ENGINEERING
TOMORROW

Selection Guide | VLT® DriveMotor FCM 106 and FCP 106, 0.55 – 7.5 kW

VLT® DriveMotor FCM 106 and FCP 106 deliver **space saving efficiency** for IM and PM motors

IE4
efficiency class according to EN 60034-30-1 gives you the energy-saving requirements of tomorrow, today.

www.danfoss.com/fcm106 | VLT®

One drive. Two solutions. Full flexibility.

Select the drive component as a stand-alone unit or factory mounted to a high efficiency permanent magnet (PM) or induction motor (IM), and enjoy the benefits of Danfoss' new VLT® DriveMotor.

With integrated fan, pump and basic industry features, and VVC+ motor control, the VLT® DriveMotor is a space saving, efficient alternative to drive solutions in the 0.55-7.5 kW range.

Motor mounted for IE4 efficiency

Available as a motor-mounted drive solution the VLT® DriveMotor FCM 106 can be delivered factory fitted to either an IE4 rated PM or IE2 rated IM motor. This provides owners with an opportunity to be well prepared for future demands already today.

Standalone drive for your own motor

Alternatively, choose your own motor and attach the stand-alone frequency converter, VLT® DriveMotor FCP 106, for full flexibility in motor choice, system design and energy efficiency.

VLT® DriveMotor FCP 106

VLT® DriveMotor FCM 106

Maximize system efficiency with EC+

Optimize PM motor performance
To make it possible for users to benefit from the high motor efficiency on the same level or above EC technology, Danfoss has refined its VVC+ control algorithm and optimized it for permanent magnet motors. After entering the relevant motor data, the drive automatically optimizes the performance of the application.

Free choice of technology
The EC+ concept allows manufacturers to choose their preferred motor, fan/pump from any supplier, as the same Danfoss VLT drive is equally efficient at controlling PM or asynchronous motors.
By providing vendors with the freedom to choose the optimal combination of drive, motor and fan/pump it is possible to achieve the best possible system efficiency.
This is a clear advantage compared to integrated systems, where it often is not possible to optimize the individual components.

Easy maintenance
Component replacement as a result of wear and tear is not always possible without installing a complete new, integrated system. The EC+ concept answers this by making service and maintenance easier, as only the affected component needs to be repaired/replaced in the event of malfunction.

Downtime is therefore reduced to a minimum, as are maintenance costs due to the fact that the EC+ concept is based on standardized components, which can be shipped at short notice and installed with little effort.

EC+

Installation and service friendly

The VLT® DriveMotor FCM 106 is a complete drive and motor solution. Its compact design reduces both installation costs and complexity significantly. By eliminating the need for cabinets and long motor cables, costs are reduced further.

Flexible installation

Integrated cooling and an individually adjustable motor adapter plate makes installation very simple. The VLT® DriveMotor FCM 106 has an IP66 protection rating and is UL approved 'UL Type 4X', for outdoor installation.

Attach the frequency converter to any motor

For those who prefer to choose their own motor, VLT® DriveMotor FCP 106, can be ordered individually and fitted with a motor adapter plate. Setup is easy with Danfoss VLT® Motion Control Tool MCT 10.

Automatic Motor Adaptation

The standalone VLT® DriveMotor FCP 106 provides customers with a high level of flexibility, as the drive automatically sets the optimal parameters for the attached motor, providing stable, energy efficient operation.

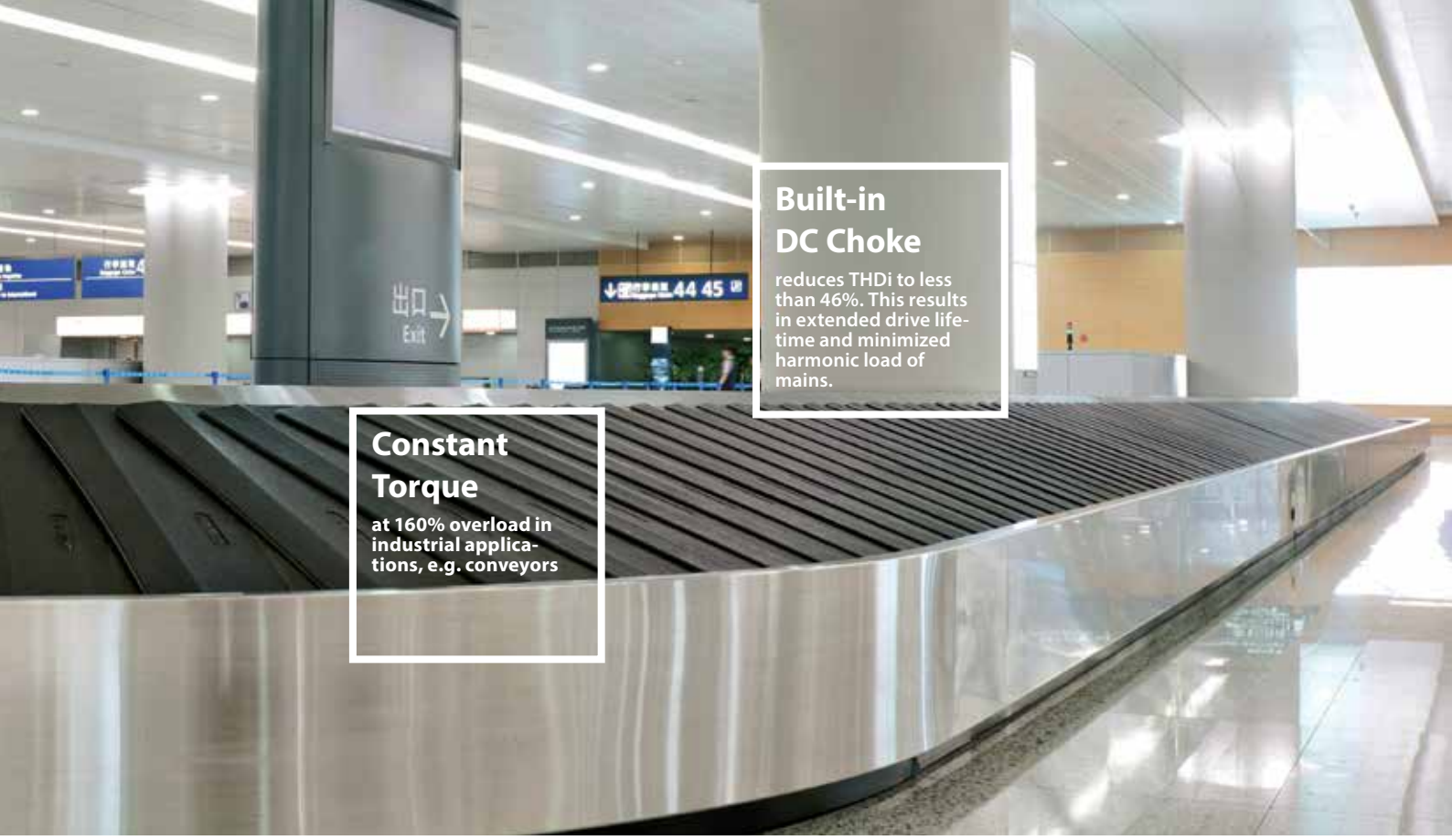
Compatible with VLT® DriveMotor FCM 300

The new FCM 106 covers all specifications and functionalities of the FCM 300 – and more.

Service friendly

The VLT® Memory Module MCM 101 facilitates helpful implementation of factory settings for OEM and machine builders, fast installation of firmware updates, and easy commissioning or exchange of drives in service situations – a first for VLT® frequency converters.
Simply use your PC to copy the drive settings from one VLT® Memory Module to another.

Insert VLT® Memory Module MCM 101 into the Memory Module Programmer for easy transfer of settings.



Industrial features

Built-in Smart Logic Controller

The Smart Logic Controller is a simple but clever way to keep your drive, motor and application working together without a PLC. The controller monitors a specified event. When an event occurs, the controller triggers a specified act and starts monitoring the next event, continuing for up to 20 steps before returning to step one.

Motor thermistor

If increased temperature monitoring of the motor is required, the motor thermistor can be monitored by connecting a thermistor input to the drive. This secures that the motor temperature does not exceed the specified temperature rating.

AC brake

Instead of a brake resistor the drive can ramp down induction motors by absorbing the energy.

Control a mechanical brake via a signal

The drive can provide an output signal for an externally mounted mechanical brake.

Technical overview

- Control PM (permanent magnet) & IM (induction motors) with the same drive
- Available as motor-mounted drive solution or standalone drive unit
- Motor sizes 0.55 – 7.5 kW
- VLT® DriveMotor FCM 106 – IP55
- VLT® DriveMotor FCP 106 – IP66
- VLT® Motion Control Tool MCT 10 for easy setup
- Embedded fieldbus via RS485: Modbus RTU, BACnet, FC Protocol
- PROFIBUS DP V1 (optional)

Cost reducing advantages

- Eliminate cabinets for the drive
- Save motor cable costs
- Energy efficient operation
- Automatic Motor Adaptation

Fan features

VLT® DriveMotor FCP 106 and VLT® DriveMotor FCM 106 are equipped with basic air handling unit functions to ensure safety, equipment reliability and low noise operation.

Belt monitoring

Based on the speed/current the drive can detect situations where the motor has lost contact with the fan and raise an alarm.

Flying start

This protective feature prevents violent starts and wear and tear on the equipment. By detecting the speed and direction of a freely spinning fan the drive can catch it at the correct frequency.

Resonance monitoring

Using only a few keystrokes on the local control panel (accessory) or via VLT® Motion Control Tool MCT 10, the drive can be set to avoid frequency bands at which connected fans create resonances in the ventilation system. This reduces vibration, noise and equipment wear.

Pump features

Sleep mode

Sleep Mode keeps pump wear and power consumption to an absolute minimum. In low flow situations, the VLT® DriveMotor will ramp up the pump to boost the system pressure and then stop. Monitoring the pressure, the VLT® DriveMotor will restart when the pressure falls below the required level.

Flow compensation

A pressure sensor mounted close to the fan or pump provides a reference point that enables pressure to be kept constant at the discharge end of the system. The drive constantly adjusts the pressure reference to follow the system curve. This method both saves energy and reduces installation costs.

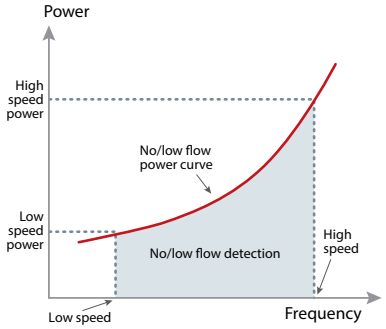
Dry Run Detection

Dry Run Detection helps protects the pump from cavitation. The VLT® DriveMotor constantly evaluates the condition of the pump based on internal frequency/power measurements.
In case of too low power consumption - indicating a no- or low-flow condition – the VLT® DriveMotor will stop the pump.

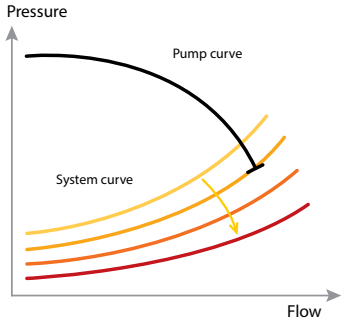
End of Curve

This feature detects pipe breakage and high leakages to protect the pump

Sleep mode



End of curve



VLT® DriveMotor FCM 106

Fire override mode

This setting prevents the drive from stopping to protect itself and ensures that vital fan operation is maintained for as long as possible, regardless of control signals, warnings or alarms.

Stairwell pressurization

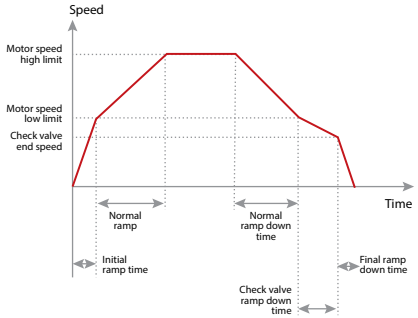
In the event of a fire, the FCM/FCP 106 can maintain a higher level of air pressure in stairwells than in other parts of the building. This helps ensure that fire escapes remain free of smoke.

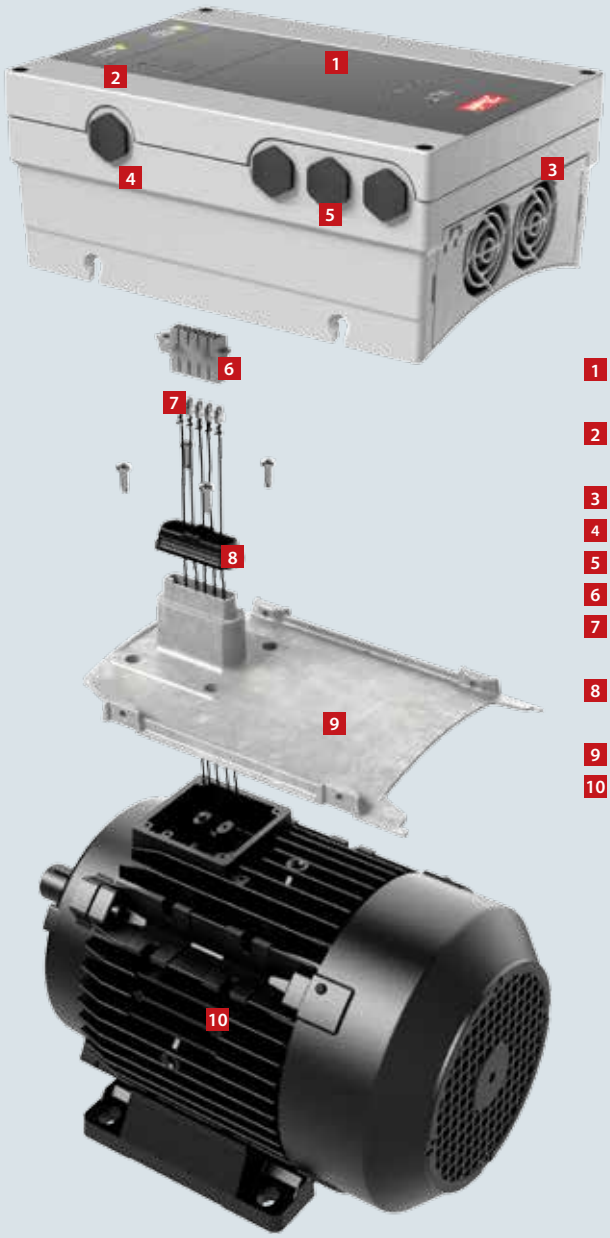
from cavitation damages and reduce water losses. End-of-Curve triggers an alarm, shuts off the pump and performs other programmed actions whenever the pump is found running at full speed without creating the desired pressure.

Check valve ramp

This feature protects the check valve and helps prevent water hammering. When the pump ramps to stop, Check Valve Ramp slows down the ramp and closes the check valve softly. When the check valve is closed, the final ramp brings the pump to a fast stop to prevent pump cavitation.

Check Valve Ramp





1. VLT® DriveMotor FCP 106 drive unit
2. Status LEDs for easy monitoring
3. Removable fan
4. LCP connector
5. Mains
6. Motor plug
7. Power terminal contacts
8. Motor connector gasket
9. Motor adapter plate
10. Motor

Local Control Panel

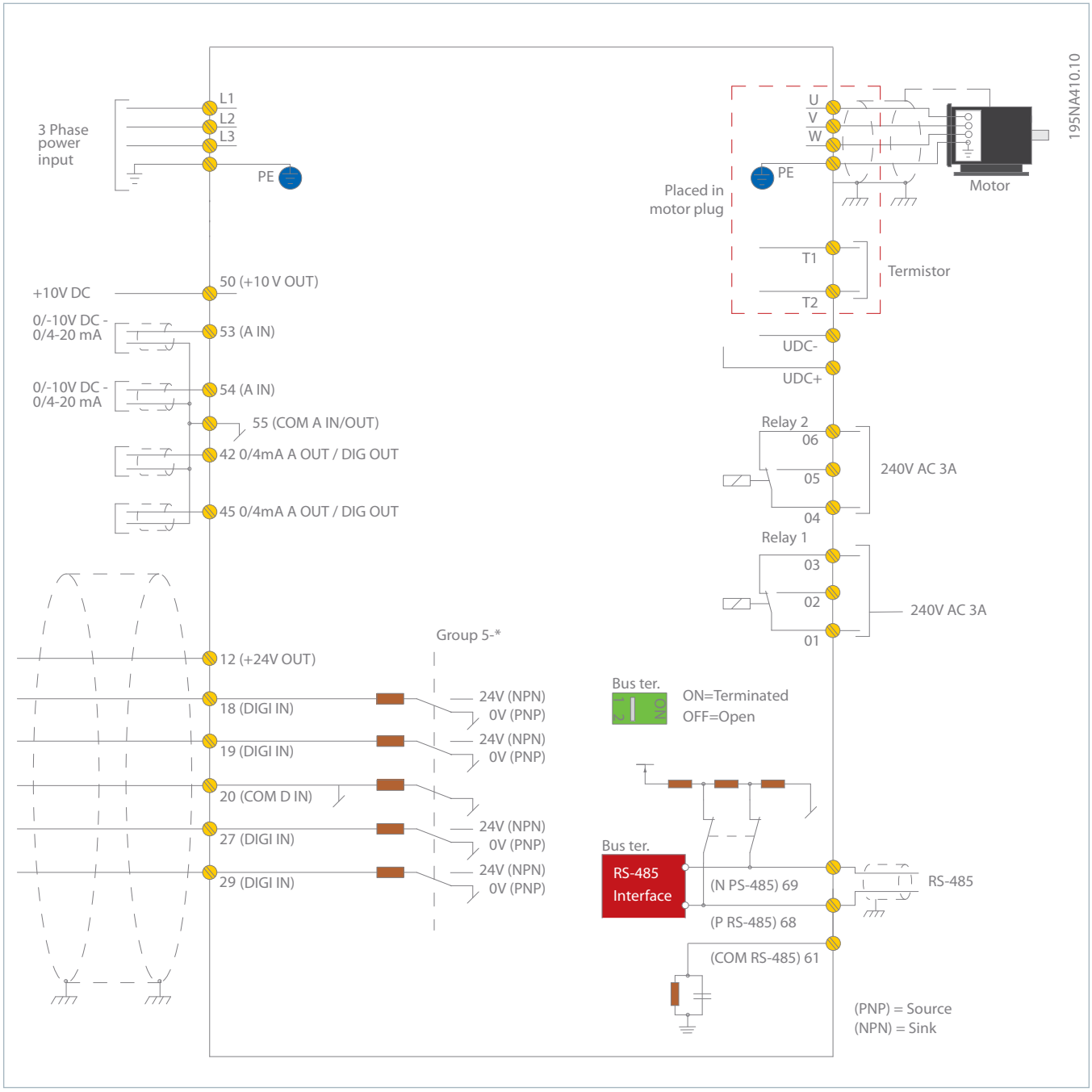
Connect the VLT® Control Panel LCP 102 for programming, commissioning and monitoring.

Removable fan

The built-in fan can be removed for easy access for cleaning or replacement.

Connection examples

The numbers represent the terminals on the drive.



The diagram shows the terminals of the VLT® DriveMotor FCM 106 and VLT® DriveMotor FCP 106.

Users can set the mode of the analogue inputs 53 and 54. The FCM/FCP 106 has a RS485 interface as standard.

The RS485 terminations are integrated in the drive (S801). The drive can be equipped with a PROFIBUS option if necessary. To switch from NPN to PNP logic for the digital signals, use parameter Group 5-*.

Power and currents

VLT® DriveMotor FCP 106

Mains Supply 3 x 380 – 480 VAC

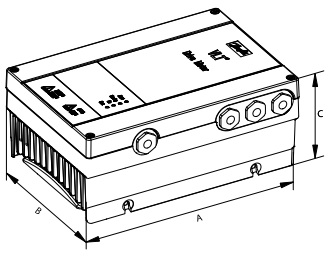
Enclosure	IP66	MH1	MH1						MH2					
		NK55	NK75		N1K1		N1K5		N2K2		N3K0		N4K0	
		NO	HO	NO	HO	NO	HO	NO	HO	NO	HO	NO	HO	NO
Typical Shaft Output [kW]		0.55		0.75		1.1		1.5		2.2		3.0		4.0
Typical Shaft Output [HP] at 460 V		0.75		1.0		1.5		2.0		3.0		4.0		5.0
Output current														
Continuous (3 x 380-440 V) [A]		1.7		2.2		3.0		3.7		5.3		7.2		9.0
Intermittent (3 x 380-440 V) [A]		1.9	2.7	2.4	3.5	3.3	4.8	4.1	5.9	5.8	8.5	7.9	11.5	9.9
Continuous (3 x 441-480 V) [A]		1.6		2.1		2.8		3.4		4.8		6.3		8.2
Intermittent (3 x 441-480 V) [A]		1.8	2.6	2.3	3.4	3.1	4.5	3.7	5.4	5.3	7.7	6.9	10.1	9.0
Max. cable cross-section in terminals (mains, motor) [mm²/ AWG]		4/10												
Max. input current														
Continuous (3 x 380-440 V) [A]		1.3		2.1		2.4		3.5		4.7		6.3		8.3
Intermittent (3 x 380-440 V) [A]		1.4	2.0	2.3	2.6	2.6	3.7	3.9	4.6	5.2	7.0	6.9	9.6	9.1
Continuous (3 x 441-480 V) [A]		1.2		1.8		2.2		2.9		3.9		5.3		6.8
Intermittent (3 x 441-480 V) [A]		1.3	1.9	2.0	2.5	2.4	3.5	3.2	4.2	4.3	6.3	5.8	8.4	7.5

Enclosure	IP66	MH3				
		N5K5		N7K5		H7K5
		HO	NO	HO	NO	HO
Typical Shaft Output [kW]		4.0	5.5		7.5	
Typical Shaft Output [HP] at 460 V		5.0	7.5		10	
Output current						
Continuous (3 x 380-440 V) [A]		9.0	12		15.5	
Intermittent (3 x 380-440 V) [A]		14.4	13.2	19.2	17.1	23.3
Continuous (3 x 441-480 V) [A]		8.2	11		14	
Intermittent (3 x 441-480 V) [A]		17.6	12.1	22.4	15.4	21
Max. cable cross-section in terminals (mains, motor) [mm²/ AWG]		4/10				
Max. input current						
Continuous (3 x 380-440 V) [A]		8.3	11		15	
Intermittent (3 x 380-440 V) [A]		12	12	17	17	23
Continuous (3 x 441-480 V) [A]		6.8	9.4		13	
Intermittent (3 x 441-480 V) [A]		11	10	15	14	20

NO: Normal overload 110% for 60s
HO: High overload 160% for 60s

IEC standard motor frame sizes

PM 1500 rpm	PM 3000 rpm	IM 3000 rpm	IM 1500 rpm	kW	MH frame size	Dimensions (mm) (L x W x H)
71	NA	NA	NA	0.55	MH1	231 162 107
71	71	71	80	0.75		
71	71	80	90	1.1		
71	71	80	90	1.5		
90	71	90	100	2.2	MH2	277 187 113
90	90	90	100	3		
90	90	100	112	4		
112	90	112	112	5.5	MH3	322 220 124
112	112	112	132	7.5		



Ordering type code

VLT® DriveMotor FCP 106
VLT® DriveMotor FCM 106

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Fixed	F	C	P	1	0	6					T	4	C	6	6	H	1	F	S	X	X				E	Not relevant for FCP 106												
Fixed	F	C	M	1	0	6					T	4	C	5	5	H	1	F	S	X	X				E														
Variants							N	K	5	5												A	X	X		2	H	K	5	5	1	5	0	B	0	3	0	0	0
							N	K	7	5												A	O	O		4	N	K	7	5	1	8	0	B	0	5	0	7	5
							N	1	K	1																		1	K	1	3	0	0	B	1	4	0	8	5
							N	1	K	5																		1	K	5	3	6	0	B	3	4	1	0	0
							N	2	K	2																		2	K	2				B	3	5	1	1	5
							N	3	K	0																		3	K	0							1	3	0
							N	4	K	0																		4	K	0							1	6	5
							N	5	K	5																		5	K	5							2	1	5
							N	7	K	5																		7	K	5							2	6	5
							H	7	K	5																										3	0	0
																																					3	5	0

[01-03]	Product group
FCM	VLT® DriveMotor FCM 106
FCP	VLT® DriveMotor FCP 106
[04-06]	**Frequency converter series**
106	VLT® DriveMotor
[07-10]	**Power size**
NK55	0.55 kW / 0.75 HP
NK75	0.75 kW / 1.0 HP
N1K1	1.1 kW / 1.5 HP
N1K5	1.5 kW / 2.0 HP
N2K2	2.2 kW / 3.0 HP
N3K0	3.0 kW / 4.0 HP
N4K0	4.0 kW / 5.0 HP
N5K5	5.5 kW / 7.5 HP
N7K5	7.5 kW / 10 HP
H7K5	7.5 kW / 10 HP
[11-12]	**Mains voltage**
T	Three phase
4	380 – 480 V
[13-15]	**Enclosure**
C55	IP55 – FCM 106
C66	IP66 – FCP 106
[16-17]	**RFI filter**
H1	Integrated RFI filter C1
[18]	**Fan**
F	Cooling fan

[19-21]	Software
SXX	Standard software
[22-23]	**Options**
AX	No option
AO	PROFIBUS DP V1
[24]	**Memory module**
X	No memory module
O	Memory module
[25]	**Motor range**
E	Standard motor range
[26]	**Efficiency class**
2	Efficiency class IE2 (IM motor)
4	Efficiency class IE4 (PM motor)
[27]	**Load profile**
H	High overload
N	Normal overload
[28-30]	**Shaft power**
K55	0.55 kW / 0.75 HP
K75	0.75 kW / 1.0 HP
1K1	1.1 kW / 1.5 HP
1K5	1.5 kW / 2.0 HP
2K2	2.2 kW / 3.0 HP
3K0	3.0 kW / 4.0 HP
4K0	4.0 kW / 5.0 HP
5K5	5.5 kW / 7.5 HP
7K5	7.5 kW / 10 HP

[31-33]	Nominel speed
150	1500 rpm nominel speed
180	1800 rpm nominel speed
300	3000 rpm nominel speed
360	3600 rpm nominel speed
[34-36]	**Mounting version**
B03	Foot mounting
B05	Flange mounting
B14	Face mounting
B34	Foot and face mounting
B35	Foot and flange mounting
[37-39]	**Flange size**
000	Feet only
075	75 mm
085	85 mm
100	100 mm
115	115 mm
130	130 mm
165	165 mm
215	215 mm
265	265 mm
300	300 mm
350	350 mm

Specifications

Mains supply (L1, L2, L3)	
Supply voltage	380 – 480 V ±10%
Supply frequency	50/60 Hz
True Power Factor (λ)	≥ 0.9 nominal at rated load
Displacement Power Factor (cos ϕ)	(>0.98)
Switching on input supply	Max. 2 times/min.
Output data (U, V, W)	
Output voltage	0 – 100% of supply
Output frequency	0– 200 Hz (asynchronous motor) 0 – 390 Hz (PM motor)
Switching on output	Unlimited
Ramp times	0.05 – 3600 sec.
Digital inputs	
Programmable digital inputs	4
Logic	PNP or NPN
Voltage level	0 – 24 V DC

Note: Two analogue outputs can be programmed as digital outputs

Analogue inputs	
Number of analogue inputs	2
Modes	Voltage or current
Voltage level	0 – 10 V
Current level	0/4 – 20 mA (scalable)
Pulse inputs	
Programmable pulse inputs	2
Voltage level	0 – 24 V DC (PNP positive logic)
Digital output	
Programmable digital outputs	2
Voltage level at digital output	17 V
Analogue output	
Programmable analogue outputs	2
Current range	0/4 – 20 mA
Relay outputs	
Programmable relay outputs	2
Fieldbus	
Embedded via RS485	Modbus RTU BACnet FC Protocol
Optional	PROFIBUS DP V1

Accessories

- **VLT® Control Panel LCP 102 (Graphical LCP only)**
  Ordering number: 130B1107

- **Remote Mounting Kit** (LCP 102)
  3 m cable, panel mounting bracket, gasket and fastners
  Ordering number: 134B0564

- **Local Operation Pad LOP**
  Panel for start/stop and setting the reference
  Ordering number: 175N0128

- **Potentiometer for cable gland**
  Ordering number: 177N0011

- **Motor Adapter Plate FCM 106 (for Lafert motors only)**
  MH1 – frame 71
  Ordering number: 134B0338
  MH1 – frame 80/90
  Ordering number: 134B0339
  MH2 – frame 71
  Ordering number: 134B0388
  MH2 – frame 80-100
  Ordering number: 134B0389
  MH2 – frame 112
  Ordering number: 134B0393
  MH3 – frame 112
  Ordering number: 134B0438
  MH3 – frame 132
  Ordering number: 134B0439
  MH3 – frame 90/100
  Ordering number: 134B0443

- **Motor Adapter Plate FCP 106**
  MH1 – Ordering number: 134B0340
  MH2 – Ordering number: 134B0390
  MH3 – Ordering number: 134B0440

- **Wall Mounting Plate FCP 106**
  MH1 – Ordering number: 134B0341
  MH2 – Ordering number: 134B0391
  MH3 – Ordering number: 134B0441

- **Crimp terminals for mounting FCP on motor**
  Crimp terminals
  0.2 – 0.5 mm^2, 25 pcs.
  Ordering number: 134B0495
  Crimp terminals
  0.5 – 1.0 mm^2, 25 pcs.
  Ordering number:134B0496
  Crimp terminals
  1.0 – 2.5 mm^2, 25 pcs.
  Ordering number: 134B0497
  Crimp terminals
  2.5 – 4.0 mm^2, 25 pcs.
  Ordering number: 134B0498
  Crimp terminals
  4.0 – 6.0 mm^2, 25 pcs.
  Ordering number: 134B0499

- **VLT® Memory Module MCM 101**
  Ordering number: 134B0791

- **Memory Module Programmer**
  Ordering number: 134B0792

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Danfoss Drives

Danfoss Drives is a world leader in variable speed control of electric motors. We aim to prove to you that a better tomorrow is driven by drives. It is as simple and as ambitious as that.

We offer you unparalleled competitive edge through quality, application-optimized products targeting your needs – and a comprehensive range of product lifecycle services.

You can rely on us to share your goals. Striving for the best possible performance in your applications is our focus. We achieve this by providing the innovative products and application know-how required to optimize efficiency, enhance usability, and reduce complexity.

From supplying individual drive components to planning and delivering complete drive systems; our experts are ready to support you all the way.

We draw on decades of experience within industries that include:

- Chemical
- Cranes and Hoists
- Food and Beverage
- HVAC
- Lifts and Escalators
- Marine and Offshore
- Material Handling
- Mining and Minerals
- Oil and Gas
- Packaging
- Pulp and Paper
- Refrigeration
- Water and Wastewater
- Wind

You will find it easy to do business with us. Online, and locally in more than 50 countries, our experts are never far away, reacting fast when you need them.

Since 1968, we have been pioneers in the drives business. In 2014, Vacon and Danfoss merged, forming one of the largest companies in the industry. Our AC drives can adapt to any motor technology and we supply products in a power range from 0.18 kW to 5.3 MW.

VLT® | VACON®

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