



# VLT® drives for 690 V now available down to smallest power sizes

Danfoss makes 690 V installations most cost efficient. The high performance frequency converters now cover the complete 690 V power range from 1.4 MW down to 1.1 kW.

Danfoss presents the smallest 690 V enclosure on the market below 7.5 kW and extends the power range of its IP 20 drives up to 75 kW with 4 new enclosure sizes.

Now you can even control 690 V motors down to 0.37 kW without expensive over-dimensioned drives or step down transformers.

Built on the powerful and reliable VLT® platform, the drives offer system designers, machine builders, and end

users the efficiency enhancing benefits offered by Danfoss' single drive concept for industrial applications.

Suitable for use on normal TN and IT (isolated) grids, the IP 20 protected

drives are especially useful in installations within chemical, mining, water/wastewater and marine applications.

Feature	Benefit
Dedicated enclosure sizes down to 1.1 kW	No need for large over-dimensioned drive
Operate motors down to 0.37 kW	No need for step-down transformer
Smallest size and required space	Cost for cabinet and installation room reduced
Side-by-side mounting without derating	Saves valuable panel space
Integrated harmonic filters (<40% THiD)	Maintain mains quality without external filters
Integrated EMC filter (A1/EN 55011) with up to 150 m screened motor cable	Provide reliable operation of the installation without additional external filters
Class 3C3 conformal coating (IEC60721-3-3) as standard	Increase lifetime and reliability in harsh environments
Full performance at 50°C ambient temperature (D-frames 45°C)	Secure operation without derating/over-dimensioning
Danfoss output filters	Matching Sine-Wave or du/dt filters
Complete range of 690V drives up to 1.4 MW	One drive series covers all your system needs

**65%**

**less cabinet space required**

Especially for power sizes below 7.5 kW, Danfoss offers a remarkable space reduction in comparison to other solutions.

## Technical data

Enclosure		Typical shaft output	Output Current 150% for 1 min (HO) 110% for 1 min (NO) 160% for 1 min (HO for A3)		Output power	Max. input current		Est. loss at rated max load	Efficiency	Height	Width	Depth	Max. cable cross-section *	Max. external Input (mains) fuses	Max. weight	
IP 20		[kW]	Continuous (3 x 551-690 V) [A]	Intermittent (3 x 551-690 V) [A]	Continuous kVA 690 V AC [kVA]	Continuous (3 x 551-690V) [A]	Intermittent (3 x 551-690 V) [A]	[W]		of back-plate [mm]	of back-plate [mm]	without option A/B [mm]	[mm <sup>2</sup> ] (AWG)	[A]	[kg]	
A3	P1K1	1.1	1.6	2.6	1.9	1.4	2.3	44	0.96	268	130	205	0.2-4 (24-12)	25	6.6	
	P1K5	1.5	2.2	3.5	2.6	2.0	3.2	60								
	P2K2	2.2	3.2	5.1	3.8	2.9	4.6	88								
	P3K0	3	4.5	7.2	5.4	4.0	6.5	120								
	P4K0	4	5.5	8.8	6.6	4.9	7.9	160								
	P5K5	5.5	7.5	12	9	6.7	10.8	220								
	P7K5	7.5	10	16	12	9.0	14.4	300								
B4*	P11K	HO	11	13	20.8	15.5	12.5	20.1	228	0.98	520	230	242	35 (2)	-	23.5
		NO	15	18	19.8	21.5	17.4	19.1								
	P15K	HO	15	18	28.8	21.5	17.4	27.8	285							
		NO	18.5	22	24.2	26.3	21.2	23.3								
	P18K	HO	18.5	22	35.2	26.3	21.2	33.9	335							
		NO	22	27	29.7	32.3	26.0	28.6								
	P22K	HO	22	27	43.2	32.3	26.0	41.6	375							
		NO	30	34	37.4	40.6	32.8	36.0								
	P30K	HO	30	34	51	40.6	32.8	49.2	480							
		NO	37	41	45.1	49.0	39.5	43.5								
C3	P37K	HO	37	41	61.5	49	39.5	59.3	592	0.98	550	308	333	50 (1)	100	35
		NO	45	52	57.2	62.2	50.1	55.1								
	P45K	HO	45	52	78	62.2	50.1	75.2	720							
		NO	55	62	68.2	74.1	59.8	65.8								
D3h	N55K	HO	55	73	110	87	77.0	96.3	1057	0.98	909	250	375	2 x 95 (2 x 3/0)	200	62
		NO	75	86	95	103	87.0	95.7								
	N75K	HO	75	86	129	103	87.0	130.5	1205							
		NO	90	108	119	129	109.0	119.9								

VLT® power rating: Power ratings correspond to both HO and NO ratings  
\*B4 available Q4 2013

## Brake resistors

FC 302				Horizontal braking						Vertical braking					
Drive data				Brake resistor data						Brake resistor data					
Mains	Pm	R <sub>min</sub>	Rbr, nom	Rrec	P <sub>br,cont.</sub>	Danfoss part number				Rrec	P <sub>br,cont.</sub>	Danfoss Part number			
						Wire	Screw terminal	Screw terminal	Bolt connection			Wire	Screw terminal	Screw terminal	Bolt connection
						IP 54	IP 21	IP 65	IP 20			IP 54	IP 21	IP 65	IP 20
[type]	[kW]	[Ohm]	[Ohm]	[Ohm]	[kW]	[p/n]	[p/n]	[p/n]	[p/n]	[Ohm]	[kW]	[p/n]	[p/n]	[p/n]	[p/n]
T7	1.1	620	830	630	0.100	175u3002	x	x	x	630	0.360	x	175u3108	175u3109	x
T7	1.5	513	600	570	0.100	175u3003	x	x	x	570	0.570	x	175u3110	175u3111	x
T7	2.2	340	403	415	0.200	175u3005	x	x	x	415	0.790	x	175u3112	175u3113	x
T7	3	243	292	270	0.300	175u3361	x	x	x	270	1.130	x	175u3118	175u3119	x
T7	4	180	216	200	0.360	x	175u3009	175u3010	x	200	1.700	x	175u3122	175u3123	x
T7	5.5	130	156	145	0.450	x	175u3012	175u3013	x	145	2.200	x	175u3106	175u3107	x
T7	7.5	94	113	105	0.790	x	175u3481	175u3482	x	105	3.200	x	175u3132	175u3133	x
T7	11	69.7	76.2	72	1.130	175u3351	175u3466	175u3465	x	72	4.200	x	175u3142	175u3143	x
T7	15	46.8	55.5	52	1.400	175u3352	175u3468	175u3467	x	52	6.000	x	x	x	175u3242
T7	18.5	36.0	44.7	42	1.700	175u3353	175u3032	175u3033	x	42	8.000	x	x	x	175u3243
T7	22	33.7	37.5	31	2.200	175u3354	175u3470	175u3469	x	31	10.000	x	x	x	175u3244
T7	30	22.5	29.1	27	2.800	175u3355	175u3472	175u3471	x	27	14.000	x	x	x	175u3201
T7	37	18.0	23.5	22	3.200	175u3356	175u3479	175u3480	x	22	17.000	x	x	x	175u3202
T7	45	13.5	19.3	15.5	4.200	x	175u3474	175u3473	x	15.5	21.000	x	x	x	175u3205
T7	55	13.5	15.7	13.5	5.500	x	175u3476	175u3475	x	13.5	26.000	x	x	x	175u3209
T7	75	8.8	11.5	11	7.000	x	x	x	175u3232	11	36.000	x	x	x	175u3212
T7	90	8.8	9.5	9.1	9.000	x	x	x	175u3067	9.0	42.000	x	x	x	175u3214



## Sine-Wave Filters

VLT® ratings		Filter current rating			Switching frequency kHz	Part number	
690V		@50Hz	@60Hz	@100Hz		IP 00	IP 20
kW	current [A]	[A]	[A]	[A]			
1.1	1.6	4.5	4	3	4	130B7335	130B7356
1.5	2.2						
2.2	3.2						
3.0	4.5						
4.0	5.5	10	9	7	4	130B7289	130B7324
5.5	7.5						
7.5	10						
11	13	13	12	9	3	130B3195	130B3196
15	18	28	26	21	3	130B4112	130B4113
18.5	22						
22	27						
30	34						
37	41	45	42	33	3	130B4114	130B4115
45	52	76	72	57	3	130B4116	130B4117
55	62						
75	86						
90	108	115	109	86	3	130B4118	130B4119

## du/dt Filters



VLT® ratings		Filter current rating	Part number		
551-690V		690V @50Hz	IP 00	IP 20	IP 54
kW	current [A]	[A]			
1.1	1.6	10	N/A	130B7367*	N/A
1.5	2.2				
2.2	3.2				
3.0	4.5				
4.0	5.5				
5.5	7.5				
7.5	10	27	130B2835	130B2836	130B2837
11	13				
15	18				
18.5	22				
22	27	54	130B2838	130B2839	130B2840
30	34				
37	41				
45	52				
55	62	86	130B2841	130B2842	130B2843
75	86				
90	108				
		108	130B2844	130B2845	130B2846

\*Available Q3 2013

### IMPORTANT INSTALLATION INSTRUCTIONS

Danfoss recommends that all drives below 7.5 kW should be installed with output filters, unless the manufacturer specifically confirms that the motors comply with IEC60034-25 curve B for 690 V. If the motor is converter rated, but not for 690 V – then a du/dt filter is needed. In all other situations a sine-wave filter should be used.

VLT® AutomationDrive frequency converters can be individually configured with additional safety functions through special options and accessories.

### ATEX-certified thermistor input



The PTB ATEX-certified VLT® PTC Thermistor Card MCB 112 can be used to monitor both Ex d and Ex e motors.

It is certified according to IEC 61508 for use in low demand applications to protect motors placed in zones 1, 2, 21 and 22. The option can be used as the sole protective device of an explosion-proof motor operated by a frequency converter.

### Universal residual current monitoring



The RCMB20/35 external fault current monitoring module reliably detects insulation faults in drives systems operating on IT or TN mains.

In addition to usual protection against sudden insulation faults, this module supports preventive maintenance by detecting gradual insulation deterioration in the equipment in advance, avoiding unexpected and expensive machine standstills.

Code number	Enclosure	Inside diameter	Supply voltage Us*
130B5645	A2-A3	20 mm	DC 20.4...28.8 V
130B5764	B3		
130B5765	B4		
130B6226	C3	35 mm	
130B5647	C4		

\*Absolute values of the voltage ranges

# Ordering typecode for 690 V IP 20 drives (1.1 – 75 kW)

See High Power Drives Selection Guide for ordering typecodes for power sizes > 90 kW

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20]

FC [ ] - [ ]

[1] Application (character 1-3)	
102	VLT® HVAC Drive – advanced version*
202	VLT® AQUA Drive – advanced version*
302	VLT® AutomationDrive – advanced version
[2] Power size (character 4-7)	
P1K1	1.1 kW
P1K5	1.5 kW
P2K2	2.2 kW
P3K0	3.0 kW
P4K0	4.0 kW
P5K5	5.5 kW
P7K5	7.5 kW
P11K	11 kW**
P15K	15 kW**
P18K	18.5 kW**
P22K	22 kW**
P30K	30 kW**
P37K	37 kW
P45K	45 kW
N55K	55 kW
N75K	75 kW
[3] AC Line Voltage (character 8-9)	
T7	3 phase 525-690 V AC
[4] Enclosure (character 10-12)	
E20	IP 20/Chassis (power sizes 1.1-45 kW)***
E2S	IP 20 (power sizes 55-75 kW)
E2D	IP 21 (power sizes 55-75 kW only)
E5D	IP 54 (power sizes 55-75 kW only)
[5] RFI filter, terminal and monitoring options – EN/IEC 61800-3 (character 13-14)	
H2	RFI-Filter, Class A2 (power sizes 55-75 kW only)
H4	RFI-Filter, Class A1 Cat. C3

[6] Braking and safety (character 15)	
X	No brake chopper
B	With brake chopper****
[7] LCP Display (character 16)	
X	Blank faceplate, no LCP installed
G	Graphical Local Control Panel (LCP-102)
[8] PCB Coating – IEC 721-3-3 (character 17)	
C	Conformal coating on all PCBs (Class 3C3)
R	Conformal coating plus ruggedized
[9] Mains input (character 18)	
X	No mains option
D	Loadsharing terminals (IP20 only)
[10] Hardware A (character 22)	
X	No option
[11] Hardware B (character 23)	
X	No option
[12] Special SW version (character 24)	
SXXX	No option
[13] LCP language (character 25)	
X	Standard language package including English, German, French, Spanish, Danish, Italian and Finnish
Contact factory for other language options	
[14] Fieldbus (character 26-27)	
AX	No option
A0	VLT® PROFIBUS DP V1 MCA 101
A4	VLT® DeviceNet MCA 104
A6	VLT® CANopen MCA 105
AG	VLT® LonWorks MCA 108 <sup>1)</sup>
AJ	VLT® BACnet MCA 109 <sup>1)</sup>
AT	VLT® 3000 PROFIBUS Converter MCA 113 (FC 302 only)
AU	VLT® 5000 PROFIBUS Converter MCA 114 (FC 302 only)
AL	VLT® PROFINET MCA 120
AN	VLT® EtherNet/IP MCA 121
AQ	VLT® Modbus TCP MCA 122
AY	VLT® POWERLINK MCA 123
A8	VLT® EtherCAT MCA 124
AV	VLT® 5000 DeviceNet Converter MCA 194

[15] Application (character 28-29)	
BX	No application option
B0	VLT® Analog I/O Option MCB 109 <sup>1) 2)</sup>
BK	VLT® General Purpose MCB 101
BR	VLT® Encoder Input MCB 102 <sup>3)</sup>
BU	VLT® Resolver Input MCB 103 <sup>3)</sup>
BP	VLT® Relay Option MCB 105
BZ	VLT® Safety PLC I/O MCB 108 <sup>3)</sup>
B2	VLT® PTC Thermistor Card MCB 112
B4	VLT® Sensor Input Card MCB 114
B6	VLT® Safe Option MCB 150 TTL <sup>3)</sup>
B7	VLT® Safe Option MCB 151 HTL <sup>3)</sup>
BY	VLT® Extended Cascade Controller MCO 101 <sup>2)</sup>
[16] Motion Control (character 30-31)	
CX	No motion control option
C4	VLT® Motion Control MCO 305
C4	VLT® Synchronizing Control MCO 350
C4	VLT® Positioning Control MCO 351
[17] Extended Relay (character 32)	
X	No selection
R	VLT® Extended Relay Card MCB 113 <sup>3)</sup>
S	VLT® Advanced Cascade Controller MCO 102 <sup>2)</sup>
[18] Motion Software (character 33-34)	
XX	No software option Note: C4 option in [17] selected with no motion software in [19] will require programming by qualified individual
10	VLT® Synchronizing Controller MCO 350 (must select C4 in position [17])
11	VLT® Position Controller MCO 351 (must select C4 in position [17])
12	VLT® Center Winder MCO 352 (must select C4 in position [17])
[19] Control Power Backup Input (character 35-36)	
DX	No DC input installed
D0	VLT® 24 V DC Supply Option MCB 107

<sup>1)</sup> FC 102 only  
<sup>2)</sup> FC 202 only  
<sup>3)</sup> FC 302 only

\* FC 102 and FC 202 available Q3 2013  
 \*\* Available in Q4 2013  
 \*\*\* For upgrade from Enclosure type IP 20 to IP 21, an additional IP 21/NEMA 1 kit is required  
 \*\*\*\* 1.1 – 7.5 kW power sizes always include brake chopper



Danfoss extends the power range of its IP20 drives up to 75 kW with 4 new enclosure sizes.

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