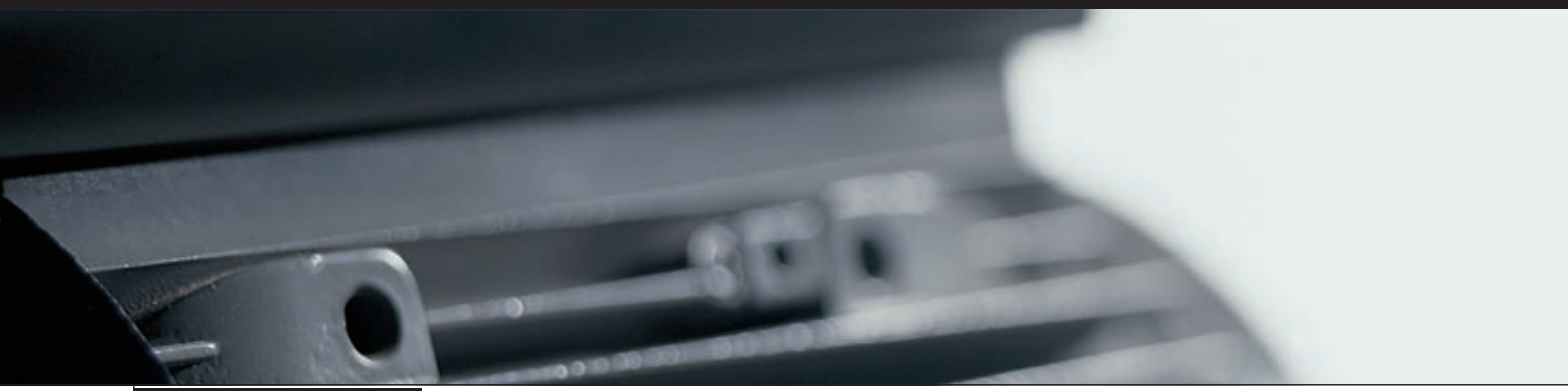
FCM 300



Datasheet



Drives Solutions

www.danfoss.com/drives

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Symbols

When reading through this Design Guide, you will come across various symbols that require special attention.

The symbols used are the following:



Indicates a general warning.



Indicates something to be noted by the reader.



Indicates a high-voltage warning.

■ Integration of frequency converter and motor

The Danfoss VLT® frequency converter integrated onto the asynchronous motor gives infinite speed control in one unit.

The VLT® DriveMotor FCM 300 Series is a very compact alternative to the ordinary solution with VLT frequency converter and motor as separate units. The frequency converter is attached instead of the motor terminal box, and it is no higher than the standard terminal box, nor wider or longer than the motor.

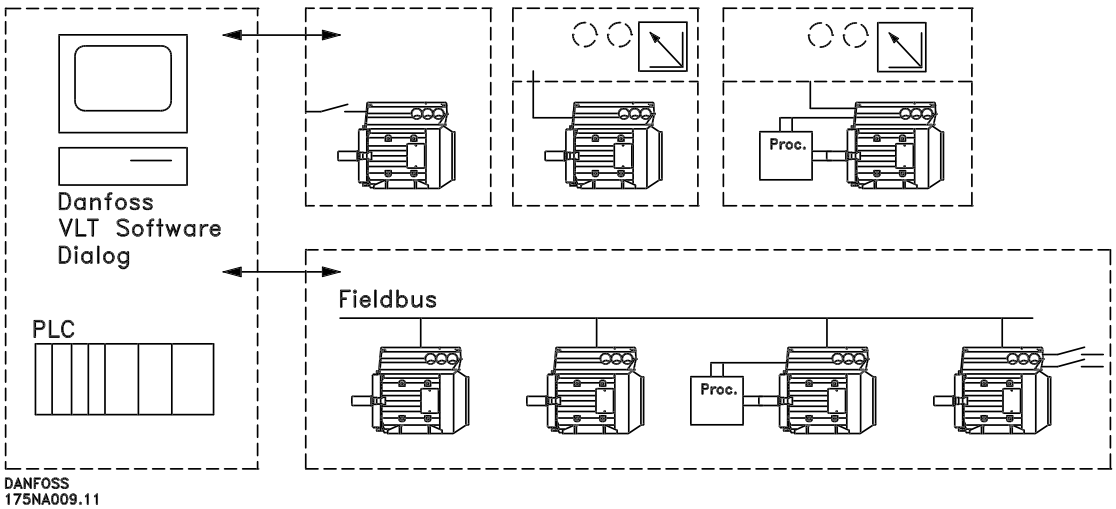
Installation is made extremely easy. Panel space is not a problem. There is no need for special details on wiring to meet the EMC directive, since motor cables are not necessary. The only connections are mains and control connections.

Factory-set adaption between frequency converter and motor gives precise and energy efficient control in addition to eliminating pre-setting on site.

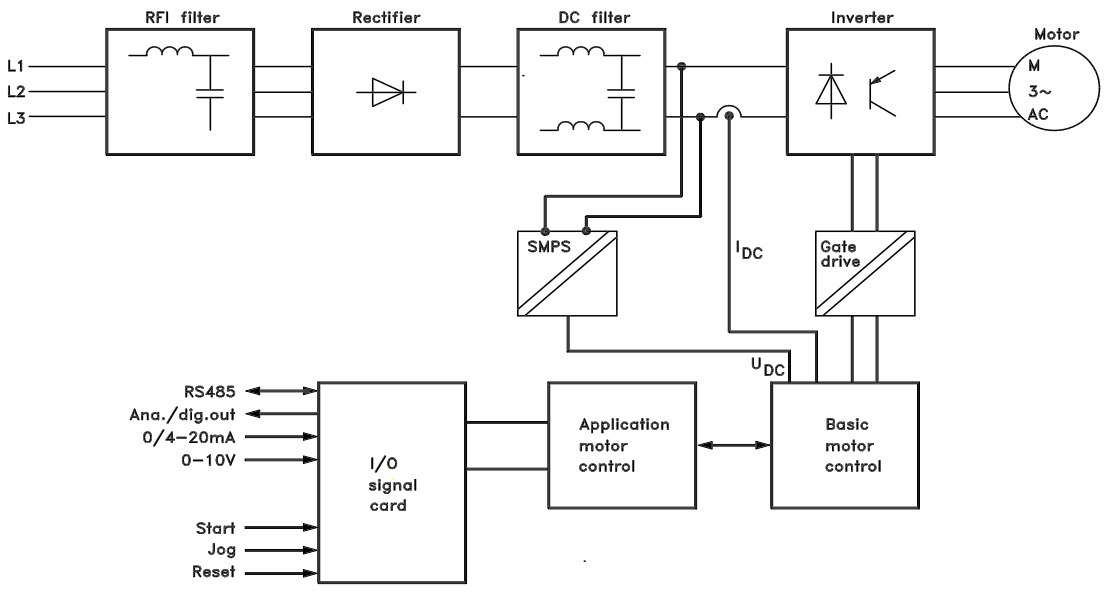
The FC motor can be used in stand alone systems with traditional control signals, such as start/stop signals, speed references and closed loop process control or in multiple drive systems with control signals distributed by a field bus.

Combination of fieldbus and traditional control signals and closed loop PID control is possible.

Control structures



■ Key diagram for FCM 300 Series



■ Product range

VLT® DriveMotor FCM 300 Series, 2/4 poled motors

Type	Motor output	Mains supply
FCM 305	0.55 kW	3 phase 380-480 V
FCM 307	0.75 kW	
FCM 311	1.1 kW	
FCM 315	1.5 kW	
FCM 322	2.2 kW	
FCM 330	3.0 kW	
FCM 340	4.0 kW	
FCM 355	5.5 kW	
FCM 375	7.5 kW	

Each type in the product range is available in different versions.

Inverter versions

Drive control:
- *ST:* Standard version
- *SP:* Version for PROFIBUS

RFI filter:
Inverter with integrated RFI filter, class A1 (industrial) or class B1 (domestic).

Cooling:
- TEFV: Motor cooled by a shaft mounted fan (IC 411)
- FV: Motor cooled by an independent fan (IC 416)

Mounting versions
- Foot mounting (B3)
- Flange mounting (B5)
- Face mounting (B14)
- Foot + flange mounting (B35)
- Foot + face mounting (B34)

Inverter box position: Top, right side or left side.
Drainhole (+ position): None, between feet, opposite feet, vertical drive end, vertical non-drive end, 90° right of feet, 90° left of feet.
Brake kits: No brake, brake with or without hand-release

■ Ordering

Take a copy of the ordering forms on page 6. Fill in and post or fax your order to the nearest branch office of the Danfoss sales organisation. On the basis of your order, the FCM 300 Series motor is given a type code, which may look as follows:

FCM 330-P-T4-ST-S55-R1-100LT-4-1-B05-215-T-D1

This means that the FC motor ordered is a FCM 330 for three-phase mains voltage of 380-480 V (T4) and for process applications (P). The inverter is a standard version for remote control (ST) in an IP55 enclosure (S55) with integrated RFI filter, class A1 (R1). The motor frame size is 100LT. The motor has 4 poles (4) and is cooled by a shaft mounted fan (1). The motor is for flange mounting (B05) and the flange size is 215 mm. The inverter box is mounted on the top of the motor (T) and the drainhole is placed between feet (D1).

If you wish to place your order by using the type code directly, please use the codes given in parenthesis on the left-hand side of the ordering forms. The code sequence in the type code is stated at the top of each part of the form (character number).

The ordering form for the basic unit must always be completed. When the type code is written, always state the characters of the basic string (1-30). Together with the order confirmation the customer receives an 8-figure code number to be used when reordering.

Danfoss PC software for serial communication

All FCM 300 Series units have an RS 485 port as standard, which enables them to communicate e.g. with a PC. A programme entitled VLT® Software Dialog is available for this purpose.

Ordering numbers, VLT® Software Dialog

VLT® Software Dialog	175Z0953

Incl Basic, Logging, Template, Guided tour modules in 6 languages (Danish, English, German, Italian, Spanish and French)

Accessories for the FC motor

A Local Operation Pad (LOP) for local set point and start/stop is available for the FC motor. The LOP is IP 66 enclosed. A Local Control Panel (LCP 2) which makes up a complete interface for operation, programming and monitoring of the FC motor is also available.

Ordering numbers, accessories

Local Operation Pad (LOP)	175N0128
Local Control Panel (LCP 2)	175N0131
Remote mounting kit (LCP 2)	175N0160
Plug kit (LCP 2)	175N0161
Cable for plug kit (LCP 2)	175N0162
Cable (direct mounting) (LCP 2)	175N0165
Service plug kit (LCP 2)	175N0166

■ Ordering info for Frames and Flanges

Frame sizes and the corresponding flange sizes for different mounting versions

Type	Motor frame size		Mounting version	Flange size, standard (S) [mm]	Flange size, alternatives (A) [mm]	Flange size alternatives (B) [mm]
	4 pole	2 pole				
FCM 305	080MG	080MF	B5/B35	165	85/100/115/130	
			B14/B34	100		75/85/115/130/165
FCM 307	080MR	080MF	B5/B35	165	85/100/115/130	
			B14/B34	100		75/85/115/130/165
FCM 311	090LK	090SJ	B5/B35	165	100/115/130	215
			B14/B34	115		85/100/130/165
FCM 315	090LT	090SJ	B5/B35	165	100/115/130	
			B14/B34	115		85/100/130/165
FCM 322	100LR	100LR	B5/B35	215	165	
			B14/B34	130	165	85/100/115/215
FCM 330	100LT	100LM	B5/B35	215	165	
			B14/B34	130	165	85/100/115/215
FCM 340	112MT	112MS	B5/B35	215	115/130/165	
			B14/B34	130	165	85/100/115/215
FCM 355	132SJ	132SF	B5/B35	265	215	
			B14/B34	165	215	
FCM 375	132MT	132SJ	B5/B35	265	215	
			B14/B34	165	215	

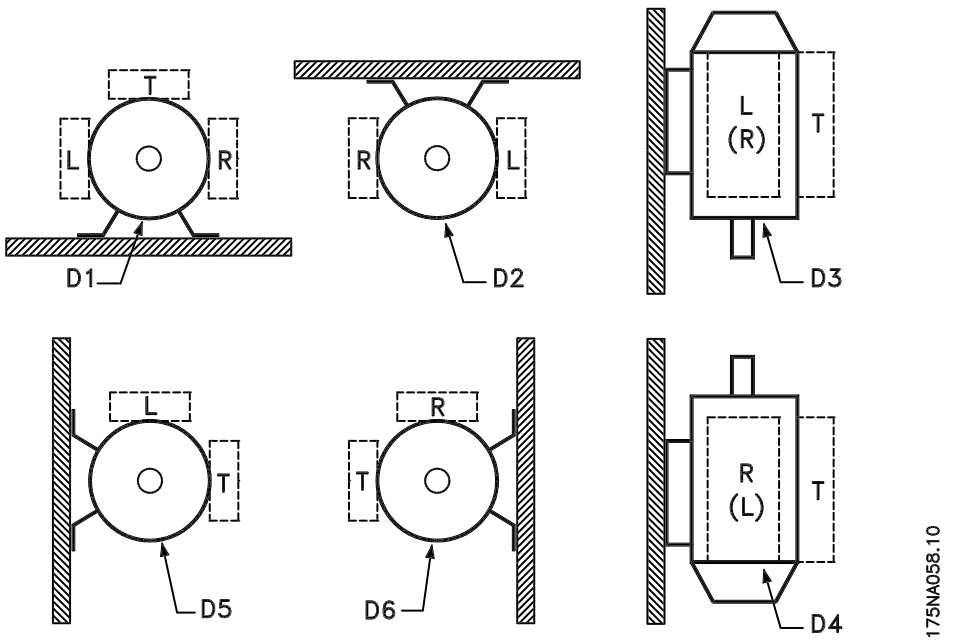
Flange size according to IEC ref. FFxxx

S: Available as standard shaft

A: Available as an alternative with specially elongated shaft to provide standard shaft for frame

B: Available as an alternative with standard shaft for frame, requiring no modification

■ Ordering info for inverter box position and drain hole position.



ering form **FCM 300 Series**

FCM type (character nos. 1-6) **FCM** ☐☐☐

Select the required FCM type from the product range on the previous page and fill in the squares.

Application range (char. no. 7)

(P) **Process**

Mains voltage (char. nos. 8-9)

(T4) **3-phase 380-480 V AC**

Tick off as appropriate.

Inverter vs. (char. nos. 10-11)

(ST) **Standard** ☐

(SP) **PROFIBUS** ☐

Tick off as appropriate.

Enclosure (char. no. 12-14)

(S55) **IP55** ☐

(S56) **IP56** ☐

(S66) **IP66** ☐

RFI filter (char. nos. 15-16)

(R1) **W/ integrated filter, class A1** ☐

(R2) **W/integrated filter, class B1** ☐

Tick off as appropriate.

Frame size (char. nos. 17-21) ☐☐☐☐☐

Fill in the squares with the appropriate value from column 2 and 3 in the table on page 5.

Polarity (char. no. 22)

(4) **4 poles** ☐

(2) **2 poles** ☐

Tick off as appropriate.

Cooling (char. no. 23)

(1) (IC 411) **Shaft mounted fan** ☐

(6) (IC 416) **Forced ventilation unit** ☐

Tick off as appropriate.

Ordering form **FCM 300 Series**

Mounting vs. and flange size (char. nos. 24-29)

(B03) **B3 Foot** ☐ **0 0 0**

(B05) **B5 Flange** ☐ **flange size** ☐☐☐

(B35) **Foot & flange** ☐ **flange size** ☐☐☐

(B14) **Face** ☐ **flange size** ☐☐☐

(B34) **Foot & face** ☐ **flange size** ☐☐☐

Tick off as appropriate and select flange size from the table on page 5.

Inverter box position (char. no. 30)

(T) **Top** ☐

(R) **Right side** ☐

(L) **Left side** ☐

Tick off as appropriate.
Inverter box position is seen from drive end.
(See drawing on page 5).

Drain hole position (char. nos. 31-32)

(00) **None** ☐

(D1) **Between feet** ☐

(D2) **Opposite feet** ☐

(D3) **Vertical drive end** ☐

(D4) **Vertical non-drive end** ☐

(D5) **90° right of feet** ☐

(D6) **90° left of feet** ☐

Tick off as appropriate.
(See drawing on page 5).

Other options (contact Danfoss for code) ☐☐☐

☐☐☐

☐☐☐

Number of FCM 300 Series ordered ☐☐☐

Ordered by:

Date: _____

MD.03.A4.02 - VLT is a registered Danfoss trademark

■ FCM 305-375 for 3 phases, 380-480 V

Type	Motor output	Motor torque		Frame size	Weight	Input current 380 V		Input current 480 V		Power terminals	Gland sizes
		2 pole	4 pole			2 p	4 p	2 p	4 p		
	[kW]	[Nm]	[Nm]	[mm]	[kg]	[A]	[A]	[A]	[A]	[mm²]	
FCM 305	0.55	1.8	3.5	80	11	-	1.4	-	1.1	4	3XPG16
FCM 307	0.75	2.4	4.8	80	13	1.3	1.7	1.1	1.4	4	3XPG16
FCM 311	1.1	3.5	7.0	90	17	2.2	2.5	1.8	2.0	4	3XPG16
FCM 315	1.5	4.8	9.6	90	20	2.8	3.3	2.3	2.6	4	3XPG16
FCM 322	2.2	7.0	14.0	100	26	4.1	4.7	3.3	3.7	4	3XPG16
FCM 330	3.0	9.5	19.1	100	28	5.3	6.4	4.2	5.1	4	3XPG16
FCM 340	4.0	12.6	25.4	112	37	7.0	7.9	5.6	6.4	4	1XPG21, 2XPG16
FCM 355	5.5	17.5	35.0	132	56	9.3	11.1	7.4	8.8	10	1XPG21, 2XPG16
FCM 375	7.5	24.0	48.0	132	61	13.0	15.3	10.2	11.9	10	1XPG21, 2XPG16

■ General technical data

Mains supply, TT, TN and IT* (L1, L2, L3):

- Supply voltage 380-480 V units ..... 3 x 380/400/415/440/460/480 V ±10%
- Supply frequency ..... 50/60 Hz
- Max. imbalance of supply voltage ..... ±2% of rated supply voltage
- Power factor / cos φ ..... max. 0.9/1.0 at rated load
- No. of switching operations on supply input L1, L2, L3 ..... approx. 1 time/2 min
- Max prefuse ..... 25 A

See "Special conditions".

**) Not valid for RFI class 1B units*

Torque characteristics:

- Starting torque/overload torque ..... 160 % for 1 min
- Continuous torque ..... see page 20

Control card, digital/pulse inputs:

- Number of programmable digital inputs 4
- Terminal nos. ..... X101-2, -3, -4, -5
- Voltage level ..... 0-24 V DC (PNP positive logics)
- Voltage level, logic ´0´ ..... < 5 V DC
- Voltage level, logic ´1´ ..... > 10 V DC
- Maximum voltage on input ..... 28 V DC
- Input resistance, R_i ..... approx. 2 kΩ
- Scanning time ..... 20 msec

Control card, pulse input:

- No. of programmable pulse inputs 1
- Terminal nos. X101-3
- Max. frequency on terminal 3, open collector/push pull 24 V ..... 8 kHz/70 kHz
- Resolution ..... 10 bit
- Accuracy (0.1-1 kHz), terminal 3 ..... Max. error: 0.5% of full scale
- Accuracy (1-12 kHz), terminal 3 ..... Max. error: 0.1% of full scale

Control card, analogue inputs:

- No. of programmable analogue voltage inputs 1
- Terminal nos. X101-2
- Voltage level ..... 0 - 10 V DC (scalable)
- Input resistance, R_i ..... approx. 10 kΩ
- No. of programmable analogue current inputs 1
- Terminal no. X101-1
- Current range ..... 0 - 20 mA (scalable)
- Input resistance, R_i ..... approx. 300 Ω
- Resolution ..... 9 bit
- Accuracy on input ..... Max. error 1% of full scale
- Scanning time ..... 20 msec.

Control card, digital/pulse and analogue outputs:

- No. of programmable digital and analogue outputs 1
- Terminal nos. X101-9
- Voltage level at digital output/load ..... 0 - 24 V DC/25 mA
- Current at analoque output ..... 0 - 20 mA
- Maximum load to frame (terminal 8) at analogue output ..... $R_{LOAD} \leq 500$ Ω
- Accuracy of analogue output ..... Max. error: 1.5% of full scale
- Resolution on analogue output. ..... 8 bit

Control card, RS 485 serial communication:

- Terminal nos. ..... X100-1, -2

Control characteristics (frequency converter):

- Frequency range ..... 0 - 132 Hz
- Resolution on output frequency ..... 0.1 %
- System response time ..... Max. 40 msec.

Externals:

- Enclosure ..... IP 55 (IP56, IP66)
- Vibration test ..... (IEC 68 see page 21) 1 g
- Max. relative humidity ..... 93 % +2 %, -3 % (IEC 68-2-3) for storage/transport
- Ambient temperature ..... Max. 40°C (24-hour average max. 35°C)

Derating for high ambient temperature.

- Min. ambient temperature in full operation ..... 0°C
- Min. ambient temperature at reduced performance ..... -10°C
- Temperature during storage/transport ..... -25 - +65/70°C
- Max. altitude above sea level ..... 1000 m

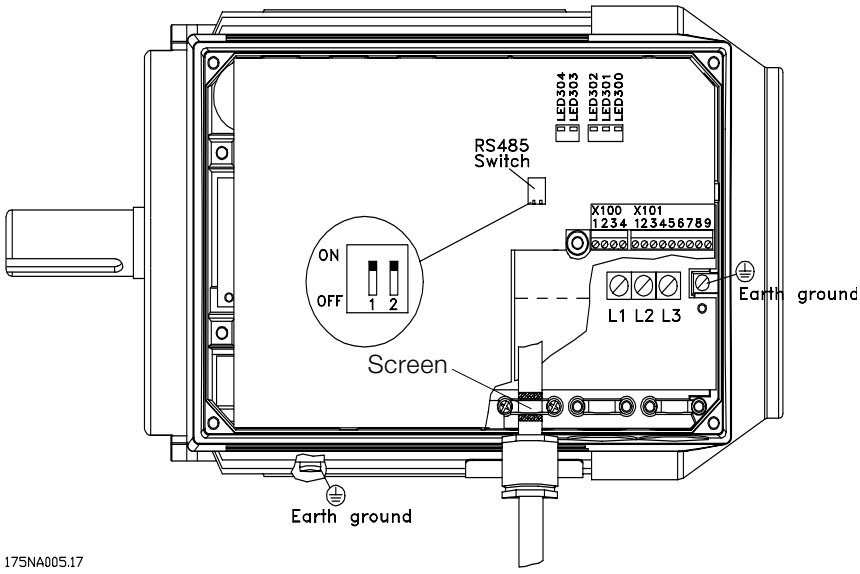
Derating for air pressure.

- EMC standards applied, Emission ..... EN 50081-1/2, EN 61800-3, EN 55011, EN 55014
  Immunity ..... EN 50082-2, EN 61000-4-2, IEC 1000-4-3, EN 61000-4-4
  EN 61000-4-5, ENV 50140, ENV 50141
- Safety standards applied, ... EN 60146, EN 50178, EN 60204

Protection:

- Thermal overload protection of motor and electronics.
- Monitoring of the intermediate circuit voltage ensures that the inverter cuts out if the intermediate circuit voltage gets too high or too low.
- If a mains phase is missing, the inverter will cut out when a load is placed on the motor.
- Overcurrent, and voltage transients protection.

Terminal arrangement (for installation see quick setup, MG.03.Fx.xx)



X101: Terminal block for analogue/digital control signals

Terminal No.	Function	Example
1	Analogue input (0-20 mA)	Feedback signal
2	Analogue (0-10 V)/digital input 2	Speed reference
3	Digital input (or pulse) 3	Reset
4	Digital input (or precise stop) 4	Start
5	Digital input (other) 5	Jog (fixed speed)
6	24 V DC supply for digital inputs (max. 150 mA)	
7	10 V DC supply for potentiometer (max. 15 mA)	
8	0 V for terminals 1-7 and 9	
9	Analogue (0-20 mA)/digital output	Fault indication

X100: Terminal block for data communication

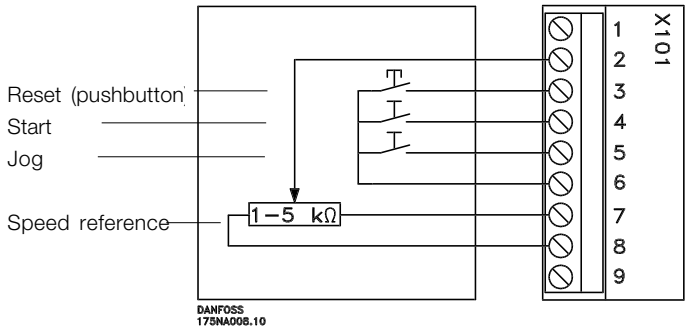
Terminal No.	Function	
1	P RS 485	for connection to bus or PC
2	N RS 485	
3	5 V DC	Supply for RS 485 bus
4	0 V DC	

LED 300-304

LED 300 (red):	Fault trip
LED 301 (yellow):	Warning
LED 302 (green):	Power on
LED 303-304:	Communication

For PROFIBUS versions please refer to the manual MG90AXYY.

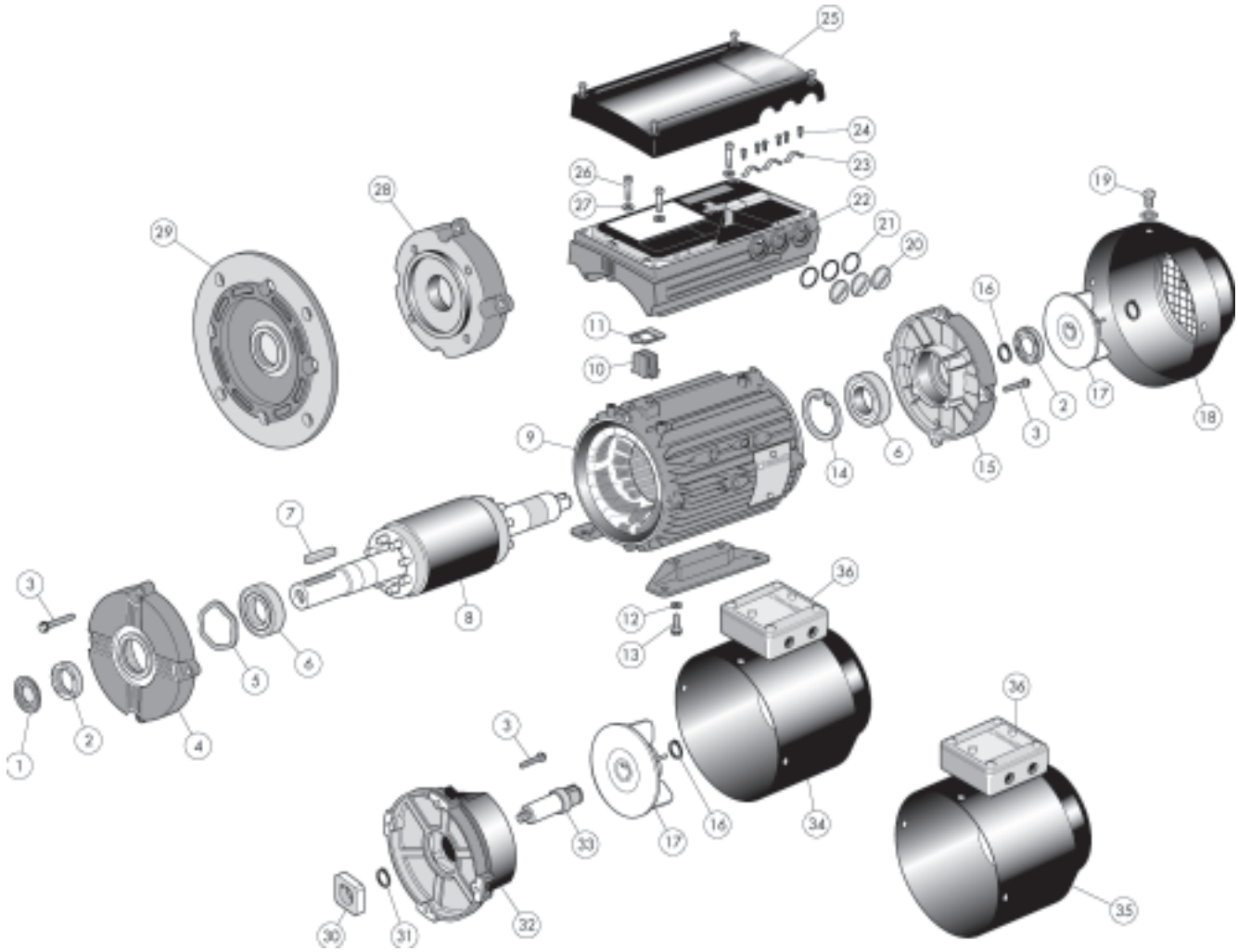
Connection diagram - factory setting



- *Reset* to be closed short time for resetting fault trips
- *Start* to be closed for changing to *run mode*
- *Jog* will run at fixed speed while closed (10 Hz)
- *Speed reference* (0-10 V) determines speed while in *run mode*

■ Description of the motor

The FC motor consists of the following parts:



Item	Description	Item	Description
1	Flinger (when fitted)	19	Fan cover screw and washer
2	Drive end oilseal	20	Screwed bung
3	Endshield fixing bolt	21	O‘ ring
4	Drive end endshield	22	ISM box
5	Preload washer	23	Cable strap
6	Bearing	24	Cable strap screws
7	Shaft key	25	ISM box lid
8	Rotor assembly	26	Torx screw
9	Stator assembly with or without fee	27	Washer
10	Connector block	28	Face endshield
11	Gasket	29	Flange endshield
12	Detachable feet	30	Brake hub
13	Foot fixing bolt and washer	31	Brake hub retention circlip
14	Bearing retention circlip	32	Brake and adaptor plate
15	Non-drive endshield	33	Stub shaft
16	Bearing circlip	34	Brake fan cover
17	Fan	35	Force vent fan cover
18	Fan cover	36	Terminal box

■ Handling the FC motor

Handling and lifting of VLT® DriveMotors (FC motors) must only be undertaken by qualified personnel. Full product documentation and operating instructions must be available together with tools and equipment necessary for safe working practice. Eyebolts and/or lifting trunnions supplied with the FC motor are designed to support only the weight of the FC motor, not the weight of the FC motor and any auxcillary equipment attached to it. Be absolutely sure that cranes, jacks, slings and lifting beams are capable of carrying the weight of equipment to be lifted.

Where an eyebolt is provided with the motor, this should be screwed down until its shoulder is firmly against the face of the stator frame to be lifted.

FCM type	approx. weight (kg.)
FCM 305	11
FCM 307	13
FCM 311	17
FCM 315	20
FCM 322	26
FCM 330	28
FCM 340	37
FCM 355	56
FCM 375	61

■ Bearings.

To avoid static indention, the storage area should be vibration free. Where exposure to some vibration is unavoidable, the shaft should be locked. Bearings may be fitted with a shaft locking device which should be kept in place during storage.
Shafts should be rotated by hand, one quarter of a revolution, at weekly intervals.
Bearings are despatched from the works fully charged with lithium based grease. Shielded bearings have sufficient grease for an operating life of at least two years in normal ambient temperatures, providing there is little or no grease leakage.

Lubrication

Frame size	Lubrication type	Temperatur range
80-132	Esso unirex N3	-10 to + 140°C

Bearing life

Maximum hours bearing life (Lna) expected at 80° C bearing temp. x 10^3 hours.

Frame size	3000 min^{-1}		1500 min^{-1}	
	Horiz.	Vert.	Horiz.	Vert.
80-90	22	22	32	32
100/112	26	26	35	35
132	26	26	35	35

Lna bearing life is the adjusted, L10 life rating, taking account of: -Reliability -Material improvement -Lubrication conditions.

Standard Bearing references and oil seals

Frame size	Mounting	Poles (2/4)	Bearings		Oil seals - Bore x O/D x width in mm	
			Drive end	Non-drive end	Drive end	Non-drive end
80	All	All	6204 2Z	6202 2Z	20 x 30 x 7	15 x 24 x 5
90	All	All	6205 2Z	6203 2Z	25 x 35 x 7	17 x 28 x 6
100	All	All	6206 2Z	6205 2Z	30 x 42 x 7	25 x 37 x 7
112	All	All	6206 2Z	6205 2Z	30 x 42 x 7	25 x 37 x 7
132	All	All	6208 2Z	6305 2Z	40 x 52 x 7	25 x 37 x 7

■ Output shafts.

Output shafts are produced from 35/40 Ton (460/540 MN/m^2) tensile steel. Drive end shafts are provided with a tapped hole to DIN 332 Form D and a closed profile keyway as standard.

Balance

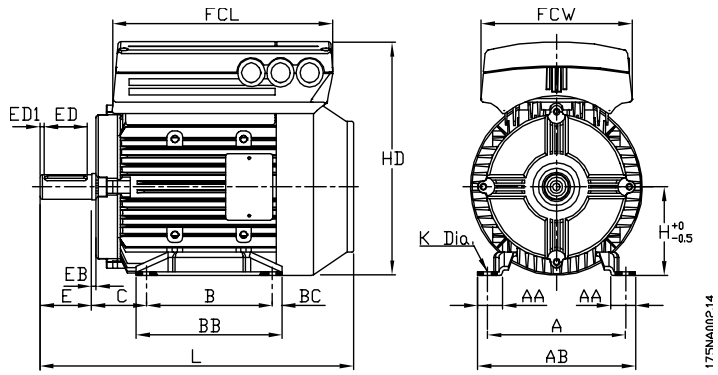
All motors are dynamically balanced, to ISO 2373 with key convention to IEC 34-14.

Inertia

FCM Type	J [kgm^2]	
	2 pole	4 pole
305	0.0015	0.0019
307	0.0015	0.0027
311	0.0024	0.0035
315	0.0024	0.0047
322	0.006	0.009
330	0.007	0.010
340	0.008	0.016
355	0.017	0.027
375	0.020	0.032

■ Dimensions

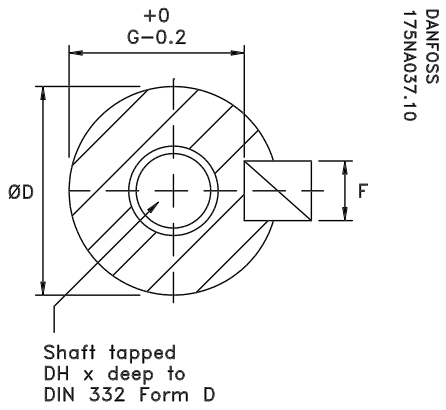
Foot mounting - B3



General

FCM	305	307	311	315	322	330	340	355	375
Frame size	**80**	**80**	**90**	**90**	**100**	**100**	**112**	**132**	**132**
A [mm]	125	125	140	140	160	160	190	216	216
B [mm]	100	100	125	125	140	140	140	140	178
C [mm]	50	50	56	56	63	63	70	89	89
H [mm]	80	80	90	90	100	100	112	132	132
K [mm]	10	10	10	10	12	12	12	12	12
AA [mm]	27	27	28	28	28	28	35	38	38
AB [mm]	157	157	165	165	184	184	218	242	242
BB [mm]	127	127	152	152	170	170	170	208	208
BC [mm]	13.5	13.5	38.5	13.5	15	15	15	53	15
L [mm]	278	278	322	322	368	368	381	451	451
L2 [mm]	298	298	342	342	397	397	410	490	490
AC [mm]	158	158	178	178	199	199	215	255	255
HD [mm]	219.5	219.5	234	234	264	264	291	335	335
EB [mm]	1.5	1.5	1.5	1.5	6	6	6	6	6
FCL [mm]	206	206	230	230	256	256	286	340	340
FCW [mm]	141	141	158	158	176	176	197	235	235

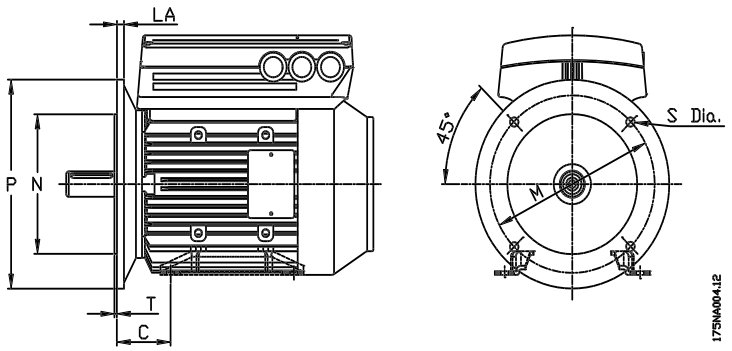
Shaft Drive End



FCM	305	307	311	315	322	330	340	355	375
Frame size	**80**	**80**	**90**	**90**	**100**	**100**	**112**	**132**	**132**
D [mm]	19	19	24	24	28	28	28	38	38
E [mm]	40	40	50	50	60	60	60	80	80
ED [mm]	32	32	40	40	50	50	50	70	70
ED1 [mm]	4	4	5	5	5	5	5	5	5
DH	M6x16	M6x16	M8x19	M8x19	M10x22	M10x22	M10x22	M12x28	M12x28
F [mm]	6	6	8	8	8	8	8	10	10
G [mm]	15.5	15.5	20	20	24	24	24	33	33

MD.03.A4.02 - VLT is a registered Danfoss trademark

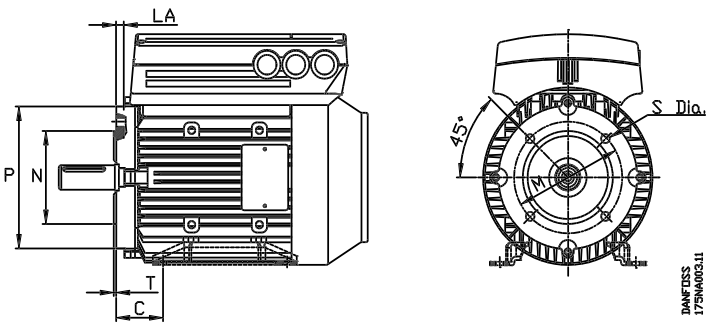
Flange mounting - B5, B35 (B3+B5)



B5

FCM					305/ 307	311/ 315	322/ 330	340	355/ 375
Frame size	48	56	63	71	80	90	100	112	132
IEC Ref.	FF85	FF100	FF115	FF130	FF165	FF165	FF215	FF215	FF265
DIN Ref.	A105	A120	A140	A160	A200	A200	A250	A250	A300
M [mm]	85	100	115	130	165	165	215	215	265
N [mm]	70	80	95	110	120	120	180	180	230
P [mm]	105	120	140	160	200	200	250	250	300
S [mm]			10	10	12	12	15	15	15
T [mm]			3	3.5	3.5	3.5	4	4	4
LA [mm]			7	7	12	12	12	12	12

Face mounting - B14, B34 (B3+B14)



B14

FCM				305/ 307	311/ 315	322/ 330	340	355/ 375
Frame size	56	63	71	80	90	100	112	132
IEC Ref.	FT65	FT75	FT85	FT100	FT115	FT130	FT130	FT215
DIN Ref.	C80	C90	C105	C120	C140	C160	C160	C200
M [mm]	65	75	85	100	115	130	130	165
N [mm]	50	60	70	80	95	110	110	130
P [mm]	80	90	105	120	140	160	160	200
S		M5	M6	M6	M8	M8	M8	M10
T [mm]		2.5	2.5	3	3	3.5	3.5	3.5
LA [mm]		9	9	9	9	12.5	13	14

■ Forced ventilation (FV) units

In some applications the fan built on to the motor shaft do not give sufficient cooling for operation at low speed (see drawing on page 20). That problem is solved by mounting a FV unit.

Typical applications are for example conveyors, spindles and other contant torque (CT) applications where the customer wants a wide control range down to low speed.

The FV unit is available in 2 versions. The characteristics of the two versions are the same. The variable factors are the length and the placing of the terminal box.

The VLT Drive Motor yields full continuous torque down to low speed with FV built on.

Voltage range for forced ventilation (FV) units:

Frame size:			Prefuse [A]
80	0.55 and 0.75 kW	1 phase 1 x 230V +/-6%	0.2
90-132	1.1 to 7.5 kW	3 phase 3 x 230/400V +/-6%	0.25

NB!
Restricted voltage range applies when FCM 300 series is fitted with forced ventilation unit.

Forced ventilation units can be ordered with different supply voltages.

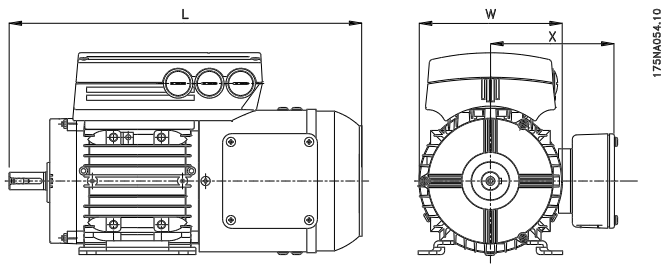
■ Brake Motors

The VLT Drive Motor can be delivered with an electo mechanical brake, which is controlled by the frequency converter. See parameter 138 and 139 for adjustment.

Brake data:

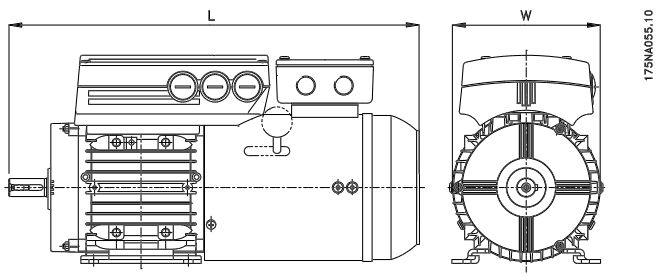
FCM type	Frame Size	Torque Nm	Thermal capacity kJ/h	Brake inertia kgcm2
305-307	80	10	250	1.22
311-315	90	20	350	2.10
322-330	100	40	550	5
340	112	40	550	14
355-375	132	80	800	70

Short version - only forced ventilation units:
The terminal box is mounted on the side of the motor.



	80	90	100	112	132
L:	384	456	480	496	553
X:	138	149	161	172	192
W:	160	178	199	215	255

Standard version - brake and forced ventilation units:
The terminal box is mounted in line with the inverter box.



	80	90	100	112	132
L:	434	510	557	573	653
W:	160	178	199	215	255

Control panel

The FC motor optionally features a Local Control Panel - LCP 2 which makes up a complete interface for operation and monitoring of the FC motor.

NB!
The LCP from the VLT 5000 Series (code number 175Z0401) cannot be used for the FC motor. However, the general LCP 2 (code number 175N0131) can be used for both the FCM 300, VLT 2800 and the VLT 5000 Series.

LCP installation

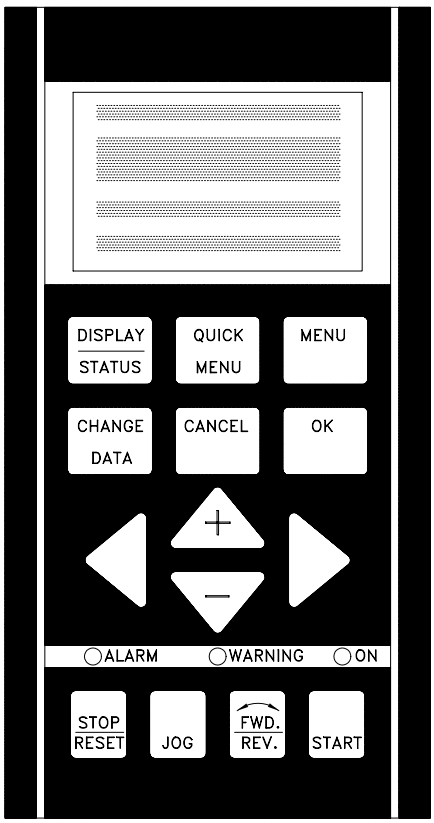
The LCP 2 is connected to the terminal X100, 1-4 (see separate instruction MI.03.AX.YY).

LCP functions

The functions of the control panel can be divided into three groups:

- display
- keys for changing program parameters
- keys for local operation

All data are indicated by means of a 4-line alpha-numeric display, which in normal operation is able to show 4 measurements and 3 operating conditions continuously. During programming, all the information required for quick, effective parameter Setup of the FC motor will be displayed. As a supplement to the display, there are three LEDs for voltage, warning and alarm.
All program parameters of the FC motor can be changed immediately from the control panel, unless this function has been blocked via parameter 018.



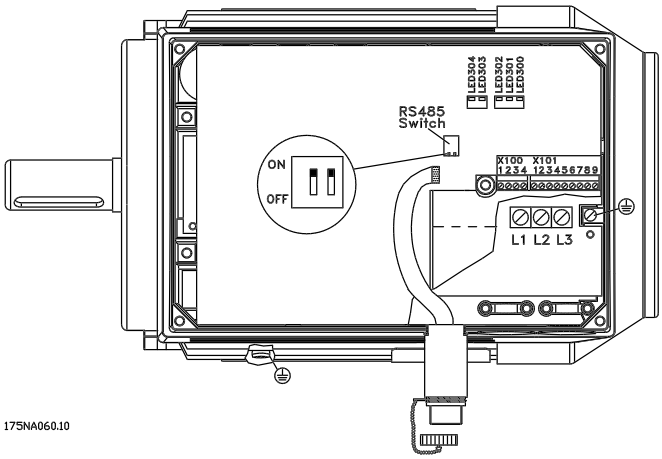
DANFOSS
175ZA004.10

■ Service plug kit

Purpose:

To run LCP2 and PROFIBUS at the same time.
The service plug can be used with FCM 300 of serial number 03Gxxx and software version as from 2.03.
Used together with cable for plug kit 175N0162.

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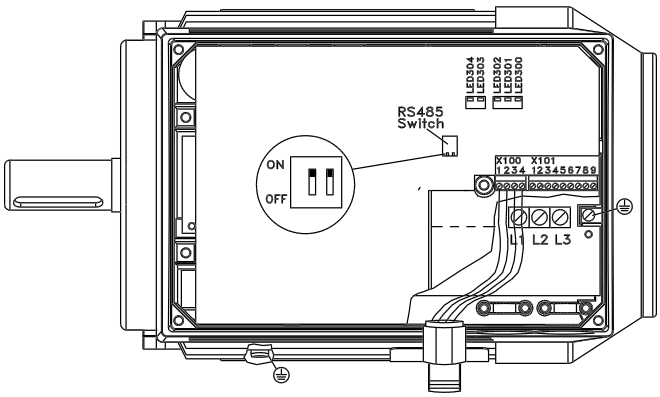
175NA060.10

■ Plug kit

Purpose

To make a plugable connection between LCP 2 and FCM 300.
Used together with cable for plug kit 175N0162.

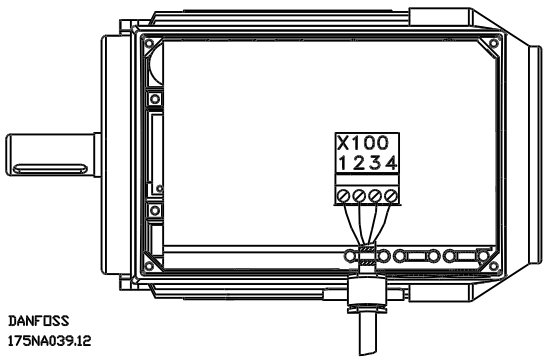
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175NA061.10

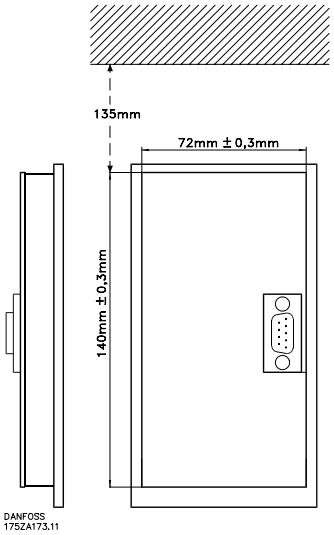
■ Remote mounting kit

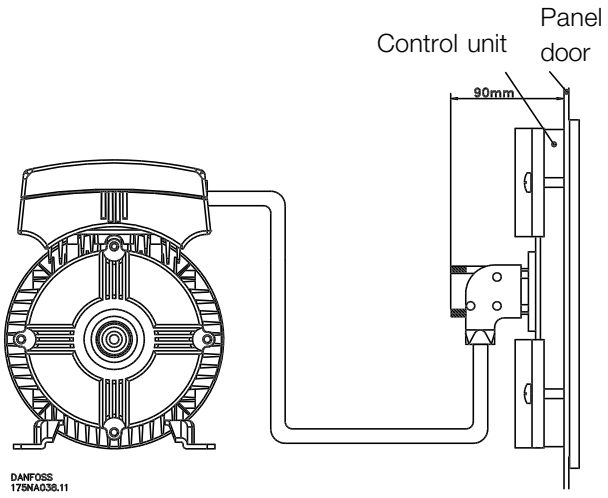
Connections:



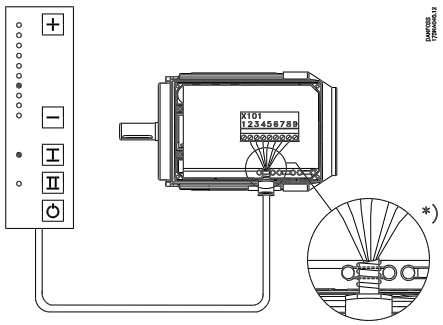
Colour of wire/	Terminal X100/	D-sub pin
yellow	1	8
green	2	9
red	3	2
blue	4	3

■ Remote mounting kit cont.





■ Local Operation Pad (LOP)



Use the +/- keys to set reference

Wiring

Colour of wire	Terminal	Function
White	2	Reference
Brown	3	Reset
Purple or Grey	4	See table under button I
Green	5	See table under button II
Red	6	+24V
Yellow	7	+10V
Blue	8	Ground

Function/settings	Key I (Start)	Key II (Start)	Key ⏻ (Stop)
Default - Dual speed operation (connect purple wire): No changes to factory setting.	Run on set reference (+/-)	Run on 10 Hz** jog speed	Stop (and reset* - if trip)
Function 2 - Dual mode operation (connect purple wire): Select desired modes of operation in Setups 1 and 2 (use para. 4-6) Parameter 335 = 18 (select Setup)	Run with Setup 1	Run with Setup 2	Stop (and reset* - if trip)
Function 3 - Dual direction operation (connect grey wire): Parameter 335 = 10 (start reversing) Parameter 200 = 1 (both directions)	Run forward	Run reverse	Stop (and reset* - if trip)

*If no reset is required, do not connect the brown wire
**or set parameter 213

At power up the unit will always be in stop mode. Set reference will be stored during power down. If permanent start mode is desired, connect terminal 6 to terminal 4 and do not connect purple/grey wire to terminal 4. This means the stop function on LOP is disabled.

NB!
After fitting, cut off or isolate excess wire.

■ Galvanic isolation (PELV)

PELV offers protection by way of extra low voltage. Protection against electric shock is considered to be ensured when all connected devices are of the PELV type and the installation is made as described in local/national regulations on PELV supplies.

In FCM 300 Series all control terminals are supplied from or in connection with extra low voltage (PELV).

Galvanic (ensured) isolation is obtained by fulfilling requirements concerning higher isolation and by providing the relevant creapage/clearance distances. These requirements are described in the EN 50178 standard.

The components that make up the electrical isolation, as described below, also comply with the requirements concerning higher isolation and the relevant test as described in EN 50178.

The galvanic isolation can be shown in three locations (see drawing below), namely:

1. Power supply (SMPS) incl. signal isolation of U_{DC}, indicating the intermediate current voltage.
2. Gate drive that runs the IGBTs (opto-couplers).
3. Current transducers (opto-couplers).

■ Earth leakage current

Earth leakage current is primarily caused by the capacitance between motor phases and the motor frame. The RFI filter contributes additional leakage current, as the filter circuit is connected to earth through capacitors.

The size of the leakage current to the ground depends on the following factors, in order of priority:

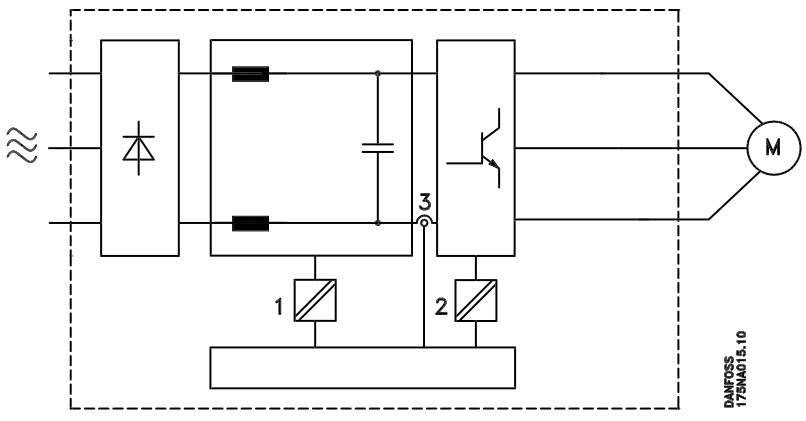
1. Switching frequency
2. Motor grounded on site or not

The leakage current is of importance to safety during handling/operation of the frequency converter if (by mistake) the frequency converter has not been earthed.

NB!
Since the leakage current is > 3.5 mA (approx. 4-20 mA), reinforced earthing must be established (see Quick Guide MG.03.A1.02), which is required if EN 50178 is to be complied with. Never use ELCB relays that are not suitable for DC fault currents (type A).

If ELCB relays are used, they must be:
- Suitable for protecting equipment with a direct current content (DC) in the fault current (3-phase bridge rectifier)
- Suitable for power-up with short charging current to earth
- Suitable for a high leakage current.

Galvanic isolation



■ Extreme running conditions

Motor-generated overvoltage

The voltage in the intermediate circuit is increased when the motor acts as a generator. This occurs in two cases:

1. The load drives the motor (at constant output frequency from the frequency converter), i.e. the load generates energy.
2. During deceleration ("ramp-down") if the moment of inertia is high, the load is low and the ramp-down time is too short for the energy to be dissipated as a loss in the VLT frequency converter, the motor and the installation.

The control unit attempts to correct the ramp if possible.

The inverter turns off to protect the transistors and the intermediate circuit capacitors when a certain voltage level is reached.

Mains drop-out

During a mains drop-out, FCM 300 Series continues until the intermediate circuit voltage drops below the minimum stop level, which is typically 15% below FCM 300 Series's lowest rated supply voltage.

The time before the inverter stops depends on the mains voltage before the drop-out and on the motor load.

Static overload

When FCM 300 Series is overloaded (the current limit in parameter 221 has been reached), the controls will reduce the output frequency in an attempt to reduce the load.

If the overload is excessive, a current may occur that makes the FC motor cut out after approx. 1.5 sec.

■ Acoustic noise

Below are the typical values measured at a distance of 1 m from the unit at full load:

	2 pole	4 pole
FCM 305		54 dB(A)
FCM 311		58 dB(A)
FCM 315		59 dB(A)
FCM 322		58 dB(A)
FCM 330		61 dB(A)
FCM 340	62 dB(A)	63 dB(A)
FCM 355	64 dB(A)	
FCM 375		61 dB(A)

■ Balance

The FCM 300 is balanced to class R according to ISO2373 (reduced balance). For critical applications especially at high speed (>4000 RPM) special balance (class S) might be required.

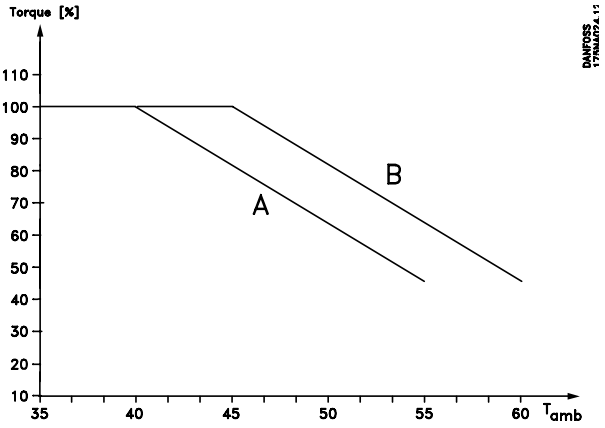
■ Derating

The FCM 300 Series motor is thermally protected in case limits are exceeded. At high temperatures the switching frequency will be gradually reduced down to 2 kHz and eventually the motor will trip.

■ Derating for ambient temperature

The ambient temperature ($T_{AMB,MAX}$) is the maximum temperature allowed. The average ($T_{AMB,AVG}$) measured over 24 hours must be at least 5ºC lower.

If FCM 300 Series is operated at temperatures above 40 ºC, a derating of the continuous output current is necessary.

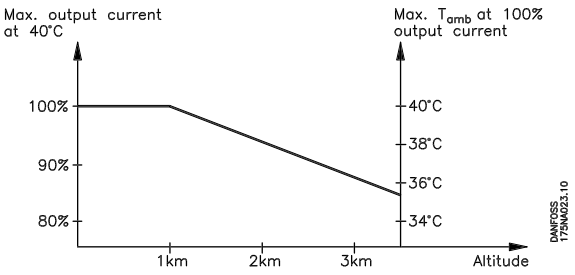


■ Derating for air pressure

Below 1000 m altitude no derating is necessary.

Above 1000 m the ambient temperature (T_{AMB}) or max. output current ($I_{VLT,MAX}$) must be derated in accordance with the following diagram:

1) Derating of output current versus altitude at T_{AMB} = max. 40°C
2) Derating of max. T_{AMB} versus altitude at 100% output current.

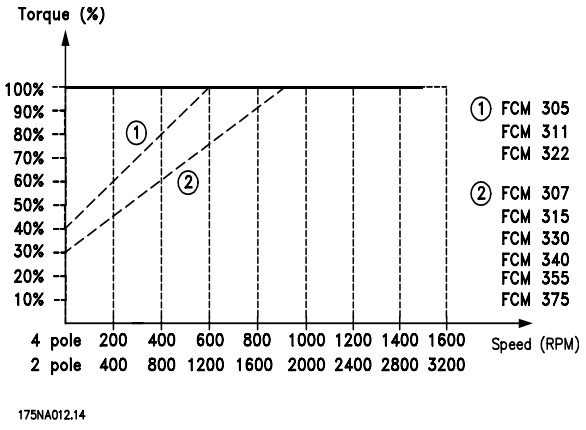


■ Derating for running at low speed

When a centrifugal pump or a fan is controlled by a FC motor, it is not necessary to reduce the output at low speed because the load characterstic of the centrifugal pumps/fans, automatically ensures the necessary reduction.

FC motors running constant load torque applications continuously at low speed must be derated (see diagram) or an independent fan must be used (cooling option 6).

Nominal torque (100%) can be yielded up to 15 min and at a duty cycle up to 25% at low speed.



■ Derating for high switching frequency

The FCM 300 Series motor can use two different PWM schemes, SFAVM and 60° AVM. Factory setting is SFAVM. The PWM scheme can be changed in parameter 446. Below 25 Hz motor speed the FCM 300 Series motor automatically change to SFAVM.

Factory setting of the switching frequency is 4000 Hz. It can be changed between 2 and 14 kHz in parameter 411.

A higher switching frequency leads to a quieter running unit but higher losses in the electronics of the FC motor and makes an appropriate derating necessary.

■ Vibration and shock

FCM 300 Series has been tested according to a procedure based on the following standards:

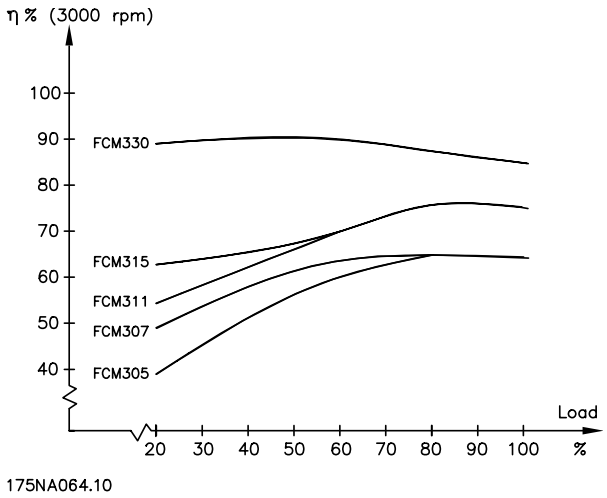
IEC 68-2-6:	Vibration (sinusoidal) - 1970
IEC 68-2-34:	Random vibration broad-band - general requirements
IEC 68-2-35:	Random vibration broad-band - high reproducibility
IEC 68-2-36:	Random vibration broad-band - medium reproducibility

FCM 300 Series complies with requirements that correspond to conditions in the standards mentioned above.

■ Air humidity

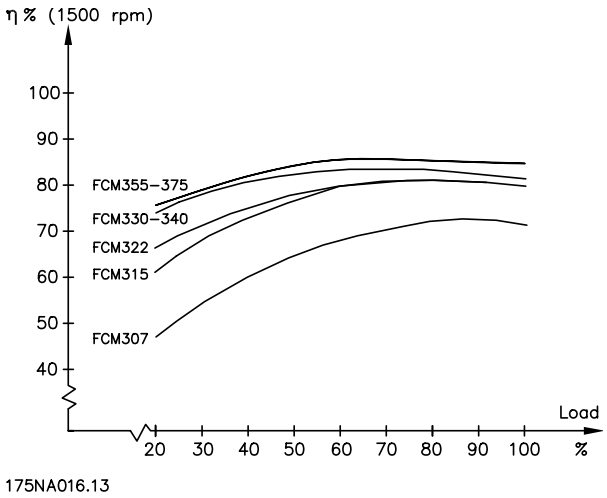
FCM 300 Series has been designed to meet the IEC 68-2-3 standard, EN 50178 item 9.4.2.2/DIN 40040, class E, at 40°C.

■ Efficiency



175NA064.10

2 pole



175NA016.13

4 pole

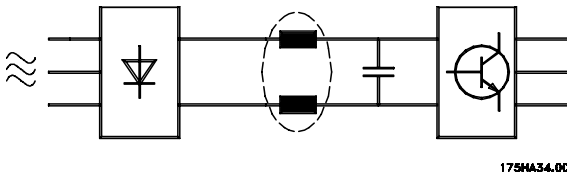
■ Mains supply interference/harmonics

A FC motor takes up a non-sinusoidal current from mains, which increases the input current I_{RMS}. A non-sinusoidal current can be transformed by means of a Fourier analysis and split up into sine wave currents with different frequencies, i.e. different harmonic currents I_N with 50 Hz as the basic frequency:

Harmonic currents	I_1	I_5	I_7	I_{11}
Hz	50 Hz	250 Hz	350 Hz	550 Hz
In/I1 [%]	100%	44%	29%	8%

The harmonics do not affect the power consumption directly, but increase the heat losses in the installation (transformer, cables). Consequently, in plants with a rather high percentage of rectifier load, it is important to maintain harmonic currents at a low level to avoid overload of the transformer and high temperature in the cables.

Some of the harmonic currents might disturb communication equipment connected to the same transformer or cause resonance in connection with power-factor correction batteries.



To ensure low, harmonic currents, FCM 300 has intermediate circuit coils as standard..
THD (current) ≤ 54%
The voltage distortion on the mains supply depends on the size of the harmonic currents multiplied by the mains impedance for the frequency in question.
The total voltage distortion THD is calculated on the basis of the individual voltage harmonics using the following formula:

$$THD = \frac{U_1}{\sqrt{U_2^2 + \ldots + U_N^2}} \quad (\%)$$

■ Power factor

The power factor is the relation between I_1 and I_{RMS}.

The power factor for 3-phase control

$$= \frac{\sqrt{3} \times U \times I_1 \times \cos \varphi_1}{\sqrt{3} \times U \times I_{RMS}}$$

$$\text{Power factor} = \frac{I_1 \times \cos \varphi_1}{I_{RMS}} = \frac{I_1}{I_{RMS}} \approx 0.9 \text{ since } \cos \varphi = 1$$

The power factor indicates the extent to which the FC motor imposes a load on the mains supply.

The lower the power factor, the higher the I_{RMS} for the same kW performance.

In addition, a high power factor indicates that the different harmonic currents are low.

$$I_{RMS} = \sqrt{I_1^2 + I_5^2 + I_7^2 + \ldots + I_n^2}$$

■ What is CE labelling?

The purpose of CE labelling is to avoid technical obstacles to trade within EFTA and the EU. The EU has introduced the CE label as a simple way of showing whether a product complies with the relevant EU directives. The CE label says nothing about the specifications or quality of the product. Frequency converters are regulated by three EU directives:

■ The machinery directive (89/392/EEC)

All machines with critical moving parts are covered by the machinery directive, which came into force on 1 January 1995. Since a frequency converter is largely electrical, and the motor always will be placed in connection with other machines, it does not fall under the machinery directive. However, if a FC motor is supplied for use in a machine, we provide information on safety aspects relating to the FC motor. We do this by means of a manufacturer's declaration.

■ The low-voltage directive (73/23/EEC)

Frequency converters must be CE labelled in accordance with the low-voltage directive. The directive applies to all electrical equipment and appliances used in the voltage range of 50-1000 V AC and 75-1500 V DC.

The EMC directive (89/336/EEC)

EMC is short for electromagnetic compatibility. The presence of electromagnetic compatibility means that the mutual interference between different components/ appliances is so small that the functioning of the appliances is not affected. The EMC directive came into force on 1 January 1996. The directive distinguishes between components, appliances, systems and installations.

What is covered?

The EU "Guidelines on the Application of Council Directive 89/336/EEC" outline three typical situations of using a FC motor. For each of these situations, explanations are offered as to whether the situation in question is covered by the EMC directive and must be CE labelled.

1. The FC motor is sold directly to the end-consumer. The FC motor is for example sold to a DIY market. The end-consumer is a layman. He installs the FC motor himself for use with a hobby machine, a kitchen appliance, etc. For such applications, the FC motor must be CE labelled in accordance with the EMC directive.

2. The FC motor is sold for installation in a plant. The plant is built up by professionals of the trade. It could be a production plant or a heating/ ventilation plant designed and installed by professionals of the trade. Neither the FC motor nor the finished plant has to be CE labelled under the EMC directive. However, the unit must comply with the basic EMC requirements of the directive. The installer can ensure this by using components, appliances and systems that are CE labelled under the EMC directive.

3. The FC motor is sold as part of a complete system. The system is being marketed as complete. It could be e.g. an air-conditioning system. The complete system must be CE labelled in accordance with the EMC directive. The manufacturer who supplies the system can ensure CE labelling under the EMC directive either by using CE labelled components or by testing the EMC of the system. If he chooses to use only CE labelled components, he does not have to test the entire system.

Danfoss FCM 300 Series motor and CE labelling

CE labelling is a positive feature when used for its original purpose, i.e. to facilitate trade within the EU and EFTA.

However, CE labelling may cover many different specifications. This means that it has to be checked what a given CE label specifically covers.

The specifications covered can in fact be widely different. That is why a CE label can give the installer a false feeling of security when using a FC motor as a component in a system or an appliance.

We CE label our VLT® DriveMotors in accordance with the low-voltage directive. This means that as long as the FC motor is installed correctly, we guarantee that it complies with the low-voltage directive. We issue a declaration of conformity that confirms our CE labelling in accordance with the low-voltage directive.

The CE label also applies to the EMC directive, on condition that the instructions given in the Operating Instructions for EMC-correct installation and filtering have been followed. On this basis, a declaration of conformity in accordance with the EMC directive is issued.

The Quick Guide gives detailed instructions for installation to ensure that your installation is EMC-correct. Furthermore, we specify which norms that are complied with by our different products.

We offer the filters that can be seen from the specifications and gladly provide other types of assistance that can help you obtain the best EMC result.

Compliance with EMC directive 89/336/EEC

In the great majority of cases, the VLT® DriveMotor is used by professionals of the trade as a complex component forming part of a larger appliance, system or installation. It must be noted that the responsibility for the final EMC properties of the appliance, system or installation rests with the installer. As an aid to the installer, Danfoss has prepared EMC installation guidelines for the Power Drive System. The standards and test levels stated for Power Drive Systems are complied with, provided the right EMC-correct instructions for installation have been followed, see electrical installation.

■ EMC standards



NOTE!

- All EMC specifications are stated with factory settings.
- Maximum 4 kHz switching frequency.
- Screened data/control cables must be used for surge protection.
- The FC motor must be connected to earth in order to comply.
- Maximum/minimum line impedance Z_{max} = 0.24 + j0.15 ohm; Z_{min} = 0 + j0 ohm. (EN 61800-3 commutation notches)

Generic standards

The generic standards are stated in the EMC directive (89/336/EEC).

The FC motor complies with:
EN 50081-1[1)], EN 50082-1.
Residential, commercial and light industrial environment.

EN 50081-2, EN 50082-2.
Industrial environment.

[1)] Emission levels stated by EN 50081-1 are only fulfilled by FC motors with class B-1 optional filter.

Furthermore the FC motor complies with:
DIN VDE 0160/1990 [2)]

[2)] 'Protection against overvoltage 7.3.1. class1'

Product standards

The product standards are stated in EN 61800-3 (IEC 1800-3).

The FC motor complies with:
EN 61800-3, unrestricted distribution[3)].
EN 61800-3, restricted distribution.

[3)] Emission levels stated by EN 61800-3 unrestricted distribution are only fulfilled by FC motors with class B-1 filter.

Basic standards, emissions

- *EN 55011:* Limits and methods of measuring radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
- *EN 55022:* Limits and methods of measuring radio disturbance characteristics of information technology equipment.
- *EN 61000-3-2:* Limits for harmonic current emissions (equipment input current ≤16 A)
- *EN 61000-3-4:* Limits for harmonic current emissions (equipment input current ≥16 A)

Basic standards, immunity

- *EN 61000-2-4 (IEC 1000-2-4):*
  Compatibility levels
  Simulation of voltage and frequency fluctuations, harmonics and commutation notches on the power line.
- *EN 61000-4-2 (IEC 1000-4-2):*
  Electrostatic discharge (ESD)
  Simulation of electrostatic discharge.
- *EN 61000-4-4 (IEC 1000-4-4):*
  Fast transients, burst 5/ 50 nS
  Simulation of transients caused by switching of contactors, relays or similar devices.
- *EN 61000-4-5 (IEC 1000-4-5):*
  Surges 1.2/ 50 µS.
  Simulation of transients caused by e.g. lightning that strikes near an installation.
- *EN 61000-4-6: (IEC 1000-4-6):*
  Radio-frequency electromagnetic field.
  Amplitude modulated.
  Simulation of interference caused by radio transmission equipment.
- *ENV 50140:*
  Radio-frequency electromagnetic field. Pulse modulated.
  Simulation of interference caused by GSM mobile phones.

General aspects of EMC emissions

For high frequency shielding, screened cables used for Profibus, standard bus, control cables and signal interface must in general be connected to the enclosure at both ends.

General aspects of EMC immunity

If there are problems with low frequency interference (ground loops), screened cable used for Profibus, standard bus, control cables and signal interface can be left open at one end.

■ Aggressive environments

In common with all electronic equipment, a VLT frequency converter contains a large number of mechanical and electronic components, all of which are vulnerable to environmental effects to some extent.

The VLT frequency converter should not therefore be installed in environments with airborne liquids, particles or gases capable of affecting and damaging the electronic components. Failure to take the necessary protective measures increases the risk of stoppages, thus reducing the life of the VLT frequency converter.

Liquids can be carried through the air and condense in the VLT frequency converter. In addition to this, liquids may cause corrosion of components and metal parts.
Steam, oil and salt water may cause corrosion of components and metal parts.
In such environments, equipment with enclosure rating ≥ IP 54 is recommended.

In environments with high temperatures and humidity, corrosive gases such as sulphur, nitrogen and chlorine compounds will cause chemical processes on the VLT frequency converter components. Such chemical reactions will rapidly affect and damage the electronic components.

NOTE!
Mounting VLT frequency converters in aggressive environments will increase the risk of stoppages and furthermore considerably reduce the life of the converter.

Before the installation of the VLT frequency converter, the ambient air should be checked for liquids, particles and gases. This may be done by observing existing installations in this environment. Typical indicators of harmful airborne liquids are water or oil on metal parts, or corrosion of metal parts.

Excessive dust particle levels are often found on installation cabinets and existing electrical installations.
One indicator of aggressive airborne gases is blackening of copper rails and cable ends on existing installations.

Functions to programme, to control, and to monitor via bus (PROFIBUS) or by PC.

	Function	Range/number of settings/value	Factory setting	Parameter No.
Operation and display	Language	6	English	Parameter 001
	Local/remote control	2	Remote control	Parameter 002
	Local reference		000.000	Parameter 003
	Active Setup	4	Setup 1	Parameter 004
	Programming Setup	4	Active setup	Parameter 005
	Copying of Setups	4	No copying	Parameter 006
	LCP copy	4	No copying	Parameter 007
	Display scaling of motor frequency		100	Parameter 008
	Display line 2	24	Frequency [Hz]	Parameter 009
	Display line 1.1		Reference [%]	Parameter 010
	Display line 1.2		Motor current [A]	Parameter 011
	Display line 1.3		Power [kW]	Parameter 012
	Local control/configaration	5	LCP digital control/par. 100	Parameter 013
	Local stop	2	Possible	Parameter 014
	Local jog	2	Not possible	Parameter 015
	Local reversing	2	Not possible	Parameter 016
	Local reset of trip	2	Possible	Parameter 017
	Lock for data change	2	Not locked	Parameter 018
	Operating state at power up, local c.	3	Forced stop, use saved ref.	Parameter 019
Load and motor	Configuration	2	Speed, open loop mode	Parameter 100
	Torque characteristics	4	Constant torque	Parameter 101
	Motor power	XX.XX kW - dep. on unit		Parameter 102
	Motor voltage	XX.XX V - dep. on unit		Parameter 103
	Motor frequency	XX.X Hz - dep. on unit		Parameter 104
	Motor current	XX.XX A - dep. on unit		Parameter 105
	Rated motor speed	XX rpm - dep. on unit		Parameter 106
	DC braking time	0.0 (off) - 60.0 sec.	10.0 sec.	Parameter 126
	DC brake cut-in frequency	0.0 Hz - f_{MAX}	0.0 Hz	Parameter 127
	Motor thermal protection	2	Disable	Parameter 128
	DC braking voltage	0 - 100 %	0 %	Parameter 132
	Start voltage	0.00 - 100.00 V	Motor dependent	Parameter 133
	Start compensation	0.0 - 300.0 %	100.0 %	Parameter 134
	U/f ratio	0.00 - 20.00 V/Hz	Motor dependent	Parameter 135
	Slip compensation	-500.0 - +500.0 %	100.0 %	Parameter 136
	DC holding voltage	0 - 100 %	0 %	Parameter 137
	Brake cut out frequency	0.5 - 132 Hz	3.0 Hz	Parameter 138
	Brake cut in frequency	0.5 - 132 Hz	3.0 Hz	Parameter 139
References and limits	Rotation direction	3	Only clockwise 0 - 132 Hz	Parameter 200
	Min. output frequency (f_{MIN})	0.0 Hz - f_{MAX}	0.0 Hz	Parameter 201
	Max. output frequency (f_{MAX})	f_{MIN} - f_{RANGE}	f_{RANGE} (132 Hz)	Parameter 202
	Reference/feedback range	Min. - max./-max.- +max.	Min. - Max.	Parameter 203
	Minimum reference	-100,000.000 - Ref_{MAX}	0.000	Parameter 204
	Maximum reference	Ref_{MIN} - 100,000.000	50.000	Parameter 205
	Ramp-up time 1	0.05 - 3600.00 sec.	3.00 sec.	Parameter 207
	Ramp-down time 1	0.05 - 3600.00 sec.	3.00 sec.	Parameter 208
	Jog ramp time	0.05 - 3600.00 sec.	3.00 sec.	Parameter 211
	Quick stop ramp-down time	0.05 - 3600.00 sec.	3.00 sec.	Parameter 212
	Jog frequency	0 Hz - f_{MAX}	10.0 Hz	Parameter 213
	Reference function	2	Sum	Parameter 214

	Function	Range/number of settings	Factory setting	Parameter No.
	Preset reference 1	-100.00 % - +100.00 %	0.00 %	Parameter 215
	Preset reference 2	-100.00 % - +100.00 %	0.00 %	Parameter 216
	Catch up/slow down value	0.00 - 100.00 %	0.00 %	Parameter 219
	Current limit for motor mode	Min.- max. limit in % of I_{RATED}	Max. limit	Parameter 221
	Frequency bypass, bandwidth	0 (off) - 100 %	0 %	Parameter 229
	Frequency bypass 1	0.0 - 132 Hz	0.0 Hz	Parameter 230
	Frequency bypass 2	0.0 - 132 Hz	0.0 Hz	Parameter 231
	Time out	1 -99 sec.	10 sec.	Parameter 317
	Function after time out	Off/Stop and trip	Off	Parameter 318
	Pulse reference/feedback, max. freq.	100 - 70000 Hz	5000 Hz	Parameter 327
Inputs and Outputs	Terminal 1, analog input current	3	No operation	Parameter 331
	Terminal 2, digital input	25	Reference	Parameter 332
	Terminal 3, digital input	25	Reset	Parameter 333
	Terminal 4, digital input	24	Start	Parameter 334
	Terminal 5, digital input	23	Jog	Parameter 335
	Terminal 1, min. scaling	0.0 - 20.0 mA	0.0 mA	Parameter 336
	Terminal 1, max. scaling	0.0 - 20.0 mA	20.0 mA	Parameter 337
	Terminal 2, min. scaling	0.0 - 10.0 V	0.0 V	Parameter 338
	Terminal 2, max. scaling	0.0 - 10.0 V	10.0 V	Parameter 339
	Output functions	21	No operation	Parameter 340
	Brake function	Off/AC braking	Off	Parameter 400
	Reset function	11	Manual reset	Parameter 405
	Switching frequency	1.5 - 14.0 kHz	Unit dependent	Parameter 411
	Variable switching frequency	3	Temp. dep. sw. freq.	Parameter 412
	Overmodulation function	Off/On	On	Parameter 413
	Minimum feedback	-100000 - FB_{HIGH}	0	Parameter 414
	Maximum feedback	FB_{LOW} - 100,000	1500	Parameter 415
	Reference/feedback unit	42	%	Parameter 416
	Process PID normal/inverse ctrl.	Normal/inverse	Normal	Parameter 437
	Process PID anti windup	Disable/Enable	Enable	Parameter 438
	Process PID start frequency	f_{MIN} - f_{MAX}	f_{MIN}	Parameter 439
	Process PID proportional gain	0.00 (off) - 10.00	0.01	Parameter 440
	Process PID integral time	0.01 - 9999 sec. (off)	9999 sec.	Parameter 441
	Process PID differentation time	0.00 (off) - 10.00 sec.	0.00 sec.	Parameter 442
	Process PID different. gain limit	5 -50	5	Parameter 443
	Process PID lowpass filter time	0.1 - 10.00 sec.	0.1 sec.	Parameter 444
	Flying start	4	Disable	Parameter 445
	Switching pattern	2	SFAVM	Parameter 446
	Bus address	1 - 126	1	Parameter 500
	Baudrate	300 - 9600 Baud/6	9600 Baud	Parameter 501
	Coasting	4	Logic or	Parameter 502
	Quick-stop	4	Logic or	Parameter 503
	DC-brake	4	Logic or	Parameter 504
	Start	4	Logic or	Parameter 505
	Reversing	4	Logic or	Parameter 506
	Selection of setup	4	Logic or	Parameter 507
	Selection of speed	4	Logic or	Parameter 508
	Bus jog 1	0.0 - f_{MAX}	10.0 Hz	Parameter 509
	Bus jog 2	0.0 - f_{MAX}	10.0 Hz	Parameter 510
	Telegram profile	Profidrive/FC Drive	FC Drive	Parameter 512
	Bus time interval		1 sec.	Parameter 513
	Bus time interval function	6	Off	Parameter 514

Special functions

Serial communication

	Function	Range/number of settings	Factory setting	Parameter No.
	Data read-out: Reference	XXX.X		Parameter 515
	Data read-out: Refer. unit	Hz/rpm		Parameter 516
	Data read-out: Feedback			Parameter 517
	Data read-out: Frequency	Hz		Parameter 518
	Data read-out: Frequency x scale	Hz		Parameter 519
	Data read-out: Current	A x 100		Parameter 520
	Data read-out: Torque	%		Parameter 521
	Data read-out: Power	kW		Parameter 522
	Data read-out: Power	hp		Parameter 523
	Data read-out: Motor voltage	V		Parameter 524
	Data read-out: DC link voltage	V		Parameter 525
	Data read-out: FC therm.	0 - 100 %		Parameter 527
	Data read-out: Digital input			Parameter 528
	Data read-out: External reference	-200.0 - +200.0 %		Parameter 533
	Data read-out: Status word, binary			Parameter 534
	Data read-out: FC temperature	°C		Parameter 537
	Data read-out: Alarm word, binary			Parameter 538
	Data read-out: Control word, binary			Parameter 539
	Data read-out: Warning word, 1			Parameter 540
	Data read-out: Warning word, 2			Parameter 541
	Data read-out: Terminal 1, analog input	mA X 10		Parameter 542
	Data read-out: Terminal 2, analog input	V X 10		Parameter 543
	Operating data: Operating hours	0 - 130,000.0 hours		Parameter 600
	Operating data: Hours run	0 - 130,000.0 hours		Parameter 601
	Operating data: Number of power-up's	0 - 9999		Parameter 603
	Operating data: Number of overtemp.	0 - 9999		Parameter 604
	Operating data: Number of overvoltages	0 - 9999		Parameter 605
	Fault log, read-out: Error code	Index XX - XXX		Parameter 615
	Fault log, read-out: Time	Index XX - XXX		Parameter 616
	Fault log, read-out: Value	Index XX - XXX		Parameter 617
	Reset of hours-run counter	No reset/reset	No reset	Parameter 619
	Operation mode	3	Normal function	Parameter 620
	Nameplate: FC motor type	Depends on unit		Parameter 621
	Nameplate: Software version no.	Depends on unit		Parameter 624
	LCP version	Depends on unit		Parameter 625
	Nameplate: Database identification no.	Depends on unit		Parameter 626
	Nameplate: Application option type			Parameter 628
	Nameplate: Communication option type			Parameter 630
	BMC software identification			Parameter 632
	Motor database identification			Parameter 633
	Unit identification for communication			Parameter 634
	Software part No.			Parameter 635

Technical functions

XREF__BC
NOT LOADED ON RIP

FCM 300



Datasheet

VLT® frequency converters BAUER geared motors

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