCP Id No	16-94 Ext. Status Word	22-8* Flow Compensation
15-49 SW ID Control Card	16-95 Ext. Status Word 2	22-80 Flow Compensation
15-50 SW ID Power Card	18-** Info & Readouts	22-81 Square-linear Curve Approximation
15-51 Drive Serial Number	18-1* Fire Mode Log	22-82 Work Point Calculation
15-53 Power Card Serial Number	18-10 FireMode LogEvent	22-84 Speed at No-Flow [Hz]
15-59 Filename	18-5* Ref. & Feeds	22-86 Speed at Design Point [Hz]
16-** Data Readouts	18-50 Sensorless Readout [unit]	22-87 Pressure at No-Flow Speed
16-0* General Status	20-** Drive Closed Loop	22-88 Pressure at Rated Speed
16-00 Control Word	20-0* Feedback	22-89 Flow at Design Point
16-01 Reference [Unit]	20-00 Feedback 1 Source	22-90 Flow at Rated Speed
16-02 Reference [%]	20-01 Feedback 1 Conversion	24-** Appl. Functions 2
16-03 Status Word	20-03 Feedback 2 Source	24-0* Fire Mode
16-05 Main Actual Value [%]	20-04 Feedback 2 Conversion	24-00 FM Function
16-09 Custom Readout	20-12 Reference/Feedback Unit	24-01 Fire Mode Configuration
16-1* Motor Status	20-2* Feedback/Setpoint	24-05 FM Preset Reference
16-10 Power [kW]	20-20 Feedback Function	24-06 Fire Mode Reference Source
16-11 Power [hp]	20-21 Setpoint 1	24-07 Fire Mode Feedback Source
16-12 Motor Voltage	20-6* Sensorless	24-09 FM Alarm Handling
16-13 Frequency	20-60 Sensorless Unit	24-1* Drive Bypass
16-14 Motor current	20-69 Sensorless Information	24-10 Drive Bypass Function
16-15 Frequency [%]	20-8* PI Basic Settings	24-11 Drive Bypass Delay Time
16-16 Torque [Nm]	20-81 PI Normal/ Inverse Control	30-** Special Features
16-17 Speed [RPM]	20-83 PI Start Speed [Hz]	30-2* Adv. Start Adjust
16-18 Motor Thermal	20-84 On Reference Bandwidth	30-22 Locked Rotor Protection
16-22 Torque [%]	20-9* PI Controller	30-23 Locked Rotor Detection Time [s]
16-26 Power Filtered [kW]	20-91 PI Anti Windup	

5 Warnings and Alarms

Fault number	Alarm/warning bit number	Fault text	Warning	Alarm	Trip locked	Cause of problem
2	16	Live zero error	X	X	–	Signal on terminal 53 or 54 is less than 50% of the value set in <i>parameter 6-10 Terminal 53 Low Voltage</i> , <i>parameter 6-12 Terminal 53 Low Current</i> , <i>parameter 6-20 Terminal 54 Low Voltage</i> , or <i>parameter 6-22 Terminal 54 Low Current</i> . See also <i>parameter group 6-0* Analog I/O Mode</i> .
4	14	Mains ph. loss	X	X	X	Missing phase on the supply side or too high voltage imbalance. Check the supply voltage. See <i>parameter 14-12 Response to Mains Imbalance</i> .
7	11	DC over volt	X	X	–	Intermediate circuit voltage exceeds the limit.
8	10	DC under volt	X	X	–	Intermediate circuit voltage drops below voltage warning low-limit.
9	9	Inverter overload	X	X	–	More than 100% load for a long time.
10	8	Motor ETR over	X	X	–	Motor is too hot due to more than 100% load for a long time. See <i>parameter 1-90 Motor Thermal Protection</i> .
11	7	Motor th over	X	X	–	Thermistor or thermistor connection is disconnected. See <i>parameter 1-90 Motor Thermal Protection</i> .
13	5	Over Current	X	X	X	Inverter peak current limit is exceeded.
14	2	Earth Fault	–	X	X	Discharge from output phases to ground.
16	12	Short Circuit	–	X	X	Short circuit in motor or on motor terminals.
17	4	Ctrl. word TO	X	X	–	No communication to frequency converter. See <i>parameter group 8-0* General Settings</i> .
24	50	Fan Fault	X	X	–	The heat sink cooling fan is not working (only on 400 V, 30–90 kW units).
30	19	U phase loss	–	X	X	Motor phase U is missing. Check the phase. See <i>parameter 4-58 Missing Motor Phase Function</i> .
31	20	V phase loss	–	X	X	Motor phase V is missing. Check the phase. See <i>parameter 4-58 Missing Motor Phase Function</i> .
32	21	W phase loss	–	X	X	Motor phase W is missing. Check the phase. See <i>parameter 4-58 Missing Motor Phase Function</i> .
38	17	Internal fault	–	X	X	Contact the local Danfoss supplier.
44	28	Earth Fault	–	X	X	Discharge from output phases to ground, using the value of <i>parameter 15-31 InternalFaultReason</i> if possible.
46	33	Control Voltage Fault	–	X	X	Control voltage is low. Contact the local Danfoss supplier.
47	23	24 V supply low	X	X	X	24 V DC supply may be overloaded.
50		AMA calibration failed	–	X	–	Contact the local Danfoss supplier.
51	15	AMA Unom,Inom	–	X	–	The setting of motor voltage, motor current, and motor power is wrong. Check the settings.
52	–	AMA low Inom	–	X	–	The motor current is too low. Check the settings.
53	–	AMA big motor	–	X	–	The motor is too big to perform AMA.
54	–	AMA small mot	–	X	–	The motor is too small to perform AMA.
55	–	AMA par. range	–	X	–	The parameter values found from the motor are outside the acceptable range.
56	–	AMA user interrupt	–	X	–	The AMA has been interrupted by the user.

Fault number	Alarm/warning bit number	Fault text	Warning	Alarm	Trip locked	Cause of problem
57	–	AMA timeout	–	X	–	Try to start the AMA again a number of times, until the AMA is carried out. NOTICE Repeated runs may heat the motor to a level where the resistance R_s and R_r are increased. In most cases, however, this is not critical.
58	–	AMA internal	X	X	–	Contact the local Danfoss supplier.
59	25	Current limit	X	–	–	The current is higher than the value in <i>parameter 4-18 Current Limit</i> .
60	44	External Interlock	–	X	–	External interlock has been activated. To resume normal operation, apply 24 V DC to the terminal programmed for external interlock and reset the frequency converter (via serial communication, digital I/O, or by pressing [Reset] button on the LCP).
66	26	Heat sink Temperature Low	X	–	–	This warning is based on the temperature sensor in the IGBT module (on 400 V, 30–90 kW (40–125 hp) and 600 V units).
69	1	Pwr. Card Temp	X	X	X	The temperature sensor on the power card exceeds the upper or lower limits.
70	36	Illegal FC configuration	–	X	X	The control card and power card are not matched.
79	–	Illegal power section configuration	X	X	–	Internal fault. Contact the local Danfoss supplier.
80	29	Drive initialised	–	X	–	All parameter settings are initialized to default settings.
87	47	Auto DC Braking	X	–	–	The frequency converter is auto DC braking.
95	40	Broken Belt	X	X	–	Torque is below the torque level set for no load, indicating a broken belt. See <i>parameter group 22-6* Broken Belt Detection</i> .
126	–	Motor Rotating	–	X	–	High back EMF voltage. Stop the rotor of the PM motor.
200	–	Fire Mode	X	–	–	Fire mode has been activated.
202	–	Fire Mode Limits Exceeded	X	–	–	Fire mode has suppressed 1 or more warranty voiding alarms.
250	–	New sparepart	–	X	X	The power or switch mode power supply has been exchanged (on 400 V, 30–90 kW (40–125 hp) and 600 V units). Contact the local Danfoss supplier.
251	–	New Typecode	–	X	X	The frequency converter has a new type code (on 400 V, 30–90 kW (40–125 hp) and 600 V units). Contact the local Danfoss supplier.

Table 5.1 Warnings and Alarms