Motor Controllers
Variable Frequency AC Drives
Type VariFlex RVF

- **AC variable speed drive for use with AC induction motors**
- **Selectable Sensorless vector or V/f mode**
- **Input voltage ranges: 1-ph 230VAC, 1- or 3-ph 230VAC, 3-ph 400VAC**
- **3 physical frame sizes: Size A, B and C**
- **Conforms to EN 61800-3 for the second environment (Industrial sites) with integral EMC filter**
- **All Parameters accessible both via Keypad and PC**
- **Modbus RTU RS485 serial communications as standard on all models**
- **PID functionality**
- **Plug-in fieldbus option modules[*1]**
- **SmartStick option for fast and accurate drive to drive parameter transfer and storage**
- **LogicStick PLC eliminator**
- **I/O expansion[*1]**
- **DIN rail[*2] or panel mounting**

[*1] **Frame size B and C only**
[*2] **Frame size A and B only**

Product Description

The VariFlex is a simple and compact AC variable speed drive for use with 3-phase AC induction motors. The drive's first 10 parameters which are shown on the front cover are all that are required for 90% of all applications. The VariFlex employs state of the art microprocessor technology which controls all drive functions. A Digital Signal Processor synthesises an adjustable carrier frequency Pulse Width Modulated output controlling the Insulated Gate Bipolar Transistor (IGBT) inverter section. Another microcontroller handles the user interface functions. All printed circuit boards are manufactured using surface mount technology ensuring high quality and reliability.

Ordering Key

RVF A 1 20 075

- **VariFlex AC Drive**
- **Frame size**
- **Type of AC Supply**
- **Drive voltage rating**
- **Drive kW rating**

Type Selection

Frame	Supply	Drive Voltage Rating	Drive Rating
A: Size A	1: 1-phase	20: 230VAC	025: 0.25kW, 0.33HP
B: Size B	D: 1- or 3-phase	40: 400VAC	037: 0.37kW, 0.5HP
C: Size C	3: 3-phase		055: 0.55kW, 0.75HP
			075: 0.75kW, 1.0HP
			110: 1.1kW, 1.5HP
			150: 1.5kW, 2.0HP
			220: 2.2kW, 3.0HP
			300: 3.0kW, 3.0HP
			400: 4.0kW, 5.0HP

Selection Guide

Voltage Rating	Supply	Motor rating	Frame size Size A	Size B	Size C
200-240VAC ± 10%	1-phase	0.25kW, 0.33HP	**RVFA120025**	-	-
		0.37kW, 0.55HP	**RVFA120037**	-	-
		0.55kW, 0.75HP	**RVFA120055**	-	-
		0.75kW, 1.0HP	**RVFA120075**	-	-
	1- or 3-phase[*3]	1.1kW, 1.5HP	-	**RVFBD20110**	-
		1.5kW, 2.0HP	-	**RVFBD20150**	-
		2.2kW, 3.0HP	-	-	**RVFCD20220**
380-480VAC ± 10%	3-phase[*3]	0.37kW, 0.55HP	-	**RVFB340037**	-
		0.55kW, 0.75HP	-	**RVFB340055**	-
		0.75kW, 1.0HP	-	**RVFB340075**	-
		1.1kW, 1.5HP	-	**RVFB340110**	-
		1.5kW, 2.0HP	-	**RVFB340150**	-
		2.2kW, 3.0HP	-	-	**RVFC340220**
		3.0kW, 3.0HP	-	-	**RVFC340300**
		4.0kW, 5.0HP	-	-	**RVFC340400**

[*3] For 3-phase supply: phase imbalance 3% (between phases) or 2% negative phase sequence (IEC 146-1-1 Immunity Class C).

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Technical Specifications

	RVFA120025	RVFA120037	RVFA120055	RVFA120075
Nominal motor power	0.25kW	0.37kW	0.55kW	0.75kW
Horsepower rating	0.33HP	0.5HP	0.75HP	1.0HP
Typical full load input current				
1-phase	4.3A	5.8A	8.1A	10.5A
3-phase	-	-	-	-
Maximum continous input current[*4]	-	-	-	-
100% RMS output current	1.7A	2.2A	3.0A	4.0A
150% overload current for 60s	2.6A	3.3A	4.5A	6.0A
Typical inrush current (<10ms)	17.9A			
AC Supply voltage and frequency	1-phase, 200 - 240VAC ± 10%, 48 - 62Hz			
Input displacement factor (cos ø)	> 0.97			
Output voltage and frequency	3-phase, 0 - drive rating (240VAC maximum set by Pr 08), 0 - 1500Hz			

	RVFBD20110	RVFBD20150	RVFCD20220
Nominal motor power	1.1kW	1.5kW	2.2kW
Horsepower rating	1.5HP	2.0HP	3.0HP
Typical full load input current			
1-phase	14.2A	17.4A	23.2A
3-phase	6.7A	8.7A	11.9A
Maximum continous input current[*4]			
1-phase	-	-	-
3-phase	9.2A	12.6A	17.0A
100% RMS output current	5.2A	7.0A	9.6A
150% overload current for 60s	7.8A	10.5A	14.4A
Typical inrush current (<10ms)	8.9A		6.0A
AC Supply voltage and frequency	1- or 3-phase, 200 - 240VAC ± 10%, 48 - 62Hz		
Input displacement factor (cos ø)	> 0.97		
Output voltage and frequency	3-phase, 0 - drive rating (240VAC maximum set by Pr 08), 0 - 1500Hz		

	RVFB340037	RVFB340055	RVFB340075	RVFB340110	RVFB340150
Nominal motor power	0.37kW	0.55kW	0.75kW	1.1kW	1.5kW
Horsepower rating	0.5HP	0.75HP	1.0HP	1.5HP	2.0HP
Typical full load input current	1.7A	2.5A	3.1A	4.0A	5.2A
Maximum continous input current[*4]	2.5A	3.1A	3.75A	4.6A	5.9A
100% RMS output current	1.3A	1.7A	2.1A	2.8A	3.8A
150% overload current for 60s	2.0A	2.6A	3.2A	4.2A	5.7A
Typical inrush current (<10ms)	17.9A				
AC Supply voltage and frequency	3-phase, 380 - 480VAC ± 10%[*5], 48 - 62Hz				
Input displacement factor (cos ø)	> 0.97				
Output voltage and frequency	3-phase, 0 - drive rating (480VAC maximum set by Pr 08), 0 - 1500Hz				

	RVFC340220	RVFC340300	RVFC340400
Nominal motor power	2.2kW	3.0kW	4.0kW
Horsepower rating	3.0HP	3.0HP	5.0HP
Typical full load input current	7.3A	9.5A	11.9A
Maximum continous input current[*4]	9.6A	11.2A	13.4A
100% RMS output current	5.1A	7.2A	9.0A
150% overload current for 60s	7.7A	10.8A	13.5A
Typical inrush current (<10ms)	11.9A		
AC Supply voltage and frequency	3-phase, 380 - 480VAC ± 10%[*5], 48 - 62Hz		
Input displacement factor (cos ø)	> 0.97		
Output voltage and frequency	3-phase, 0 - drive rating (480VAC maximum set by Pr 08), 0 - 1500Hz		

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General Specifications

	RVFA120...				RVFBD20…		RVFCD20…
	025	037	055	075	110	150	220
Recommended input supply fuse[*6]							
1-phase	6A	10A	10A	16A	16A	20A	25A
3-phase	-	-	-	-	10A	16A	20A
DC bus capacitance	330µF	390µF	660µF	780µF	940µF	1410µF	1880µF
Weight	0.95kg (2.1lb)		1.0kg (2.2lb)		1.3kg (2.9lb)	1.4kg (3.1lb)	2.1kg (4.6lb)
Din rail mounting[*7]	Yes				Yes		No
DC bus terminals	No				Yes		
Integrated cooling fan	No				Yes		
Air flow	-				0.4m³/min (3.8feet³/min)		
Switching frequency	3, 6, 12, 18kHz						3, 6, 12kHz
Frequency accuracy	0.01%						
Max. AC line starts/hr. (evenly spaced in time)	20						
Start-up time	≤ 1s						
Internal EMC filter	Yes						

	RVFB340...					RVFC340...		
	037	055	075	110	150	220	300	400
Recommended input supply fuse[*6]	6A			6A	10A	16A		
DC bus capacitance	165µF			195µF	235µF	470µF		
Weight	1.2kg (2.7lb)			1.3kg (2.9lb)		2.1kg (4.6lb)		
Din rail mounting[*7]	Yes			Yes		No		
DC bus terminals	Yes			Yes		Yes		
Integrated cooling fan	No			Yes		Yes		
Air flow	-			0.4m³/min (3.8feet³/min)				
Switching frequency	3, 6, 12, 18kHz					3, 6, 12kHz		
Frequency accuracy	0.01%							
Max. AC line starts/hr. (evenly spaced in time)	20							
Start-up time	≤ 1s							
Internal EMC filter	Yes							

*4 For 3-ph input only at 2% negative phase sequence.

*5 The RVF.340... can be run on a 230V 1-phase supply at a very much reduced output power.

*6 Fuse types: Europe-Type gG HRC fuses complying with EN 60269 Parts 1 and 2 (BS88), USA-Bussman Limitron KTK series, class CC fast acting fuses up to 30A, class J above 30A.

*7 When the drive is to be subjected to shock or vibration, it is recommended that the bottom mounting screws are used to secure the drive to the backplate.

Housing Specifications

	RVFA120...				RVFBD20...		RVFCD20...
	025	037	055	075	110	150	220
Recommended input cable size							
1-phase	1.0mm² (AWG16)			1.5mm² (AWG14)	2.5mm² (AWG12)		4.0mm² (AWG10)
3-phase	-			-	1.5mm² (AWG14)		2.5mm² (AWG12)
Recommended motor cable size	1.0mm² (AWG16)				1.0mm² (AWG16)		1.5mm² (AWG14)
Max. motor cable length	50m (164ft)		75m (246ft)		100m (328ft)		
Power terminal							
Max. terminal tightening torque	0.5 Nm (4.4 lb-in)				1.4 Nm (12.1 lb-in)		
Control terminals	Spring connection						
Min. cross-sectional area of cable	0.5mm² (AWG20)						
Analog inputs	T2, T4						
Analog output	B1						
Digital inputs	B4, B5, B6, B7						
Digital output	B3						
Status relay	T5, T6						

	RVFB340...					RVFC340...		
	037	055	075	110	150	220	300	400
Recommended input cable size	1.0mm² (AWG16)					1.5mm² (AWG14)		2.5mm² (AWG12)
Recommended motor cable size	1.0mm² (AWG16)					1.0mm² (AWG16)		1.5mm² (AWG14)
Max. motor cable length	100m (328ft)							
Power terminal								
Max. terminal tightening torque	1.4 Nm (12.1 lb-in)							
Control terminals	Spring connection							
Min. cross-sectional area of cable	0.5mm² (AWG20)							
Analog inputs	T2, T4							
Analog output	B1							
Digital inputs	B4, B5, B6, B7							
Digital output	B3							
Status relay	T5, T6							

Environmental Specifications

Operating temperature*8	-10°C to +40°C (+14°F to +104°F) @ 3kHz switching freq.
Storage temperature	-40°C to +60°C (-40°F to +140°F) for max. 12 months
Max. relative humidity	95% (non-condensing)
Storage humidity	93%, 40°C, 4 days
Degree of Protection	IP20 IP4X (with **IP4X KIT SIZE**) UL Type 1 (with **UL KIT SIZE**)
Pollution Degree	2
Installation Category	III

Max. altitude*9	1000m (3250ft)
Vibration	
Random (IEC68-2-64, -36)	5 to 20Hz: 1.0m²/s³ (0.01g²/Hz) ASD 20 to 200Hz: - 3dB/octave
Sinosodial (IEC68-2-6)	2 to 9Hz: 3.5mm peak disp. 9 to 200Hz: 10m/s² peak disp. 200 to 500Hz: 15/s² peak disp.
Bump (IEC68-2-29)	18g, 6ms, half sine

*8 Operation up to 55°C (131°F) with de-rating

*9 Above 1000m reduce the normal full load current by 1% for every 100m (325ft) up to a max. of 3000m (9750ft)

Standards

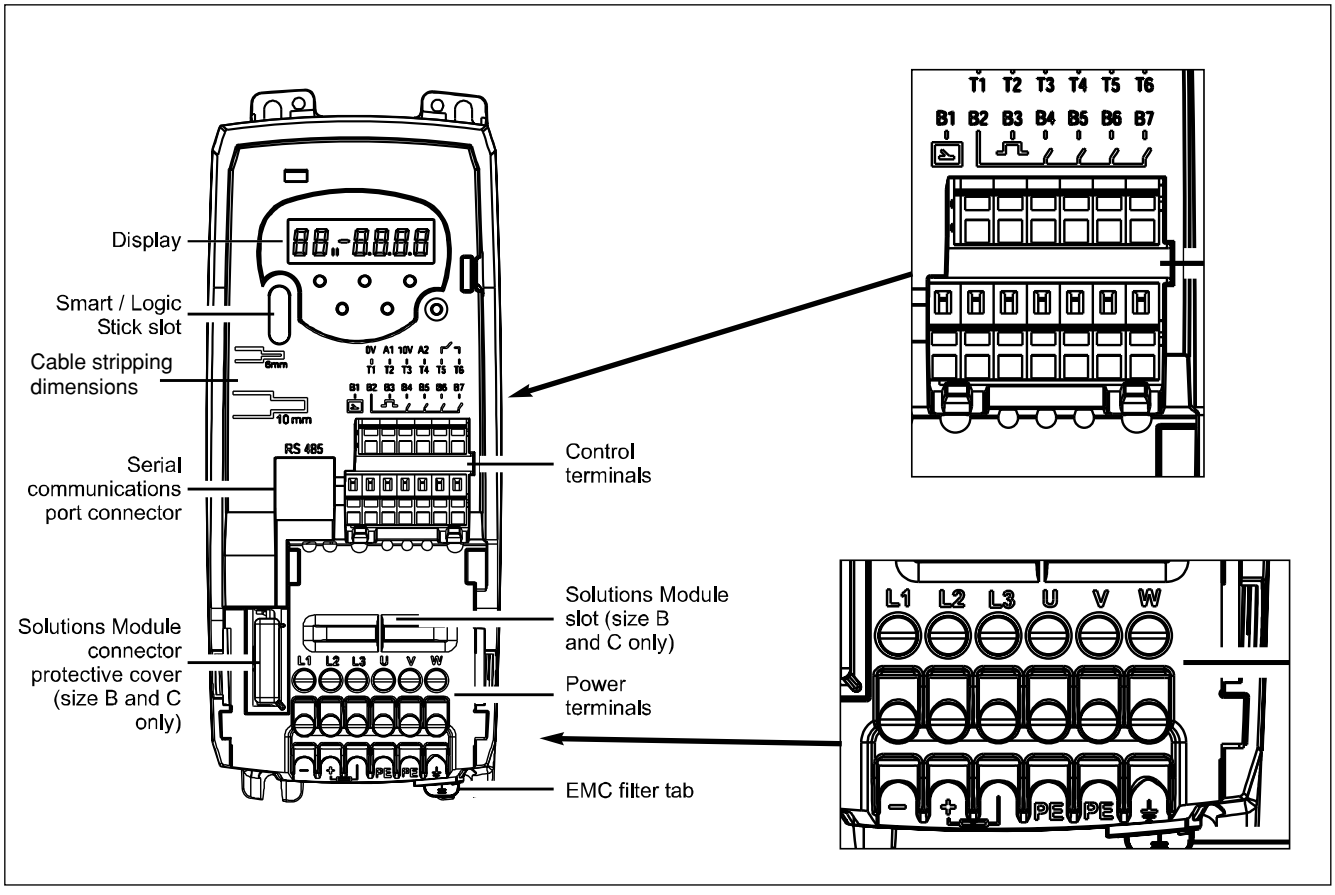
CE marking	
Low Voltage Directive	EN / IEC 61800-5-1
EMC Directive	
Conducted emission	
with internal EMC filter*10	EN 61800-3 for 2nd environment, with up to 5m cable @ 3kHz switching freq.
with additional external filter	EN 61800-3 for 1st environment, with up to 20m cable @ 3kHz switching freq. EN 61000-6-3, up to 20m cable @ 3kHz switching freq. EN 61000-6-4, up to 20m cable @ 3kHz switching freq.
Radiated emission	EN 61000-6-4 EN 61800-3
Immunity	EN 61000-6-2*11 EN 61800-3 IEEE C62.45
Voltage Fluctation (Flicker)	models within the scope of EN 61000-3-3 conform to the requirements for manual switching
Harmonics	EN 61000-3-2*12
Approvals	UL, cUL

*10 The internal filter will need to be disconnected when low earth leakage is a requirement.

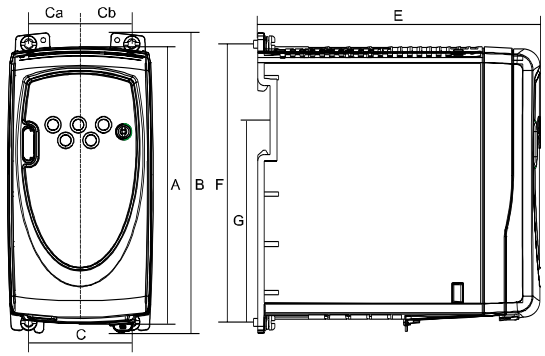
*11 The surge test at the control ports will be met provided the 0V is not connected to earth.

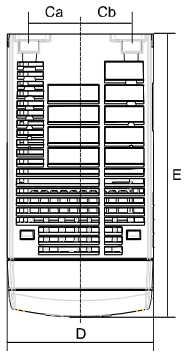
*12 Drives with input power ≤1kW that do not meet EN 61000-3-2 requirements are to be corrected at the point of installation using AC line chokes to ensure conformance.

Terminal Layout



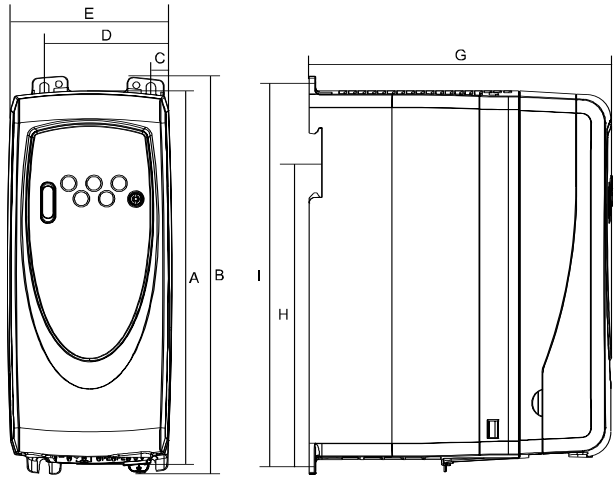
Dimensions

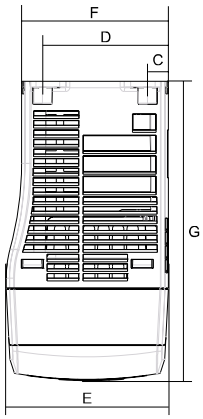




Dimension	mm	in
A	140	5.51
B	154	6.06
C	53	2.09
Ca	26.5	1.04
Cb	26.5	1.04
D	75	2.95
E	145	5.71
F	143	5.63
G	86.3	3.40

Variflex RVF Size A

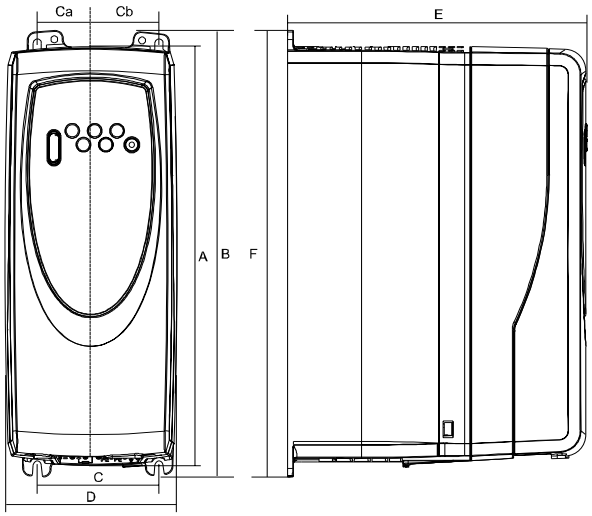


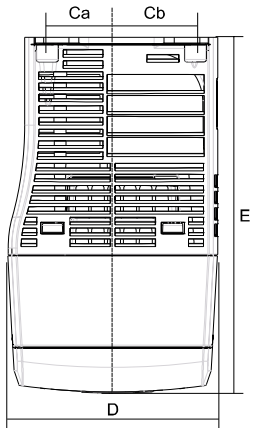


Dimension	mm	in
A	190	7.48
B	205	8.07
C	10.9	0.43
D	23.5	0.93
E	85	3.35
F	77	3
G	156	6.15
H	155.5	6.1
I	194	7.64

Holesize 4 x M4

Variflex RVF Size B



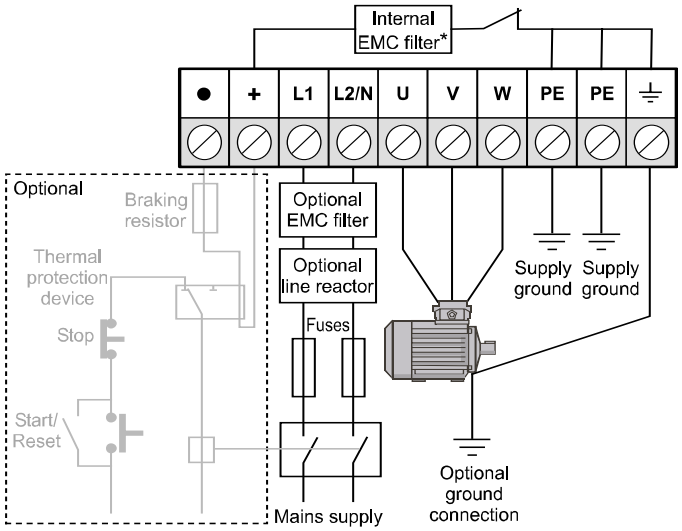


Dimension	mm	in
A	240	9.45
B	258	10.16
C	70.5	2.78
Ca	31	1.22
Cb	39.5	1.56
D	100	3.94
E	173	6.81
F	244	9.61

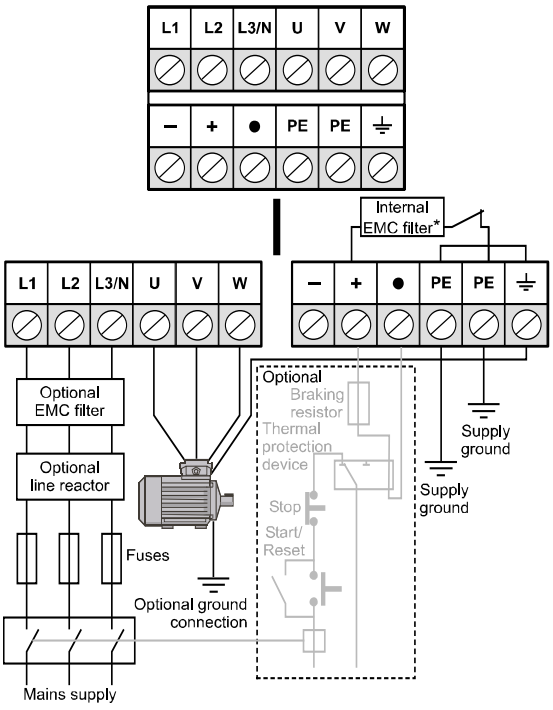
Variflex RVF Size C

Connection Diagrams

Power Terminal Connections for Frame size A



Power Terminal Connections for Frame size B and C



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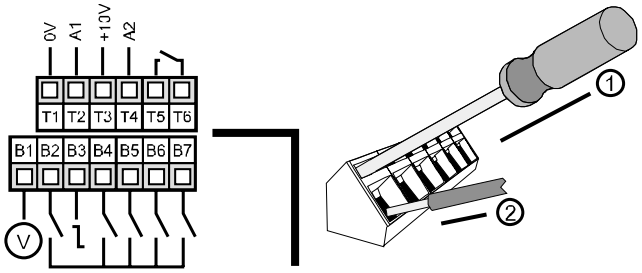
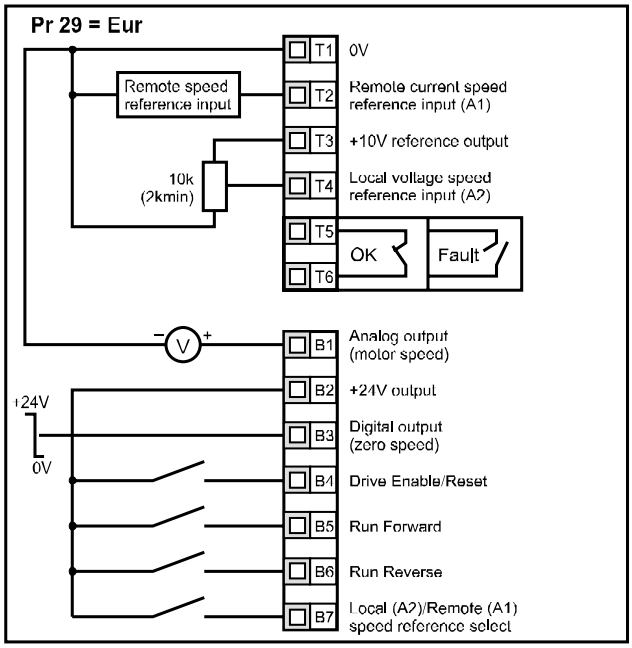
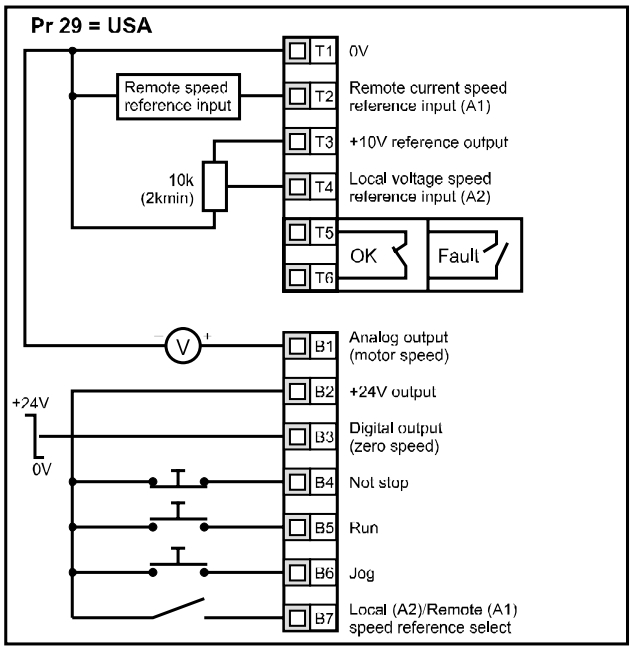
Connection Diagrams

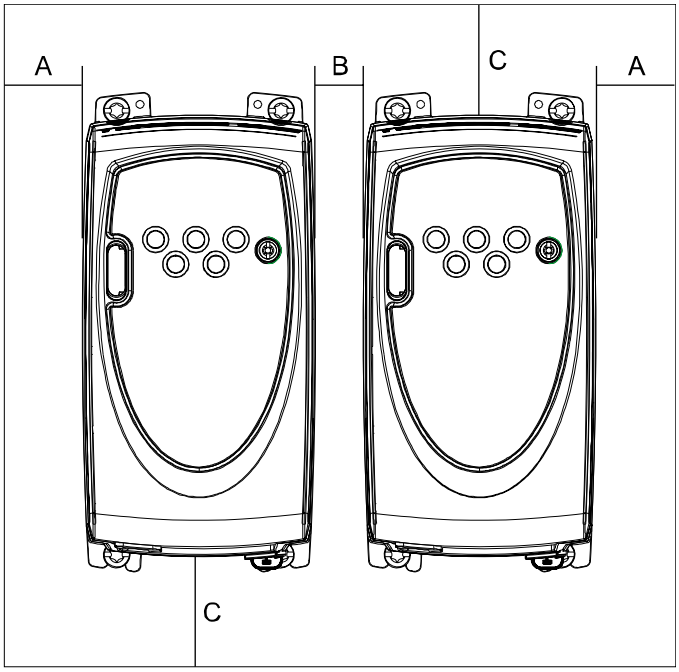
Control Terminal Connections







Panel Mounting



Minimum mounting clearances

Drive size	A		B		C	
	mm	in	mm	in	mm	in
A	10	0.39	0	0	100	3.94
B (≤0.75kW)			10	0.39		
B (≥1.1kW)			0	0		
C						

Documentation

VariFlex Getting Started Guide	• Ratings data • Installation • Keypad & Display • Parameters • Quick Start Commissioning • Diagnostics • Options
VariFlex Technical Data Guide	• Fuse Sizes • Cable Sizes • Environmental specifications • De-rating info. • Optional EMC filters info. • Braking resistor info.
VariFlex Advanced User Guide	• detailed info. on all of the drive's advanced parameters • detailed info. on the drive's serial communications • set-up examples
Option Module User Guides / Installation Sheets	• detailed info. and set-up instructions for the various options available with the VariFlex

The data included in this datasheet gives only a general overview of the VariFlex. A number of guides, referred to above, can be found on a CD supplied with the drive and can also be downloaded from www.carlogavazzi.com/ac. It is strongly recommended to refer to these guides for detailed information on the VariFlex and all other optional accessories.

Optional Features

	Ordering code
Automation	
• upload of drive parameters for storage, easy setup of identical drives or downloading to replacement drives	**SMARTSTICK**
• PLC ladder logic stick pluaggable into the front of the drive which enables programming of PLC functions within the drive	**LOGICSTICK**
Remote Keypads	
• remote panel mounting LED display to IP54 (NEMA 12)	**VF-KEYPAD REMOTE**
• remote panel mounting LCD multilingual text display to IP54 (NEMA 12)	**SM-KEYPAD PLUS**
Fieldbus	
• PROFIBUS-DP fieldbus module	**SM-PROFIBUS DP**
• DeviceNet fieldbus module	**SM-DEVICENET**
• CANopen fieldbus module	**SM-CANOPEN**
• INTERBUS fieldbus module	**SM-INTERBUS**
• Ethernet fieldbus module	**SM-ETHERNET**
Available with RVFB... & RVFC... types only	
Extended I/O	
• additional I/O	**SM-I/O LITE**
• additional I/O with real time clock for scheduling drive running	**SM-I/O TIMER**
• isolated I/O to NAMUR NE37 specs. for chemical industry applications	**SM-PELV INTERFACE**
Communications	
• cable with isolation RS232 to RS485 converter for connecting to PC/Laptop when using CGSOFT or SYPTLITE	**CTCOMMS-CABLE**
• software for PC/Laptop for commissioning & storing parameter settings (FOC)	**CGSOFT****
• PLC functions programming software for PC/Laptop (FOC)	**SYPTLITE****
Hardware	
• Size A protection cover for connecting conduit to UL Type 1	**UL KIT SIZE A**
• Size B protection cover for connecting conduit to UL Type 1	**UL KIT SIZE B**
• Size C protection cover for connecting conduit to UL Type 1	**UL KIT SIZE C**
• Size A plastic protection covers to IP4X	**IP4X KIT SIZE A**
• Size B plastic protection covers to IP4X	**IP4X KIT SIZE B**
• Size C plastic protection covers to IP4X	**IP4X KIT SIZE C**
• Size A B C cable strain relief bracket	**SK-CABLE BRACKET**
EMC filters *	
• RVFA120025, RVFA120037, RVFA120055, RVFA120075	
1-ph 12A VARIFLEX Filter	FS6512-12-07
1-ph 12A VARIFLEX Filter Low Leakage	FS6512-12-07-LL
• RVFBD20110, RVFBD20150	
1-ph 20A VARIFLEX Filter	FS6513-20-07
1-ph 20A VARIFLEX Filter Low Leakage	FS6513-20-07-LL
• RVFB340037, RVFB340055, RVFB340075, RVFB340110, RVFB340150, RVFBD20110, RVFBD20150	
3-ph 10A VARIFLEX Filter	FS6513-10-07
3-ph 10A VARIFLEX Filter Low Leakage	FS6513-10-07-LL
• RVFCD2022	
1-ph 24A VARIFLEX Filter	FS6514-24-07
1-ph 24A VARIFLEX Filter Low Leakage	FS6514-24-07-LL
• RVFC340220, RVFC340300, RVFC340400, RVFCD20220	
3-ph 14A VARIFLEX Filter	FS6514-14-07
3-ph 14A VARIFLEX Filter Low Leakage	FS6514-14-07-LL

* EMC filters data is available on request

** Downloadable from www.carlogavazzi.com/ac