

**FULL DIGITAL SERVODRIVE
FOR BRUSHLESS SERVOMOTORS
VFD400F SERIES**

INSTALLATION MANUAL

DOCUMENT NUMBER: MNINVFD4_0F-UK02
EDITION: 02
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DATE: July 2004

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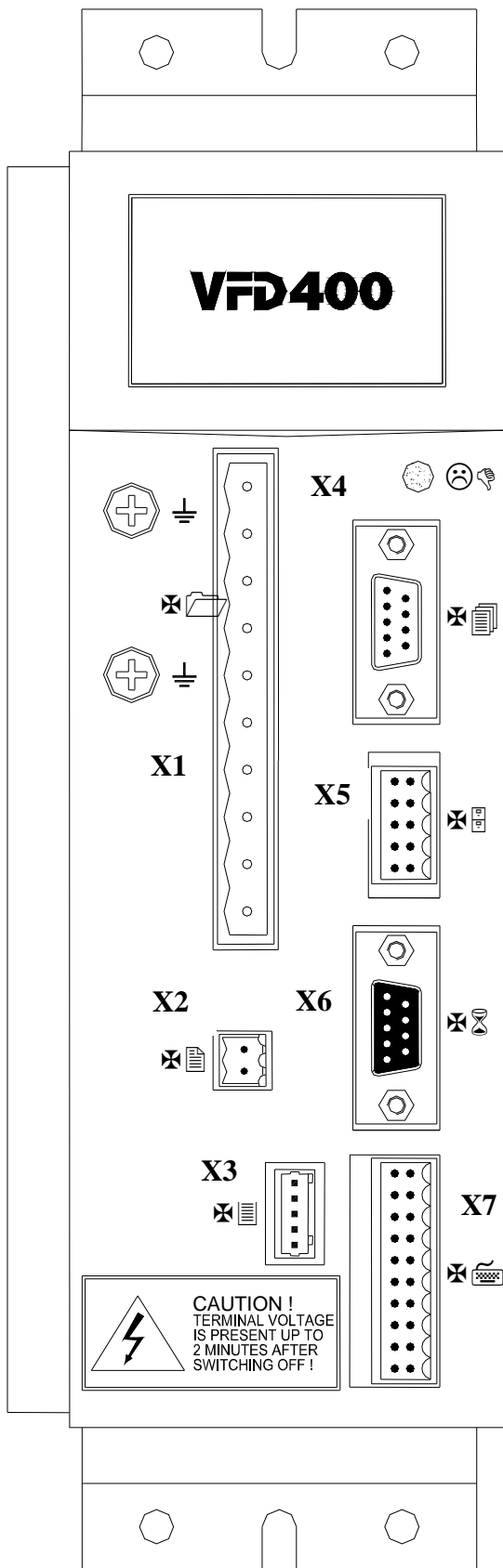
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Edition	Date	Remarks
01	04/2004	Preliminary Edition
02	07/2004	Last Edition

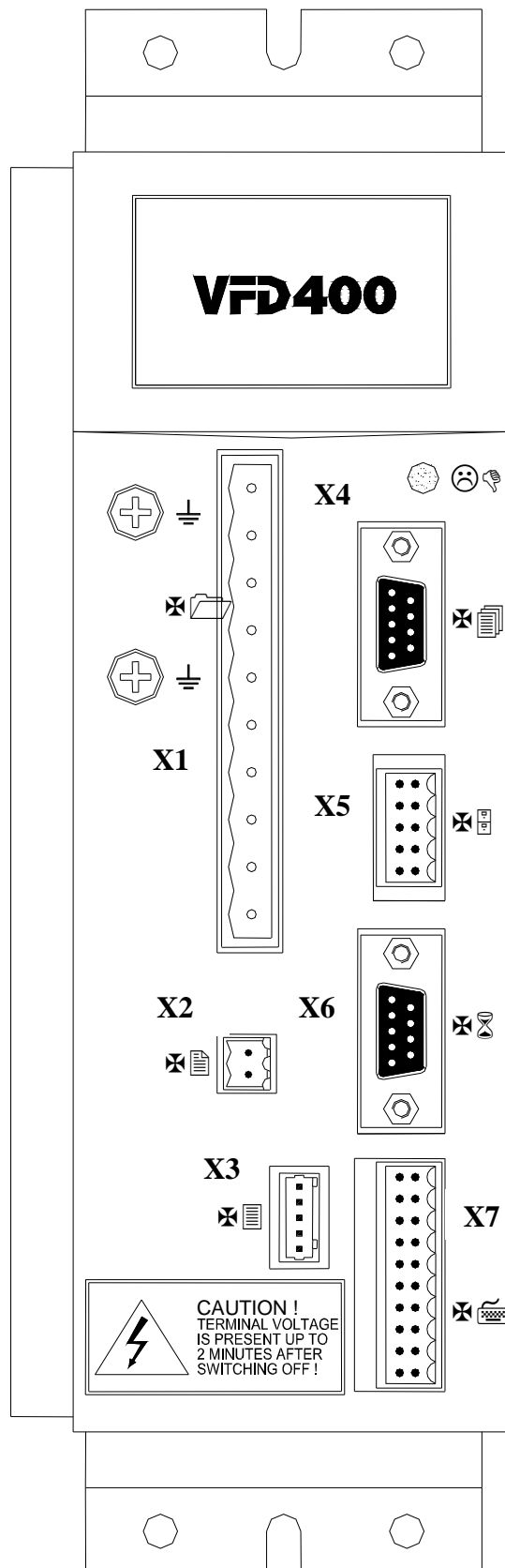
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1. External connections



VFD400FC Front View



VFD400FP Front View

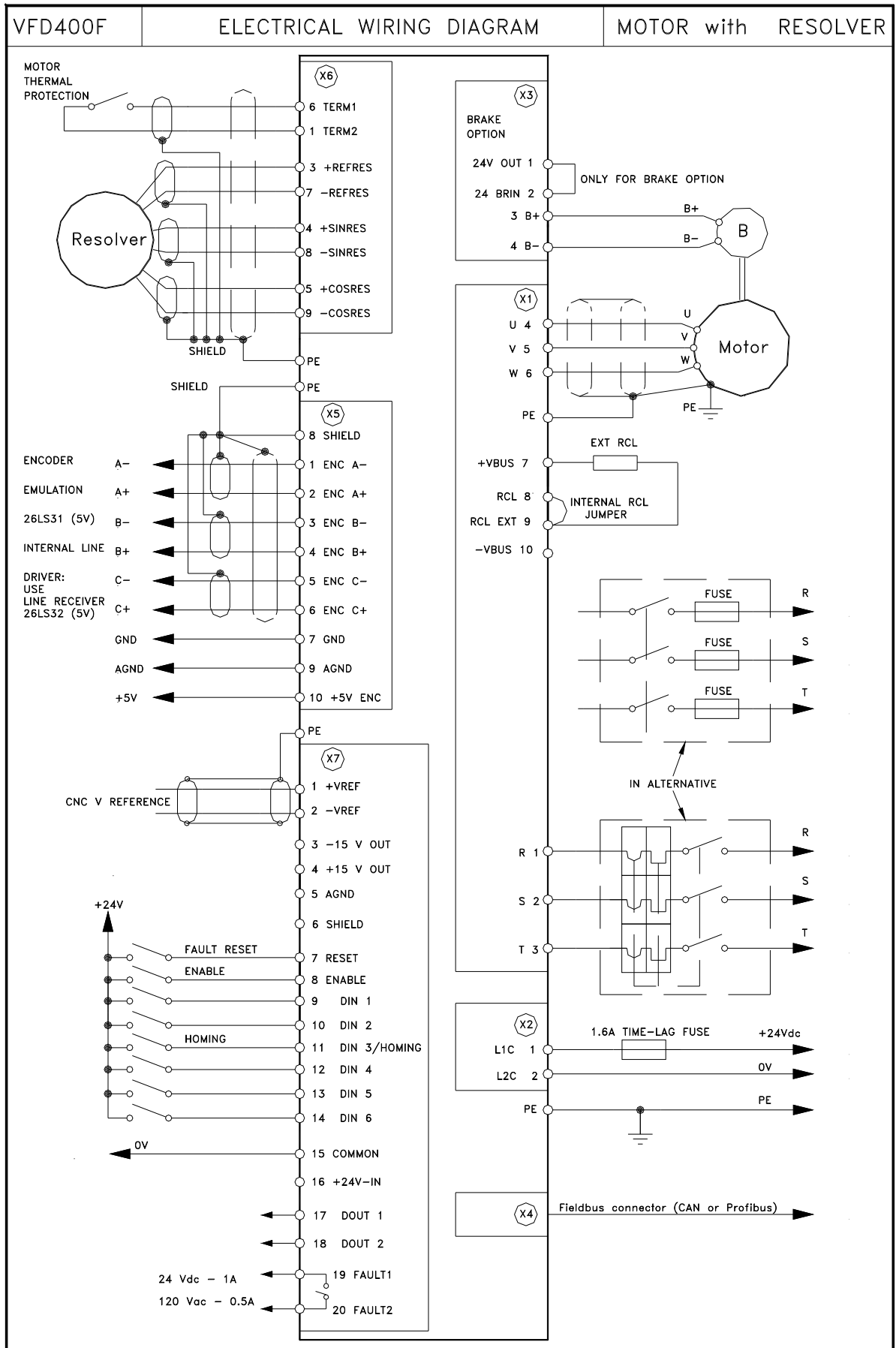


Figure 1

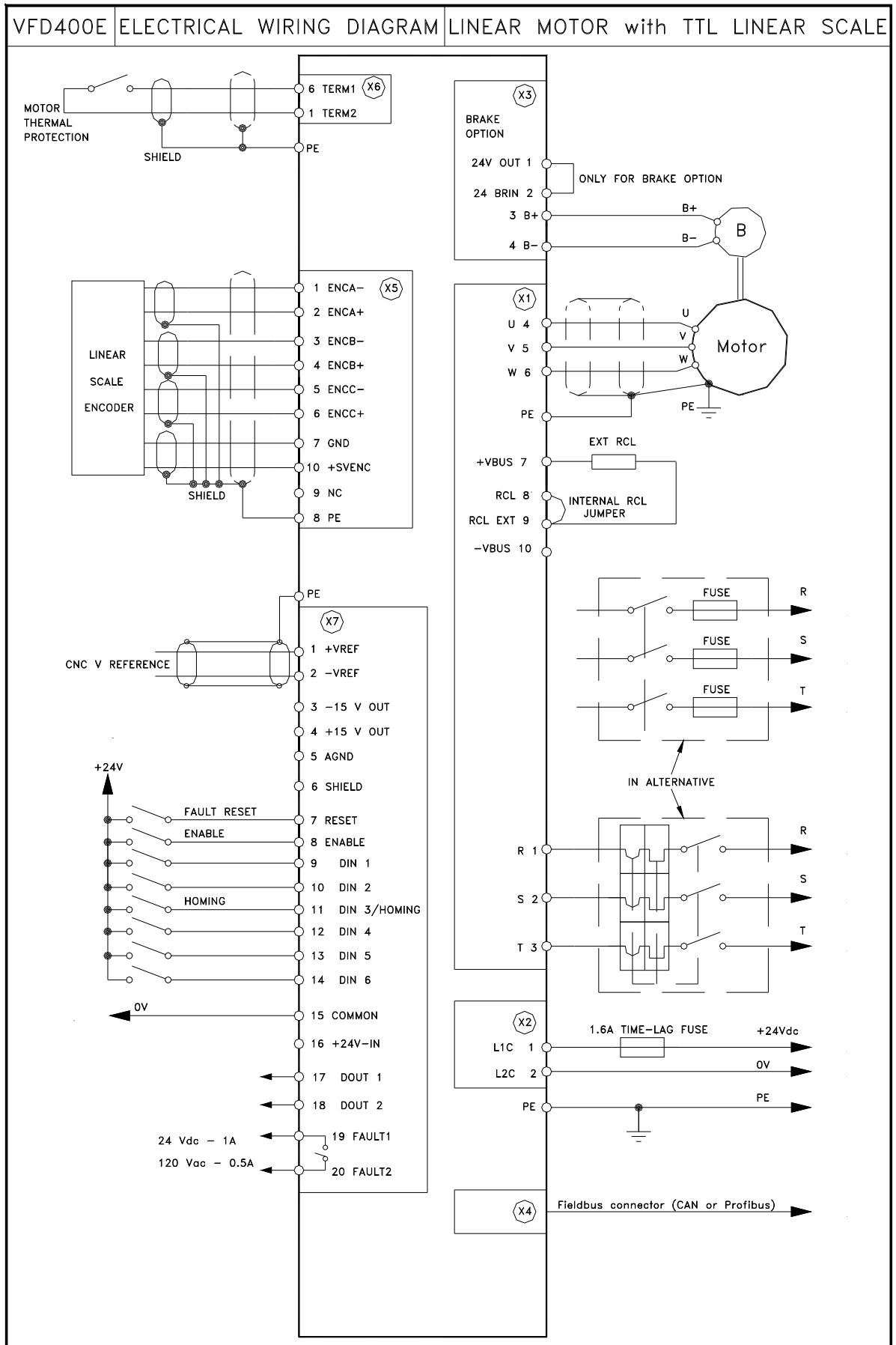


Figure 2

1.1. Power connector - X1

Connector X1 is dedicated to connections of power supply, motor and clamp resistor.

		Power connector X1		
		Pin	Ref.	Description
1		1	R	Three phase power supply (max 230 VAC)
2		2	S	Three phase power supply (max 230 VAC)
3		3	T	Three phase power supply (max 230 VAC)
4		4	U	Motor phase U
5		5	V	Motor phase V
6		6	W	Motor phase W
7		7	+VBUS	+ DC bus
8		8	RCL	Internal clamp resistor
9		9	RCL EXT	Internal/external clamp resistor
10		10	-VBUS	- DC bus

Table 1.1

1.1.1. Motor connection

- Connect the motor cables to terminals 4, 5 and 6 observing the correct pole connection.
- Connect the PE cable to one of the two PE screw terminals on the front panel.

1.1.2. Clamp resistor connection

- When using the internal resistor connect terminals 8 and 9.
- When using an external resistor, connect the resistor between terminals 7 and 9 (see fig. 1).

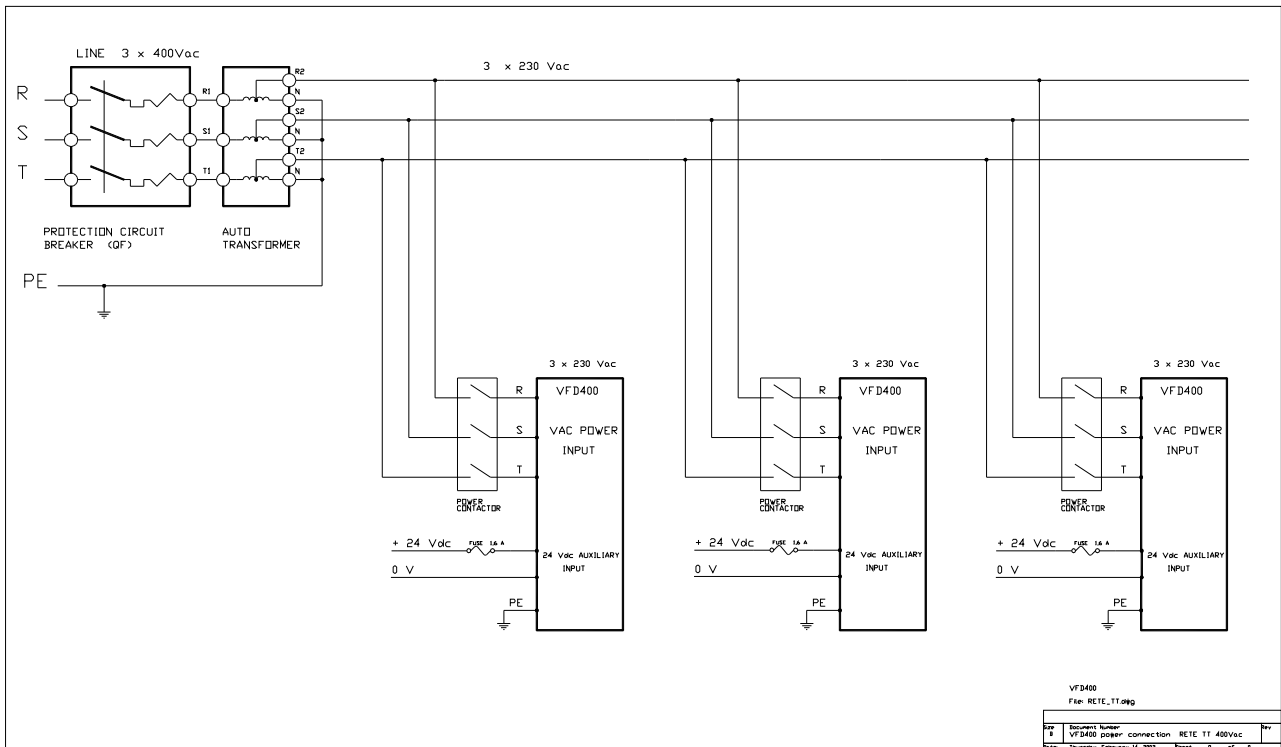
1.1.3. Mains connection

- Connect terminals 1, 2 and 3 between three phases at 230 Vac line to line mains connection.
- Insert the fuses specified in figure 1 in series with the cables.
- Connect the PE cable to one of the two PE screw terminals on the front panel.

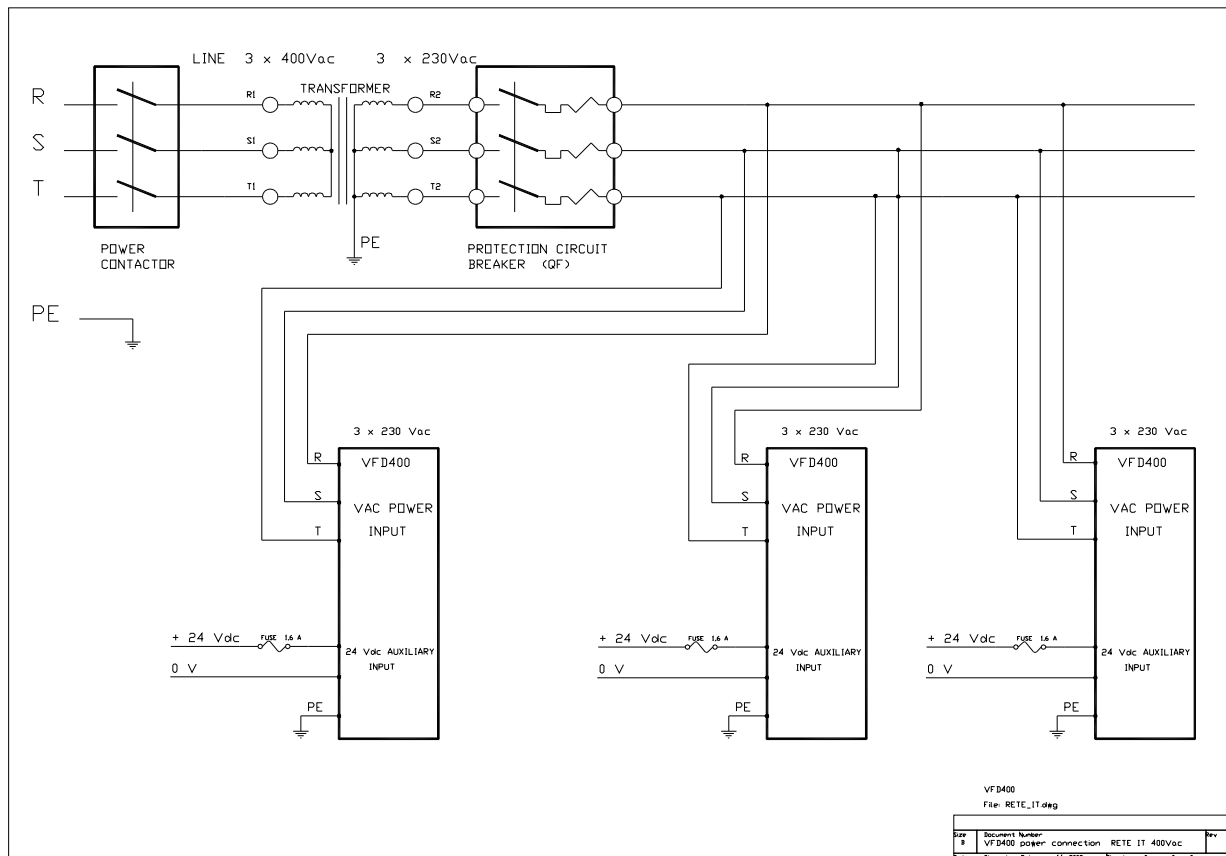


The IT connection are adviced against because it's very hard verify the overcoming of the limits in transitory regimen.

TT at 400Vac



IT at 400Vac



1.2. Auxiliary supply connector - X2

Connections for an external auxiliary power supply at 24 Vdc \pm 15% – 1,5A max

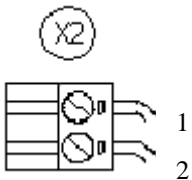
	Auxiliary supply connector X2		
	Pin	Ref.	Description
1	L1C	aux. Supply +24 Vdc \pm 15% – 1,5 A max	
2	L2C	aux. Supply GND 24 Vdc	

Table 1.2

1.3. Brake connector - X3 (Option)

This option may be used with motors including an electromagnetic brake.

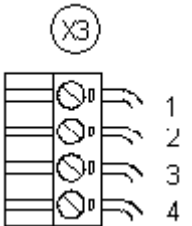
	Brake connector X3		
	Pin	Ref.	Description
1	24VOUT	Internal brake supply (24V DC, 0.8A max)	
2	24BRIN	Brake supply input (24V DC, 2A max)	
3	B+	Brake output +	
4	B-	Brake output – (GND 24 Vdc)	

Table1.3.1

- The drive automatically cuts off power and releases the electromechanic brake when connection between pins 1 and 2 is open.
- Connect a potential free contact emergency switch between pins 1 and 2, or jumper them.
- Brake supply input: connect between pin 2 (24 Vdc, 2 A) and pin 4 (GND 24 Vdc, 2 A).

	VFD400 F 03	VFD400 F 05	VFD400 F 07	VFD400 F 10
Resistance [Ω]	56	33	15	15
Nominal Power [W]	110	110	220	220
Tp(peak) [V]	400	400	400	400
Tp (o) [V]	1.8	1.8	1.8	1,8
Resistors Model	/	SIR SRC + SB1G20 A+T	/	IRE CBR 180
Dimensions [mm]	/	29x165	/	195x45x11,5

Table1.3.2

1.4. Control unit connector - X7

- VREF+/VREF-: analog reference input (+/-10 V differential). It is used to control the motor speed when the converter is configured in Analog Speed Mode or the motor current when the converter is configured in Analog Current Mode.
- ENABLE: digital input (15÷24V, 20 mA) to enable the power stage of the converter.
- RESET: digital input (15÷24V, 20 mA) to reset fault.
- FAULT1/FAULT2: relay contact normally closed when the converter is ready to switch-on or is running. The contact is open when the converter is not ready to switch-on or a fault condition has occurred.

		Control unit connector X7		
		Pin	Ref.	Description
		1	VREF+	Speed (or current) reference input +
		2	VREF-	Speed (or current) reference input -
		3	-15V-OUT	Auxiliary voltage output (50mA max.)
		4	+15V-OUT	Auxiliary voltage output (50mA max.)
		5	AGND	Analog ground
		6	SHIELD	Shield
		7	RESET	Fault reset
		8	ENABLE	Power enable input
		9	DIN1	Digital input 1
		10	DIN2	Digital input 2
		11	DIN3	Digital input 3 – Home switch
		12	DIN4	Digital input 4
		13	DIN5	Digital input 5
		14	DIN6	Digital input 6
		15	GNDCMD	24V common signal
		16	+24V-IN	24V input
		17	DOUT1	Digital output 1
		18	DOUT2	Digital output 2
		19	FAULT1	Drive ready signal output (relay contact)
		20	FAULT2	Drive ready signal output (relay contact)

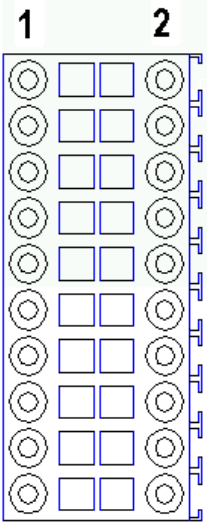


Table 1.4

1.5. Encoder emulation or encoder - linear scale input connector – X5

The signals on this connector are bidirectional. It is possible to configure the encoder as input, for external encoder, or as output, for motor feedback position.

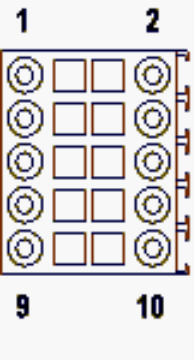
		Encoder emulation connector X5		
		Pin	Ref.	Description
	1	ENC-A-	RS422 A – signal	
	2	ENC-A+	RS422 A + signal	
	3	ENC-B-	RS422 B – signal	
	4	ENC-B+	RS422 B + signal	
	5	ENC-C-	RS422 C – signal (zero marker)	
	6	ENC-C+	RS422 C + signal (zero marker)	
	7	GND	Ground	
	8	SHIELD	Shield	
	9	AGND	Analog ground	
	10	+5V-ENC	+5V encoder supply (max 150 mA)	

Table 1.5

1.6. Resolver connector – X6

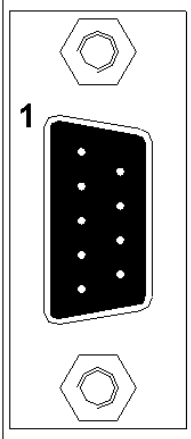
		Resolver connector X6		
		Pin	Ref.	Description
	1	THERM2	Motor thermal protection (2)	
	2	N.C.	Not connected	
	3	+ REFRES	+ resolver reference	
	4	+ SINRES	+ resolver sinus signal	
	5	+ COSRES	+ resolver cosinus signal	
	6	THERM1	Motor thermal protection (1)	
	7	- REFRES	- resolver reference	
	8	- SINRES	- resolver sinus signal	
	9	- COSRES	- resolver cosinus signal	

Table 1.6

1.7. Fieldbus connector – X4 (CAN VERSION ONLY)

CAN connector X4		
Pin	Ref.	Description
1	N.C.	Not connected
2	CANL	Can Bus Low
3	N.C.	Not connected
4	RX232	RS232 RX signal
5	N.C.	Not connected
6	GND	RS232 ground
7	CANH	Can Bus High
8	TX232	RS232 TX signal
9	N.C.	Not connected

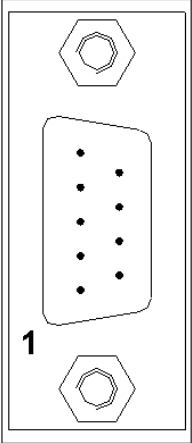


Table 1.7

1.8. Fieldbus connector – X4 (PROFIBUS VERSION ONLY)

Profibus connector X4		
Pin	Ref.	Description
1	SHIELD	Shield
2	RX232	RS232 RX signal
3	RxD/TxD-P	Receive/Transmit Data – plus
4	N.C.	Not connected
5	DGND	Data ground
6	VP	Supply voltage – plus (+5V iso)
7	TX232	RS232 TX signal
8	RxD/TxD-N	Receive/Transmit Data – minus
9	GND	RS232 ground

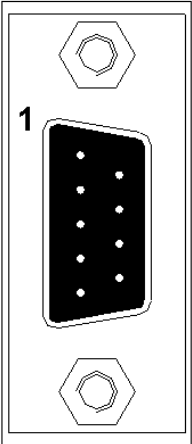


Table 1.8

1.9. RS232 Cables

Used to connect a PC RS232 serial line.

- RS232:**
 - maximum cable length: 10 meters;
 - max capacitance: 2500 pF;
 - shielded cable.

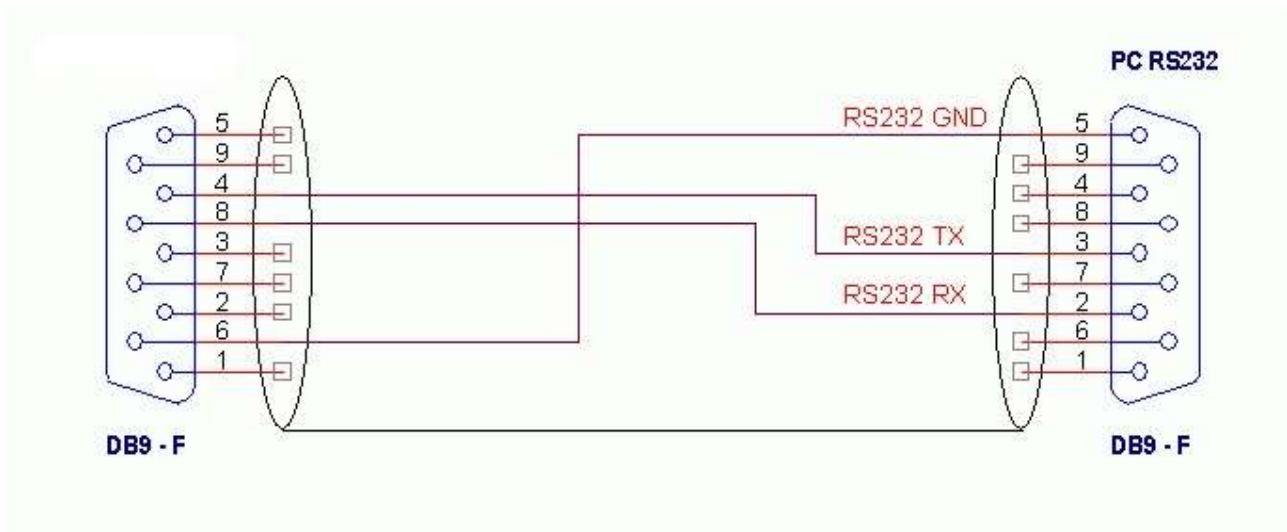


Fig. 1.9.1 – VFD400C (CAN) RS232 cable

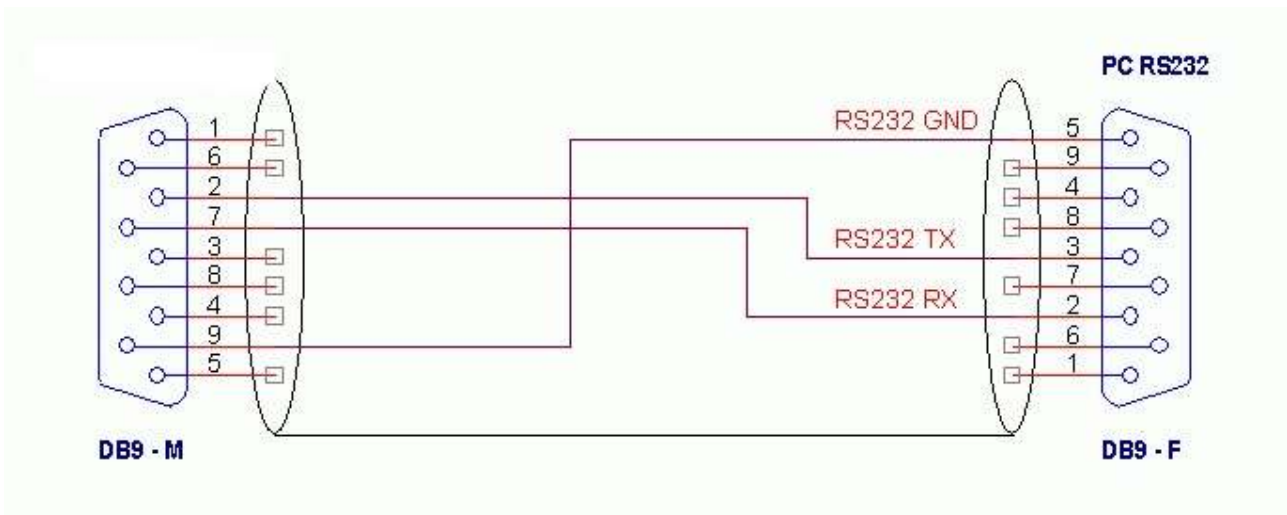


Fig. 1.9.2 – VFD400P (PROFIBUS) RS232 cable

1.10. Table Of Conductor Cross-Sections

Function	Connectors	VFD400Fx03	VFD400Fx05 VFD400Fx07 VFD400Fx10
Clamp resistor cable	X1	1.5 mm ²	
Motor cable	X1	1.5 mm ²	2.5 mm ²
Power supply cable	X1	1.5 mm ²	2.5 mm ²
Brake cable, brake supply and services	X2, X3	0.5 ÷ 1 mm ²	
Resolver cable	X6	0.14 ÷ 0.22 mm ²	
Control unit signal cable	X5, X7	0.14 mm ²	

Table 1.10

2. Mechanical Installation

Use the brackets and the screws supplied with the converter for mounting VFD300.

- fix the bottom bracket to the mounting panel with two screws;
- place the converter on the bottom bracket;
- place and fix with a screw the top bracket.

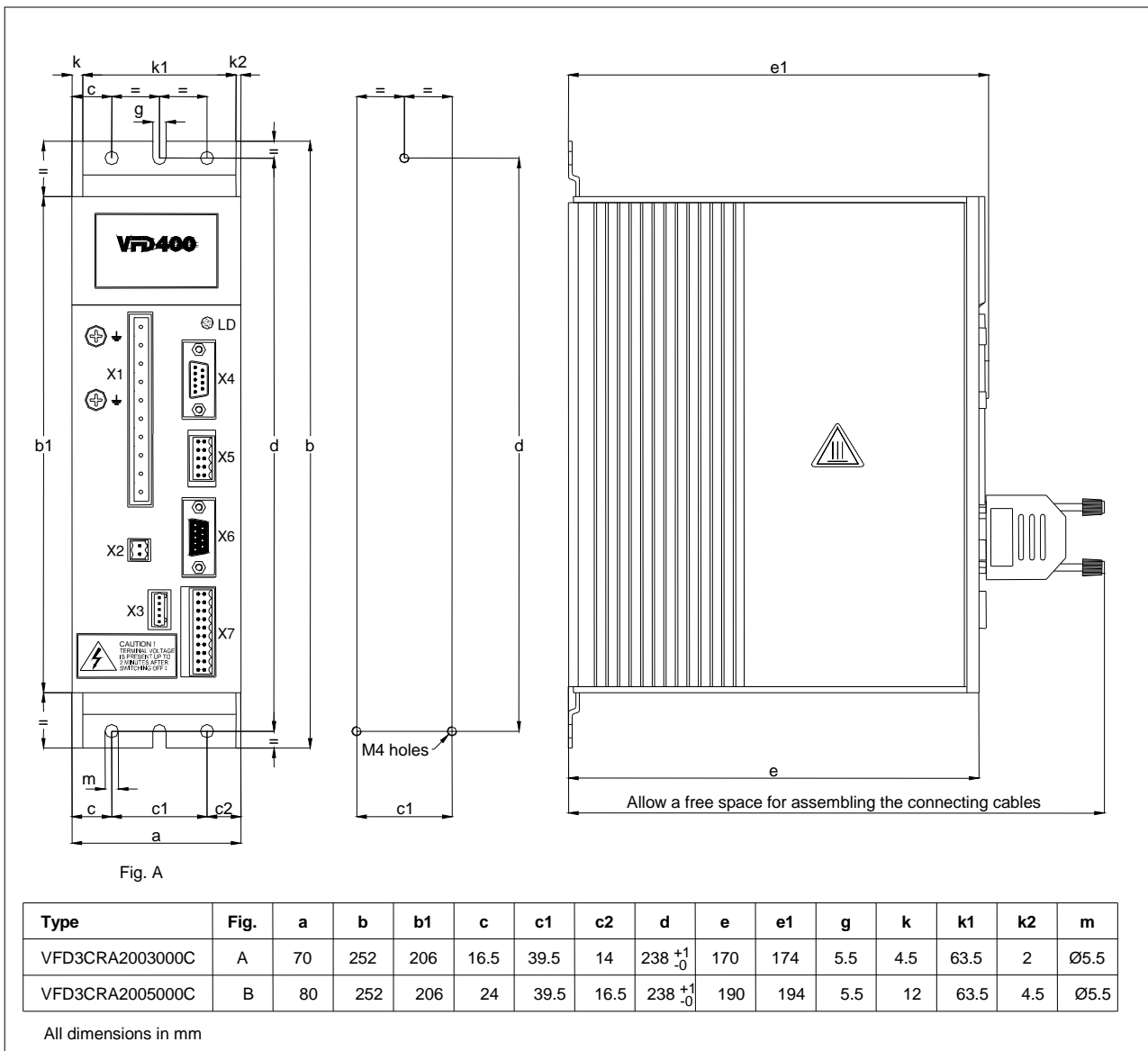


Fig. 2.1 – VFD400 FC 03 CAN version
VFD400 FC 05 CAN version

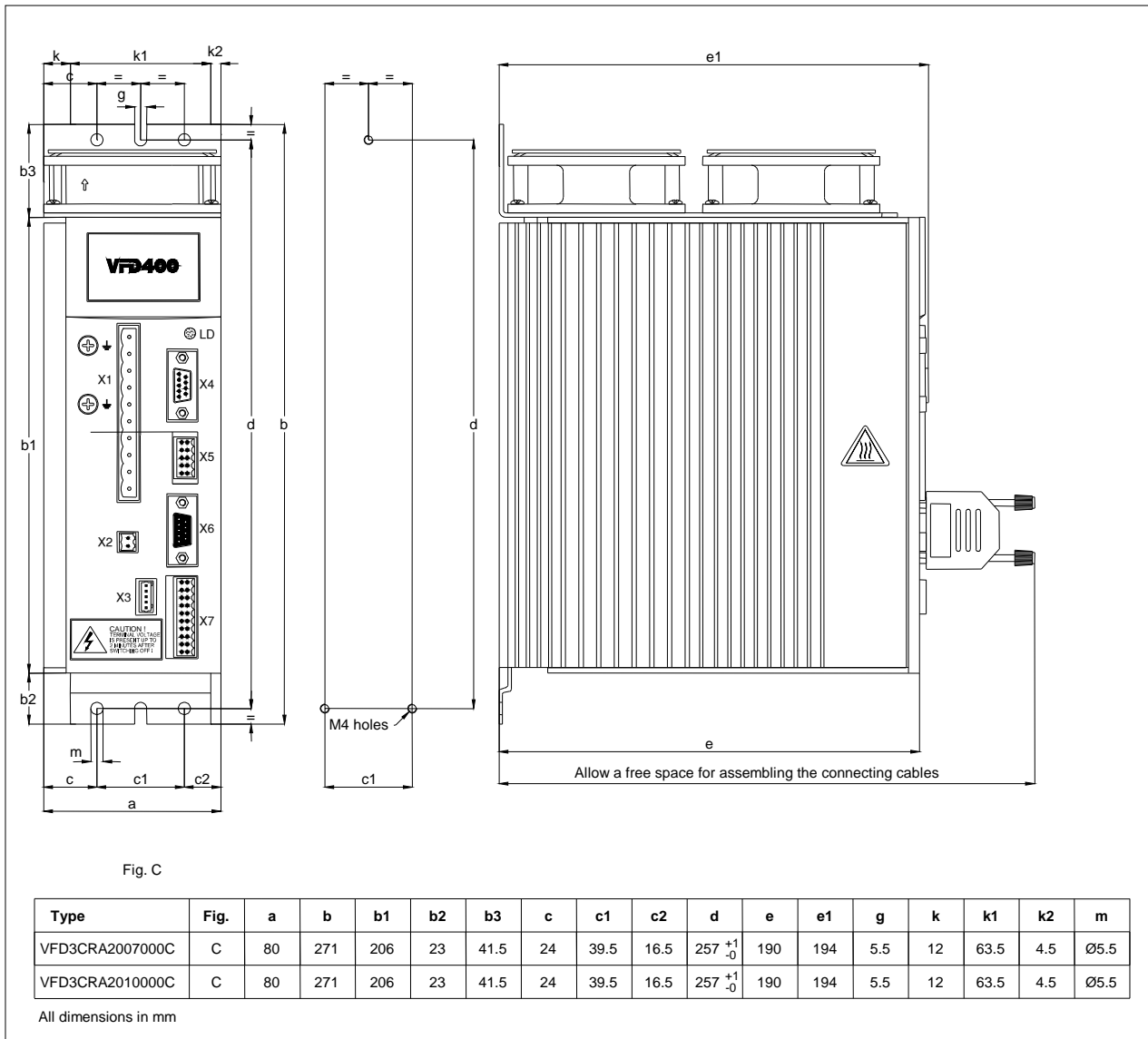


Fig. 2.2 – VFD400 FC 07 CAN version
VFD400 FC 10 CAN version

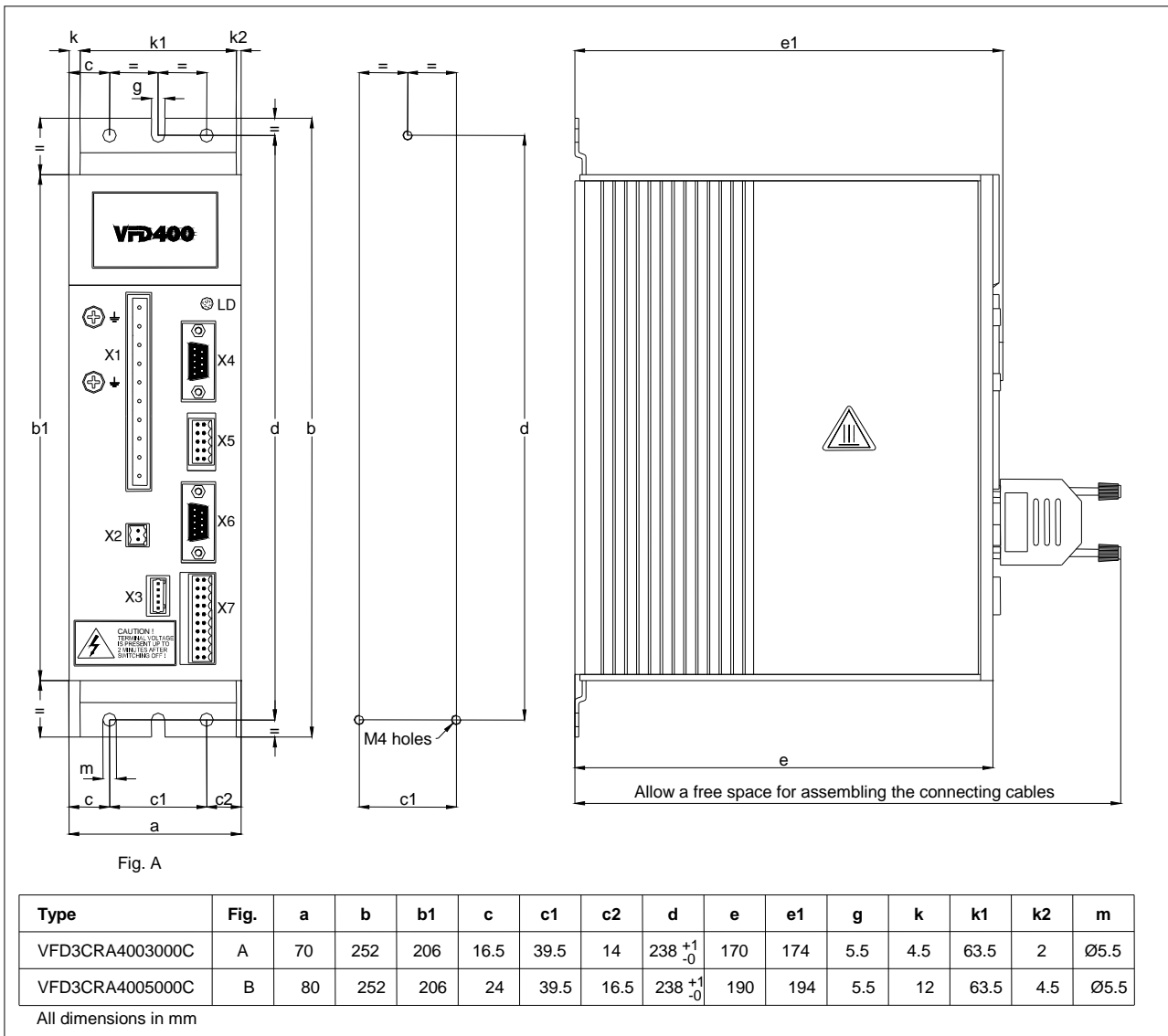


Fig. 2.3 – VFD400 FP 03 PROFIBUS version
VFD400 FP 05 PROFIBUS version

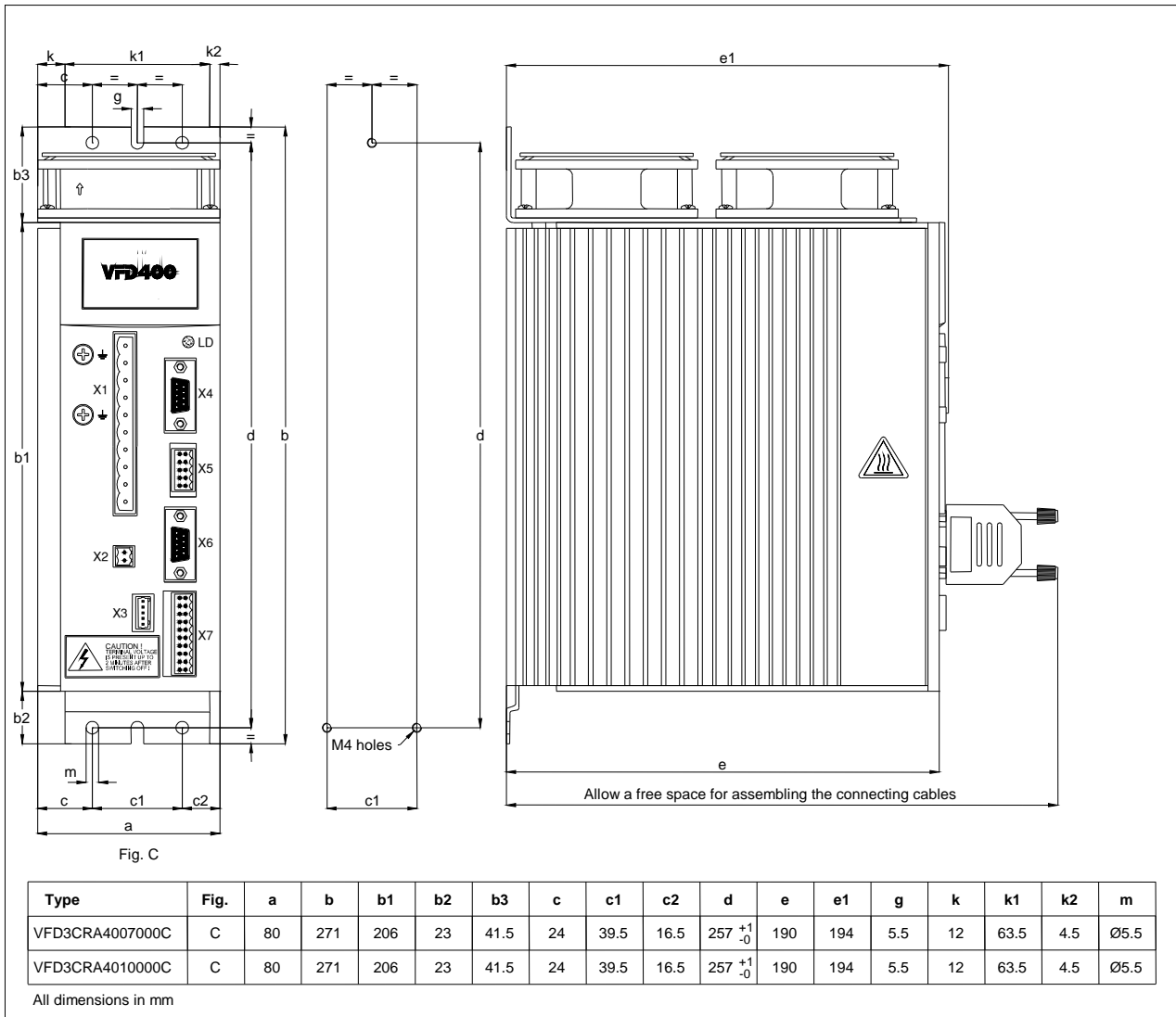


Fig. 2.4 – VFD400 FP 07 PROFIBUS version
VFD400 FP 10 PROFIBUS version

Appendix A – Single Fase Operation

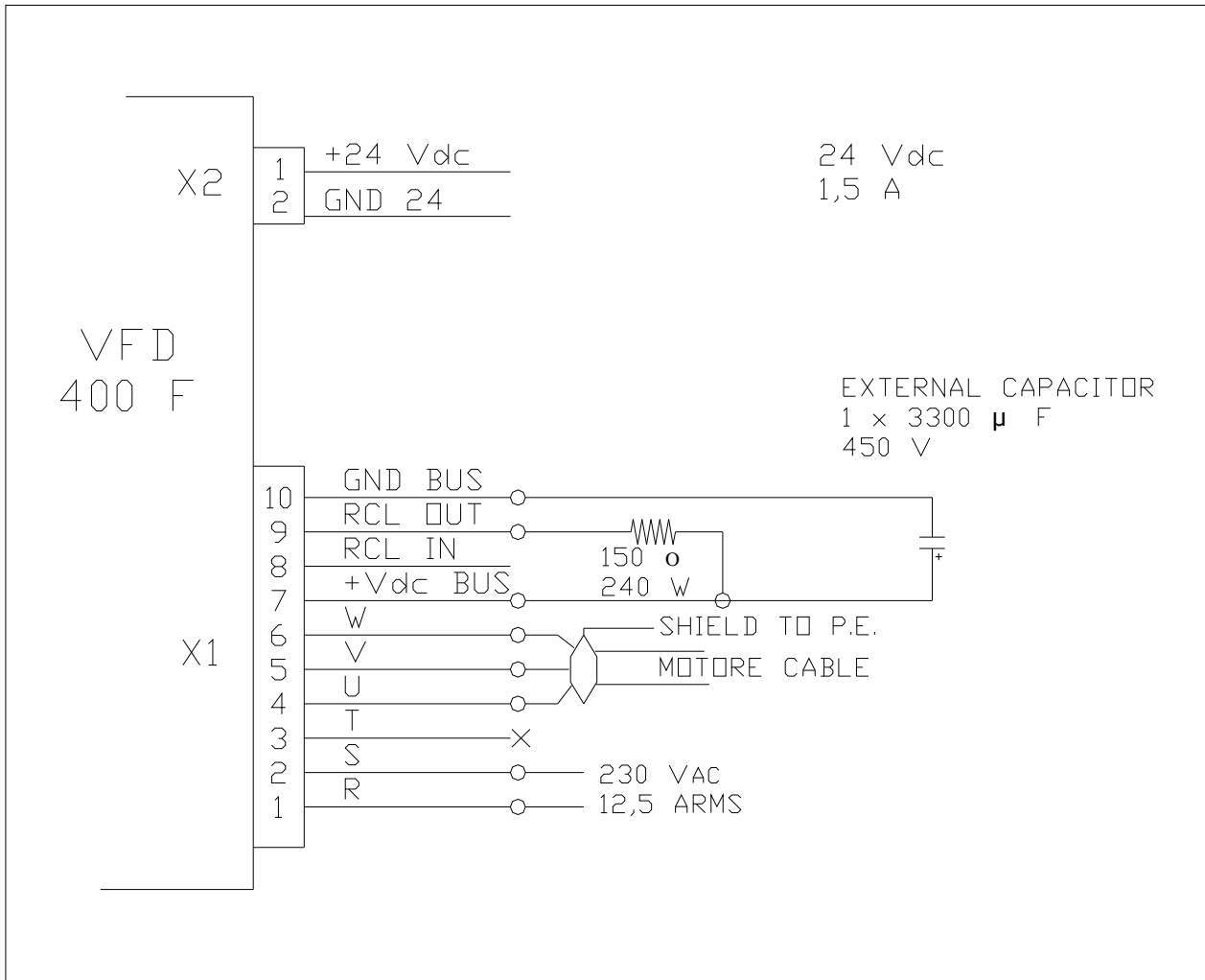


Figure A1 – Connection for VFD 400 F in single phase operation