

Emotron VFX 2.0 Variable Speed Drive



Data Sheet
English

Emotron VFX 2.0 Variable Speed Drive

Electrical specifications related to model

Table 1 Typical motor power at mains voltage 400 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @400V [kW]	Rated current [A]	Power @400V [kW]	Rated current [A]	
VFX48-003	3.8	0.75	2.5	0.55	2.0	B
VFX48-004	6.0	1.5	4.0	1.1	3.2	
VFX48-006	9.0	2.2	6.0	1.5	4.8	
VFX48-008	11.3	3	7.5	2.2	6.0	
VFX48-010	14.3	4	9.5	3	7.6	
VFX48-013	19.5	5.5	13.0	4	10.4	
VFX48-018	27.0	7.5	18.0	5.5	14.4	
VFX48-026	39	11	26	7.5	21	C
VFX48-031	46	15	31	11	25	
VFX48-037	55	18.5	37	15	29.6	
VFX48-046	69	22	46	18.5	37	
VFX40-060	92			30	61	X2
VFX40-073	111			37	74	
VFX48-090	108	45	90	37	72	E
VFX48-109	131	55	109	45	87	
VFX48-146	175	75	146	55	117	
VFX48-175	210	90	175	75	140	
VFX48-210	252	110	210	90	168	F
VFX48-250	300	132	250	110	200	
VFX48-300	360	160	300	132	240	G
VFX48-375	450	200	375	160	300	
VFX48-430	516	220	430	200	344	H
VFX48-500	600	250	500	220	400	
VFX48-600	720	315	600	250	480	I
VFX48-650	780	355	650	315	520	
VFX48-750	900	400	750	355	600	
VFX48-860	1032	450	860	400	688	J
VFX48-1000	1200	500	1000	450	800	
VFX48-1200	1440	630	1200	500	960	K
VFX48-1500	1800	800	1500	630	1200	

* Available during limited time and as long as allowed by drive temperature.

Table 2 Typical motor power at mains voltage 460 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @460 V [hp]	Rated current [A]	Power @460V [hp]	Rated current [A]	
VFX48-003	3.8	1	2.5	1	2.0	B
VFX48-004	6.0	2	4.0	1.5	3.2	
VFX48-006	9.0	3	6.0	2	4.8	
VFX48-008	11.3	3	7.5	3	6.0	
VFX48-010	14.3	5	9.5	3	7.6	
VFX48-013	19.5	7.5	13.0	5	10.4	
VFX48-018	27.0	10	18.0	7.5	14.4	
VFX48-026	39	15	26	10	21	C
VFX48-031	46	20	31	15	25	
VFX48-037	55	25	37	20	29.6	
VFX48-046	69	30	46	25	37	
VFX50-060	92			40	61	X2
VFX48-090	108	60	90	50	72	E
VFX48-109	131	75	109	60	87	
VFX48-146	175	100	146	75	117	
VFX48-175	210	125	175	100	140	
VFX48-210	252	150	210	125	168	F
VFX48-250	300	200	250	150	200	G
VFX48-300	360	250	300	200	240	
VFX48-375	450	300	375	250	300	H
VFX48-430	516	350	430	250	344	
VFX48-500	600	400	500	350	400	I
VFX48-600	720	500	600	400	480	
VFX48-650	780	550	650	400	520	
VFX48-750	900	600	750	500	600	J
VFX48-860	1032	700	860	550	688	
VFX48-1000	1200	800	1000	600	800	K
VFX48-1200	1440	1000	1200	700	960	
VFX48-1500	1800	1250	1500	750	1200	

* Available during limited time and as long as allowed by drive temperature.

Table 3 Typical motor power at mains voltage 525 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @525V [kW]	Rated current [A]	Power @525V [kW]	Rated current [A]	
VFX52-003	3.8	1.1	2.5	1.1	2.0	B
VFX52-004	6.0	2.2	4.0	1.5	3.2	
VFX52-006	9.0	3	6.0	2.2	4.8	
VFX52-008	11.3	4	7.5	3	6.0	
VFX52-010	14.3	5.5	9.5	4	7.6	
VFX52-013	19.5	7.5	13.0	5.5	10.4	
VFX52-018	27.0	11	18.0	7.5	14.4	
VFX52-026	39	15	26	11	21	C
VFX52-031	46	18.5	31	15	25	
VFX52-037	55	22	37	18.5	29.6	
VFX52-046	69	30	46	22	37	X2
VFX50-060	92			37	61	
VFX69-090	108	55	90	45	72	F69
VFX69-109	131	75	109	55	87	
VFX69-146	175	90	146	75	117	
VFX69-175	210	110	175	90	140	
VFX69-210	252	132	210	110	168	H69
VFX69-250	300	160	250	132	200	
VFX69-300	360	200	300	160	240	
VFX69-375	450	250	375	200	300	
VFX69-430	516	300	430	250	344	I69
VFX69-500	600	315	500	300	400	
VFX69-600	720	400	600	315	480	J69
VFX69-650	780	450	650	355	520	
VFX69-750	900	500	750	400	600	K69
VFX69-860	1032	560	860	450	688	
VFX69-1000	1200	630	1000	500	800	

* Available during limited time and as long as allowed by drive temperature.

Table 4 Typical motor power at mains voltage 575 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @575 V [hp]	Rated current [A]	Power @575V [hp]	Rated current [A]	
VFX69-090	108	75	90	60	72	F69
VFX69-109	131	100	109	75	87	
VFX69-146	175	125	146	100	117	
VFX69-175	210	150	175	125	140	
VFX69-210	252	200	210	150	168	H69
VFX69-250	300	250	250	200	200	
VFX69-300	360	300	300	250	240	
VFX69-375	450	350	375	300	300	
VFX69-430	516	400	430	350	344	I69
VFX69-500	600	500	500	400	400	J69
VFX69-600	720	600	600	500	480	
VFX69-650	780	650	650	550	520	
VFX69-750	900	750	750	600	600	K69
VFX69-860	1032	850	860	700	688	
VFX69-1000	1200	1000	1000	850	800	

* Available during limited time and as long as allowed by drive temperature.

Table 5 Typical motor power at mains voltage 690 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @690 V [kW]	Rated current [A]	Power @690V [kW]	Rated current [A]	
VFX69-090	108	90	90	75	72	F69
VFX69-109	131	110	109	90	87	
VFX69-146	175	132	146	110	117	
VFX69-175	210	160	175	132	140	
VFX69-210	252	200	210	160	168	H69
VFX69-250	300	250	250	200	200	
VFX69-300	360	315	300	250	240	
VFX69-375	450	355	375	315	300	
VFX69-430	516	450	430	315	344	I69
VFX69-500	600	500	500	355	400	J69
VFX69-600	720	600	600	450	480	
VFX69-650	780	630	650	500	520	
VFX69-750	900	710	750	600	600	K69
VFX69-860	1032	800	860	650	688	
VFX69-900	1080	900	900	710	720	
VFX69-1000	1200	1000	1000	800	800	

* Available during limited time and as long as allowed by drive temperature.

General electrical specifications

Table 6 General electrical specifications

General	
Mains voltage: VFX40 VFX48 VFX50/52 VFX69	230-415V +10%/-15% (-10% at 230 V) 230-480V +10%/-15% (-10% at 230 V) 440-525V +10%/-15% 500-690V +10%/-15%
Mains frequency:	45 to 65 Hz
Input power factor:	0.95
Output voltage:	0-Mains supply voltage:
Output frequency:	0-400 Hz
Output switching frequency:	3 kHz
Efficiency at nominal load:	97% for models 003 to 018 98% for models 026 to 046 97.5% for models 060 to 073 98% for models 090 to 1500
Control signal inputs:	
Analogue (differential)	
Analogue Voltage/current: Max. input voltage: Input impedance:	0-±10 V/0-20 mA via software setting +30 V/30 mA 20 kΩ (voltage) 250 Ω (current)
Resolution:	11 bits + sign
Hardware accuracy:	1% type + 1 ½ LSB fsd
Non-linearity	1½ LSB
Digital:	
Input voltage: Max. input voltage: Input impedance: Signal delay:	High>9 VDC Low<4 VDC +30 VDC <3.3 VDC: 4.7 kΩ ≥3.3 VDC: 3.6 kΩ ≤8 ms
Control signal outputs	
Analogue	
Output voltage/current: Max. output voltage: Short-circuit current (∞): Output impedance:	0-10 V/0-20 mA via software setting +15 V @5 mA cont. +15 mA (voltage) +140 mA (current) 10 Ω (voltage)
Resolution:	10 bit
Maximum load impedance for current	500 Ω
Hardware accuracy:	1.9% type fsd (voltage), 2.4% type fsd (current)
Offset:	3 LSB
Non-linearity:	2 LSB
Digital	
Output voltage: Shortcircuit current(∞):	High>20 VDC @50 mA, >23 VDC open Low<1 VDC @50 mA 100 mA max (together with +24 VDC)
Relays	
Contacts	0,1 - 2 A/U _{max} 250 VAC or 42 VDC
References	
+10VDC -10VDC +24VDC	+10 VDC @10 mA Shortcircuit current +30 mA max -10 VDC @10 mA +24 VDC Short-circuit current +100 mA max (together with Digital Outputs)

Operation at higher temperatures

Most Emotron variable speed drives are made for operation at maximum of 40°C ambient temperature. However, for most models, it is possible to use the VSD at higher temperatures with little loss in performance. Table 7 shows ambient temperatures as well as derating for higher temperatures.

Table 7 Ambient temperature and derating 400–690 V types

Model	IP20		P54	
	Max temp.	Derating: possible	Max temp.	Derating: possible
VFX**-003 to VFX**-046	–	–	40 °C	-2.5%/°C to max +10 °C
VFX**-060 to VFX40-073	40 °C	-2.5%/°C to max +10 °C	35 °C	-2.5%/°C to max +10 °C
VFX48-090 to VFX48-250 VFX69-090 to VFX69-175	–	–	40 °C	-2.5%/°C to max +5 °C
VFX48-300 to VFX48-1500 VFX69-210 to VFX69-1000	40 °C	-2.5%/°C to max +5 °C	40 °C	-2.5%/°C to max +5 °C

Example

In this example we have a motor with the following data that we want to run at the ambient temperature of 45°C:

Voltage 400 V
Current 68 A
Power 37 kW

Select variable speed drive

The ambient temperature is 5 °C higher than the maximum ambient temperature. The following calculation is made to select the correct VSD model.

Derating is possible with loss in performance of 2.5%/°C.

Derating will be: $5 \times 2.5\% = 12.5\%$

Calculation for model VFX40-073

$73 \text{ A} - (12.5\% \times 73) = 63.875 \text{ A}$; this is not enough.

Calculation for model VFX48-090

$90 \text{ A} - (12.5\% \times 90) = 78.75 \text{ A}$

In this example we select the VFX48-090.

Dimensions and Weights

The table below gives an overview of the dimensions and weights. The models 300 to 1500 consist of 2, 3, 4 or 6 parallel modules built into a standard cabinet.

Table 8 Mechanical specifications, VFX40, VFX48, VFX50, VFX52

Models	Frame size	Dim. H x W x D [mm] IP20	Dim. H x W x D [mm] IP54	Weight IP20 [kg]	Weight IP54 [kg]
003 to 018	B	–	350(416)x 203 x 200	–	12.5
026 to 046	C	–	440(512) x 178 x 292	–	24
060 to 073	X2	530(590) x 220 x 270	530(590) x 220 x 270	26	26
90 to 109	E	–	950 x 285 x 314	–	56
146 to 175	E	–	950 x 285 x 314	–	60
210 to 250	F	–	950 x 345 x 314	–	74
300 to 375	G	1036 x 500 x 390	2330 x 600 x 500	140	270
430 to 500	H	1036 x 500 x 450	2330 x 600 x 600	170	305
600 to 750	I	1036 x 730 x 450	2330 x 1000 x 600	248	440
860 to 1000	J	1036 x 1100 x 450	2330 x 1200 x 600	340	580
1200 to 1500	K	1036 x 1560 x 450	2330 x 2000 x 600	496	860

Table 9 Mechanical specifications, VFX69

Models	Frame size	Dim. H x W x D [mm] IP20	Dim. H x W x D [mm] IP54	Weight IP20 [kg]	Weight IP54 [kg]
90 to 175	F69	–	1090 x 345 x 314	–	77
210 to 375	H69	1176 x 500 x 450	2330 x 600 x 600	176	311
430 to 500	I69	1176 x 730 x 450	2330 x 1000 x 600	257	449
600 to 650	J69	1176 x 1100 x 450	2330 x 1200 x 600	352	592
750 to 1000	K69	1176 x 1560 x 450	2330 x 2000 x 600	514	878

Environmental conditions

Table 10 Operation

Parameter	Normal operation
Nominal ambient temperature	0°C–40°C See table, see Table 7 for different conditions
Atmospheric pressure	86–106 kPa
Relative humidity, non-condensing	0–90%
Contamination, according to IEC 60721-3-3	No electrically conductive dust allowed. Cooling air must be clean and free from corrosive materials. Chemical gases, class 3C2. Solid particles, class 3S2.
Vibrations	According to IEC 600068-2-6, Sinusoidal vibrations: <ul style="list-style-type: none"> • 10<f<57 Hz, 0.075 mm • 57<f<150 Hz, 1g
Altitude	0–1000 m, with derating 1%/100 m of rated current up to 2000 m.

Table 11 Storage

Parameter	Storage condition
Temperature	-20 to +60 °C
Atmospheric pressure	86–106 kPa
Relative humidity, non-condensing	0– 90%

Drawings

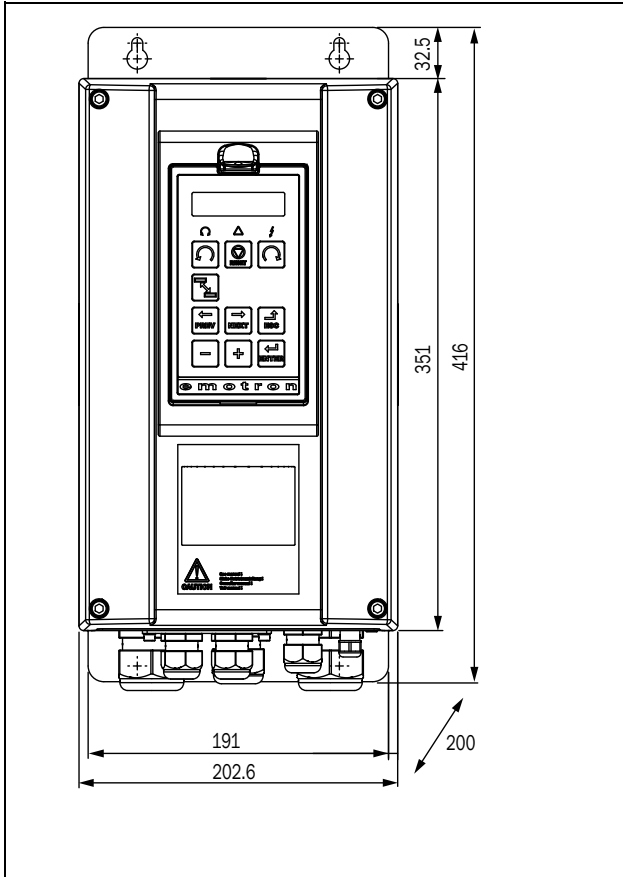


Fig. 1 VFX48/52: Model 003 – 018 (B)

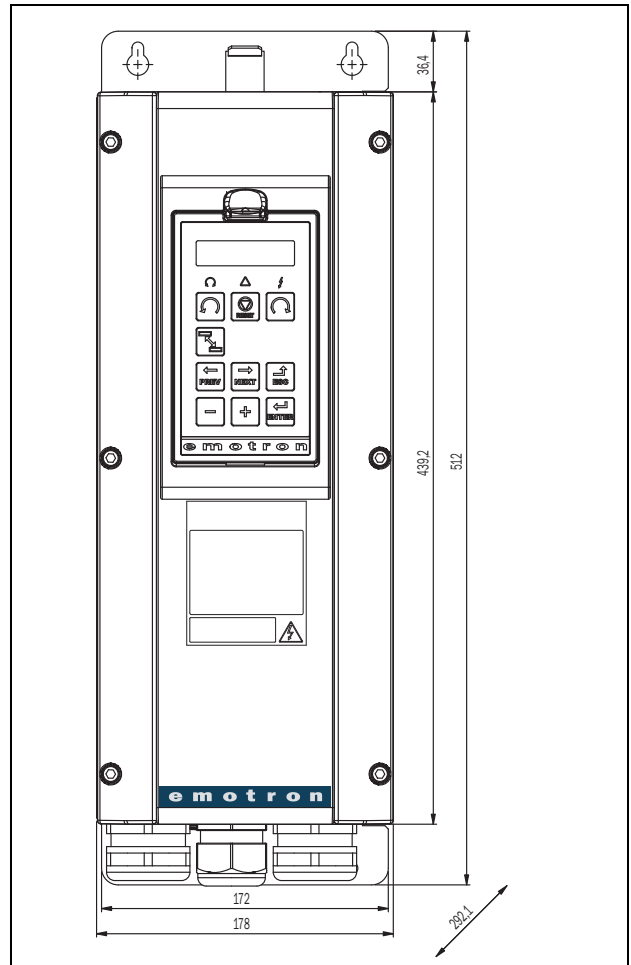


Fig. 2 VFX48/52: Model 026 – 046 (C)

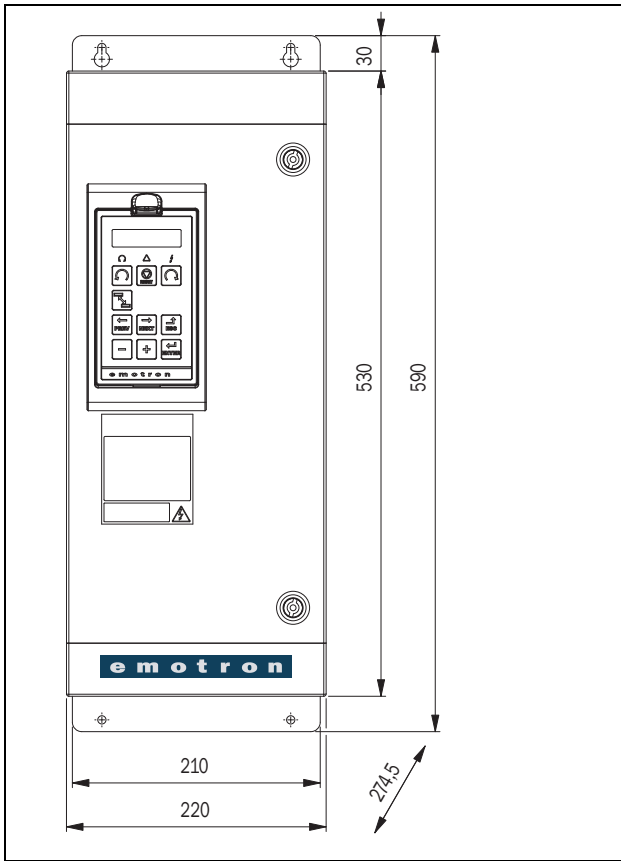


Fig. 3 VFX40/50: Model 060 – 073 (X2)

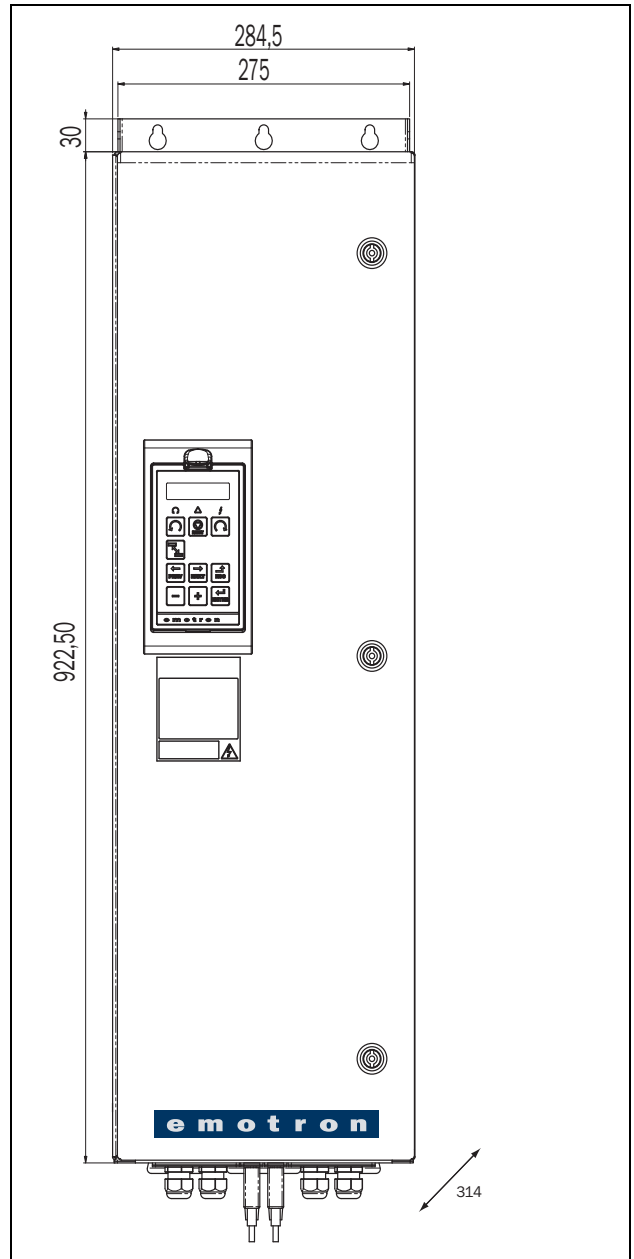


Fig. 4 VFX48: Model 090 – 175 (E)

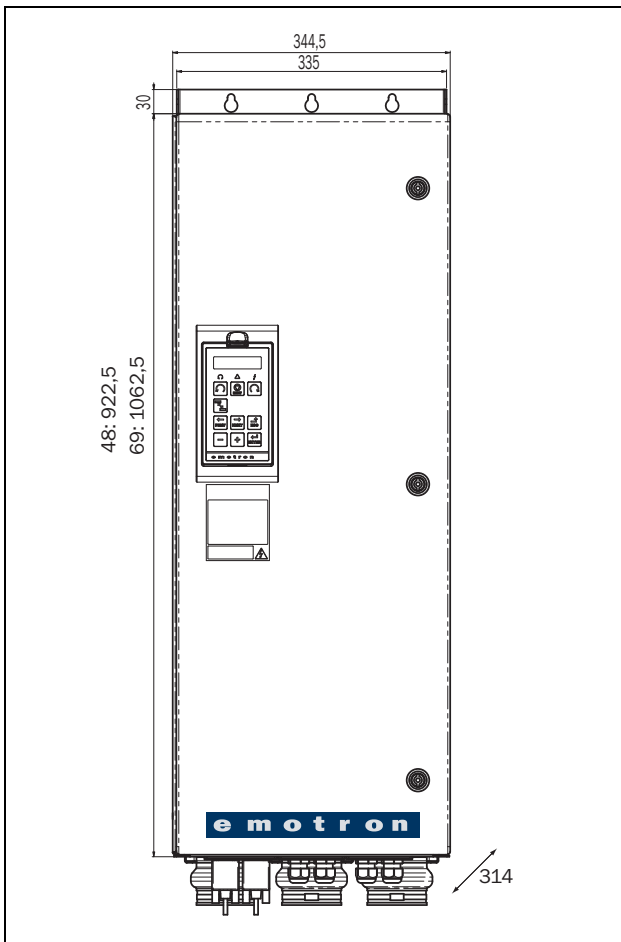


Fig. 5 VFX48: Model 210 – 250 (F)
VFX69: Model 090 – 175 (F69)

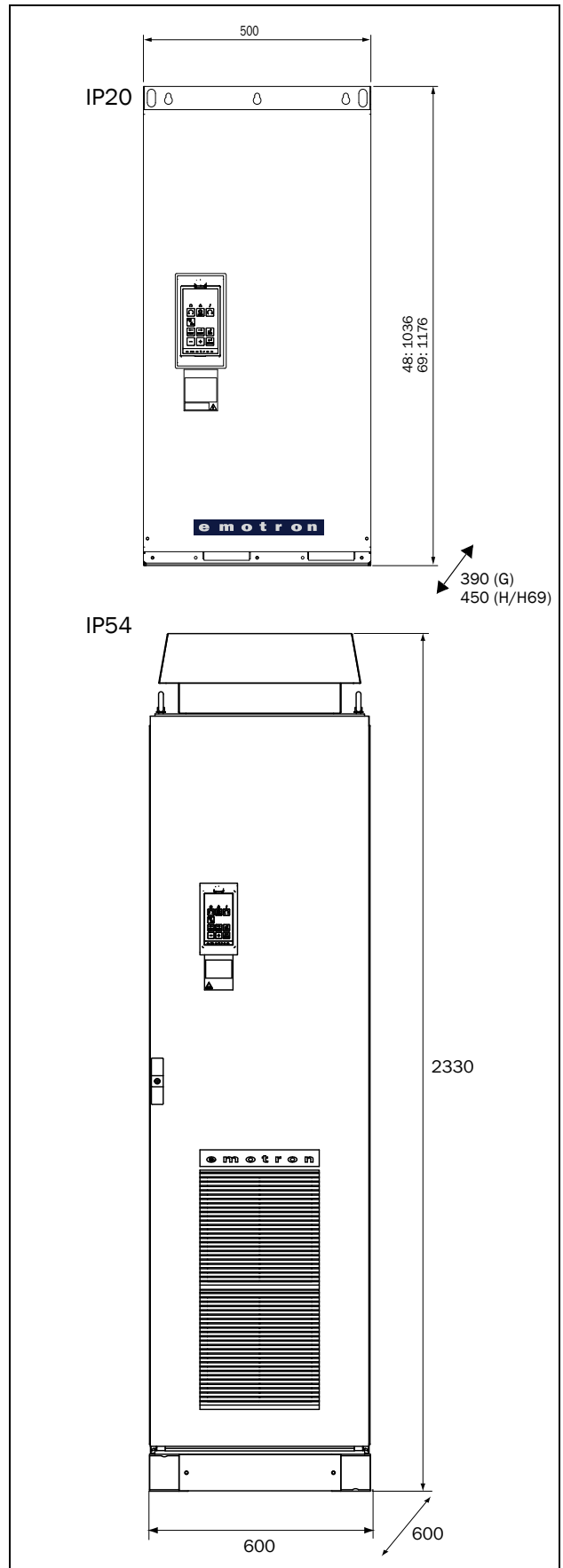


Fig. 6 VFX48: Model 300 – 500 (G and H)
VFX69: Model 210 – 375 (H69)

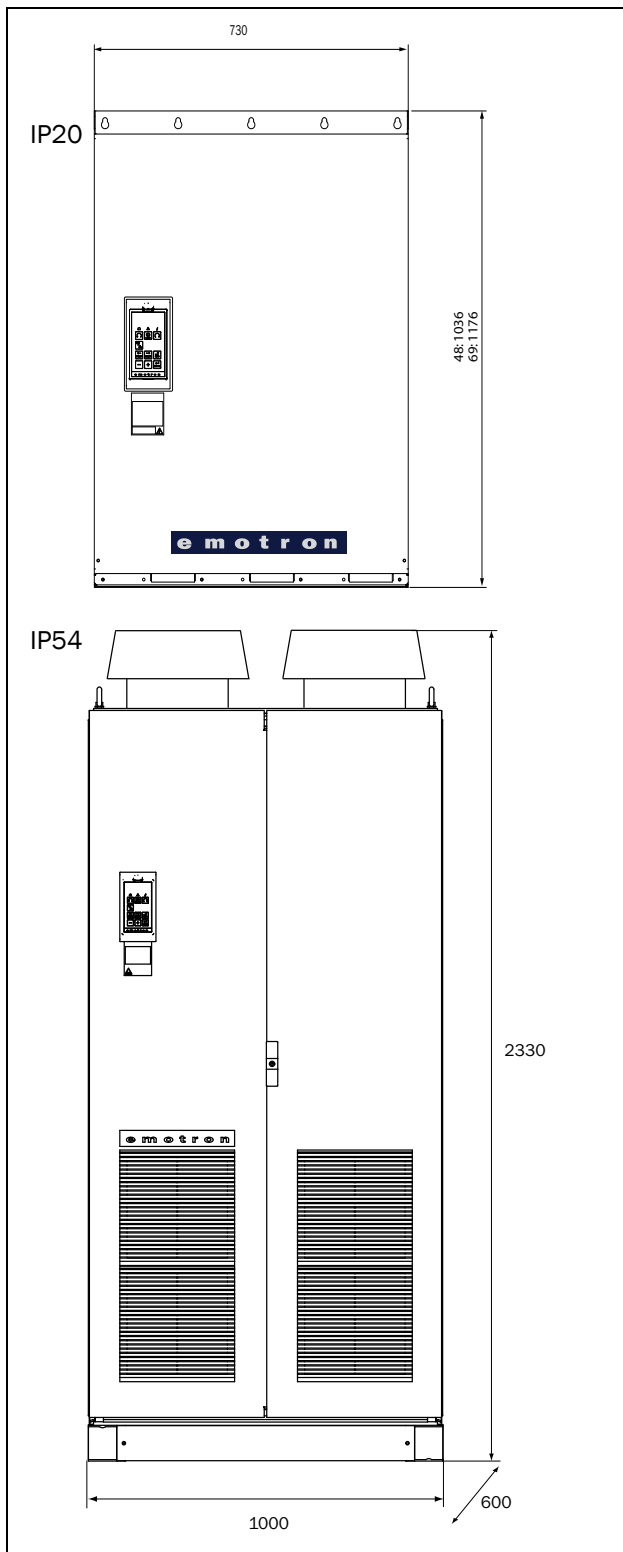


Fig. 7 VFX48: Model 600 – 750 (I)
VFX69: Model 430 – 500 (I69)

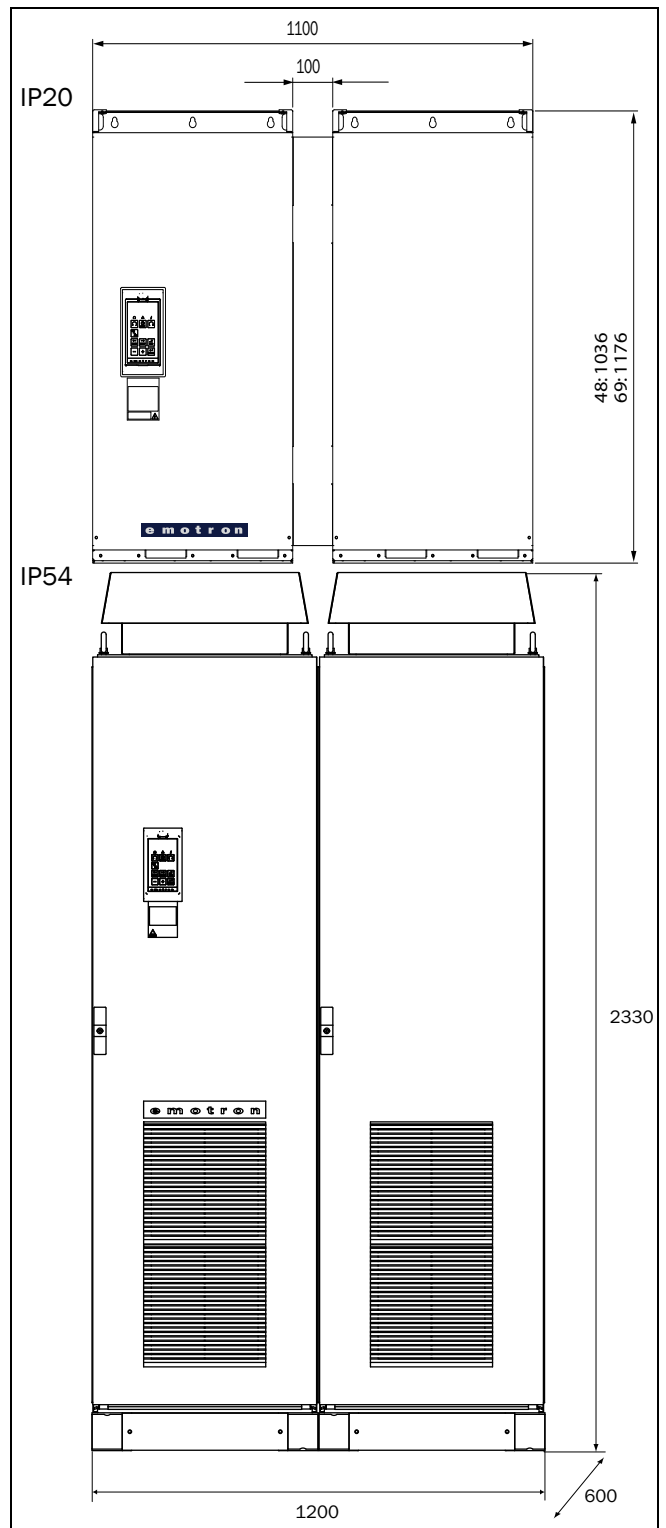


Fig. 8 VFX48: Model 860 – 1000 (J)
VFX69: Model 600 – 650 (J69)

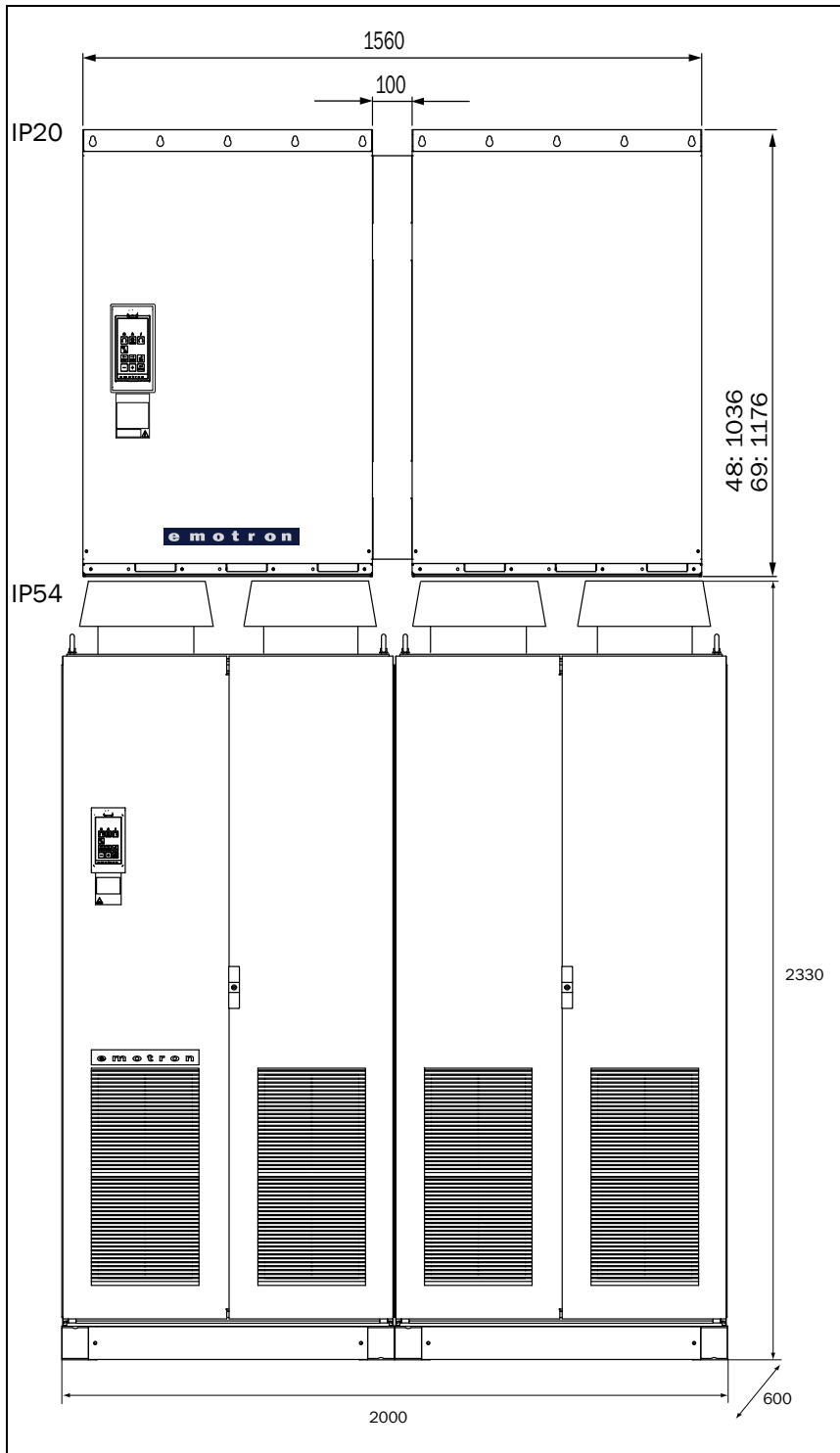


Fig. 9 VFX48: Model 1200 – 1500 (K)
 VFX69: Model 750 – 1000 (K69)

Fuses, cable cross-sections and glands

Use mains fuses of the type gL/gG conforming to IEC 269 or installation cut-outs with similar characteristics. Check the equipment first before installing the glands. In due time only metric glands will be used.

Max. Fuse = maximum fuse value that still protects the VSD and upholds warranty.

NOTE: The dimensions of fuse and cable cross-section are dependent on the application and must be determined in accordance with local regulations.

NOTE: The dimensions of the power terminals used in the models 300 to 1500 can differ depending on customer specification.

Table 12 Fuses, cable cross-sections and glands

Model	Nominal input current [A]	Maximum value fuse [A]	Cable cross section connector range [mm ²] for			Cable glands (clamping range [mm])		
			mains/ motor	Brake	PE	mains / motor	Brake	
VFX**-003	2.2	4	0.5-10	0.5-10	1.5-16	M32 opening M20 + reducer (6-12)	M25 opening M20 + reducer (6-12)	
VFX**-004	3.5	4						
VFX**-006	5.2	6						
VFX**-008	6.9	8				M32 (12-20)/ M32 opening M25+reducer (10-14)	M25 (10-14)	
VFX**-010	8.7	10						
VFX**-013	11.3	12						
VFX**-018	15.6	20	M32 (16-25)/ M32 (13-18)	M25				
VFX**-026	22	25						
VFX**-031	26	35						
VFX**-037	31	35	2.5 - 16	2.5 - 16	6 - 35	M40 (19-28)	M32	
VFX**-046	38	50						
VFX**-060	51	63	4-16	4-16	4-16	M40 (19-28)	M40 (27-34)	
VFX**-073	64	80	4-35		4-35			
VFX**-090	78	100	16 - 95	16 - 95	16-95 (16-70) ¹	VFX48: Ø30-45 cable entry or M63 VFX69: Ø27-66 cable entry		
VFX**-109	94	100						
VFX**-146	126	160	35 - 150	16 - 95	35-150 (16-70) ¹			
VFX**-175	152	160						
VFX**-210	182	200	VFX48: 35-240 VFX69: 35-150	VFX48: 35-150 VFX69: 16-95	VFX48: 35-240 (95-185) ¹ VFX69: 35-150 (16-70) ¹	VFX48: Ø27-66 cable entry		
VFX**-250	216	250						
VFX**-300	260	300	VFX48: (2x)35-240 VFX69: (2x)35-150			frame	--	--
VFX**-375	324	355	VFX48: (2x)35-240 VFX69: (3x)35-150			frame	--	--
VFX**-430	372	400	VFX48: (3x)35-240 VFX69: (4x)35-150			frame	--	--
VFX**-500	432	500	VFX48: (3x)35-240 VFX69: (4x)35-150			frame	--	--
VFX**-600	520	630	VFX48: (3x)35-240 VFX69: (6x)35-150			frame	--	--
VFX**-650	562	630	VFX48: (3x)35-240 VFX69: (6x)35-150			frame	--	--
VFX**-750	648	710	VFX48: (4x)35-240 VFX69: (6x)35-150			frame	--	--
VFX**-860	744	800	VFX48: (4x)35-240 VFX69: (6x)35-150			frame	--	--
VFX**-900	795	900	VFX48: (4x)35-240 VFX69: (6x)35-150			frame	--	--
VFX**-1000	864	1000	VFX48: (6x)35-240			frame	--	--
VFX**-1200	1037	1250	VFX48: (6x)35-240			frame	--	--
VFX**-1500	1296	1500	VFX48: (6x)35-240			frame	--	--

Note: For models 003 to 046 cable glands are optional.

¹ Values are valid when brake chopper electronics are built in.

Control signals

Table 13

Terminal X1	Name:	Function (Default):	Signal:	Type:
1	+10 V	+10 VDC Supply voltage	+10 VDC, max 10 mA	output
2	AnIn1	Process reference	0 -10 VDC or 0/4-20 mA bipolar: -10 - +10 VDC or -20 - +20 mA	analogue input
3	AnIn2	Off	0 -10 VDC or 0/4-20 mA bipolar: -10 - +10 VDC or -20 - +20 mA	analogue input
4	AnIn3	Off	0 -10 VDC or 0/4-20 mA bipolar: -10 - +10 VDC or -20 - +20 mA	analogue input
5	AnIn4	Off	0 -10 VDC or 0/4-20 mA bipolar: -10 - +10 VDC or -20 - +20 mA	analogue input
6	-10 V	-10VDC Supply voltage	-10 VDC, max 10 mA	output
7	Common	Signal ground	0V	output
8	DigIn 1	RunL	0-8/24 VDC	digital input
9	DigIn 2	RunR	0-8/24 VDC	digital input
10	DigIn 3	Off	0-8/24 VDC	digital input
11	+24 V	+24VDC Supply voltage	+24 VDC, 100 mA, see note	output
12	Common	Signal ground	0 V	output
13	AnOut 1	Speed	0 ±10 VDC or 0/4- +20 mA	analogue output
14	AnOut 2	Torque	0 ±10 VDC or 0/4- +20 mA	analogue output
15	Common	Signal ground	0 V	output
16	DigIn 4	Off	0-8/24 VDC	digital input
17	DigIn 5	Off	0-8/24 VDC	digital input
18	DigIn 6	Off	0-8/24 VDC	digital input
19	DigIn 7	Off	0-8/24 VDC	digital input
20	DigOut 1	Ready	24 VDC, 100 mA	digital output
21	DigOut 2	Brake	24 VDC, 100 mA	digital output
22	DigIn 8	RESET	0-8/24 VDC	digital input
Terminal X2				
31	N/C 1	Relay 1 output	potential free change over 2 A/250 VAC/AC1	relay output
32	COM 1	Trip, active when the VSD is in a TRIP condition		
33	N/O 1	N/C is opened when the relay is active (valid for all relays) N/O is closed when the relay is active (valid for all relays)		
41	N/C 2	Relay 2 Output	potential free change over 2 A/250 VAC/AC1	relay output
42	COM 2	Run, active when the VSD is ready to start		
43	N/O 2			
Terminal X3				
51	COM 3	Relay 3 Output	potential free change over 2 A/250 VAC/AC1	relay output
52	N/O 3	Off		

e m o t r o n[®]

DEDICATED DRIVE

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