



# VLT<sup>®</sup> AutomationDrive FC 360

90–315 kW, Enclosure Sizes J8–J9

# 1 Introduction

This operating guide provides necessary information for qualified personnel to install and commission the AC drive. Read and follow the instructions to use the drive safely and professionally.



Do not dispose of equipment containing electrical components together with domestic waste.

Collect it separately in accordance with local and currently valid legislation.

# 2 Safety

Pay particular attention to the safety instructions and general warnings to avoid the risk of death, serious injury, and equipment or property damage.

🛦 W A R N I N G 🛦

# HIGH VOLTAGE

AC drives contain high voltage when connected to AC mains input.

# UNINTENDED START

The motor may start from control panel, I/O inputs, or fieldbus at any time, when the drive is connected to the AC mains. **DISCHARGE TIME** 

The drive contains DC-link capacitors, which can remain charged even when the drive is not powered. High voltage can be present even when the warning indicator lights are off.

- Stop the motor, and disconnect AC mains, permanent magnet type motors.

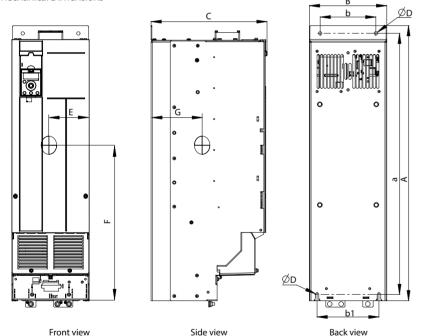
- Wait for the capacitors to discharge fully and measure it before performing any service or repair work. - The minimum waiting time is 20 minutes.

### LEAKAGE CURRENT

Leakage currents of the drive exceed 3.5 mA. Make sure that the minimum size of the ground conductor complies with the local safety regulations for high touch current equipment.

#### 3 Installation

# 3.1 Mechanical Dimensions



Front view

Illustration 1: Mechanical Dimensions, Enclosure Sizes J8–J9

Table 1: Power Ratings, Dimensions, and Weights for Enclosure Sizes J8–J9

Enclosure size	Power [kW (hp)] Height [mm (in)		)]	Width [mm (in)]			
(IP20)	3x380-480 V	А	A <sup>(1)</sup>	а	В	b	b1
8L	110–160 (150–250)	889 (35.0)	909 (35.8)	844 (33.2)	250 (9.8)	180 (7.1)	200 (7.9)
J9	200–315 (300–450)	1096 (43.1)	1122 (44.2)	1051 (41.4)	350 (13.8)	280 (11.0)	271 (10.7)
Enclosure size	Depth [mm (in)]	Mounting h	ole [mm (in)]	<b>J</b>			Maximum
(IP20)	С	D		E	F	G	weight [kg (lb)]
8L	375 (14.8)	11 (0.4)		128 (5.0)	495 (19.5)	148 (5.8)	98 (216)
9L	375 (14.8)	11 (0.4)		176 (6.9)	611 (24.1)	148 (5.8)	164 (362)

Note: (1) Including decoupling plate

3.2 Removing the Front Cover Procedure: Step 1: Loosen and remove the 2 screws on the front cover. Step 2: Disconnect the front cover from the hooks.

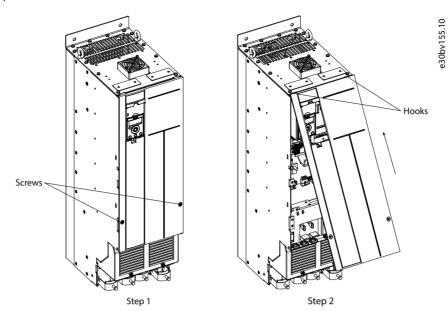


Illustration 2: Removing the Front Cover

# 3.3 Connecting to Mains, Motor, Control Terminals, and Relays

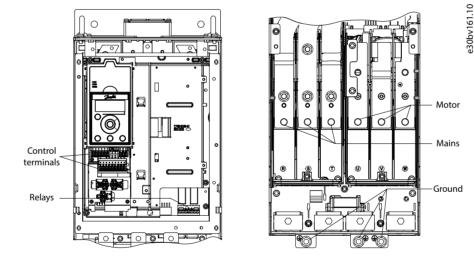


Illustration 3: Connecting to Mains, Motor, Control Terminals, and Relays

### 3.4 Control Terminals

10 V	AI53	AI54	A042	A045	GND	1			COM KS 485	N RS 485	_	
<b>0</b> 50	• 53	• 54	• 42	• 45	• 55			H-	-			
	VDD1	DI18	DI19	DI027	DIO29	DI31	DI32	DI33	GND	٦		

. . . . . . . . . .

12 18 19 27 29 31 32 33 20

(ON=RS485 terminated, OFF=Op	en)

RS485 termination switch

0

65

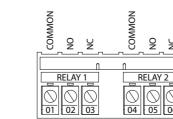


Illustration 4: Control Terminals

# **4** Specifications

Drive	Q110	Q132	Q160	Q200	Q250	Q315			
Enclosure size	8L	8L	J8	J9	J9	J9			
Normal overload=110% current during 60 s									
Typical shaft output at 400 V [kW]	110	132	160	200	250	315			
Typical shaft output at 460 V [hp]	150	200	250	300	350	450			
Output current (3-phase)									
Continuous (at 400 V) [A]	212	260	315	395	480	588			
Intermittent (60 s overload) (at 400 V) [A]	233	286	347	435	528	647			
Continuous (at 460 V) [A]	190	240	302	361	443	535			
Intermittent (60 s overload) (at 460 V) [A]	209	264	332	397	487	589			
Continuous kVA (at 400 V) [kVA]	147	180	218	274	333	407			
Continuous kVA (at 460 V) [kVA]	151	191	241	288	353	426			
Maximum input current	·								
Continuous (at 400 V) [A]	204	251	304	381	463	567			
Continuous (at 460 V) [A]	183	231	291	348	427	516			
Maximum number and size of cables per phase	2					•			
Mains and motor [mm <sup>2</sup> (AWG)]		2x95 (2x3/0	)	2x1	85 (2x350 m	ncm)			
Maximum external mains fuses [A]	315	350	400	550	630	800			
Estimated power loss at 400 V [W]	2559	2954	3770	4116	5137	6674			
Estimated power loss at 460 V [W]	2261	2724	3628	3569	4566	5714			
Efficiency [%]			9	8					
Output frequency [Hz]		0-590							
Heat sink overtemperature trip [°C (°F)]		110 (230)							
Control card overtemperature trip [°C (°F)]		75 (167) 80 (176)							
		. ,							
		0–480 V AC							
Drive	Н90К	0–480 V AC H110	H132	H160	H200				
Drive Enclosure size		0–480 V AC	H132 J8	H160 J9	H200 J9	H250 J9			
Drive Enclosure size High overload=150% current during 60 s	H90K J8	0-480 V AC H110 J8	J8	J9	9L	el			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW]	H90K J8 90	0-480 V AC H110 J8	<b>J8</b> 132	<b>J9</b> 160	<b>9</b> 200	<b>J9</b> 250			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp]	H90K J8	0-480 V AC H110 J8	J8	J9	9L	<b>J9</b> 250			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase)	H90K J8 90	0-480 V AC H110 J8	<b>J8</b> 132	<b>J9</b> 160	<b>J9</b> 200 300	<b>J9</b> 250 350			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp]	H90K J8 90	0-480 V AC H110 J8	<b>J8</b> 132	<b>J9</b> 160	<b>9</b> 200	<b>J9</b> 250 350			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase)	H90K J8 90 125	0-480 V AC H110 J8 110 150	J8 132 200	<b>J9</b> 160 250	<b>J9</b> 200 300	<b>J9</b> 250 350 480			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A]	H90K J8 90 125 177 266 160	0-480 V AC H110 J8 110 150 212 318 190	J8 132 200 260 390 240	<b>J9</b> 160 250 315 473 302	<b>J9</b> 200 300 395 593 361	<b>J9</b> 250 350 480 720 443			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Intermittent (60 s overload) (at 460 V) [A]	H90K J8 90 125 177 266 160 240	0-480 V AC H110 J8 110 150 212 318	J8 132 200 260 390	<b>J9</b> 160 250 315 473	<b>J9</b> 200 300 395 593	<b>J9</b> 250 350 480 720 443			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kVA (at 400 V) [kVA]	H90K J8 90 125 177 266 160	0-480 V AC H110 J8 110 150 212 318 190	J8           132           200           260           390           240           360           180	<b>J9</b> 160 250 315 473 302 453 218	J9           200           300           395           593           361           542           274	<b>J9</b> 250 350 480 720 443 665 333			
Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 460 V) [kVA]	H90K J8 90 125 177 266 160 240	0-480 V AC H110 J8 110 150 212 318 190 285	J8           132           200           260           390           240           360	<b>J9</b> 160 250 315 473 302 453	<b>J9</b> 200 300 395 593 361 542	H250 J9 250 350 480 720 443 665 333 353			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current	H90K H90K J8 90 125 177 266 160 240 123	-480 V AC H110 J8 110 150 212 318 190 285 147 151	J8 132 200 260 390 240 360 180 191	<b>J9</b> 160 250 315 473 302 453 218 241	J9           200           300           395           593           361           542           274           288	<b>J9</b> 250 350 480 720 443 665 333 353			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 460 V) [kVA]	H90K H90K J8 90 125 177 266 160 240 123	-480 V AC H110 J8 110 150 212 318 190 285 147	J8           132           200           260           390           240           360           180	<b>J9</b> 160 250 315 473 302 453 218	J9           200           300           395           593           361           542           274	<b>J9</b> 250 350 480 720 443 665 333 353			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kVA (at 460 V) [kVA] Continuous kVA (at 460 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current Continuous (at 400 V) [A] Continuous (at 400 V) [A]	H90K           J8           90           125           177           266           160           240           123           127           154	-480 V AC H110 J8 110 150 212 318 190 285 147 151	J8 132 200 260 390 240 360 180 191	<b>J9</b> 160 250 315 473 302 453 218 241	J9           200           300           395           593           361           542           274           288	<b>J9</b> 250 350 480 720 443 665 333 353 463			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current Continuous (at 400 V) [A] Continuous (at 400 V) [A] Continuous (at 400 V) [A]	H90K           J8           90           125           177           266           160           240           123           127           154	-480 V AC H110 J8 110 150 212 318 190 285 147 151 204	J8 132 200 260 390 240 360 180 191 251	J9 160 250 315 473 302 453 218 241 304	J9           200           300           395           593           361           542           274           288           381	<b>J9</b> 250 350 480 720 443 665 333 353 463			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kt 460 V) [kVA] Continuous kVA (at 460 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current Continuous (at 400 V) [A]	H90K H90K J8 90 125 177 266 160 240 123 127 123 127 171 154	-480 V AC H110 J8 110 150 212 318 190 285 147 151 204	J8 132 200 260 390 240 360 180 191 251 231	J9 160 250 315 473 302 453 218 241 304 291	J9           200           300           395           593           361           542           274           288           381	J9           250           350           480           720           443           665           333           353           463           427			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 400 V) [kVA] Maximum input current Continuous (at 400 V) [A] Continuous (at 460 V) [A] Continuous (at 460 V) [A] Maximum number and size of cables per phase Mains and motor [mm² (AWG)]	H90K H90K J8 90 125 177 266 160 240 123 127 123 127 171 154	-480 V AC H110 J8 110 150 212 318 190 285 147 151 204 183	J8 132 200 260 390 240 360 180 191 251 231	J9 160 250 315 473 302 453 218 241 304 291	J9           200           300           395           593           361           542           274           288           381           348	J9           250           350           480           720           443           665           333           353           463           427           hcm)			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current Continuous (at 400 V) [A] Continuous (at 400 V) [A] Continuous (at 400 V) [A]	H90K H90K J8 90 125 177 266 160 240 123 127 123 127 171 154	-480 V AC H110 J8 110 150 212 318 190 285 147 151 204 183 2x95 (2x3/0	J8 132 200 260 390 240 360 180 191 251 231	J9 160 250 315 473 302 453 218 241 304 291 2x1	<b>J9</b> 200 300 395 593 361 542 274 288 381 348 85 (2x350 m	J9           250           350           480           720           443           665           333           353           463           427           6cm)           800			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current Continuous (at 460 V) [A] Continuous (at 460 V) [A] Continuous (at 460 V) [A] Maximum number and size of cables per phase Mains and motor [mm <sup>2</sup> (AWG)] Maximum external mains fuses [A]	H90K H90K J8 90 125 177 266 160 240 123 127 123 127 171 154 9 315	2480 V AC H110 J8 110 150 212 318 190 285 147 151 204 183 2x95 (2x3/0 350	J8 132 200 260 390 240 360 180 191 251 231 400	J9 160 250 315 473 302 453 218 241 304 291 2x1 550	J9           200           300           395           593           361           542           274           288           381           348           85 (2x350 m           630	J9           250           350           480           720           443           665           333           353           463           427           ncm)           800           5004			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous (at 460 V) [A] Continuous kVA (at 460 V) [kVA] Continuous kVA (at 460 V) [kVA] Continuous (at 460 V) [kVA] Continuous (at 460 V) [A] Continuous (at 400 V) [A] Continuous (at 400 V) [A] Continuous (at 400 V) [A] Maximum number and size of cables per phase Mains and motor [mm² (AWG)] Maximum external mains fuses [A] Estimated power loss at 400 V [W]	H90K           J8           90           125           177           266           160           240           123           127           154           2           315           2031	2480 V AC H110 J8 110 150 212 318 190 285 147 151 204 183 2x95 (2x3/0 350 2289	J8           132           200           260           390           240           360           180           191           251           231           0           400           2923           2089	J9 160 250 315 473 302 453 218 241 304 291 2x1 550 3093	J9           200           300           395           593           361           542           274           288           381           348           85 (2x350 m           630           4039	J9           250           350           480           720           443           665           333           353           463           427           ncm)           800           5004			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous (at 460 V) [A] Continuous kVA (at 400 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current Continuous (at 460 V) [A] Continuous (at 460 V) [A] Continuous (at 460 V) [A] Estimated power loss at 400 V [W] Efficiency [%]	H90K           J8           90           125           177           266           160           240           123           127           154           2           315           2031	2480 V AC H110 J8 110 150 212 318 190 285 147 151 204 183 2x95 (2x3/0 350 2289	J8 132 200 260 390 240 360 180 191 251 231 231 0 400 2923 2089 9	J9 160 250 315 473 302 453 218 241 304 291 2x1 550 3093 2872	J9           200           300           395           593           361           542           274           288           381           348           85 (2x350 m           630           4039	J9           250           350           480           720           443           665           333           353           463           427           ncm)           800           5004			
Drive Enclosure size High overload=150% current during 60 s Typical shaft output at 400 V [kW] Typical shaft output at 460 V [hp] Output current (3-phase) Continuous (at 400 V) [A] Intermittent (60 s overload) (at 400 V) [A] Continuous (at 460 V) [A] Intermittent (60 s overload) (at 460 V) [A] Continuous (at 460 V) [A] Continuous kVA (at 460 V) [kVA] Continuous kVA (at 460 V) [kVA] Maximum input current Continuous (at 400 V) [A] Continuous (at 400 V) [A] Maximum number and size of cables per phase Mains and motor [mm² (AWG)] Maximum external mains fuses [A] Estimated power loss at 460 V [W]	H90K           J8           90           125           177           266           160           240           123           127           154           2           315           2031	2480 V AC H110 J8 110 150 212 318 190 285 147 151 204 183 2x95 (2x3/0 350 2289	J8 132 200 260 390 240 360 180 191 251 231 201 400 2923 2089 9 0	J9 160 250 315 473 302 453 218 241 304 291 2x1 550 3093 2872 8	J9           200           300           395           593           361           542           274           288           381           348           85 (2x350 m           630           4039	J9           250           350           480           720           443           665           333           353           463           427			

Drive
Enclosure size
High overload=150% curre
Typical shaft output at 400 \
Typical shaft output at 460 \
Output current (3-phase)
Continuous (at 400 V) [A]
Intermittent (60 s overload)
Continuous (at 460 V) [A]
Intermittent (60 s overload)
Continuous kVA (at 400 V) [l
Continuous kVA (at 460 V) [l
Maximum input current
Continuous (at 400 V) [A]
Continuous (at 460 V) [A]
Maximum number and size
Mains and motor [mm <sup>2</sup> (AW
Maximum external mains fu
Estimated power loss at 400
Estimated power loss at 460
Efficiency [%]
Output frequency [Hz]
Heat sink overtemperature
Control card overtemperatu

J8–J9 enclosure size	IP20/Chassis
Vibration test (standard)	0.7 g
Relative humidty	5%–95% (IEC 721-3-3; Class 3K3 (non-condensing) during operation)
Aggressive environment (IEC 60068-2-43) H <sub>2</sub> S test	Class Kd
Aggressive gases (IEC 60721-3-3)	Class 3C3
Test method according to IEC 60068-2-43	H <sub>2</sub> S (10 days)

# Table 2: Electrical Data for Normal Overload, Mains Supply 3x380–480 V AC

### ons

Ambient temperature (at SFAVM switching mode)	
- with derating	Maximum 55 °C (131 °F)
- with full output power of typical EFF2 motors (up to 90% output current)	Maximum 50 °C (122 °F)
- at full continuous FC output current	Maximum 45 °C (113 °F)
Minimum ambient temperature during full-scale operation	-15 °C (5 °F)
Minimum ambient temperature at reduced speed performance	-20 °C (-4 °F)
Temperature during storage/transport	-25 to +65/70 °C (-13 to +149/158 °F)
Maximum altitude above sea level without derating	1000 m (3281 ft)
Maximum altitude above sea level with derating	3000 m (9842 ft)
Energy efficiency class	IE2

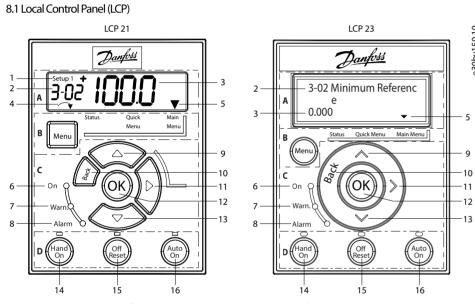
# 6 Mounting Clearance

Enclosure size	Minimum mounting clearance [Maximum temperature 50 °C (122 °F)]
J8 and J9	Above and below: 225 mm (9 in)

# 7 EMC Compatibility and Motor Cable Length

EMC standard, Emission/Immunity	Category C3/EN/IEC 61800-3
Maximum motor cable length, shielded	Category C3/ 150 m (492 ft)
Maximum motor cable length, unshielded	300 m (984 ft)
Maximum cross-section to control terminals, rigid wire	1.5 mm <sup>2</sup> /16 AWG (2x0.75 mm <sup>2</sup> )
Maximum cross-section to control terminals, flexible cable	1 mm <sup>2</sup> /18 AWG
Maximum cross-section to control terminals, cable with enclosed core	0.5 mm <sup>2</sup> /20 AWG
Minimum cross-section to control terminals	0.25 mm <sup>2</sup> /23 AWG

#### 8 Programming



#### Illustration 5: Local Control Panel (LCP 21 and LCP 23)

### Functional Section A: Display

#### **Table 4: Display Function**

Number		Function					
1	<ul> <li>For LCP 21: The setup and edit setup, only t</li> <li>For LCP 23, the setup</li> </ul>	ows the active setup and the edit setup. In umber shows the active setup and the edit setup. If the same setup acts as both active hat setup number is shown (factory setting). In umber shows on the upper right corner in the status mode. For example, "1(2)" means and the editing setup is "2".					
2	<ul> <li>LCP 21 shows only parameter number.</li> <li>LCP 23 shows both parmenter nubmer and name.</li> </ul>						
3	Parameter value.						
4	Motor direction indicated by a small arrow pointing either clockwise or counterclockwise. For LCP 23, it only shows in status menu on the upper right corner of the screen.						
5	The triangle indicates if the LCP is in Status, Quick Menu, or Main Menu.						
Function	nal Section B: Menu	Key					
Press [M	enu] to select among	g Status, Quick Menu, or Main Menu.					
Function	nal Section C: Indica	tor Lights (LEDs) and Navigation Keys					
Table 5: li	ndicator Lights (LEDs)						
Number	Indicator Light	Function					

Number	Indicator	Light	Function
6	On	Green	Turns on when the drive receives power from the mains voltage, a DC bus terminal, or a 24 V external supply.
7	Warn.	Yellow	Turns on when warning conditions are met. Text is shown in the display area identifying the warning.
8	Alarm	Red	Flashes when a fault condition occurs. Text is shown in the display area identifying the alarm.

#### **Table 6: Navigation Keys**

Number	Key	Function
9/13	Up/Down	(1) Switches among parameter groups, parameters, and within parameters. (2) Increases or decre- ases parameter values. (3) Sets local reference.
10	[Back]	Moves to the previous step or layer in the navigation structure.
11	Right	Moves from left to right within the parameter value to change each digit individually.
12	[OK]	Selects a parameter and accepts changes to parameter settings.
		D: Operation Keys and Indicator Lights (LEDs)
Table 7: C	peration Ke	ys and Indicator Lights (LEDs)
Number	Key	Function
14	[Hand On]	(1) Starts the drive in local control. (2) An external stop signal via control input or serial communi-

14	[Hand On]	(1) Starts the drive in local control. (2) An external stop signal via control input or serial communi- cation overrides the local hand on command.
15	[Off/Reset]	(1) Stops the motor but does not remove power to the drive. (2) Resets the drive manually after a fault has been cleared. (3) In alarm mode, the alarm is reset when the alarm condition is removed.
16	[Auto On]	Puts the system in remote operational mode, in which the drive only respond to an external start command via control terminals or bus communication.

# 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.

#### 8.2 Automatic Motor Adaptation (AMA)

• Via running AMA in VVC+ mode, the drive builds a mathematical model of the motor to optimize compatibility between drive and motor, and thus enhances the motor control performance.

• Some motors may be unable to run the complete version of the test. In that case, select [2] Enable Reduced AMA in parameter 1-29 Automatic Motor Adaptation (AMA).

• For best results, run the following procedure on a cold motor.

#### Procedure:

0

50.

1. Set motor data in *parameter group* 1-\*\* Load and Motor according to the motor nameplate.

2. Connect terminal 27 to terminal 12 (24 V voltage) or choose [0] No operation in parameter 5-12 Terminal 27 Digital Input.

3. Set [1] Enable Complete AMA or [2] Enable Reduced AMA for parameter 1-29 Automatic Motor Adaptation (AMA).

4. Press the [Hand On] key, the test runs automatically and the main display indicates when it is completed. 9 Troubleshooting

# Table 8: Warning and Alarm Code List

Number	Description	Warning	Alarm	Trip lock	Cause
2	Live zero error	x	x	-	Signal on terminal 53 or 54 is less than 50% of the values set in parameter 6-10 Terminal 53 Low Voltage, parameter 6-12 Terminal 53 Low Current, parameter 6-20 Terminal 54 Low Voltage, and parameter 6-22 Terminal 54 Low Current.
3	No motor	x	-	-	No motor has been connected to the output of the drive, or 1 motor phase is missing.
4	Mains phase loss <sup>(1)</sup>	x	x	х	Missing phase on the supply side, or the voltage imbalance is too high. Check the supply voltage.
7	DC overvoltage <sup>(1)</sup>	X	X	-	DC-link voltage exceeds the limit.
8	DC undervoltage <sup>(1)</sup>	X	Х	-	DC-link voltage drops below the voltage warning low limit.
9	Inverter overloaded	X	Х	-	More than 100% load for too long.
10	Motor ETR overtemp- erature	x	х	-	Motor is too hot due to more than 100% load for too long.
11	Motor thermistor overtemperature	x	x	-	Thermistor or thermistor connection is disconnected, or the moto is too hot.
12	Torque limit	x	х	-	Torque exceeds value set in either parameter 4-16 Torque Limit Motor Mode or parameter 4-17 Torque Limit Generator Mode.
13	Overcurrent	x	x	x	Inverter peak current limit is exceeded. For J1–J6 units, if this alar occurs on power-up, check whether power cables are mistakenly connected to the motor terminals.
14	Ground fault	-	X	Х	Discharge from output phases to ground.
16	Short circuit	-	x	x	Short circuit in motor or on motor terminals. For J7 units, if this alarm occurs on power-up, check whether power cables are mistakenly connected to the motor terminals.
17	Control word timeout	X	X	-	No communication to the drive.
18	Start failed	-	X	-	-
25	Brake resistor short- circuited	-	x	х	Brake resistor is short-circuited, thus the brake function is discon- nected.
26	Brake overload	x	x	-	The power transmitted to the brake resistor over the last 120 s exceeds the limit. Possible corrections: Decrease brake energy via lower speed or longer ramp time.
27	Brake IGBT/Brake chopper short-circuited	-	x	х	Brake transistor is short-circuited, thus brake function is disconn- ected.
28	Brake check	-	Х	-	Brake resistor is not connected/working.
30	U phase loss	-	X	Х	Motor phase U is missing. Check the phase.
31	V phase loss	-	Х	Х	Motor phase V is missing. Check the phase.
32	W phase loss	-	Х	Х	Motor phase W is missing. Check the phase.
34	Fieldbus fault	X	Х	-	PROFIBUS communication issues have occurred.

Number	Description	Warning	Alarm	Trip lock	Cause	
35	Option fault	-	Х	-	Fieldbus or option B detects internal faults.	
36 Mains failure		x	х	-	This warning/alarm is only active if the supply volta is lost and <i>parameter 14-10 Mains Failure</i> is NOT set <i>ction</i> .	
38	Internal fault	-	Х	Х	Contact the local supplier.	
40 Overload T27		x	-	-	Check the load connected to terminal 27 or remove short-connection.	
41	Overload T29	х	-	-	Check the load connected to terminal 29 or remove connection.	e short-circuit
46	Gate drive voltage fault	-	Х	X	-	
47	24 V supply low	Х	Х	X	24 V DC may be overloaded.	
50	AMA calibration	-	Х	-	-	
51	AMA check U <sub>nom</sub> and I <sub>nom</sub>	-	Х	-	Wrong setting for motor voltage and/or motor curr	ent.
52	AMA low I nom	-	Х	-	Motor current is too low. Check the settings.	
53	AMA big motor	-	Х	-	The power size of the motor is too large for the AM.	A to operate.
54	AMA small motor	-	Х	-	The power size of the motor is too small for the AM	A to operate.
55	AMA parameter range	-	Х	-	The parameter values of the motor are outside of the accepta range. AMA does not run.	
56	AMA interrupt	-	Х	-	The AMA is interrupted.	
57			Х	-	-	
58			Х	-	Contact the local supplier.	
59	59 Current limit		Х	-	The drive is overloaded.	
60	External Interlock	-	Х	-	-	
61	Encoder loss	Х	Х	-	-	
63	63 Mechanical brake low		х	-	Actual motor current has not exceeded release brake current within start delay time window.	
65	65 Control card temp		Х	X	The cutout temperature of the control card is 80 °C	(176 °F).
67	Option module config-	_	х	_	One or more options have either been added or rer	moved since t
-	uration has changed			_	last power-down.	
69	Power card temp	X	Х	X	-	
70	Illegal FC config Drive initialized to	-	Х	X	-	
80	default value	-	Х	-	All parameter settings are initialized to default setti	ngs.
87	Auto DC brake	x	_	_	Occurs in IT mains when the drive coasts and the DC voltage higher than 830 V. Energy on DC-link is consumed by the mot This function can be enabled/disabled in <i>parameter 0-07 Auto</i> <i>Braking</i> .	
88	Option detection	_	х	_	<ul> <li>A change in the option layout is detected. <i>Parameter 14-89 Opti</i> <i>Detection</i> is set to [0] Frozen configuration and the option layout has been changed.</li> <li>To apply the change, enable option layout changes in <i>parameter</i> 14-89 Option Detection.</li> <li>Alternatively, restore the correct option configuration.</li> </ul>	
90	Feedback monitor	Х	Х	-	A feedback fault is detected by option B.	
95	Broken belt	X	Х	-	-	
99 101	Locked rotor Flow/pressure inform-	-	X X	- X	-	
-	ation missing Position control fault	_	X	-		
120 124	Tension limit	-	X	-	-	
124	Motor rotating	-	X	-	-  _	
120	Back EMF too high	- X	_ _	-	Try to start PM motor which is rotating in an abnor	nal high coor
250		_	- X	- X		nar nign spee
250	New spare part	-	X	X	-	
lote: 1) These fau 2) An (X) m		ns distortion dicates that	ns. Insta t the wa	lling a l	- Danfoss line filter may rectify this problem. or alarm has occurred. A warning precedes an alarm.	
Accessories and spare parts			le num	nber	Accessories and spare parts	Code numb
(1) VLT	* PROFIBUS DP MCA 10	01 13	34B677	78	(6) VLT <sup>®</sup> graphical control panel LCP 23	132B0801
2) VLT <sup>®</sup> PROFINET MCA 120		13	134B6779		(7) VLT <sup>®</sup> numeric control panel LCP 21	132B0254
3) VLT <sup>®</sup> encoder input MCB 102		02 13	132B0282		(8) Remote mounting kit for LCP with cable, 3 m	132B0102
			20020		(0) ICD remote mounting cable 2 m	12200122
(4)   VLT	resolver input MCB 10	)3   1:	32B028	53	(9)   LCP remote mounting cable, 3 m	132B0132

### 11 Technical Documentation

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Note: (1) - (9) are accessories, and (10) is spare part. For more spare parts, contact Danfoss.

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