




Lloyd's
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Type Approval Certificate Extension

This is to certify that Certificate No. 10/70021(E1) for the undernoted products is extended and renumbered as shown.

This certificate is issued to:

PRODUCER	Danfoss Power Electronics A/S	
PLACE OF PRODUCTION	Danfoss Power Electronics A/S Ulsnæs 1 DK-6300 Graasten Denmark	Danfoss LLC 4401 N Bell School Rd Loves Park, IL USA 61111
DESCRIPTION	Frequency converters for speed control of squirrel cage motors - 3-phase, 50/60 Hz - at line voltages 200V-690V - in power range of 0.25 kW-1.4MW with options for Low Harmonic Drives and extended options cabinet EOC.	
TYPE	FC-102: Adjustable Frequency Converter VLT® HVAC Drive FC-202: Adjustable Frequency Converter, VLT® AQUA Drive FC-302: Adjustable Frequency Converter, VLT® Automation Drive AAF006: Stand-alone Advanced Active Filter series 006	
APPLICATION	Marine, Offshore and Industrial applications in environmental categories ENV1, ENV2, defined in LR Test Specification No.1: 2002 where the Test Specification is applicable for the service.	
STANDARD	LR Rules and Regulations for the Classification of Ship: 2010, Part 6, Ch2 IEC60533 IEC60529	
Certificate No.	10/70010(E2)	
Issue Date	23 July 2014	
Expiry Date	22 July 2019	
Sheet	1 of 4	


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Copenhagen Tech. Support Office

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RATINGS

Power sizes 1.1kW – 1.4MW
 Volt 3-ph, 50-60Hz T2: 200-240V - T4: 380-480V - T5: 380-500V - T7: 525-690V
 Enclosure Types See **SPECIFICATION** – Specification key below
 Hardware, RFI Filter See **SPECIFICATION** – Specification key below

SPECIFICATION

Specification key for FC-102 Drives:
 FC - 1 0 2 -----
 1 4 7 11 13 16 24 39
 Specification Key for FC 202 Drives
 FC - 2 0 2 -----
 1 4 7 11 13 16 24 39
 Specification Key for FC 302 Drives:
 FC - 3 0 2 -----
 1 4 7 11 13 16 24 39
 Specification Key for AAF 006 Advanced Active Filter:
 AAF 0 0 6 -----
 1 4 7 11 13 16 24 39

Char no	Specification	Options
1-3	Frq Converter	FC-
4-6	Advanced Active Filter VLT series	AAF- 102 for VLT HVAC Drive Advanced version 202 for VLT AQUA Drive Advanced version 302 for VLT Automation Drive Advanced version
7	Advanced Active Filter VLT Versions	006 N, or P
8-10	Advanced Active Filter VLT Power Size AAF Power Size	A 0.25 kW-1.4 MW
11-12	VLT Voltage range	190, 250, 310, 400 (indicates the current) T2: 200-240 - T4: 380-480 - T5: 380-500 - T7: 525-690
13-15	Advanced Active Filter VLT enclosures	T4: 380-480V E00:IP00/Chassis E20: IP20/Chassis E25:IP/Chassis / medium power D-Frame) E21: IP21/Type 1 E2D: IP21/Type 1 (medium power D-Frame) H21:IP21/Type 1 with heater E54: IP54/Type 12 H54/Type 12 with heater E5H: for Hybrid IP54 E2M: IP20/Type 1 with mains shield E5M:IP54/Type 12 with mains shield ESD: IP54/Type 12 (medium power D-Frame) E21: IP21/Type 1

Certificate No. 10/70010(E2)
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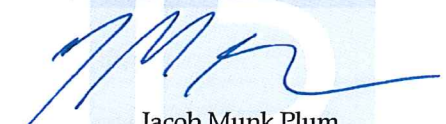


Char no	Specification	Options
13-15		E2M: IP21/Type 1 with mains shield E54: IP54 E5M: IP54 with mains shield
16-17	VLT RFI Filter	H2/H4: 6-Pulse Drive RFI for Maritime comply with Test Spec No1:2002 except for rad. and conducted emission (see OTHER CONDITIONS) B2: 12-Pulse Drive w RFI for Maritime, comply with Test Spec No1:2002 except for rad. and conducted emission. (see OTHER CONDITIONS) L2: Low Harmonics Drive w/ RFI for Maritime complies with Test Spec No1:2002 except for rad. and conducted emission (see OTHER CONDITIONS) N2: Low Harmonics Drive w/ RFI for Maritime complies with Test Spec No1:2002 except for rad. and conducted emission. (see OTHER CONDITIONS) HX: Active filter comply LR TA Spec No.1 except for radiated and conducted emissions. (see OTHER CONDITIONS)
18	Advanced Active Filter	B: Brake chopper
19	VLT hardware	X (none)
20	Advanced Active Filter	Display
21	VLT hardware	G: graphical display Coating: C: Coating; R: Ruggedized boards (required for D1h-D8h enclosures) C: Coated boards
22	Advanced Active Filter	1: Mains disconnect -2: Mains contactor -3: Mains disconnect+fuses-4: Mains contactor +fuse E: Mains disconnect, contactor and fuse J: Mains circuit breaker and fuse
23	VLT hardware	X: None - 3: Disconnectors + fuses - 7: Fuses Adaptation for power terminals Reserved
24-28	Software Options	Options for 24Vdc input for control voltage
29-30	VLT options	A: Options for field bus
31-32	VLT options	B: I-O options
33-37	VLT options	C: Motion control options
38-39	VLT options	D: External control power input
	Advanced Active Filter	DX: no D option - DO: 24V backup

For types FC-102 & FC-202 stated shaft power is defined @ 110% normal overload/variable torque.

For type FC-302 the stated shaft power is defined at 160% high overload/constant torque.

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At high overload 160% torque, de-rate output current with 1%/°C, at ambient temperatures 45-55°.
At normal overload 110% torque, de-rate output current by 1.5%/°C @ ambient temperature 45-55°.

Overview of possible combinations of converter type & rating/enclosure types/ please consult the Danfoss literature.

OTHER CONDITIONS

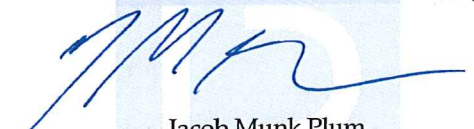
- Screened cables are to be applied between Motor and Converter.
 - Test of software is limited to demonstration of correct function during Type Approval testing.
 - Converters for installation in LR Classed vessels shall comply with the requirements of Part 6, Chapter 2, section 10 of the Ships Rules.
 - Converters used for "essential services" on board LR Classed Ships and rated above 100kW shall be surveyed and tested at the manufacturers according to Ships Rules Part 6, Chapter 2, section 1.4.
 - Converters which exceed the limits for radiated and conducted emission of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system according to IEC 60533. Planned EMC measures shall be assessed prior to installation on board.
- In LR classed vessels the harmonics content at AC switch boards and section boards shall be limited to values specified in Part 6, Chapter 2, section 1.8.3 of the Ships Rules.

"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid certificate."

The attached Design Appraisal Document No.TA10/70021(E2) and its supplementary Type Approval Terms and Conditions form part of this Certificate.

All other details remain as the previous Certificate No.10/70021(E1) to which this extension should be attached.

Certificate No.	10/70010(E2)
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DESIGN APPRAISAL DOCUMENT

Date 23 July 2014	Quote this reference on all future communications TA/I104948/1301042/PEH/jmp
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LLOYD'S REGISTER TYPE APPROVAL SYSTEM, 2002.

Issued to:

**DANFOSS POWER ELECTRONICS A/S Graasten - Denmark and
DANFOSS LLC Loves Park, IL - USA**

for:

**Frequency Converters for motor drives, types FC102, FC202 and FC301/302 series
limited for drives with Modules A3, B4 and C3**

TYPE APPROVAL CERTIFICATE No. 10/70021(E2)

The undernoted documents have been reviewed for compliance with the requirements of the Lloyd's Register Type Approval System, 2002 and this Design Appraisal Document forms part of the Certificate.

APPROVAL DOCUMENTATION

Application form for extension of 10/70021(E1)	09.10.2013
Danfoss US. Letter- pre-scope	00.10.2013

TEST REPORTS

Danfoss Test Report P462 Test Report Summary	--
Danfoss Drives A/S: P462-690V IP20 Visual Inspection for Power Drive Systems	07.02.2012
Danfoss Drives A/S: P462-690V IP20, A3 frame Visual Inspection for Power Drive Systems	18.01.2010
Danfoss Drives P462 A3 Performance Test Report - ID 00709825 Proj: P462-690V IP20	03.09.2013
Danfoss Drives P462-120 LVD General Performance Test	20.11.2013
Danfoss Drives P462 329 LVD General Performance Test	01.06.2012
Danfoss Drives P462 395 LVD General Performance Test	04.06.2013
Danfoss Drives P462-473_R0122T01V110a Power Supply Variations and Interruptions IP20 690V FC-302	18.09.2013
Danfoss Drives P462-451_R0124T02v100a IP20 690V FC-302 Wide Band Random	03.01.2013
Danfoss Drives P462-467_R0124T02v100a IP20 690V FC-302 Wide Band Random	05.07.2013
Danfoss Drives P462- 469_R0124T02v100a IP20 690V FC-302 Wide Band Random	06.04.2013
Danfoss Drives A/S - ID P420-367_R0123T03v110a- Damp Heat Cyclic on EUT: FC302P75kT5E20H1 -IP20	20.12.2007
Danfoss Drives A/S - ID P462-321_R0123T03v110a - Damp Heat Cyclic on EUT: FC302 690V IP20	30.04.2013
Danfoss Drives A/S - ID P462-454_R0123T03v110a- Damp Heat Cyclic on EUT: FC302 690V IP20	08.05.2013
Danfoss Drives A/S P462-122_R0102T01v300b Dry Heat ID P462-362_R0102T01v300b on EUT: FC302P45KT7E20-C3-IP20	27.11.2012
Danfoss Drives A/S ID P462-362_R0102T01v300b -Dry Heat on EUT: FC302P7K5T7E20-A3-IP20	06.11.2012
Danfoss Drives A/S ID P462-391_R0102T01v300b -Dry Heat on EUT: FC302P30T7E20-B4 U=690V-IP20.	19.02.2013
Danfoss Drives A/S - ID P420-368_R0123T04v110a-Cold Test on EUT: FC302P75KT5E20H1 -IP20	13.12.2007
Danfoss Drives A/S-ID P420-541_R0123T04v110a-Cold Test on EUT: FC302P18kT5 -IP20	19.12.2007
Danfoss Drives P462 C3 EMC Summary Report - ID 00708685 Proj: P462-690V IP20	09.07.2012
Danfoss Drives P462 B4 EMC Summary Report - ID 00714890 Proj: P462-690V IP20	03.09.2013
Danfoss Drives P462 A3 EMC Summary Report - ID 00709825 Proj: P462-690V IP20	03.09.2013
Danfoss Drives A/S: P462-305_R0131T01v100e- EUT FC320P37KT7E20H4BG - U4410 - 3x525-690V IP20. Conducted Emission 150kMz-30MHz /9KHz BW (.originates PWM)	28.06.2012

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Danfoss Drives P462-91_R0132T02v200c- Burst Test on FC-302 P462-A3 5.5 kW -U=690V-IP20.	03.01.2012
Danfoss Drives P462-308_R0132T02v200c - Burst Fast/ Transient Test on unit no U4410 no. FC320P37KT7E20H4BG ; U=3x525-690V-IP20.	25.06.2012
Danfoss Drives P462 -456_R0132T02v200c - Burst/Fast Transient on unit no U4410 no. FC302P30KT7E20HB -B4	25.06.2012
Danfoss Drives P462-164_R0134T05v210a Voltage Harm Distortion EUT FC302P45KT7E20H4BG - 3x525-690V IP 20	08.02.2012
Danfoss Drives P462-355_R0134T05v210a on EUT FC302P7K5T7E20 - 3x525-690V IP20	09.08.2012
Danfoss Drives P462-459_R0134T05v300a on EUT FC302P30KT7E20H1B 3x690V IP20.	21.03.2013
Danfoss Drives P462 A3 Visual Inspection EMC Summary Report - ID 00709825 Proj: P462-690V IP20	03.09.2013
CTR-12-0125 Radiated Emissions, Radiated Immunity, Conducted Immunity, ESD EUT:C3SP2-P3 37kW	11.05.2012
CTR-12-0130 Radiated Emissions, Radiated Immunity, Conducted Immunity, ESD EUT1: FC-302P7K5T7, EUT2: FC-302P3K0T7	30.05.2012
CTR-13-0120 Radiated Emissions, ESD; Radiated Immunity, Surge Immunity, Conducted Immunity, Conducted Emissions EUT: FC-302P30KT5E20H1BGCD	17.05.2013
CTR-13-0155 Conducted Emissions EUT1: FC-302P11KT7E20H4BGCD, EUT2: FC-302P30KT7E20H4BGCD	26.08.2013

All other documents remain as listed in the DAD associated with previous certificate nos. 10/70021, 10/70021(E1).



Jacob Munk Plum
Surveyor, Electrical Section

Supplementary Type Approval Terms and Conditions

Type Approval certifies that a representative sample of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein. It does not mean or imply approval for any other use, nor approval of any product(s) designed or manufactured otherwise than in strict conformity with the said representative sample.

Type Approval is based on the understanding that the manufacturer's recommendations and instructions and any relevant requirements of the Rules and Regulations are complied with.

Type Approval does not eliminate the need for normal inspection and survey procedures required by the Rules and Regulations.

Lloyd's Register EMEA reserves the right to cancel or withdraw this Type Approval Certificate in accordance with the Lloyd's Register Type Approval System Procedure.



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DESIGN APPRAISAL DOCUMENT

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SPECIFICATION OF TYPE/ENCLOSURE/FRAME/POWER

Product: Frequency Converters

Model: VLT® HVAC Drive Series FC-102 (Low/Medium Power)

FC-102: 200-240V (T2)				
Power rating	Enclosure Type			
[kW]	IP20 (*1)	IP21 (*2)	IP55 (*3)	IP66 (*4)
1.1	A2	A2 (*5)	A4/A5	
1.5				
2.2				
3.0	A3	A3 (*5)	A5	
3.7				
4.0	N/A			
5.5	B3	B1		
7.5				
11				
15	B4	B2		
18.5				
22	C3	C1		
30				
37	C4	C2		
45				
55				
75	N/A			
90				

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Product: Frequency Converters
Model: VLT® HVAC Drive Series FC-102 (Low/Medium Power)

FC-102: 380-480V (T4) & 380-500V (T5)	
Power rating	Enclosure Type
[kW]	IP20 (*1) IP21 (*2) IP55 (*3) IP66 (*4)
1.1	A2 A2(*5) A4/A5
1.5	
2.2	
3.0	
3.7	N/A
4.0	A2 A2(*5) A4/A5
5.5	A3 A3(*5) A5
7.5	
11	B3 B1
15	
18.5	
22	B4 B2
30	
37	
45	C3 C1
55	
75	C4 C2
90	



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Product: Frequency Converters

Model: VLT® HVAC Drive Series FC-102 (Low/Medium Power)

FC-102: 525-690V (T7)		Enclosure Type			
Power rating [kW]	IP20 (*1)	IP21 (*2)	IP55 (*3)	IP66 (*4)	
1.1	A3	N/A			
1.5					
2.2					
3.0					
4.0					
5.5					
7.5	B4	B2			
11					
15					
18.5					
22					
30					
37	C3	C2			
45					
55					
75	D3h				
90					



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Product: Frequency Converters

Model: VLT[®] HVAC Drive Series FC-102 (Low/Medium Power)

(*1) IP20/Panel mount. All IP20 versions can be upgraded to IP21 with optional kit

(*2) IP21/NEMA Type 1

(*3) IP55/NEMA Type 12

(*4) IP66/NEMA Type 4X

(*5) IP20/Panel with IP21 upgrade kit

H1; H2; H3; H4 RFI comply with IACS E10 requirements except radiated and conducted emissions.

H5 RFI complies with IACS E10 requirements except radiated and conducted emissions.

Ruggedized boards, selection "R" in character 20, or H5 in character 16-17 must be selected

Limitations: Converters which exceed the limits for radiated and conducted emissions of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system Planned EMC measures according to IEC60533 shall be assessed prior to installation on board.



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Product: Frequency Converters

Model: VLT® AQUA Drive Series FC-202 (Low/Medium Power)

FC-202: 200-240V (T2)				
Power rating [kW]	Enclosure Type			
	IP20 (*1)	IP21 (*2)	IP55 (*3)	IP66 (*4)
0.25	A2	A2 (*5)	A4/A5	
0.37				
0.55				
0.75				
1.1				
1.5				
2.2				
3.0	A3	A3(*5)	A5	
3.7				
4.0	N/A			
5.5	B3	B1		
7.5				
11				
15	B4	B2		
18.5				
22	C3	C1		
30				
37				
45	C4	C2		



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Product: Frequency Converters

Model: VLT® AQUA Drive Series FC-202 (Low/Medium Power)

FC-202: 380-480V (T4) & 380-500V (T5)	
Power rating	Enclosure Type
[kW]	IP20 (*1) IP21 (*2) IP55 (*3) IP66 (*4)
0.37	A2 A2(*5) A4/ A5
0.55	
0.75	
1.1	
1.5	
2.2	
3.0	
4.0	
5.5	A3 A3(*5) A5
7.5	
11	B3 B1
15	
18.5	
22	B4 B2
30	
37	
45	C3 C1
55	
75	C4 C2
90	

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Product: Frequency Converters
Model: VLT® AQUA Drive Series FC-202 (Low/Medium Power)

FC-202: 525-690V (T7)		Enclosure Type			
Power rating [kW]	IP20 (*1)	IP21 (*2)	IP55 (*3)	IP66 (*4)	
1.1	A3	N/A			
1.5					
2.2					
3.0					
4.0					
5.5					
7.5					
11	B4	B2			
15					
18.5					
22					
30					
37					
45	C3	C2			
55					
75					
90	D3h				

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Product: Frequency Converters

Model: VLT® AQUA Drive Series FC-202 (Low/Medium Power)

(*1) IP20/Panel mount. All IP20 versions can be upgraded to IP21 with optional kit

(*2) IP21/NEMA Type 1

(*3) IP55/NEMA Type 12

(*4) IP66/NEMA Type 4X

(*5) IP20/Panel with IP21 upgrade kit

H1; H2; H3; H4 RFI comply with IACS E10 requirements except radiated and conducted emissions

H5 RFI complies with IACS E10 requirements except radiated and conducted emissions.

Limitations: Converters which exceed the limits for radiated and conducted emissions of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system Planned EMC measures according to IEC60533 shall be assessed prior to installation on board.



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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-301/302 (Low/Medium Power)

FC-301/302: 200-240V (T2)				
Power rating [kW]	Enclosure Type			
	IP20 (*1)	IP21 (*2)	IP55 (*3)	IP66 (*4)
0.25	A2	A2(*5)	A4/ A5	
0.37				
0.55				
0.75				
1.1				
1.5				
2.2	A3	A3(*5)	A5	
3.0				
3.7	B3	B1		
5.5		B2		
7.5		B2		
11	B4	C1		
15				
18.5	C3	C2		
22				
30				
37	C4			

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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-301/302 (Low/Medium Power)

FC-301/302: 380-480V (T4) & 380-500V (T5)				
Power rating	Enclosure Type			
[kW]	IP20 (*1)	IP21 (*2)	IP55 (*3)	IP66 (*4)
0.37	A2	A2(*5)	A4/ A5	
0.55				
0.75				
1.1				
1.5				
2.2				
3.0				
4.0	A3	A3(*5)	A5	
5.5				
7.5	B3	B1		
11				
15				
18.5	B4	B2		
22				
30	C3	C1		
37				
45				
55	C4	C2		
75				

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Product: Frequency Converters
Model: VLT® Automation Drive Series FC-301/302 (Low/Medium Power)

FC-301/302: 525-690V (T7)				
Power rating	Enclosure Type			
[kW]	IP20 (*1)	IP21 (*2)	IP55 (*3)	IP66 (*4)
1.1	A3	Not Available		
1.5				
2.2				
3.0				
4.0				
5.5				
7.5	B4	B2		
11				
15				
18.5				
22				
30	C3	C2		
37				
45				
55	D3h			
75				



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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-301/302 (Low/Medium Power)

(*1) IP20/Panel mount. All IP20 versions can be upgraded to IP21 with optional kit

(*2) IP21/NEMA Type 1

(*3) IP55/NEMA Type 12

(*4) IP66/NEMA Type 4X

(*5) IP20/Panel with IP21 upgrade kit

H1; H2; H3; H4 RFI comply with IACS E10 requirements except radiated and conducted emissions

H5 RFI complies with IACS E10 requirements except radiated and conducted emissions.

Ruggedized boards, selection "R" in character 20, or H5 in character 16-17 must be selected

Limitations: Converters which exceed the limits for radiated and conducted emissions of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system Planned EMC measures according to IEC60533 shall be assessed prior to installation on board.



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Product: Frequency Converters

Model: Series FC-102, FC-202, FC-301/302 (Low/Medium Power)

Selection types for Type Codes for FC-102, FC-202, FC-301/302

1	4	7	10	23	24-39 (SW +options)
---	---	---	----	----	---------------------------

Basic string definitions:

Product Group (character 1-3)

FC- : Adjustable Frequency Converters

VLT series (character 4-6)

- 102 : VLT HVAC Drive - Advanced version
- 202 : VLT AQUA Drive - Advanced version
- 301 : VLT Automation Drive - Standard version
- 302 : VLT Automation Drive - Advanced version

Power size (character 7-10)

- PK25 : 0.25 kW / 0.33 HP
-
- P75K : 75 kW / 100 HP
- P90K : 90 kW / 125 HP
- N75K : 75 kW / 100 HP (D3h)
- N90K : 90 kW / 125 HP (D3h)

Voltage: (character 11-12)

- T2 : Three phase 200-240 V_{AC}
- T4 : Three phase 380-480 V_{AC}
- T5 : Three phase 380-500 V_{AC}
- T7 : Three Phase 525-690 V_{AC}

Enclosure (character 13-15)

- E20 : IP20 / Chassis
- E21 : IP21 / Type 1
- E55 : IP55 / Type 12
- E66 : IP66 / Type 4X

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Product: Frequency Converters

Model: Series FC-102, FC-202, FC-301/302 (Low/Medium Power)

Selection types for Type Codes for FC-102, FC-202, FC-301/302 (Low/Medium Power) (continued)

Hardware (character 16-23)

Hardware, RFI filter (character 16-17) – As follows:

- H6: RFI for Maritime use. H6 RFI complies with IACS E10 requirements except radiated and conducted emissions
- H5: RFI for Maritime use. H5 RFI complies with IACS E10 requirements except radiated and conducted emissions
- H4: RFI for Maritime use. H4 RFI complies with IACS E10 requirements except radiated and conducted emissions
- H2: RFI Class A2 (C3)

Hardware, Brake & Stop (character 18)

Hardware, Display (character 19)

Hardware, Coating (character 20) – As follows:

- C: Coated PCB;
- R: Coated PCB + Ruggedized

Hardware, Mains options (character 21)

Hardware, adaptation A (character 22)

Hardware, adaptation B (character 23)

Software (character 24-28)

Options – A (character 29-30)

Options – B (character 31-32)

Options – C (character 33-37)

Options – D (character 38-39)



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Product: Frequency Converters

Model: Series FC-102, FC-202, FC-301/302 (Low/Medium Power)

Brand Labelling and Customer Specific Definitions

Brand labelling and customer specific drives are following the type codes except the characters 1-6 for product group and VLT series. Character 1-6 are used for customer specific definitions.

Basic string definitions for brand labelling and customer specific drives:

Product Group and VLT series (character 1-6)

<u>Model #</u>	<u>Description</u>
AF-600	Equals to FC-102
AKD102	
ADS102	
IVS102	
TR-200	
ITT102	
CUE202	Equals to FC-202
FC-311	Equals to FC-301
LD-302	Equals to FC-302
IR-302	
IRV302	
CD-302	
MWU302	
CDS302	
DV-302	
3G3DV	
LB-302	
AFE302	
AF-650	
FCK302	
FC-312	

Product: Frequency Converters

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Model: VLT® HVAC Drive Series FC-102 (High Power)

FC-102: 380-480V (T4)					
Power rating [kW]	Enclosure type				
	IP20 (*1)	IP00 (*1)	IP21 (*2)	IP54 (*3)	
110	D3h	NA	D1h/D5h/D6h		
132					
160	D4h		D2h/D7h/D8h		
200					
250					
315	NA		D3	D1	
110		D4	D2		
132					
160		E2	E1		
200					
250					
315		NA	F1/F3		
355					
400			NA	F2/F4	
450					
500					
560					
630					
710					
800					
1M0					

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Product: Frequency Converters
Model: VLT® HVAC Drive Series FC-102 (High Power)

FC-102: 525-690V (T7)				
Power rating [kW]	Enclosure type			
	IP20 (*1)	IP00 (*1)	IP21 (*2)	IP54 (*3)
75	D3h	NA	D1h/D5h/D6h	
90				
110				
132				
160				
200	D4h	NA	D2h/D7h/D8h	
250				
315				
400				
45	NA	D3	D1	
55				
75				
90				
110				
132		D4	D2	
160				
200				
250				
315				
400		E2	E1	
450				
500				
560				
630				
710		NA	F1/F3	
800				
900			F2/F4	
1M0				
1M2				
1M4				

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Product: Frequency Converters

Model: VLT® HVAC Drive Series FC-102 (High Power)

FC-102: 380-480V (T4)			
Power rating [kW]	Enclosure type		
	IP00 (*1)	IP21 (*2)	IP54 (*3)
315	NA	F8/F9	
355			
400			
450			
500			
560		F10/F11	
630			
710			
800		F12/F13	
1M0			

FC-102: 525-690V (T7)			
Power rating [kW]	Enclosure type		
	IP00(*1)	IP21 (*2)	IP54 (*3)
450	NA	F8/F9	
500			
560			
630			
710			
800		F10/F11	
900			
1M0			
1M2		F12/F13	
1M4			

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Product: Frequency Converters
Model: VLT® HVAC Drive Series FC-102 (High Power)

FC-102: 380-480V (T4)			
Power rating [kW]	Enclosure type		
	IP00 (*1)	IP21 (*2)	IP54 (*3)
160	NA	D11/D13/D1n	
200		D11/D13/D2n	
250		E7/E9	
315		F17/F18	
355			
400			
450			
500			
560			
630			
710			

- (*1) IP00/IP20/Panel mount.
- (*2) IP21/NEMA Type 1
- (*3) IP54/NEMA Type 12

Limitations: Converters which exceed the limits for radiated and conducted emissions of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system Planned EMC measures according to IEC60533 shall be assessed prior to installation on board.

Ruggedized boards, selection "R" in character 20, must be selected for D1h - D8h and D1n - D2n.



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Product: Frequency Converters
Model: VLT® HVAC Drive Series FC-102 (High Power)

Selection of Type Codes for FC-100

----- (character 24 – 39 software + options)
1 4 7 10 11 23

Basic string definitions:

Product Group (character 1-3)

FC- : Adjustable Frequency Converters

VLT series (character 4-6)

102 VLT HVAC Drive – Advanced version

Power size (character 7-10)

P110: 110 kW / 150 HP

N110: 110 kW/ 150 HP

Voltage: (character 11-12)

T4 : Three phase 380-480 VAC

T7 : Three Phase 525-690 VAC

Enclosure (character 13-15)

E00 : IP00 / Chassis

E20 : IP20 / Chassis

E2S: IP20 / Chassis (medium power D-Frame)

E21 : IP21 / Type 1

E2D: IP21 / Type 1 (medium power D-Frame)

H21: IP21 / Type 1 with heater

E54 : IP54/ Type 12

H54.: IP54 / Type 12 with heater

E5H : Hybrid IP54

E2M : IP20 / Type 1 with mains shield

E5M : IP54 / Type 12 with mains shield

E5D : IP54 / Type 12 (medium power D-Frame)

Hardware (character 16-23)

Hardware, RFI filter (character 16-17)

H2: 6 Pulse Drive RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

H4: 6 Pulse Drive RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

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Product: Frequency Converters Model: VLT® HVAC Drive Series FC-102 (High Power)

B2: 12 Pulse Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions) "

B4: 12 Pulse Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

N2: Low Harmonic Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

N4: Low Harmonic Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

Hardware, Brake & Stop (character 18)

Hardware, Display (character 19)

Hardware, Coating (character 20)

Hardware, Mains options (character 21)

Hardware, adaptation A (character 22)

Hardware, adaptation B (character 23)

Software (character 24-28)

Options - A (character 29-30)

Options - B (character 31-32)

Options - C (character 33-37)

Options - D (character 38-39)

Brand labelling and customer specific definitions

Brand labelling and customer specific drives are following the type codes except the characters 1-6 for product group and VLT series. Character 1-6 are used for customer specific definitions.

Basic string definitions for brand labelling and customer specific drives:

Product Group and VLT series (character 1-6)

AF-600	Same as FC-102
AKD102	
FC-103	
ADS102	
IVS102	
TR-200	
ITT102	



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Product: Frequency Converters

Model: VLT® AQUA Drive Series FC-202 (High Power)

FC-202: 380-480V (T4)				
Power rating [kW]	Enclosure type			
	IP20 (*1)	IP00 (*1)	IP21 (*2)	IP54 (*3)
110	D3h	NA	D1h/D5h/D6h	
132				
160				
200	D4h		D2h/D7h/D8h	
250				
315				
110	NA	D3	D1	
132		D4	D2	
160				
200		E2	E1	
250				
315				
355		NA	F1/F3	
400				
450				
500				
560				
630		NA	F2/F4	
710				
800				
1M0				

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Product: Frequency Converters
Model: VLT® AQUA Drive Series FC-202 (High Power)

FC-202: 525-690V (T7)					
Power rating [kW]	Enclosure type				
	IP20 (*1)	IP00 (*1)	IP21 (*2)	IP54 (*3)	
75	D3h	NA	D1h/D5h/D6h		
90					
110					
132					
160					
200					
250	D4h	NA	D2h/D7h/D8h		
315					
400					
45					
55	NA	D3	D1		
75					
90					
110					
132					
160		D4	NA	D2	
200					
250					
315					
400		E2	NA	E1	
450					
500					
560					
630					
710					
800					
900					
1M0		NA	NA	F1/F3	
1M2					
1M4					
1M4					
1M4	NA	NA	F2/F4		
1M4					
1M4					
1M4					

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Product: Frequency Converters

Model: VLT® AQUA Drive Series FC-202 (High Power)

FC-202: 380-480V (T4)			
Power rating [kW]	Enclosure type		
	IP00 (*1)	IP21 (*2)	IP54 (*3)
315	NA	F8/F9	
355			
400			
450		F10/F11	
500			
560			
630			
710		F12/F13	
800			
1M0			

FC-202: 525-690V (T7)			
Power rating [kW]	Enclosure type		
	IP00 (*1)	IP21 (*2)	IP54 (*3)
450	NA	F8/F9	
500			
560			
630		F10/F11	
710			
800			
900			
1M0		F12/F13	
1M2			
1M4			

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Product: Frequency Converters
Model: VLT® AQUA Drive Series FC-202 (High Power)

FC-202: 380-480V (T4)			
Power rating [kW]	Enclosure type		
	IP00 (*1)	IP21 (*2)	IP54 (*3)
160	NA	D11/D13/D1n	
200		D11/D13/D2n	
250		D11/D13/D2n	
315		E7/E9	
355		E7/E9	
400		E7/E9	
450		E7/E9	
500		E7/E9	
560		F17/F18	
630		F17/F18	
710	F17/F18		

- (*1) IP00/IP20/Panel mount.
- (*2) IP21/NEMA Type 1
- (*3) IP54/NEMA Type 12

Limitations: Converters which exceed the limits for radiated and conducted emissions of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system Planned EMC measures according to IEC60533 shall be assessed prior to installation on board.

Ruggedized boards, selection "R" in character 20, must be selected for D1h - D8h and D1n - D2n.



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Product: Frequency Converters

Model: VLT® AQUA Drive Series FC-202 (High Power)

Selection types for Type Codes for FC-200

----- (character 24 – 39 software + options)
1 4 7 10 11 ----- 23

Basic string definitions:

Product Group (character 1-3)

FC- : Adjustable Frequency Converters

VLT series (character 4-6)

202 VLT AQUA Drive – Advanced version

Power size (character 7-10)

P110: 110 KW / 150 HP

N110: 110 KW / 150 HP

Voltage: (character 11-12)

T4 : Three phase 380-480 VAC

T7 : Three Phase 525-690 VAC

Enclosure (character 13-15)

E00 : IP00 / Chassis

E20: IP20 / Chassis

E2S: IP20 / Chassis (medium power D-Frame)

E21 : IP21 / Type 1

E2D: IP21 / Type 1 (medium power D-Frame)

H21: IP21 / Type 1 with heater

E54 : IP54/ Type 12

H54:: IP54 / Type 12 with heater

E5H : Hybrid IP54

E2M: IP21 / Type 1 with mains shield

E5M: IP54 / Type 12 with mains shield

E5D : IP54 / Type 12 (medium power D-Frame)

Hardware (character 16-23)

Hardware, RFI filter (character 16-17)

H2: 6 Pulse Drive RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

H4: 6 Pulse Drive RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

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Product: Frequency Converters
Model: VLT® AQUA Drive Series FC-202 (High Power)

B2: 12 Pulse Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions) "

B4: 12 Pulse Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

N2: Low Harmonic Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

N4: Low Harmonic Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

- Hardware, Brake & Stop (character 18)*
- Hardware, Display (character 19)*
- Hardware, Coating and ruggedized (character 20)*
- Hardware, Mains options (character 21)*
- Hardware, adaptation A (character 22)*
- Hardware, adaptation B (character 23)*

- Software (character 24-28)**
- Options - A (character 29-30)**
- Options - B (character 31-32)**
- Options - C (character 33-37)**
- Options - D (character 38-39)**

Brand labelling and customer specific definitions

Brand labelling and customer specific drives are following the type codes except the characters 1-6 for product group and VLT series. Character 1-6 are used for customer specific definitions.

Basic string definitions for brand labelling and customer specific drives:

Product Group and VLT series (character 1-6)

CUE202	Same as FC-
FC-322	202



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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-302 (High Power)

FC-302: 380-500V (T5)				
Power rating [kW]	Enclosure type			
	IP20 (*1)	IP00 (*1)	IP21 (*2)	IP54 (*3)
90	D3h	NA	D1h/D5h/D6h	
110				
132				
160	D4h		D2h/D7h/D8h	
200				
250				
90	NA	D3	D1	
110		D4	D2	
132				
160		E2	E1	
200				
250				
315		NA	F1/F3	
355				
400				
450				
500				
560		NA	F2/F4	
630				
710				
800				

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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-302 (High Power)

FC-302: 525-690V (T7)				
Power rating [kW]	Enclosure type			
	IP20 (*1)	IP00 (*1)	IP21 (*2)	IP54 (*3)
55	D3h	NA	D1h/D5h/D6h	
75				
90				
110				
132				
160	D4h		D2h/D7h/D8h	
200				
250				
315				
37				
45	NA	D3	D1	
55				
75				
90				
110				
132		D4	D2	
160				
200				
250				
315				
355	E2	E1		
400				
500				
560				
630				
710	NA	F1/F3		
800				
900		F2/F4		
1M0				
1M2				

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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-302 (High Power)

FC-302: 380-500V (T5)			
Power rating [kW]	Enclosure type		
	IP00(*1)	IP21 (*2)	IP54 (*3)
250	NA	F8/F9	
315			
355			
400			
450		F10/F11	
500			
560			
630		F12/F13	
710			
800			

FC-302: 525-690V (T7)			
Power rating [kW]	Enclosure type		
	IP00(*1)	IP21 (*2)	IP54 (*3)
355	NA	F8/F9	
400			
500			
560			
630		F10/F11	
710			
800			
900		F12/F13	
1M0			
1M2			

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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-302 (High Power)

FC-302: 380-500V (T5)			
Power rating [kW]	Enclosure type		
	IP00 (*1)	IP21 (*2)	IP54 (*3)
132	NA	D11	
160			
200			
250		E7	
315			
355			
400			
450		F17	
500			
560			
630			

FC-302: 380-500V (T5)			
Power rating [kW]	Enclosure type		
	IP00 (*1)	IP21 (*2)	IP54 (*3)
132	NA	D11/D13/D1n	
160		D11/D13/D2n	
200		E7/E9	
250			
315			
355			
400		F17/F18	
450			
500			
560			
630			

(*1) IP00/IP20 Panel mount.

(*2) IP21/NEMA Type 1

(*3) IP54/NEMA Type 12

Limitations: Converters which exceed the limits for radiated and conducted emissions of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system Planned EMC measures according to IEC60533 shall be assessed prior to installation on board.

Ruggedized boards, selection "R" in character 20, must be selected for D1h – D8h and D1n – D2n.

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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-302 (High Power)

B2: 12 Pulse Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions) "

B4: 12 Pulse Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

N2: Low Harmonic Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

N4: Low Harmonic Drive with RFI for Maritime (complies with IACS E10 requirements except radiated and conducted emissions)

Hardware, Brake & Stop (character 18)

Hardware, Display (character 19)

Hardware, Coating and Ruggedized (character 20)

Hardware, Mains options (character 21)

Hardware, adaptation A (character 22)

Hardware, adaptation B (character 23)

Software (character 24-28)

Options - A (character 29-30)

Options - B (character 31-32)

Options - C (character 33-37)

Options - D (character 38-39)



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Product: Frequency Converters

Model: VLT® Automation Drive Series FC-302 (High Power)

Brand labelling and customer specific definitions

Brand labelling and customer specific drives are following the type codes except the characters 1-6 for product group and VLT series. Character 1-6 are used for customer specific definitions.

Basic string definitions for brand labelling and customer specific drives:

Product Group and VLT series (character 1-6)

LD-302	Same as FC-302
IR-302	
IRV302	
CD-302	
MWU302	
CDS302	
DV-302	
3G3DV	
LB-302	
AFE302	
AF-650	
FCK302	



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Model: VLT® Active Filter AAF006 (High Power)

E21 : IP21 / Type 1

E54 : IP54/ Type 12

E2M : IP21 / Type 1 with mains shield

E5M : IP54 / Type 12 with mains shield

Hardware (character 16-23)

Hardware, RFI filter (character 16-17)

HX: Active Filter complies with IACS E10 requirements except radiated and conducted emissions

Hardware, Not Used X

Hardware, Display (character 19)

Hardware, Coating and Ruggedized (character 20)

Hardware, Mains options (character 21)

Hardware, Reserved for Future (character 22)

Hardware, Reserved for Future (character 23)

Software (character 24-28)

Options - A (character 29-30)

Options - B (character 31-32)

Options - C (character 33-37)

Options - D (character 38-39)